Digital display

Operating instructions

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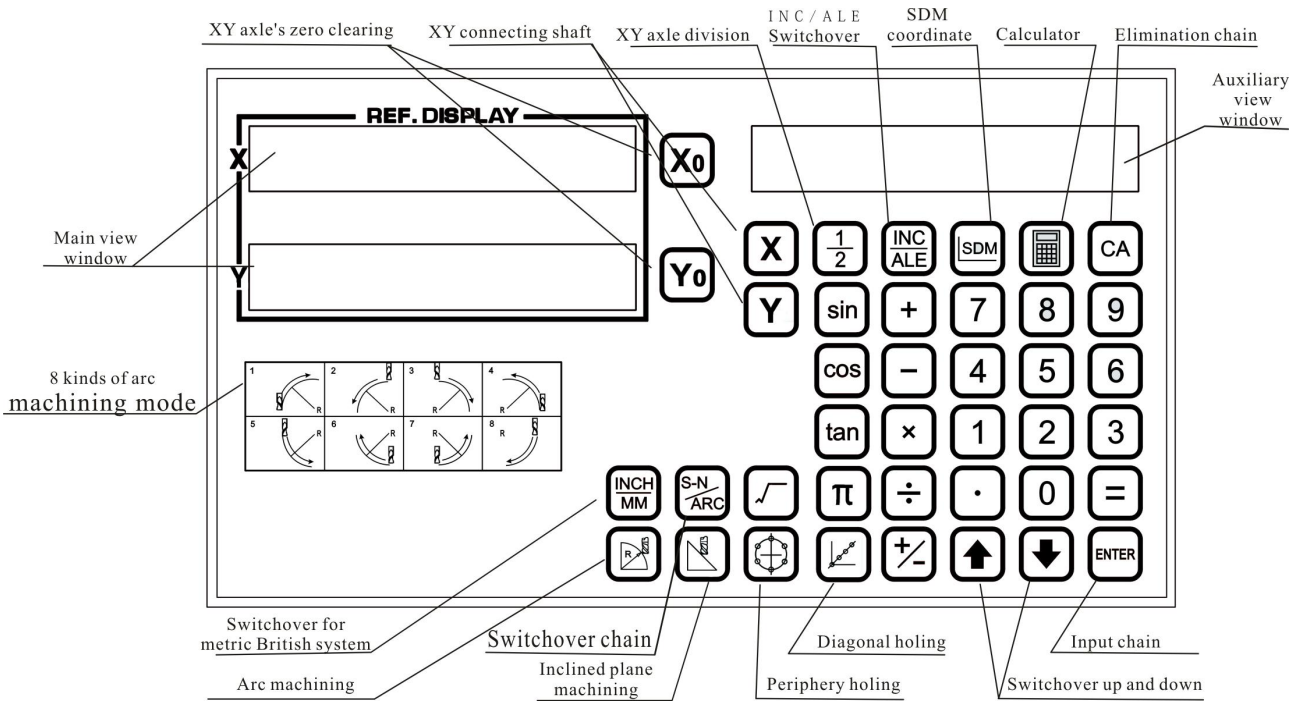
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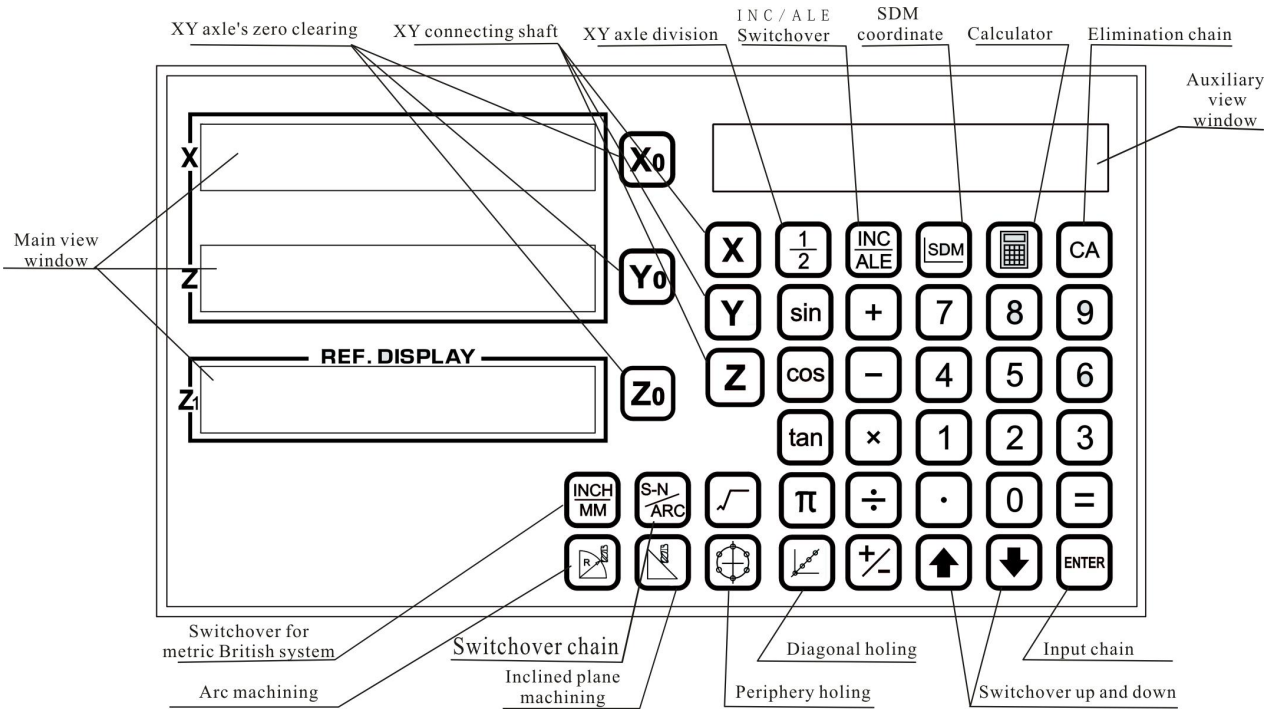
XY axle's zero clearing
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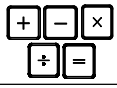
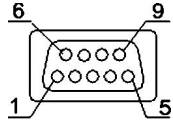
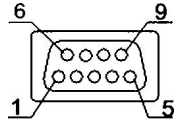
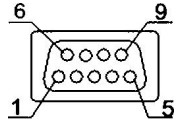
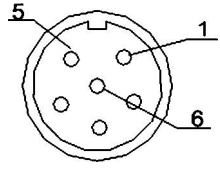
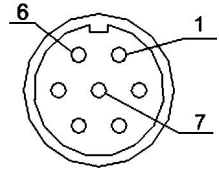
1.1 Key Description of Digital Readout

Symbol of Key	Function description	XH-2 X-2	XH-3 X-3	XH-3E X-3E
X0 Y0 Zo	Reset key of number axis	No Zo		
X Y Z	Option key of number axis and preset number	No Z		
INCH MM	Shift key between metric / imperial			
1/2	Key for dividing center of axis display value			
INC ALE	Shift key between ALE/INC (absolute/relative)			
SDM	Option key of SDM coordinate (offer 200 sets of coordinates and use them to preset working points)			
0 ~ 9	Numeric key			
.	Decimal point input key			
+/-	Symbol input key			
ENTER	Key of confirming operation			
	Calculator key (enter or exit calculator state)			
AC	Reset key of calculator			
S-N ARC	Function shift key (in state of calculator, calculate anti-trigonometric function. In display state of SDM coordinate, enter the state of input of SDM coordinate)			
sin COS tan	Trigonometric function key (calculate trigonometric function and anti-trigonometric function)			

Symbol of Key	Function description	XH-2 X-2	XH-3 X-3	XH-3E X-3E
	Operation key(add, subtract, multiply and divide)			
	Square or radication key			
	Pi key			
	EDM process key	No 	No 	
	Key for drilling holes on circumference (process uniform holes on arc)			
	Key for drilling holes on oblique line (process uniform holes on oblique line)			
	Arc processing key (process a plane some workpiece into arc surface)			No 
	Inclined plane machining key (machine a plane of some workpiece into inclined plane)			No 
	Arrow keys			

1.2 Interface Description of Digital Readout

No.	Interface Type	Schematic Diagram of Interface	Pin	Signal
1.	9-core TTL interface		1/3/5	Null
			2	0V
			4	Error signal
			6.	A
			7	+5V
			8	B:
			9	R
2.	9-core EIA-422-A signal interface		1	-A
			2	0V
			3	-B
			4	Error signal
			5	-R
			6	A
			7	+5V
			8	B:
			9	R
3.	EDM signal interface		1/4/5/ 7/8/9	Null
			2	Common terminal
			3	Normal close
			6	Normal open
4.	6-core signal interface		1	0V
			2	A
			3	B:
			4	R
			5	+5V
			6	PE earth wire
5.	7-core signal interface		1	0V
			2	Null
			3	A
			4	B:
			5	+5V
			6	R
			7	PE earth wire

Chapter II Basic Operation Instructions

2.1 Starting up

Function introduction:

Turn on power switch and digital readout enters normal display status.

When starting up, press ENTER key and enter internal setting.

The digital readout memory function in case of power-down and can memorize the current coordinate position, coordinate mode of ALE/INC/SDM and metric and imperial measurement mode and can restore the three kinds of information to status before power-down to avoid resetting parameters by the operators.

2.2 Reset

Function introduction:

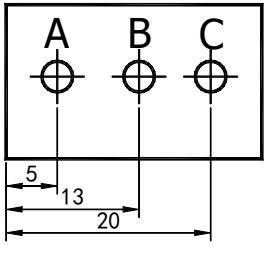
When digital readout is in normal display status, coordinate display values can be reset at any point.

- After resetting of ALE, INC display value are reset at the same time.
- After resetting of INC, ALE and SDM display values are not affected.
- If grating ruler does not move after resetting, press reset key at the same axis and cancel the previous resetting and restore data before resetting.

