LCD DIGITAL DISPLAY

SDS 200

OPERATION MANUAL

V1.0-202201

Dear user:

Thank you for purchasing the LCD digital display model SDS 200, It is a precise measuring product, with the main purpose of providing detecting and locating functions for test instruction or during the processing of various manual machine tools of different types.

Note: When using the product, the user needs to handle with care, otherwise, its precision will be affected. Besides, read the following safety knowledge and notes so as to ensure that the new display device is used safely.

Safety Matters:
Symbol Description
Warning Prompt
Symbols and signs are given for warning in the instructions.
Such prompts are introduced by signal texts which describe the criticality explicitly.
Be sure to follow such warnings and take actions carefully, so as to avoid accidents and human damage and property loss.


Danger!
The prompt of a dangerous case leading to death or serious injury directly, which must be avoided.


Warning!
The prompt of a dangerous case leading to death or serious injury, which must be avoided.


Caution!
The prompt of a dangerous case possibly leading to death or serious injury, which must be avoided.

⚠ Caution:

- To prevent electric shock for fire, this machine must not be affected with damp or subjected to direct spurting of the cooling liquid.

⚠ Warning:

- To avoid electric shock, do not open the enclosure by yourself. The machine has no components that can be repaired by users. For service, Please contact professional and technical personnel for inspection and maintenance.

⚠ Attention:

- If the display is found to give out smoke or undesirable odor, immediately unplug the power cord. Continuing to use this product at this time will lead to fire or electric shock. Please contact its agent. Do not try to repair the display by yourself.
- The display is connected with an optical electronic rule to constitute a precise test device. Once the wiring between electronic rule and display is broken or has its surface damaged, the test data would be wrong. Users must be especially careful.
- Do not try to repair of remodel the display unit, which would otherwise leads to failure, malfunction or injury. If an abnormality occurs, **contact its agent.**
- If the optical electronic ruler used by the display unit is indeed damaged, do not use an electronic rule of another brand for connection, because the products from different companies have different features, indexes and wirings. Without the guide of professionals, products from different companies are not allowed to be connected, which otherwise would lead to display failure.

CE displacement sensor conforms to European low-voltage directive 2006/9SEC for electric equipment safety and electromagnetic compatibility directive 2004/108/EC.

Note: Our products will be updated without any further notice.