2.3 Preset Value of Some Axis

Function introduction:

When digital readout is in normal display status, display value of some axis on current position can be set.



Example: Machine hole A and hole B on X-axis.

Operating steps:

1. For example, in the above figure, position of work piece is moved after hole A is machined.
2. Hole B needs to be machined currently. Point tool to hole A, press [X] → [5] → [ENTER] and input value (when inputting the value, if input error occurs, please press [AC] key to cancel incorrect value).
3. Move the tool to position displaying 27 and machine point B.
   Note: when under SDM coordinate system:
   Set number-setting direction of SDM as "0" and the display value is equal to input value.
   Set number-setting direction of SDM as "1" and the display value is equal to opposite number o the input value.
   Set number-setting of SDM in the internal setting.

2.4 Conversion of Metric/Imperial

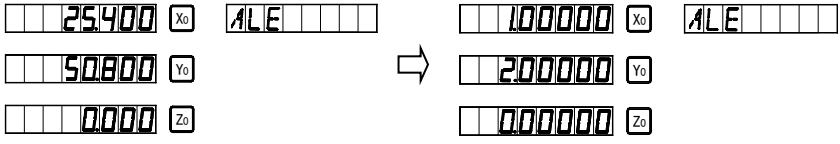
Function introduction:

Display size unit is switched between "mm" (metric) and "inch" (imperial). Both imperial parts and metric parts can be processed.

Example: as shown in the figure, it used to be displayed in metric unit but now it shall be displayed in imperial unit.

Operating steps:

Press [INCH/MM] key to switch metric and imperial.

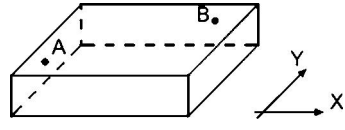


When number axis is in encoder status, press key and the switch is invalid.

2.5 Automatic Center Division

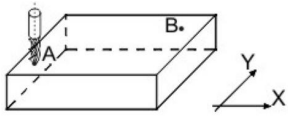
Function introduction: Find central position between two points.

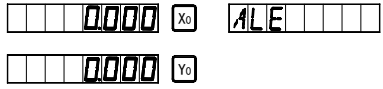
Example: Find central position between point A and point B on a rectangular workpiece, as shown in figure.



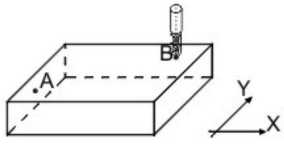
Operating steps:

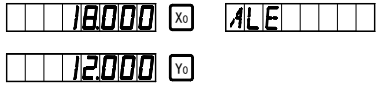
1. Move the tool to point it to point A, press [X0] key and [Y0] key to reset count values on X-axis and Y-axis;



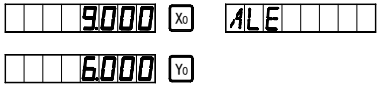


2. Move the tool to point it to point B;

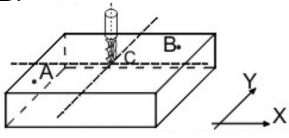


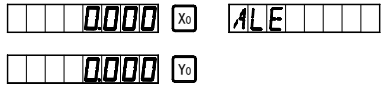


3. Press [1/2] keys on X-axis and Y-axis and divide central of count values on the two axises.



4. Move the tool to find a point on which display values of X-axis and Y-axis are zero and the point is central position of point A and point B.





Note: When axis is set as rotary encoder, center division is invalid to the axis.

2.6 Absolute/Relative/200 Sets of User Coordinate Systems

Function introduction:

Digital readouts provide three coordinate display modes, including absolute coordinate system (ALE), relative coordinate system (INC) and 200 sets of user coordinate system (SDM 001 —SDM 200).

1: Workpiece zero is set on origin of ALE coordinate;
2: When changing origin of ALE, relative distance from SDM origin and ALE origin is not changed;

I: Switch of Three Coordinates of ALE/INC/SDM

Switch of coordinate system can be carried out only in normal display status.

Press [INC/ALE] to switch between ALE and INC:

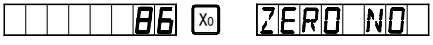
- INC displayed in sub-window: Indicate status of INC.
- ALE displayed in sub-window: Indicate ALE status (not in SDM status at this time).Press [SDM] key to switch to SDM coordinate status.

II: Input new group number value of SDM under SDM coordinate system

Operating steps:

1: Press [SDM] key to enter SDM choosing coordinate, as shown in figure below, indicate that new group number of SDM can be input at present.

2: Input group number, for example, input86.



3: Press [ENTER] key to confirm input, the sub-window stops flashing, group number of SDM is changed into 86.

III: Selection of Coordinate

Press [⇧] key or [⇩] key to input any coordinate.

2.7 De-wobbling Function of Grinder

In the course of grinding, wobbling of the grinder makes display of digital readout change repeatedly and fastly, which cause visual discomfort to operators.The digital readout has function of digital filtering, namely so-called "de-wobbling function", which makes display of digital readout not change rapidly and cause visual confusion when the grinder is wobbling.

Operating steps: Continuously press [TT] key for 5 times under ALE coordinate system, promote line displays "SHIFT_ON" and the de-wobbling function is started. When the function is started, press [TT] key

for 1 time and close the function and the promote line displays "SHIFT_OFF".

2.8 Lathe Function

When machining workpiece, two axles are installed on some apparatuses in the same direction, position of apparatus is the sum of displacements of two axles, a mode like this is called lathe mode.

When lathe mode is 0, close lathe function;

When lathe mode is 1, display value of X-axis = display value of X-axis + display value of Y-axis;

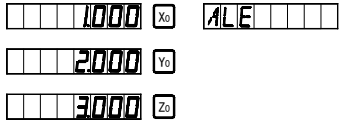
When lathe mode is 2, display value of X-axis = display value of X-axis + display value of Z-axis;

When lathe mode is 3, display value of Y-axis = display value of Y-axis + display value of Z-axis;

Operating steps:

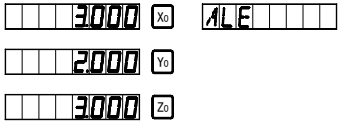
1: Lathe mode is set in internal function set (refer to chapter of internal parameter set);

A Normal display



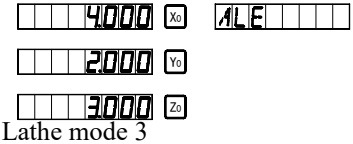
B Lathe mode 1

Display value of X-axis= normal display value of X-axis + normal display value of Y-axis;



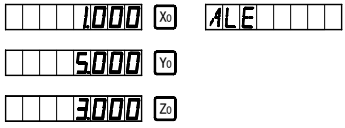
C Lathe mode 2

Display value of X-axis= normal display value of X-axis + normal display value of Z-axis;



D Lathe mode 3

Display value of Y-axis= normal display value of Y-axis + normal display value of Z-axis;



Chapter III 200 Sets of Auxiliary Zero Point Functions

Digital readouts provides three kinds of coordinates: absolute coordinate system (ALE), relative coordinate system (INC) and 200 sets of user coordinate system (SDM 001—SDM 200)。 200 sets of user coordinate system can be used as auxiliary zero point during machining.

ALE is absolute coordinate system which is established when beginning to machine workpiece. 200 sets of user coordinate system is relative to the definition of absolute coordinate system, when ALE coordinate of the user is changed, SDM zero point shall be changed for corresponding distance.

When machining workpiece, only one benchmark zero point always cannot meet demands of customers, several sets of benchmark zero point can be provided for users by SDM coordinates added currently. Each zero point is equivalent to a coordinate origin defined by users and current auxiliary zero point of SDM coordinate system are used as benchmark by each point in the coordinate system, machining used for special function can be carried out in this relatively independently coordinate system.

When machining workpiece shown in the figure, set origin of ALE on 0, the center of workpiece and the other four auxiliary zero points are A, B, C and D shown in the figure;

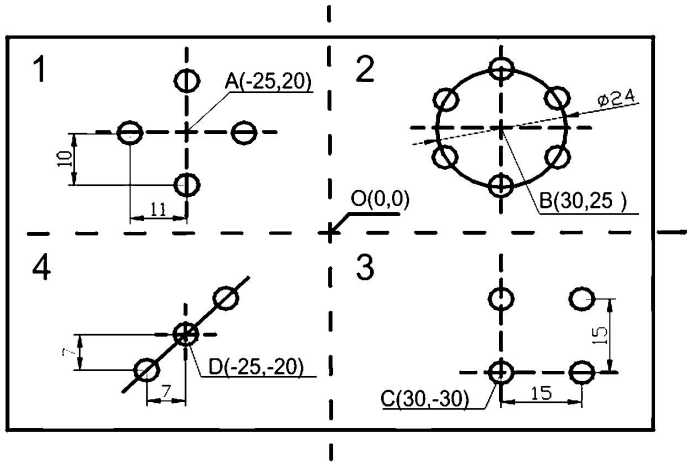


Diagram 3.1

Auxiliary zero points can be set in this means:

1) Coordinate input;

2) Reset when in place.

3.1 Directly Input Zero point of SDM

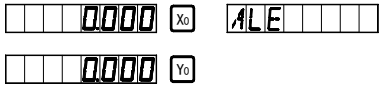
Do not move the equipment and preset user coordinate origin according to user's size of processing drawing, and the user coordinate origin can be set precisely and rapidly.

Under the user coordinate system (SDM coordinate), input auxiliary zero point coordinate in the position of zero point of absolute coordinate and display coordinate position of absolute coordinate zero point (Point 0) under the auxiliary zero point coordinate. From relative coordinate system, Point 0 is at (25,-20) of point A, at (-30,-25) of point B, at (-30,30) of point C and at (25 ,20) of point D, which are exactly opposite numbers of position of each point in the absolute coordinate. If relative zero point is input in point outside the absolute coordinate system, position of the point in the user coordinate is displayed. If user coordinate auxiliary zero point of point B is input in point A, display value of point B is (-55,-5). So a minus is added and opposite number will be automatically chosen when presetting value in SDM coordinate system. Therefore, coordinate value of processing workpiece can be directly used for input.