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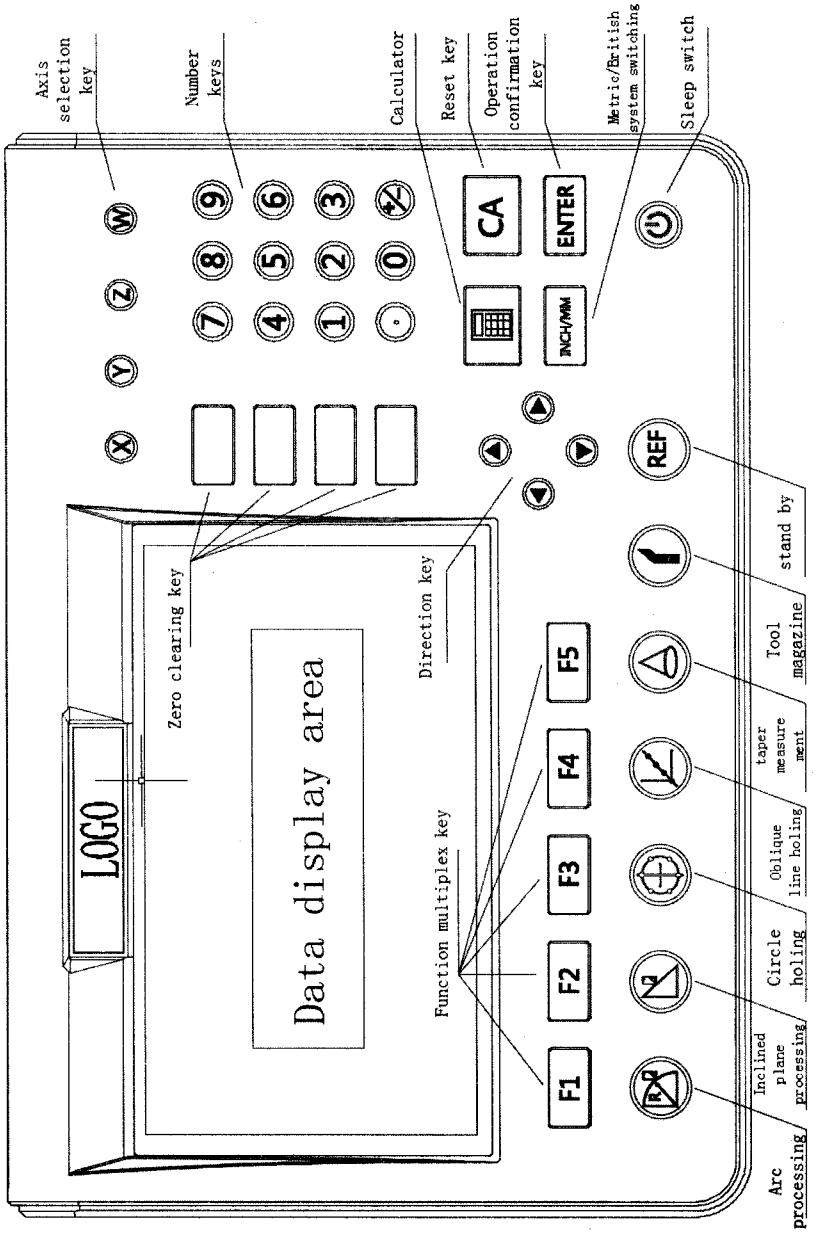
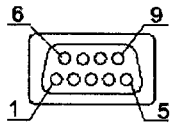
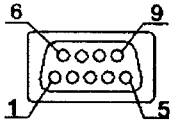
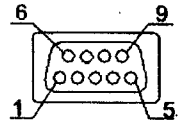
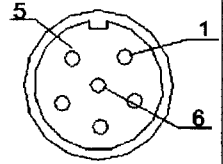
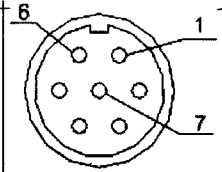
Chapter I Monitor are briefly introduced



1.1 Display Key Description

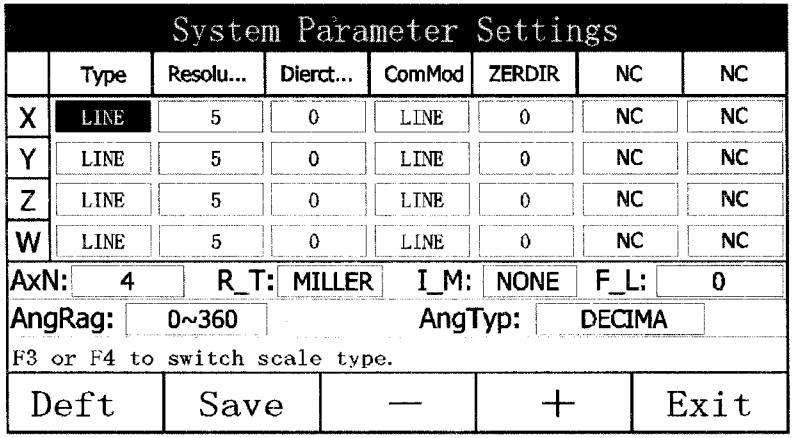
Key symbol	Function Description
	Number axis zeroing key
X Y Z W	**Number axis selection key and preset number**
0 ~ 9	**Number keys**
.	**Decimal point enter key**
+/-	**Symbol enter key**
INCH / MM	**Metric/imperial system switching key**
ENTER	**Operation confirmation key**
	Calculation function key (for entering or quiting the calculator state)
CA	**Calculator zeroing key**
	Circle holing key (for equally divided hole pocessing on an arc)
	Oblique line holing key (for equally divided hole pocessing on an oblique line)
	Arc processing key (for processing the flat surface of a workpiece into an arc surface)
	Oblique processing key (for processing the surface of a workpiece into an oblique surface)
	Up, down, left and right (direction) selection key
	Taper measurement key (lathe meter)
	Tool magazine function key (lathe meter)
REF	**Alternate key**
F1 ~ F5	**Function multiplex key**

1.2 Display Interface Description

No.	Interface type	Interface diagram	Pin	Signal
1	9 core TTL interface		1/3/5	Null
			2	0V
			4	Wrong signal
			6	A
			7	+5 V
			8	B
			9	R
2	9 core EIA-422-A signal interface		1	-A
			2	0V
			3	-B
			4	Wrong signal
			5	-R
			6	A
			7	+5 V
			8	B
			9	R
3	EDM signal interface		1/4/5/ 7/8/9	Null
			2	Common
			3	Normally off
			6	Normally off
4	6 core signal interface		1	0V
			2	A
			3	B
			4	R
			5	+5 V
			6	PE ground wire
5	7 core signal interface		1	0V
			2	Null
			3	A
			4	B
			5	+5 V
			6	R
			7	PE ground wire

Chapter II System Parameter Setting

Based on grating rule installation and actual needs, set various parameters to achieve the goal of normal operation.



(Figure 2.1)

2.1 Enter/Quit System Parameter Setting

In the time frame of startup screen, Press the ENTER key to enter the interface of system parameter setting, as shown in Figure 2.1.

After parameter setting, press the "Save" function key to save system parameter setting and the "Exit" key to quit the interface of system parameter setting.

2.2 Setting the Number Axis Type

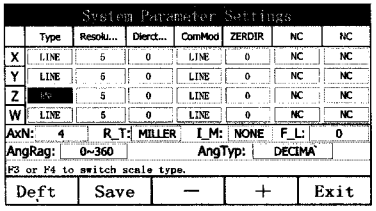
Each axis of the display can be connected with a grating rule to show the distance or a rotary encoder to show the angle.

Factory default: A grating ruler is mounted.

For example: Set axis Z to mount a rotary encoder.

1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to the type option field for axis Z.



2) Press the "+" or "-" function key to switch the type of axis Z to the angle mode.

3) Press the "Save" function key to save the modification.

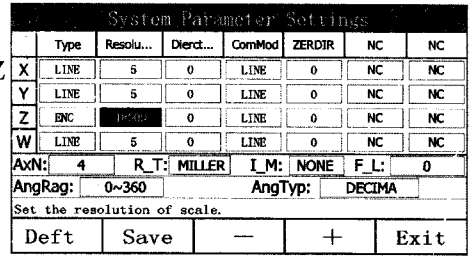
4) Press the "Exit" function key to quit the interface of system parameter setting.

2.3 Setting the Number of Encoder Lines

The display supports the rotary encoder with any number of lines, which is set based on actual situation. After rotary encoder installation, if the number of lines are different from the current value, the number of lines for the encoder must be set in the display, otherwise the reading would be incorrect. This parameter must be set by the installation personnel and must not be modified by the user.

Factory default: 9,000 lines

For example: The resolution on axis Z is set to 180,000 lines.



1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to

To the resolution option field for axis Z.

2) Press number keys to enter 180,000 for the resolution on axis Z.

Note: The value of number of lines can be entered only when the type is switched to angle.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

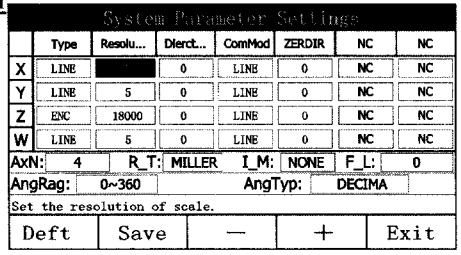
2.4 Setting the Grating Ruler Resolution

The display can be connected with a grating ruler with resolution 0.05 μm, 0.1 μm, 0.2 μm, 0.5 μm, 1 μm, 2 μm, 5 μm, 10 μm, 20 μm or 50 μm, 10 different types in all. After grating rule installation, if the resolution is different from current value, the resolution of the grating ruler must be set in the display, otherwise the reading would be incorrect.

Note: This parameter must be set by the installation personnel and must not be modified by the user.

Factory default: 5 μm

For example, the resolution on axis X is 1 μm.



1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to

to the resolution option field for axis X.