Operating steps:

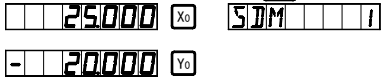
1. In the absolute coordinate system (ALE), move the equipment and point the tool to the center, Point 0, as shown in Fig. 3.1.

   Press [X0] [Y0] key to reset data of X-axis and Y-axis and confirm zero point of the absolute coordinate.



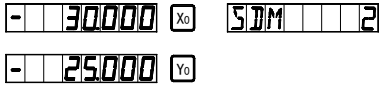
2. Press [SDM] key to enter user coordinate system, enter SDM 1 coordinate and set position of point A, input coordinate value of point A (-25,20), if any error is found during input, press [AC] key to cancel input.

   Press [X] → [2] → [5] → [+/-] → [ENTER]
   Press [Y] → [2] → [0] → [ENTER]



3. Press [⇧] key to enter SDM 2 coordinate system, set position of point B and input coordinate value of point B, (30,25).

   Press [X] → [3] → [0] → [ENTER]
   Press [Y] → [2] → [5] → [ENTER]

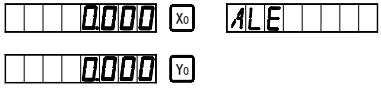


4. Set auxiliary zero points of point C and D according to Step 2.
5. Workpiece can be processed in corresponding auxiliary zero point coordinate system after the auxiliary zeropoint is set, as shown in the figure, drill holes at equal interval on the arc in auxiliary zero point coordinate system of point B.

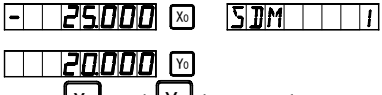
6. Press [SDM] or [INC ALE] key to exit SDM coordinate system after completion of processing.

3.2 Reset When in Place

1. Move the tool to absolute coordinate.
2. In the absolute coordinate (ALE), as shown in Fig. 3.1, move the tool to Point 0, press [X0] and [Y0] keys to reset data of X-axis and Y-axis and confirm zero point of absolute coordinate (if users want to re-machine workpiece, users can clear the SDM coordinate system and reset it).

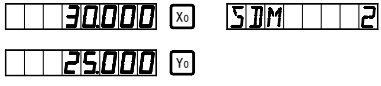


3. Press [SDM] key to enter SDM 1 coordinate, set position of point A and move the tool to point A and the digital readout will display

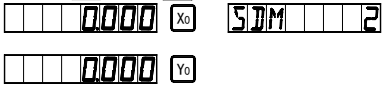


Press [X0] and [Y0] keys and SDM coordinate of point A is set successfully.

4. Press [⇧] key to enter SDM 2 coordinate, set position of point B, move the tool to point B and the digital readout will display.



Press [X0] and [Y0] keys and SDM coordinate of B is set successfully.



5. Auxiliary zero points of point C and D can be set according to Step 3.
6. After completion of machining, press [SDM] or [INC ALE] keys to exit SDM coordinate system.
7. When processing workpieces with same dimension, SDM zero point can be automatically set only after ALE zeropoint is set behind Point 0. As shown in Fig. 3.1, enter SDM 1 coordinate system, the benchmark of SDM 1 coordinate system is the position with display value of 0 on X-axis and Y-axis and users can machine workpieces on this basis.

When machining in batches, the user coordinate systems can save a large amount of time to set user coordinate zero point so that processing efficiency is improved.

Note:

- When using user coordinate, reset in corresponding user coordinate system and that is to reset auxiliary zero point, position which is cleared is the origin of the new user coordinate, the old coordinate origin is replaced by the new coordinate origin.
- When using user coordinate, division of center in corresponding user coordinate is resetting auxiliary zero point as well. New coordinate origin is midpoint of the coordinate, the old coordinate origin is replaced by the new coordinate origin.
- Press  key for 10 times to clear the SDM coordinate, after the clearing, 200 sets of coordinate is consistent with ALE coordinate.
- When resetting SDM coordinate, firstly clear data of X-axis and Y-axis in ALE coordinate system and set absolute coordinate zero point, otherwise the SDM coordinate is set incorrectly.

Chapter IV Special Functions

Except for testing and positioning, Digital display meter also provide following special machining functions :

Diagonal holing(XH-2,XH-3,XH-3E,X-2,X-3,X-3E)

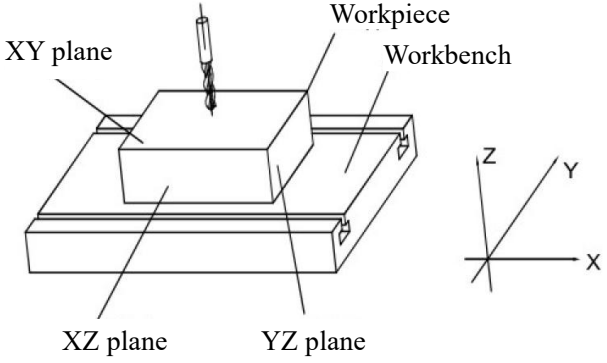
Periphery holing(XH-2,XH-3,XH-3E,X-2,X-3,X-3E)

Inclined plane machining(XH-2,XH-3,X-2,X-3)

Arc machining(XH-2,XH-3,X-2,X-3)

Electrical discharging machining (XH-3E,X-3E)

User's original equipment may be further utilized effectively While utilizing the special function of digital display meter, firstly recognize the coordinate system.



As shown in Diagram, within the horizontal plane, it is Axle X on the direction parallel to operator, and it is Axle Y on the direction parallel to operator. The direction vertical to horizontal plane is Axle Z. The direction pointed by arrow is forward direction of coordinate, the user may also change the forward counting direction in the setting of internal parameters based on own use habit.

4.1 Diagonal holing

Function introduction:

Digital display meter provides the diagonal's equivalent holing function. to be used for machining the center of circle on XY plane on identical straight line and on the uniformly distributed hole location. The operator is only required to input following parameters:

LINE DIS: length of diagonal(distance between center of circle for starting hole to center of circle for ending hole)

LINE ANG:angle of diagonal (Included angle between diagonal and forward direction of Axle X)

HOLE NUM:quantity of hole (**quantity of hole must be >1**)

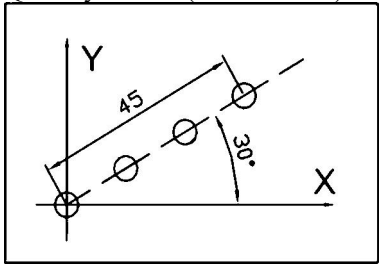
After inputting the parameters, the digital display meter may automatically calculate out the location of each hole on the diagonal, the operator presses " ⇧ or ⇩ " key, select the hole No, and then, the lathe tool moves onto the location Axle X and Axle Y for display value is 0.000, this is this hole's location.

Example: for workpieces as shown in the diagram, the parameter setting is as follows:

Length of diagonal (LINE DIS):45mm

Angle of diagonal (LINE ANG):30°

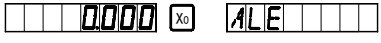
Quantity of hole (HOLE NUM):4



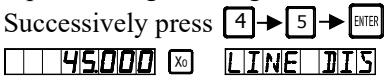
Operating steps:

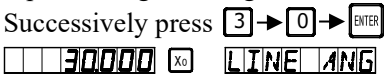
1. During normal display status, the metric/British system is regulated up to metric system

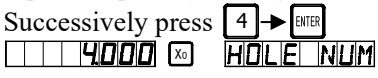
   Move the machine tool, the peak of lathe tool aligns the center of first hole, Axle X zero clearing, Axle Y zero clearing.

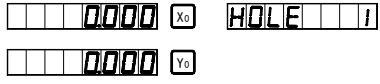


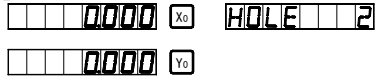
2. Press [⌐] , enter into the diagonal holing function;
   If the parameters input previously are not required to be changed, press [⇩] key and directly start the diagonal holing.

3. Input the diagonal length
   Successively press [4] → [5] → [ENTER]
   

4. Input the angle of diagonal
   Successively press [3] → [0] → [ENTER]
   

5. Input the quantity of diagonal holing
   Successively press [4] → [ENTER]
   

6. Display no " HOLE 1 " on the auxiliary view window
   Move the machine tool onto the location when Window X and Window Y all display 0, punching may be conducted on this point;
   

7. After completing the machining for first hole, press [⇩] the auxiliary view window and display" HOLE 2".
   Move the machine tool onto the location when Window X and Window Y all display 0, second punching may be conducted on this point;
   

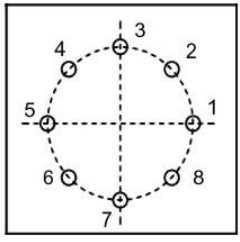
Note: Press [⇧] or [⇩] key and switch over on each hole.

8. Machine the third hole to fourth hole according to identical step.
9. After completing the machining, press [⌐] , return to normal display status.

4.2 Periphery holing

Function introduction:

Digital display meter provides the periphery's equivalent division hole function and may be used for machining the uniformly distributed hole on XY plane arc.



After entering into periphery holing, the information window shall prompt various parameters required to be defined towards user.

RADIUS: arc radius (arc radius required to be divided equivalently)

ST_ANGLE: starting angle (angle that the first hole center locates on the arc)

ENDANGLE: ending angle (angle that the last hole center locates on the arc)

HOLE_NUM: quantity of holing(**quantity of hole must be >1**)

DIRECT: angle direction

(Note: when the starting angle is equal to terminating angle, show the uniform holing on the whole periphery.)