2) Press the "+" or "-" function key to switch the resolution on axis X to 1 μm.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

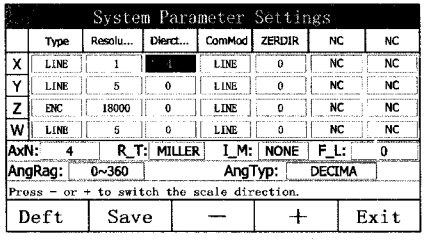
2.5 Setting the Counting Direction

After the user mounts the grating ruler or encoder, actual counting direction may be just opposite to what the user expects. This user need can be met in system parameter setting.

The counting direction of the grating rule is set by the installation personnel and must not be modified by the user.

Factory default: 0

For example: The counting direction on axis X is set to 1.



1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to

to the direction option field for axis X.

2) Press the "+" or "-" function key to switch the direction of axis X to 1.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

2.6 Setting the Compensation Mode

Term

Linear and non-linear error:

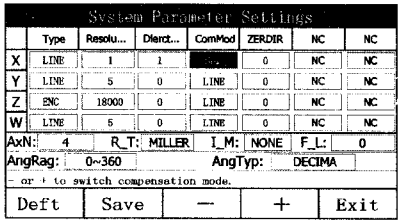
There is an error between the measured value and standard value of the grating rule. If the two measurement curves are in an identical shape within the grating ruler's range of travel but not in coincidence, this is called a linear error. If the two measurement curves are in different shapes, this is called a non-linear error.

Linear correction: to compensate for the linear error so that the displayed value is equal to the standard value.

Note: The linear error correction value is set by the installation personnel, and must not be modified by the user at will, which otherwise would affect measurement accuracy.

Error correction has two setting types: 1. Linear compensation; 2. non-linear compensation.

For example: Set the compensation mode on axis X to non-linear error correction.



Operation steps:

1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to

to the option field for compensation mode on axis X.

2) Press the "+" or "-" function key to switch the compensation mode on axis X to non-linear compensation.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

2.7 Setting the Number of Display Axes

The display is capable of setting the number of display axes on the coordinate interface based on user needs, from 2 to 4.

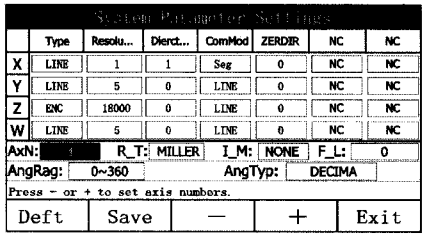
Factory default: 2

For example: Set the number of axes to 4.

1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to

to the option field for number of axes.



2) Press the "+" or "-" function key to switch the number of axes to 4.

3) Press the "Save" function key to save the modification.

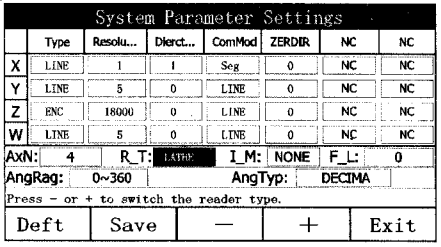
4) Press the "Exit" function key to quit the interface of system parameter setting.

2.8 Setting the Display Type (Meter Type)

The display is capable of switching the meter type based on the type of used machine tool. After meter type switching, the corresponding processing function of the display changes accordingly.

Factory default: milling machine

For example: Set the meter type to lathe



1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to

to the option field for meter type.

2) Press the "+" or "-" function key to switch the meter type to lathe.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

2.9 Setting the Combined Axis Display

During machine tool design, the case that two grating rulers are installed in the same axis direction may occur, requiring to display the positions of actually processed contact points, and the counting values of two grating rulers need to be displayed in combination. The combination setting can meet this requirement.

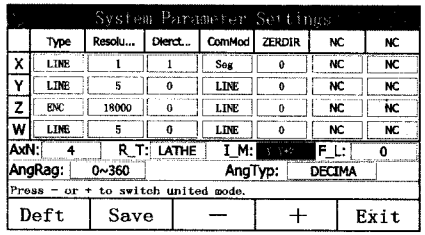
The combination has the following modes:

1) No combination: The value on each axis is displayed separately.

2) Y=Y+Z: The displayed value on axis Y is equal to the value on axis Y and the value on axis Z.

Factory default: no combination

For example: Set the combination mode to Y=Y+Z



1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to to the option field of combination.

2) Press the "+" or "-" function key to switch the combination mode to Y=Y+Z.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

2.10 Setting the Display of Dithering Elimination

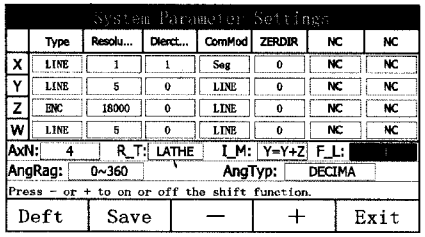
During grinding, the vibration of the grinder makes what's on the display change repeatedly and quickly, discomforting the operator visually. The display has a dithering elimination function which prevents what's on the display from changing quickly and causing visual confusion when the grinder vibrates.

Factory default: 0 (disabled)

For example: Set dithering elimination to 1 (enabled).

1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to
to the option field of dithering elimination.



2) Press the "+" or "-" function key to switch the dithering elimination mode to 1.

3) Press the "Save" function key to save the modification.

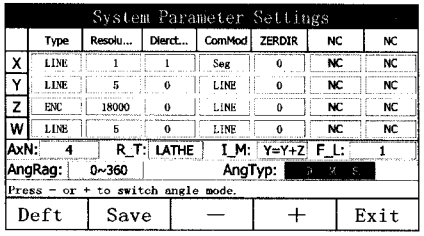
4) Press the "Exit" function key to quit the interface of system parameter setting.

2.11 Setting the Angle Display Type

The angle display mode has two types: degree and degree, minute and second. After the angle type is switched, the display mode of each angle axis is based on this parameter.

Factory default: decimal system

For example: Set the angle type to degree, minute and second.



1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to
to the option field of angle type.

2) Press the "+" or "-" function key to switch the angle type to degree, minute and second.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

2.12 Setting the Angle Display Range

In order for the operator to meet the rotation axis' display requirement, a parameter of angle display range is set hereby specially, which can be modified by the operator as required.

Angle range:

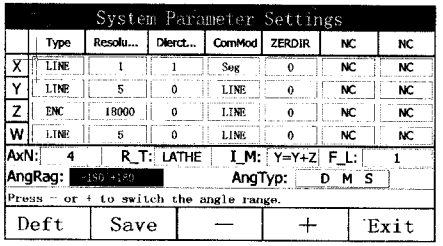
1) 0 – 360: The angle display value is between 0 – 360 degrees.

2) -360 – 360: The angle display value is between -360 – 360 degrees.

3) -180 – 180: The angle display value is between -180 – 180 degrees.

Factory default: 0~360

For example: Set the angle range to -180 – 180.



1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to
to the option field of angle range.

2) Press the "+" or "-" function key to switch the angle range to -180 – 180.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

2.13 Setting the Number Setting Direction for the ZER Coordinate System

In the ZER coordinate system, there are two two number setting modes:

Mode 0: normal number setting mode, in which the displayed value is equal to the entered value.

Mode 1: special number setting mode, in which the displayed value is equal to the opposite number of the entered number. This mode is suitable for directly following the drawing to mark the dimension presetting coordinate in the ZER coordinate system.

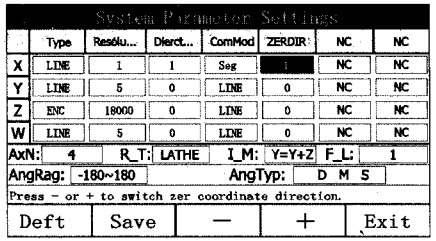
Factory default: 0

For example: Set the ZERDIR on axis X to 1.

1) On the interface of system parameter setting,

Press the ⇧ or ⇩ key until the cursor moves to

to option field of ZERDIR on axis X.



2) Press the "+" or "-" function key to switch ZERDIR to 1.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

Note: The number setting direction of the ZER coordinate system must be in accordance with the type of each axis. Therefore, you need to only modify the parameter of one axis, and the parameters of other axes change accordingly.

Note: If the modification of system parameter setting is in confusion, you can use the "Factory Value" (DEFT)function key to restore to factory defaults.