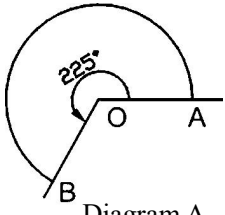


Diagram A

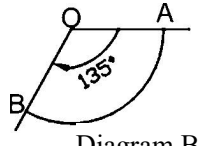


Diagram B

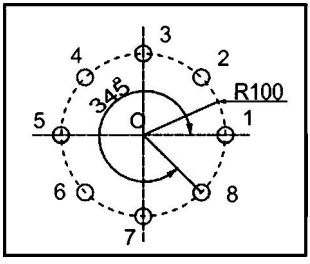
On any plane of XY, ZX and YZ, the angle direction is divided as anti-clockwise direction and clockwise direction, and the angle direction should be inputted while machining;

When the direction is set as "0", represent that the direction from starting angle to ending angle is anti-clockwise direction; for arc as shown in Diagram A, it is anti-clockwise direction 225° from Point A to Point B.

When the direction is set as “1”, represent that the direction from starting angle to ending angle is clockwise direction; For arc as shown in Diagram B, it is clockwise direction 135° from Point A to Point B.

After inputting above-said parameters, the digital display meter automatically counts the location of each equivalently divided hole, and the location of each hole is set as 0. The user is only required to press ⇧ or ⇩ key and select the hole location required to be machined as well as move the tool onto the location where the display value on Axle X and Axle Y is 0 wholly, the machining may be conducted.

Example : Hole on the parts periphery as shown in Machining Diagram (E)



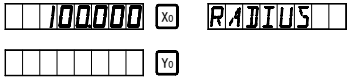
Radius (RADIUS): 100mm
Starting angle (ST_ANGLE): 0°
Ending angle (ENDANGLE): 315°
Quantity of hole (HOLE NUM): 8 (quantity of machining hole must be >1)
Angle direction (DIRECT): 0

Operating steps:

1. While being on normal display status, the displayed dimension unit is regulated up to metric system. Move the machine tool, set the coordinate origin on O point.
2. Press ⊕ , enter into the periphery holing function
   If the parameters input previously are not required to be changed, press key and directly start the periphery holing.

3. Input the radius

   Successively press [1] → [0] → [0] → [ENTER]

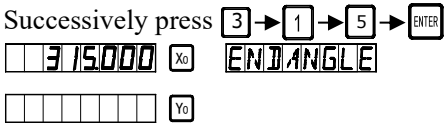
4. Input the starting angle

   Successively press [0] → [ENTER]

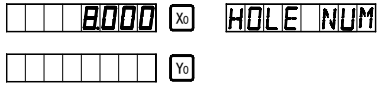
5. Input the ending angle

   Successively press [3] → [1] → [5] → [ENTER]

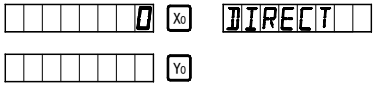
6. Input the holing quantity

   Successively press [8] → [ENTER]

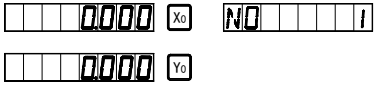
7. Input the angle direction

   Successively input [0] → [ENTER] ,enter into machining status;

8. Show“ NO 1 ” on the auxiliary view window ;

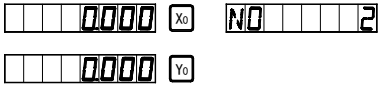
   Move the machine tool onto the location when Window X and Window Y all display 0, punching may be conducted on this point;

9. After completing the machining for first hole, press [⇩] and display “ NO 2” on auxiliary view window ;

   Move the machine tool onto the location when Window X and Window Y all display 0, second punching may be conducted on this point;

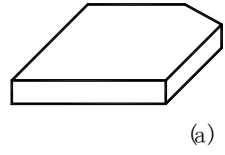
Note: Press ⇧ or ⇩ key and switch over the hole location required to be machined on each hole.



10. Machine the third hole to eighth hole according to identical step.
11. After completing the machining, press ⊕, return to normal display status.

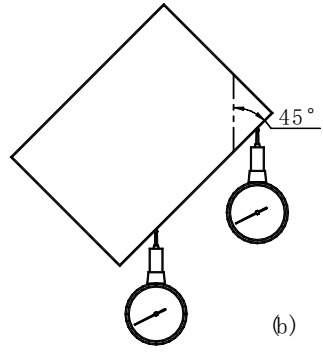
4.3 Bevel(inclination)machining

During machining, when the greater bevel is required to be machined, the bevel machining function is utilized easily and freely.



I. Inclination calibration for bevel :

While machining plane locates on XY plane as shown in Diagram (a) Shown parts must be calibrated firstly prior to bevel machining. For workpieces' inclination angle, the bevel machining function plays the function of bevel's inclination calibration



Steps on bevel's inclination calibration:

Firstly according to required inclination angle, roughly place the workpieces onto the console.

1. Press ⊿ , enter into bevel machining function.
2. Select the machining plane—XY plane
3. Input the bevel angle(ANGLE)
4. Move the console and enable that the measuring tool installed and clamped on the milling machine lightly touches the calibrated bevel.

   Adjust up to zero setting and move any distance for console on Axle X direction.

   any distance for console on Axle X direction.
5. Press Y key, press the display, move and display as zero on Axle Y direction

6. Adjust the angle of workpiece and enable that the workpieces touch the measuring tool and are up to zero.

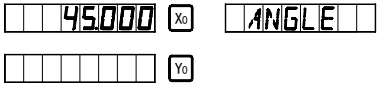
For instance: calibrate the inclination of workpieces up to 45°as shown in Diagram (b)

1) According to rough 45°， properly arrange the workpieces on the console.
   Press [▽]

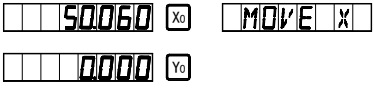
2) Select the machining plane .
   Press [△] or [▽]， select XY plane
   Press

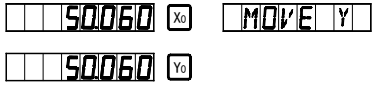
3) Input the bevel angle.
   Press [4] → [5] → [ENTER]

4) Move the console on the direction of Axle X, the measuring tools lightly touch the workpieces, after zero setting, move any location on Axle X direction.

5) Display the moving distance on the direction of Axle Y
   Press [Y]

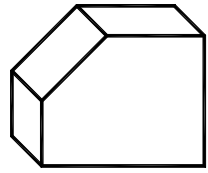
   

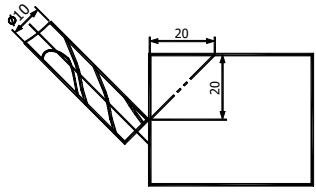
6) Move the console on the direction of Axle Y and adjust the workpiece angle so as to enable that the calibrated bevel touches the measuring tool until zero.

7) Move the console until zero displays on Axle Y.
   Press [▽]， quit from the bevel machining function randomly.

II. Bevel machining

When machining plane locates on XZ plane or YZ plane, the bevel machining function, the bevel machining function can gradually indicate operator's machining bevel.





Use step for bevel machining function

When the machining plane locates on XZ plane or YZ plane,

Firstly calibrate the inclination angle of main spindle head on the machine tool and implement the tool setting

Press [▽] enter into bevel machining

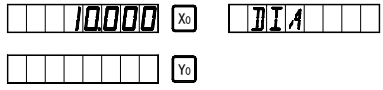
1. Select the machining plane XZ or YZ.
2. Input the cutter diameter (DIA)
3. Input the starting point (ST XZ/YZ)
4. Input the ending point (ED XZ/YZ)
5. Press [▽] quit from bevel machining function at any time.

Refer to example, please!:

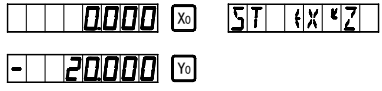
1) Calibrate the inclined angle and implement the tool setting
   Press [▽]

2) Select the machining plane .
   Press [⇧] or [⇩], select XZ plane, press [ENTER]

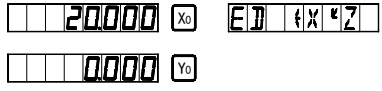
3) Input the cutter diameter
   Press [1] → [0] → [ENTER]



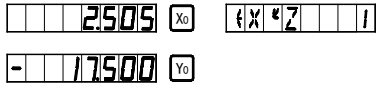
4) Input the coordinate of starting point
   Press [Y] → [2] → [0] → [+/-] → [ENTER]
   [X] → [0] → [ENTER]



5) Input the coordinate of ending point
   Press [X] → [2] → [0] → [ENTER]
   [Y] → [0] → [ENTER]



6) Enter into machining status.



7) Press ⇧ or ⇩, display the location of each machining point, move the machine tool onto axle and display as zero, namely, location of each point on the bevel.

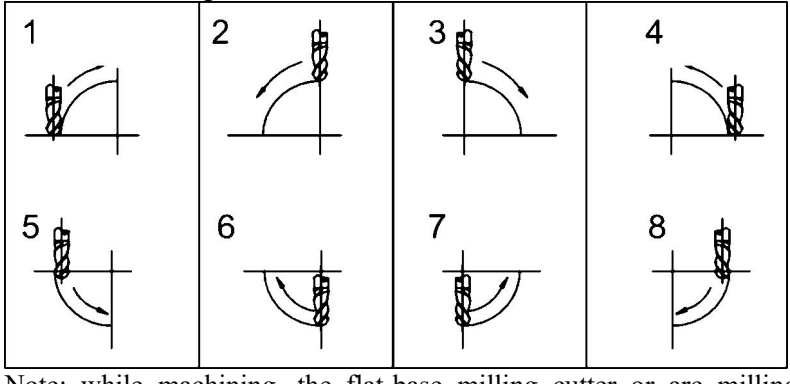
Press ↖ quit from bevel machining function at any time.