Chapter III Basic Operation Instructions

3.1 Startup

Function Introduction

Power on and the display enters the normal display state.

During startup, press the key to access the internal settings.

This display has an outage memory function which can memorize the current coordinate position, ALE/INC/ZER coordinate mode, and metric/British system measurement mode when an outage occurs. When the display starts up next time, the above three pieces of information can be restored to the state before outage, so that the user does not have to set parameters again.

3.2 Zeroing

Function Introduction

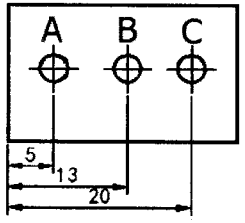
When the display is in normal display state, press the number axis zeroing key at any point to zero the displayed value on the coordinate axis.

- ALE zeroing does not affect the displayed INC value.
- INC zeroing does not affect either the displayed ALE or ZER value.
- If the grating ruler does not move after zeroing, press the zeroing key for the same axis again to cancel previous zeroing operation and restore to the value before zeroing.

3.3 Preset Value for an Axis

Function Introduction

to set the displayed value on an axis at current position when the display is in normal display state.



Example: Process two holes A and B in the axis X direction.

Operating steps:

1. As shown in the figure above, the workpiece position is moved after hole A processing.
2. Hole B needs to be processed now. After aiming the tool at hole A, press [X] → [5] → [ENTER] to enter a value. (If a wrong value is entered during value entry, you can press the "CA" key to cancel the wrong value.)
3. Move the tool to the position with a displayed value of 27 to process point B.

Note: In the ZER coordinate system,

When the ZER number setting direction is set to "0", the displayed value is equal to the entered value.

When the ZER number setting direction is set to "1", the displayed value is equal to the opposite number of the entered value.

You can set the ZER number setting direction in "System Parameter Setting".

3.4 Metric/British System Switching

Function Introduction

to switch the displayed unit of size between "mm" (metric system) and "inch" (British system), so that parts in both metric and British systems can be processed.

Example: As shown in the figure, the original display is in metric system, but now the display in British system is required (1 inch = 25.4 mm).

Operating steps:

Press the [INCH/MM] key to switch between metric and British systems.

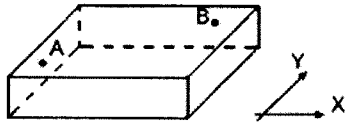
	X	-25.000				X	-1.00000		
MM/INCH	Y	20.000		⇨	MM/INCH	Y	0.78740		
MM	Z	25.400			INCH	Z	1.00000		
COOR	W	25.400			COOR	W	1.00000		
ALE					ALE				
INFOR					INFOR				
MILLER					MILLER				
A/I	Zer	1/2	R/D	Set	A/I	Zer	1/2	R/D	Set

If the number axis is in encoder state, when you press the [INCH/MM] key, the switching does not work.

3.5 Automatic Middling

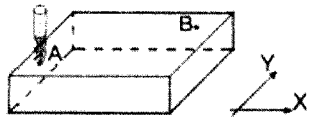
Function introduction: to find the middle position between two points.

Example: On the rectangular workpiece as shown in the figure, find the middle position between points A and B.



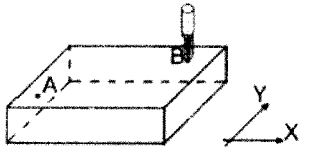
Function Introduction:

1. Move the tool and aim it at point A, and press the X0 and Y0 keys to zero the count values on both axis X and axis Y.



	X	18.000			
MM/INCH	Y	12.000			
MM	Z	25.400			
COOR	W	25.400			
ALE					
INFOR					
MILLER					
A/I	Zer	1/2	R/D	Set	

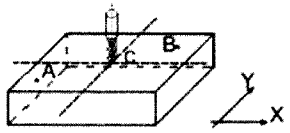
2. Move the tool and aim it at point B.



3.Press the "1/2" function keys on both axis X and axis Y to middle the count values on the two number axes respectively.

	X	9.000			
MM/INCH	Y	6.000			
MM	Z	25.400			
COOR	W	25.400			
ALE					
INFOR					
MILLER					
A/I	Zer	1/2	R/D	Set	

4. Move the tool and find the point with valve 0 displayed on both axis X and axis Y, which is the middle position between points A and B.



3.6 Absolute/Relative/200 Group User Coordinate Systems

Function Introduction

The display provides three coordinate display modes: absolute coordinate system (ALE), relative coordinate system (INC), and 200 group user coordinate system (ZER 001 - ZER 200).

1: The zero point of a work-piece is set at the origin of the ALE coordinates.

2: When the ALE origin is changed, the relative distance between ZER and ALE origins remains the same.

Ⅰ: Switch Between ALE/INC/ZER Coordinate Systems

The coordinate system can be switched only in normal display state.

Press the "A/I" function key to switch between ALE and INC.

- The coordinate system prompt bar displays INC: in INC state.
- The coordinate system prompt bar displays ALE: in ALE state.

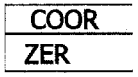
Press the "ZER" function key to switch to the ZER coordinate state.

Ⅱ: In the ZER Coordinate System, Enter a New ZER Group Number Value.

Operating steps:

1. Press the "ZER" function key to enter the ZER for coordinate selection, as shown in the figure below. "ZER" flashing means a new ZER group number can be entered now.

2: Enter a group number, e.g. 86.



3: Press the [ENTER] key for confirmation, and the ZER group number of the coordinate system becomes 86.

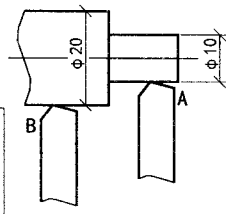
Ⅲ: Coordinate Selection

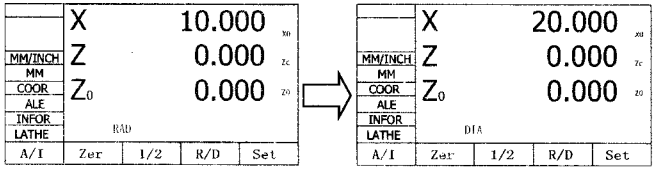
Press the [⇧] or [⇩] key to enter any coordinate.

3.7 Radius/Diameter Conversion (R/D)

Function introduction: to switch the axis X display between workpiece radius and diameter modes (effective only on the lathe).

Example: As shown in the figure, the benchmark of axis X is in the center, and the tool is at the position of point A. Press the "R/D" function key to switch between radius and diameter display.





(Radius) (Diameter)

3.8 User Parameter Setting

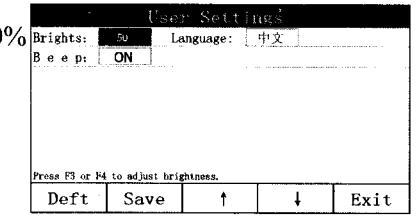
Based on user needs, set related parameters to achieve the goal of proper operation.

3.8.1 Setting the LCD Brightness

The user can adjust the brightness of the display based on field environment.

Factory default: 100%。

Example: Adjust the display brightness to 50%



1) On the user setting interface,

Press the [⇧] or [⇩] key until the cursor moves to to the option field of brightness.

2) Press the " ↓ "" or " ↑ " function key to adjust the brightness to 50%.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

3.8.2 Setting the Display Language

Based on nationality, the user can switch the display language by himself/herself.

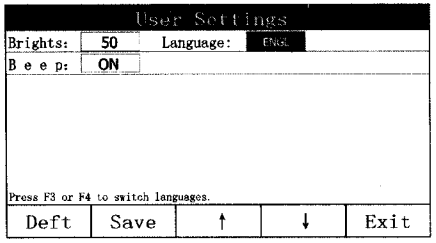
Factory default: Chinese.

Example: Set the display language to ENG (English).

1) On the user setting interface,

Press the ⇧ or ⇩ key until the cursor moves to

to the option field of language.



2) Press the " ↓ " " or " ↑ " function key to switch the language to ENG (English).

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

3.8.3 Setting the Buzzer Prompt

The operator can enable or disable the buzzer prompt tone as required. After enabled, the buzzer prompt tone sounds with key pressing and processing. After disabled the buzzer prompt tone does not sound.