4.4 Arc machining

While machining the mould, the arc should be machined frequently. Under the condition that the appearance is simple and output is very small, the numerically-controlled machine tool shall be utilized for machining, it is suspected to be wasted. XH-2 provides the simple arc machining to enable that the one-piece machining for mould and copper electrode can be machined out on the general milling machine conveniently and efficiently. Control parameter "MAX CUT", the arc quantity cut every time is equal, and the arc's smoothness is controlled. The smaller the MAX CUT, the less the cutting quantity every time, more smoother the machined arc, the longer the machining time; the larger the MAX CUT, the larger the cutting quantity every time; the rougher the machined arc, the shorter the machining time (in the process of machining, press ENTER key and reset MAX CUT or Z STEP).

A: Machine ZX and YZ plane

On arc machining ZX and YZ plane, there are 8 kinds of machining modes as shown in diagram below.



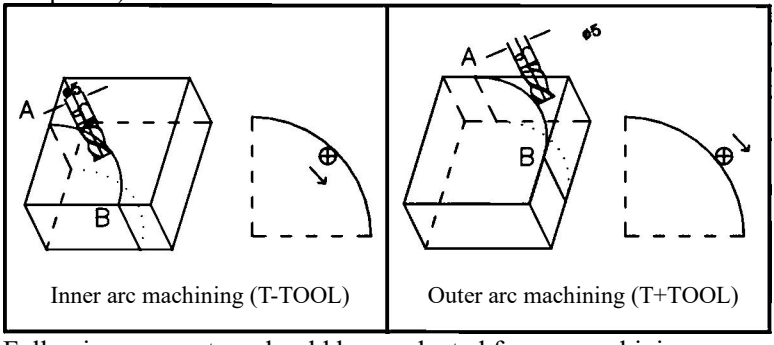
Note: while machining, the flat-base milling cutter or arc milling cutter may be utilized. While machining the circle by utilizing the flat-base cutter, the cutter diameter is set as 0.000.

B: Machine XY plane

While machining XY plane, if there are above 8 kinds of machining mode as well, the cutter should be vertical to machining plane, each kind of mode is also divided into inner arc machining and outer arc machining. Therefore, while machining XY plane, the cutter compensation mode should be selected: inner arc machining (T-TOOL) and outer arc machining(T+T00L)

Note: while machining XY plane, regardless of round cutter head and flat cutter head, the cuter diameter shall be set according to actual value.

Select the cutter compensation direction (used while machining on XY plane)



Inner arc machining (T-TOOL) Outer arc machining (T+TOOL)

Following parameters should be conducted for arc machining

TYPE 1-8: Arc machining form

T+TOOL/T-TOOL: selection between inner/outer arc (this parameter exists specially in machining XY plane.)

RADIUS: radius of arc to be machined

TOOL DIA:cutter diameter

Z STEP: Axle Z stepping quantity for machining every time (internally set STEP.MODE is 0)

MAX CUT: machined arc length every time (internally set STEP.MODE is 1)

Example 1: The machining is 90°arc AB as shown in Diagram 4.4-1, the machining commences from Point A and ends at Point B.

The parameter setting is as follows:

Machining plane: XY

Arc machining mode : 3

T +TOOL mode

Radius: 20mm

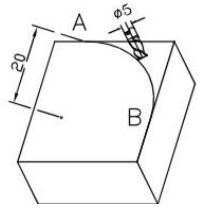


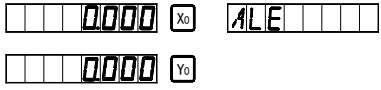
Diagram 4.4-1

Cutter diameter: 5m

Arc length machined every time: 1mm

Operating steps:

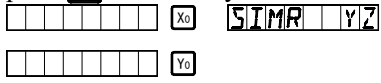
1. During normal display status, the metric/British system is regulated up to metric system
2. Move the machine console, the turning tool aligns Point A, zero clearing on Axle X and zero clearing on Axle Y



3. Enter into arc machining ；

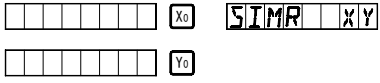
Press [▷|], enter into arc machining.

If the parameters inputted previously are not required to be changed, press [ENTER] and directly commence the arc machining.



4. Select the machining plane:

Press [X] → [ENTER] select XY plane ， enter into the selected machining mode o

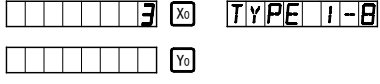


Note: press [X], select XY plane；press [Y], select YZ plane；press [Z], select ZX plane；also press [S/ARC], switch among XY plane, YZ plane and ZX plane.

5. Select the machining type:

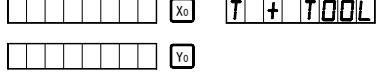
"TYPE 1-8" displays on the auxiliary view window, and previous machining type displays on X window;

Successively press [3] → [ENTER], select the machining type 3, enter into selected inner arc machining or outer arc machining.



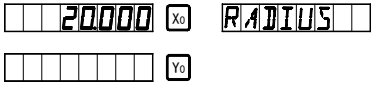
6. Select T + TOOL mode

Press [+] → [ENTER] ， select the outer arc machining and enter into arc radius inputting.

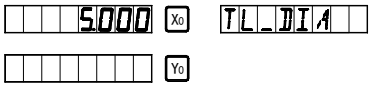


Note: press [+],T + TOOL， select the outer arc machining.
Press [−],T – TOOL， select the inner arc machining.

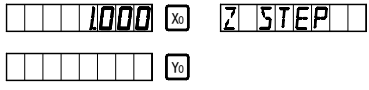
7. Input the arc radius
   Display “RADIUS” on the auxiliary view window， the originally set radius displays on X window.
   Successively press [2]→[0]→[ENTER] ， complete the input for arc radius；



8. Input the cutter diameter
   Display “TL_DIA” on the auxiliary view window
   Successively press [5]→[ENTER] , complete the inputting for cutter input diameter;

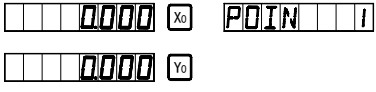


9. Input the arc length machined every time
   Display “Z STEP” on Auxiliary view window
   Successively press [1]→[ENTER]



   Enter into machining arc next step;

10. Machining the arc
    Display “POIN 1 ” on auxiliary view window, machine up to X window, when the display value on Y window is “0.000”, complete the machining for first point, and then press [⇩] , begin the machining for second point , repeat the previous operation and machine until display “POIN 37” on the auxiliary view window, switch over among each machining point by pressing up and down key;



11. After completing the machining, press [⊠] quit

Example 2

The machining is arc on AB section as shown in Diagram 4.4-2, the machining is commenced from Point A, the parameter setting is as follows:
Machining plane: ZX
Machining type: 3
Arc radius: actual value
Cutter diameter: 0(flat-end cutter)
Arc length machined every time: self-definition by user

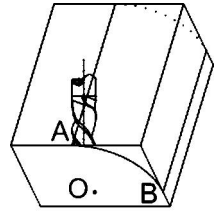


Diagram 4.4-2

Example 3

The machining is arc on CD section as shown in Diagram 4.4-3, the machining is commenced from Point D, the parameter setting is as follows:
Machining plane: ZX
Machining type:5
Arc radius: actual value
Cutter diameter: actual value (round-end cutter)
Axle Z stepping quantity while machining every time: self-definition by user

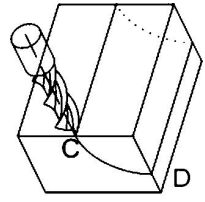


Diagram 4.4-3

Example 4

The machining is arc on EF section as shown in Diagram 4.4-4, the machining is commenced from Point E, the parameter setting is as follows:
Machining plane: YZ
Machining type: 7
Arc radius: actual value
Cutter diameter: actual value (round-end cutter)
Arc length machined every time: self-definition by user

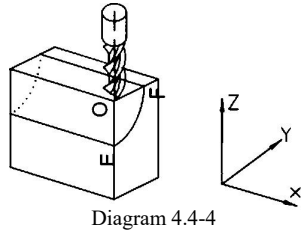


Diagram 4.4-4

Note: for XH-2 and X-2, Axle Z isn't installed, ⇧ or ⇧ should be employed to simulate Axle Z location , ⇩ the simulated Axle Z moves up to previous machining point and ⇩ move down to next machining point.

Steps

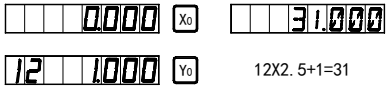
1: In SETUP, set “STEP MODE” as mode 0 (namely: Z STEP mode) and set Axle Z boring ring quantity (default value: 2.5mm)；

2: Prior to machining, firstly align the machine tool towards Z location at R starting point; right now, Axle Z is set as 0;

3: In the process of machining, Axle Z simulation height displays on the auxiliary view window, presenting Axle Z simulation height when the machining for current machining point stops;

As shown in Diagram, machine ZX plane, X window displays Axle X location; when X displays 0, the machining on X direction is completed; number of turns for boring ring display on former two digits of Y window, the number of scale for boring ring displays on rear five digits, for current machining point, it is OK that the machining is up to the scale on this ring;

If YZ plane is machined, Y window displays Axle Y location; when Y displays 0, the machining on Y direction is completed; number of turns for boring ring display on former two digits of X window, the number of scale for boring ring displays on rear five digits, for current machining point, it is OK that the machining is up to the scale on this ring;



Chapter V Calculator Function

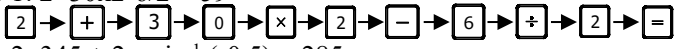
Some numerical values may be required to be calculated possibly in the process that the users machine the workpieces , the calculator function provided by BOMATEC digital display meter enables that the users' machining is more convenient while machining according to the drawing. This calculator may also directly transfer the calculation results onto the axle required to be machine, the user is only required to move the machine stand onto the location where the display is o, and this location is the location of calculation results.

Under normal display status, press [▣] , enter into calculator function.

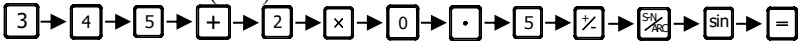
After entering into the calculator function, press [▣] , return to normal display status,

5.1 Counting example

Example 1: 2+30x2-6/2 = 59



Example 2 :345 + 2 x $\sin^{-1}$ (-0.5) = 285



Note: If the digit is put wrongly, press [AC], input once again.

If the error appears during calculation, the system may produce the error alarm sound Right now, press [AC] , input anew.

The absolute value of input value and operation result can't be greater than 9999999 or less than 0.000001, otherwise, the display can't be realized.

5.2 Transfer on calculation results

After completing the calculation, press [X0] , [Y0] ,[Z0], the calculation results respectively transfer onto Axle X, Axle Y and Axle Z and display (**the numerical value exceeding the display scope can't be transferred**), under the calculator function, press [X] [Y] [Z] key and respectively transfer the displayed value on Axle X, Axle Y and Axle Z into the calculator.

Chapter VI Setting for Internal Parameters

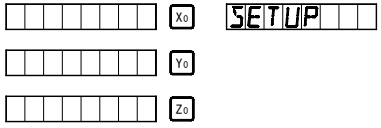
Based on the installation condition of grating ruler and actual demand, set various parameters so as to reach the correct running purpose.

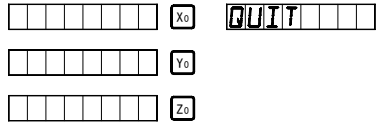
Note: only quit from SETUP via QUIT, the data after modification can be effective (except for full clearing of system) If shut down or power fails in the process of setting, the resetting is required.

Setting contents	Chinese Name
SEL TYPE	Set the type of digital display meter.
directly hold	Set the counting direction of grating ruler
COM TYPE	Set the error correction type
R-D MODE	Set the radius /diameter display mode
Z DIAL	Set Axle Z's boring circular sector
RESOLUTE	Set grating ruler's resolution ratio
SDM DIR	Set SDM number-setting direction
SLOPMODE	Set the stepping quantity mode for bevel machining
AXISTYPE	Set the number axle type
STEPMODE	Set the stepping quantity mode for arc machining
ANGLMODE	Set the angle display mode
ANGLTYPE	Set the angle display type
ERROR	Set the error function switch
LATHMODE	Set the lathe mode
DSP LEVE	Set the brightness display degree
CLR ALL	Fully clearing for system
QUIT	Quit from system setting

6.1 Enter /quit from internal parameter setting

Within 1s time scope of startup. Press [ENTER] key, display "SETUP" on the auxiliary window and enter into internal parameter setting. Press [⇧] or [⇩] key, select the parameters required to be set for setting.



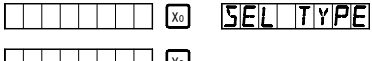


After completing the parameter setting, press [⇧] or [⇩] until display "QUIT" on the auxiliary view window, press [ENTER] key and quit , and save the internal parameter setting, press [AC] key and quit , don't save the internal parameter setting;

6.2 Set the digital display meter type (SEL TYPE)

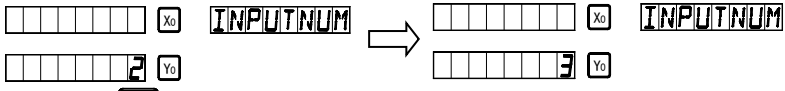
Since two-axle digital display meter and triaxial digital display meter share the software, there is difference on some functions for two-axle digital display meter and triaxial digital display meter, therefore, prior to delivering, the digital display meter is required to be set. While setting, two-axle digital display meter and triaxial digital display meter are only distinguished. All clear of system doesn't influence the digital display meter's type setting.

1) After entering into setting status, observe that "SEL TYPE" displays on the auxiliary view window.



2) Press [ENTER] , display"2"or "3" on Axle Y window.
"2"indicates the two-axle digital display meter(XH-2,X-2)。
"3" indicates the tri-axle digital displaymeter (XH-3 ,X-3 ,XH-3E, X-3E)

3) Press [2] or [3], change the digital display type



4) Press [ENTER] , save new setting, quit from this item setting.
Press [AC], don't save the setting after change, quit from this item setting.

6.3. Set the counting direction of grating ruler (DIRECT)

After the user properly installs the grating ruler, the actual counting direction is just opposite to the direction expected by the user, this kind of demand for user may be solved in the internal setting.

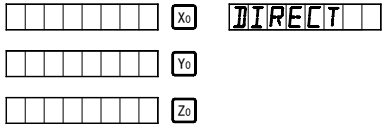
The counting direction of grating ruler shall be set by the installer, the user can't implement the change.

Ex-factory default: 0

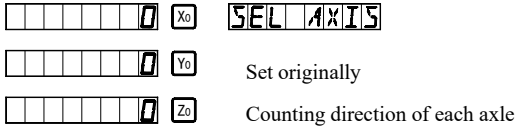
For example: the set counting direction is 1.

Operating steps:

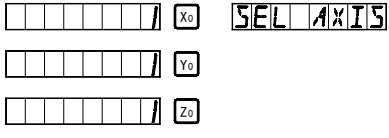
1) Under setting status, press ⇧ or ⇩ key until "DIRECT" displays on the auxiliary view window.



2) Press ENTER , enter into the counting direction setting;
Display "SEL AXIS" on the auxiliary view window and show that it is selectable axle on next step.
The number axis counting direction"0" or"1" ("0"and "1"counting direction is opposite) originally set displays on X window, Y window and Z window.



3) Axle selection, press X , Y , Z key and respectively change the counting direction of X,Y and Z number axis.



4) Press ENTER , confirm new direction setting, quit from this setting;
Press AC , don't change the setting, quit from direction setting.

6.4 Set the error correction type (COM TYPE)

Term interpretation
Linearity and non-linearity error:

There is a error between grating ruler's measuring value and standard value, if it is assumed that the shape of two measuring curves within grating ruler's travel range is consistent completely but isn't coincide, which is called as linearity error. The inconsistent shape of two measuring curves is called as non-linearity error.

Linearity correction: the linearity error is compensated so as to enable that the displayed value is equal to standard value.

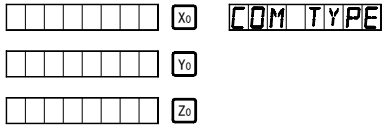
Notice: the correction value on linearity error shall be set by the installer, the user should not modify randomly, otherwise, the measurement precision shall be influenced.

There are two kinds of setting type for error correction; 1. Linearity error correction; 2. Non-linearity error correction.

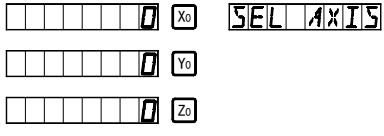
For example: Axle X correction mode is set as non-linearity error correction.

Operating steps:

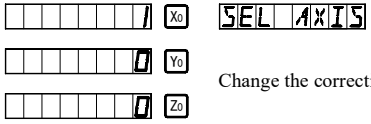
1) Under setting status, press ⇧ or ⇩ key until "COM TYPE" displays on the auxiliary view window.



2) Press ENTER , "0" or "1" displays respectively on X, Y and Z window. "0" indicates the linearity compensation mode. "1" indicates the non-linearity compensation mode. Display "SEL AXIS" on the auxiliary view window and show that it is selectable axle on next step.



3) Axis of selection, press [X], [Y], [Z] key，respectively change the correction type of each numerical axis;



4) Press [ENTER] , save the new setting value and quit from this setting; Press [AC] , don't save the setting after change, quit from this setting;

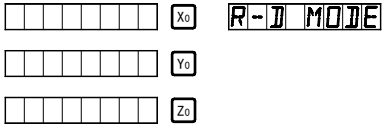
6.5 Set the radius/diameter display mode (R-D MODE)

Ex-factory default value: radius mode

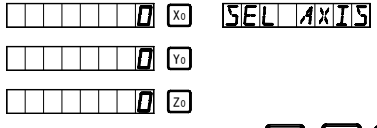
Example: set as diameter mode.

Operating steps:

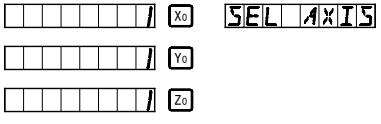
1) Under setting status, press [⇧] or [⇩] key until "R-D MODE" displays on the auxiliary view window;



2) Press [ENTER] , "0" or "1" displays respectively on X, Y and Z window. "0" indicates R mode, the display value is equal to actual value. "1" indicates that display value under D mode is 2 times of actual value. Display "SEL AXIS" on the auxiliary view window and show that it is selectable axle on next step.



3) Axis of selection, press [X], [Y], [Z] key，respectively change the display of each numerical axis;



4) Press [ENTER], save the new setting value and quit from this setting;
Press [AC], don't save the setting after change, quit from this setting;

6.6 Set Axle Z's boring ring sector (Z DIAL)

If the grating ruler is installed only on Axle X and Axle Y, Axle Z boring ring sector is required to be set while simulating Axle Z height. There are two kinds of setting mode for Axle Z boring ring sector: 1. Directly set the screw rod's screw pitch, indicate the moving distance on the direction of Axle Z when the screw rod shakes for one circle; 2. Set the screw rod's screw pitch and relate encoder's line number.

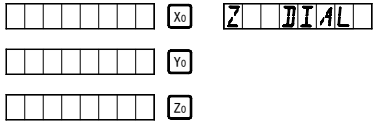
Notice: this function is effective only under triaxial digital display.

Ex-factory default value: 2.5mm

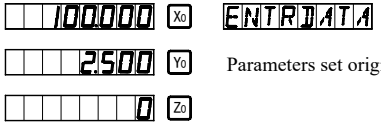
Example: set 2.2 mm boring ring sector on Axle Z and relate 9000 line encoder.

Operating steps:

1) Under setting status, press [⇧] or [⇩] key until "Z DIAL" displays on the auxiliary view window;

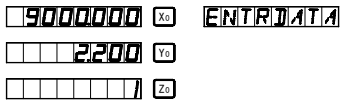


2) Press [ENTER] key, display " ENTRDATA". on the auxiliary view window.
Encoder's line number on Axle Z originally set displays on X window.
Boring ring sector on Axle Z originally set displays on Y window.



3) Input the line number of encoder and boring ring sector on Axle Z;
Input successively [X] → [9] → [0] → [0] → [0] → [ENTER]
Input successively [Y] → [2] → [·] → [2] → [ENTER]
Press [Z] key, select open-1or close-0 screw rod's screw pitch and relate the line number of encoder.

If the input is wrong, after pressing [AC] , input the digits once again. If the negative number is imputed, the treatment shall be conducted according to the absolute value of this value.



4) Press [ENTER] , confirm the inputting value and quit from Axle Z boring ring section setting.

6.7 Set the grating ruler' s resolution (RESOLUTE)

Digital display meter may access the grating ruler with 10 kinds of resolution, such 9 kinds as 0.1μm, 0.2μm, 0.5μm, 1μm, 2μm, 5μm, 10μm, 20μm and 50pm After installing the grating ruler, if the resolution is different from current value, the grating ruler's resolution must be set inside the digital display meter, otherwise, the reading is incorrect.

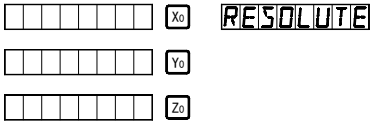
This parameter shall be set by the installers, the users are strictly forbidden to modify voluntarily.

Ex-factory default value: 5μm

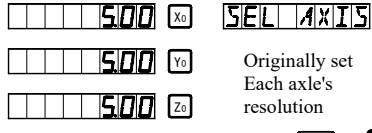
Example: set the resolution on Axle X, Y and Z is 1μm fully.

Operating steps:

1) Under setting status, press [⇧] or [⇩] key until "RESOLUTE" displays on the auxiliary view window;

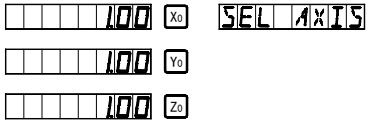


2) Press [ENTER] , "SEL AXIS" displays on the auxiliary view window, indicate the axle of selection on next step,
The original grating ruler's resolution ratio on each axle is displayed on Window X, Y and Z.



3) Axis of selection， press [X] , [Y] , [Z] key,respectively select Axle X, Y and Z, set the resolution, the corresponding number axle flashes.

4) Press ⇧ or ⇩ key, appear 0.10, 0.20, 0.50, 1.00, 2.00, 5.00, 10.00, 20.00 and 50.00. While 1.00 displaying, press ENTER, select this resolution. Return to the status on axis of selection. If the modification is given up, press AC.



5) After completing the setting,， press ENTER and quit from resolution setting.

6.8 Set SDM number setting direction (SDM DIR)

There are two kinds of number setting mode under SDM coordinate

Mode 0: ordinary number setting mode, the display value is equal to input value;

Mode 1: special number setting mode, the display value is equal to the opposite number of input value. Be applicable to directly preset the coordinate under SDM coordinate according to the dimension marked on the drawing.

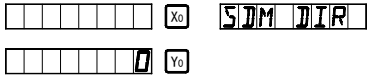
Ex-factory default value: SDM number setting mode is “0”.

Example：set SDM number-setting mode is “1”.

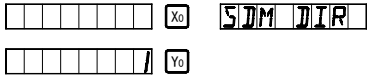
Operating steps:

1) Under setting status ， press ⇧ or ⇩ key until “SDM DIR” displays on the auxiliary view window；

2) Press ENTER, display original SDM number-setting mode on Window Y.



3) Press 1 ， set the number-setting mode is 1；



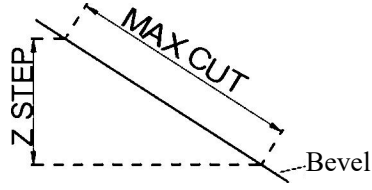
Note: press 0, change as number- setting mode 0, or press ⇧ or ⇩ key and select.

4) Press [ENTER] , confirm the number-setting mode and quit.
Press [AC], this change is ineffective, quit from SDM DIR setting.

6.9 Set the bevel machining stepping capacity mode (SLOPMODE)

While machining the bevel, there are two kinds of setting mode for machining stepping capacity.

1. Set the stepping capacity Z STEP of second axle.
   Set stepping capacity on Axle Y on XY Plane.
   Set Axle Z for YZ plane and ZX plane.
   Stepping capacity.
2. MAX CUT Set the bevel length MAX CUT for machining every time.



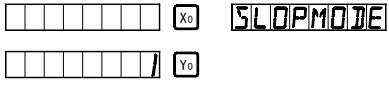
Ex-factory default value: set the stepping capacity for second axle as Z STEP.

Example: set the setting mode MAX CUT of bevel parameters.

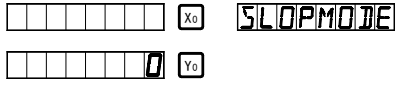
Operating steps:

1) Under setting status, press [⇧] or [⇩] key until "SLOPMODE" displays on the auxiliary view window;

2) Press [ENTER] , display original mode on Y window.
Press [1] , select MAX CUT mode;



Note; press [0] , select Z STEP mode, or press [⇧] or [⇩] key, select MAX CUT mode;



3) Press [AC] , save the new setting value and quit from this setting;
Press [ENTER] , don't save the setting after change, quit from this setting.

6.10 Set the number axle type (AXISTYPE)

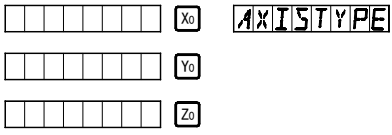
Each axle of may access the grating ruler and may also access the rotating encoder. Display distance while connecting the displaying distance and display angle while accessing the rotating encoder.

Ex-factory default value: install the grating ruler.

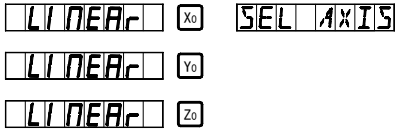
Example: set the rotary encoder installed on Axle Z.

Operating steps:

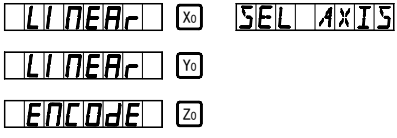
1) Under setting status, press ⇧ or ⇩ key until "AXISTYPE" displays on the auxiliary view window;



2) Press ENTER , "SEL AXIS" displays on the auxiliary view window, indicate that it is axis of selection on the next step.
Display the originally-set interface type on Window X, Y and Z. "LINEA" indicates access to grating ruler, "ENCODE" indicates access to rotary encoder.



3) Set Axle Z as rotary encoder.
Press X , Y , Z , change the interface type for corresponding number axis;



4) Press ENTER , save the new setting value and quit from this setting;
Press AC , don't save the setting after change, quit from this setting;

6.11 Set the stepping capacity mode of arc machining (STEPMODE)

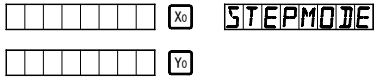
When B implements the arc machining, upon machining YZ or ZX Plane, the stepping capacity mode while machining may be selected.

Ex-factory default value: Axle Z's steeping capacity

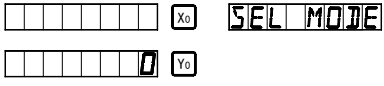
Example: Set the arc length as the stepping capacity;

Operating steps:

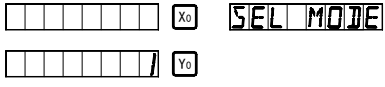
1) Under setting status, press ⇧ or ⇩ key until "STEPMODE" displays on the auxiliary view window;



2) Press ENTER , "SEL MODE" displays on the auxiliary view window, indicate that it is selection for stepping capacity on the next step. Original setting displays on Window Y. "0" indicates Axle Z's stepping capacity ,"1" indicates the arc length's stepping capacity.



3) Set as arc length's stepping capacity
Press 1 , display the mode after change on Y Window;



4) Press ENTER , save the new setting value and quit from this setting;
Press AC , don't save the setting after change and quit from this setting.

6.12 Set the angle display mode (ANGLMODE)

Have three kinds of angle display mode:

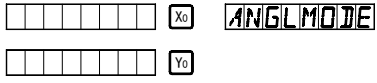
- MODE1 refers to display from 0-360°;
- MODE2 refers to display from -360°to -360°;
- MODE3 refers to display from -180°to -180°.

Ex-factory default value: MODE1.

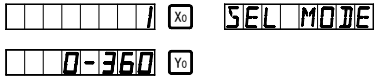
Example: set the angle display mode as mode 2.

Operating steps:

1) Under setting status, press [⇧] or [⇩] key until "ANGLMODE" displays on the auxiliary view window;



2) Press [ENTER], display the original setting on Window X.
"SEL MODE" displays on the auxiliary view window, indicate that it is selection for angle on the next step.
Axle Y displays that the Mode 1 is 0°- 360°display.



3) Set the angle display mode as mode 2.
Press [2], display the mode after change on X Window;
Axle Y displays that the Mode 2 is -360°- 360° display.

4) Press [ENTER], save the new setting value and quit from this setting.
Press [AC] ,don't save the new setting value and quit from this setting.

6.13 Set the angle display type (ANGLTYPE)

Has three kinds of angle display type

- TYPE is 0 : indicate that the angle is displayed as centigrade.
- TYPE is 1 : indicate that the angle is displayed as centigrade, min and second.

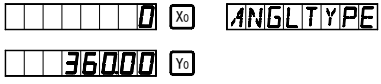
Ex-factory default value: TYPE is 0.

Example: Set the angle display type is centigrade, min and second.

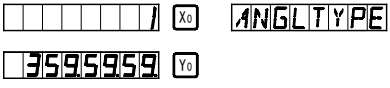
Operating steps:

1) Under setting status, press ⇧ or ⇩ key until "ANGLTYPE" displays on the auxiliary view window;

2) Press ENTER , Y Window displays the originally set angle mode is centigrade (for example: 359° 59′), X window displays the original location.



3) Set the angle display mode as mode 1.
Press 1 , Y Window indicates that the current mode is centigrade, min and second. (for example: 359° 59′59″).
X window displays the mode after change;



Note: or press ⇧ or ⇩ key, select the angle display mode.

4) Press ENTER , Save the new setting value and quit from this setting;
Press AC , don't save the new setting value and quit from this setting.

6.14 Error testing function (ERROR)

BOMATEC series of digital display meter has the error detection function (it is required to coordinate the special grating ruler or magnetic grating ruler is required to be coordinated). Under the condition that the grating ruler or magnetic grating ruler is damaged, the installation is error as well as the number leaks, this digital display's buzzer may tweet for long term, and the "ERROR" prompt displays on the main window of

corresponding axle.

1) Under setting status, press [⇧] or [⇩] key until ERROR displays on the auxiliary view window; press [ENTER], enter into this setting, close or open this function by pressing the corresponding axle selection key, “0”is close, “1” is open.

6.15 Set the lathe mode (LATHMODE)

When lathe mode is 0, close lathe function;

When the lathe mode is 1, display value on Axle X = normal display value on Axle X + normal display value on Axle Y;;

When the lathe mode is 2, display value on Axle X = normal display value on Axle X + normal display value on Axle Z;

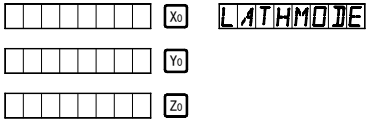
When lathe mode is 3, display value of Y-axis = display value of Y-axis + display value of Z-axis;

Ex-factory default value: close the lathe function.

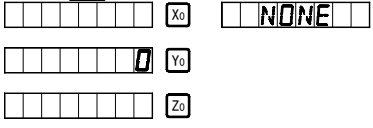
Example: set the lathe mode as 3.

Operating steps:

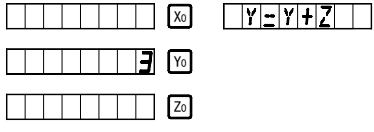
1) Under setting status, press [⇧] or [⇩] key until “LATHMODE” displays on the auxiliary view window;



2) Press [ENTER], display originally set lathe mode on Window Y.



3) Set the new lathe mode.
Press [0] or [1] or [2] key, change the lathe mode (this example is changed as lathe mode 1);



4) Press [ENTER], confirm the mode after change and quit.

6.16 Set the display brightness grade (DSP LEVE)

The brightness displayed by the digital tube may be regulated based on the environment on user's site environment, Grade 0~7 is divided totally.

Under setting status, press ⇧ or ⇩ key until "AXISTYPE" displays on the auxiliary view window; press ENTER enter into this setting, press ⇧ or ⇩ key, switch the brightness display grade.

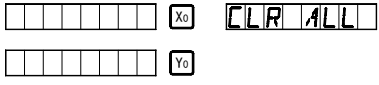
6.17 TOTAL CLEAR of System (CLR ALL)

Eliminate all data except for linearity compensation and installation quantity of grating ruler as well as automatically set the parameters.

After implementing the all clear of system, the original data can't be restored. CLR ALL Password:4321

Operating steps:

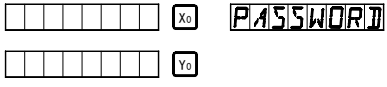
1) Under setting status, press ⇧ or ⇩ key until "CLR ALL" displays on the auxiliary view window;



2) Press ENTER , "PASSWORD" displays on the auxiliary view window, the all clear of system can be entered, there are two kinds of selection.

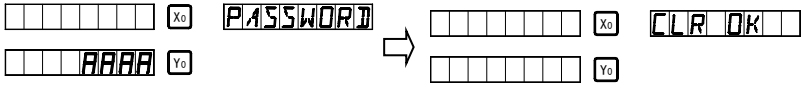
① Press AC quit from total clear of system,

②Input the correct password, implement the all clear of system.



3) Input the password

After correctly inputting the password, implement the all clear of system. Number of password imputing displays on Y Window.



After completing the elimination, return to main menu.

Default parameter value after all clear of system;

- Counting mode of grating ruler, the counting value increases when Phase A signal is ahead of Phase A signal;
- Compensation mode: linearity compensatation;
- R/D mode selects R (radius)mode;
- Z axle' boring ring sector = 2.5mm;
- Resolution =5μm;
- Number setting mode under SDM is " 0" , display value =input value;
- The bevel machinig is set as: Axle Z stepping capacity;
- Close the lathe function ；
- Number axle type：grating ruler ；
- Angle display mode is Mode 1：0-360°；
- Angle display type is 0:centigrade；
- While machining the arc, employ Axle Z stepping capacity；
- Close the error detection function

Note: total clear of system doesn't affect the setting of digital display meter, 3 axle or 2 axle is selected originally, after all clear , it still is original setting value.

Chapter VII Linearity Error Correction

There is a error between grating ruler's measuring value and standard value, if it is assumed that the shape of two measuring curves within grating ruler's travel range is consistent completely but isn't coincide, which is called as linearity error.

Linearity correction: compensate the linearity error so as to enable that the display value is equal to standard value.

Notice: the correction value on linearity error shall be set by the installer, the user should not modify randomly, otherwise, the measurement precision shall be influenced.

Step I: enter into the parameters inside digital display meter and set the error correction type of corresponding axle is 0 (linearity compensation mode). (Specific setting methods refer to Chapter "6.4".)

Step II: input the linearity error compensation system, there are two kinds of setting method:

1. Based on standard and digital display value, calculate the correct coefficients according to the formula;
2. Move the grating ruler up to standard value (the value must be 10mm's integral multiple), after confirming the current location, the system may automatically calculate the compensation coefficients.

Example: install the standard measuring equipment on the workbench (such as: block gauge, laser etc.) , move the grating ruler corresponding to workbench up to standard measurement value and display 1000mm, right now, the display value of digital display meter is 999.98mm.

Method 1: manually input the correction system and calculate according to following formula:

Correction coefficient: S =(L-L')/(L/1000) mm/m

L---actually-measured length，unit：mm

L'---display value on the digital display meter, unit: mm

S--- correction coefficient: mm/m，when it is "+", represent the growth; when it is "-", represent the shortening.

Compensation scope：-1.500 mm/m~+1.500 mm/m

Actually-measured length of lathe workbench is 1000, the final display value on the digital display value is 999.98

S=(1000-999.98)/(1000/1000)=0.02 mm/m

After the correction coefficients are obtained through calculation, press the corresponding axle key; press INCH/MM key, enter into the setting interface, input the correction coefficients and confirm, complete it.

Method 2: automatically calculate the correction coefficients:

1. Press the corresponding axle selection key until display “LIN COMP”, the axle glints;
2. Move the axle grating ruler corresponding to workbench up to the standard measuring value and display 1000mm, the display value on the digital display meter is 999.98mm;
3. Press ENTER key, complete the error correction.

Chapter VIII Malfunction Treatment

There are simple malfunction elimination methods in the table below, if the elimination can't still be realized, don't voluntarily dismantle digital display meter so as to prevent electric shock. Timely contact this company or corresponding agent appeal.

Fault description:	Possible causes	Method of eliminating
No display on the digital display meter	1: Power source failure 2: Damage of fuse 3: Poor 220V power source wiring 4: Whether to utilize the appropriate power voltage.	1: Power source access 2: Replace the fuse with identical specification 3: The power socket should be good. 4: Whether the input voltage is within 100V~240V.
Powered shell of digital display meter	1: Improper grounding between lathe and digital display meter 2: Electric leaking of 220V power source	1: The lathe shell and digital display meter's shell should ground properly. 2: Inspect 220Vpower source
The display value on certain axle is 2 times of normal value.	1: Improper setting for grating ruler's resolution 2: Some axle is set as diameter display mode	1: Set the correct resolution rate 2: Set the radius mode display
Digital display meter –no counting of axle	1: Improper grating ruler contact 2: No signal output of grating ruler 3: Failed counting function on this axle of digital display meter	Exchange with another axle and observe whether the counting is normal; if normal, the grating ruler fails; if abnormal, the digital display meter fails.
Disorderly display value on Window X, Y and Z.	1: Disorderly system memory 2: Failure of grating ruler, number leaking	1: Implement the system's all clear. 2: Repair or replace the grating ruler

All keys on the digital display meter don't respond.	1: Disorderly system memory 2: Key short-circuit	1: Replace the new panel and implement the total clear of system 2: Replace the key panel.
Single key on the digital display meter doesn't respond.	1: Key failure 2: Disorderly system memory	1: Replace the key panel; 2: Implement the system's all clear.
The counting on the digital display meter is error, the displayed distance doesn't conform to actual distance.	1: Improper precision of lathe equipment 2: Too fast operating speed of lathe equipment 3: The installation of grating ruler doesn't conform to the requirement and the precision is insufficient. 4: The display mm/lnch on the digital display meter doesn't conform . 5: The resolution on the digital display meter doesn't conform to the grating ruler's resolution. 6: Improper setting for linearity error compensation value on the digital display meter 7: Failure of grating ruler, number leaking	1: Lathe maintenance 2: Speed lowering 3: Reinstall the grating ruler 4: Correct switchover for mm/inch 5: Set the correct resolution rate 6: Set the correct the linearity error compensation value (when the compensation value isn't required, the linearity error compensation value is set as 0). 7: Repair or replace the grating ruler
Normal display of data on Axle X and Y, data doesn't display on Axle Z.	1: Error number axle selection	1: Enter into the internal setting, the axle of selection is Axle 3.
No movement of grating ruler, the data on the digital display meter automatically increases or decreases.	1: Failure of grating ruler 2: Malfunction of digital display meter	Exchange with another axle and observe whether the counting is normal; if normal, the grating ruler fails; if abnormal, the digital display meter fails.