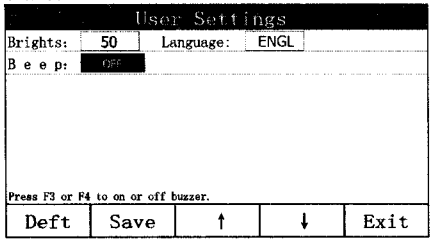
Factory default: ON.

Example: Set the buzzer to the disabled state.

1) On the user setting interface,

Press the ⇧ or ⇩ key until the cursor moves to

to the option field of buzzer.



2)Press the " ↓ " " or " ↑ " Function key to switch the buzzer to the disabled state.

3) Press the "Save" function key to save the modification.

4) Press the "Exit" function key to quit the interface of system parameter setting.

Note: If the modification of system parameter setting is in confusion, you can use the "Defaults" (DEFT) function key to restore to factory defaults.

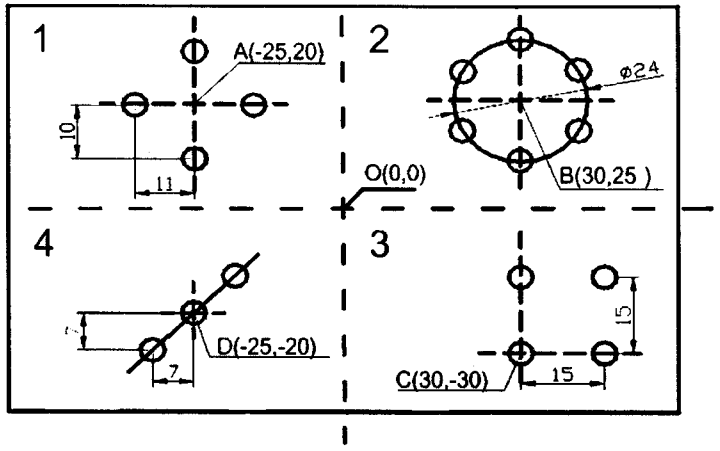
Chapter IV Auxiliary Zero Position Function of the 200 Group User Coordinate System

The display provides three coordinate systems: absolute coordinate system (ALE), relative coordinate system (INC) and 200 group user coordinate system (ZER 001 - ZER 200). The 200 group user coordinate system can be used as the auxiliary zero point during processing.

ALE is the absolute coordinate system which is established at the beginning of work-piece processing. The 200 group user coordinate system is defined relative to the absolute coordinate system. When the user's ALE coordinate changes, the ZER zero position changes along for an according distance.

During work-piece processing, one benchmark zero position is often not enough to meet user needs, but currently added ZER coordinate system can provide multiple benchmark zero points for users. Each auxiliary zero point is equivalent to a coordinate system origin defined by the user. Every point in this coordinate system takes the auxiliary zero position in current ZER coordinate system as the benchmark. In such a relatively independent coordinate system, the processing for all kinds of special functions can be carried out.

To process the work-piece shown in the figure, ALE origin is set at point 0 of the work-piece center, and the rest four auxiliary zero positions are points A, B, C and D, as shown in the figure.



The auxiliary zero position can be set in two ways:
1) Coordinate entering;
2) Zero clearing in place.

4.1 Entering the ZER Zero Position Directly

Without moving the machine, follow the dimensions on the user processing drawing to directly preset the user coordinate zero point, In this way, the user coordinate zero point can be set precisely and quickly.

In the user coordinate system (ZER coordinate system), enter the coordinate of an auxiliary zero position at the absolute coordinate zero position, and the coordinate position of absolute coordinate zero (point 0) in the auxiliary zero position coordinate is displayed. Viewed in the relative coordinate system, point 0 is at (25,-20) of point A, (-30,-25) of point B, (-30,30) of point C, and (25,20) of point D, exactly the opposite numbers of position of each point in the absolute coordinate system. If you enter the relative zero position at a point outside of the absolute coordinate system, the position of this point in this user coordinate is displayed. If you enter the auxiliary zero position of point B in the user coordinate at point A, the displayed value of B is (-55,-5). Therefore, when a value is preset in the ZER coordinate system, a minus is added to get the opposite number automatically. Hence, the coordinate value of the processed work-piece can be directly used for entry.

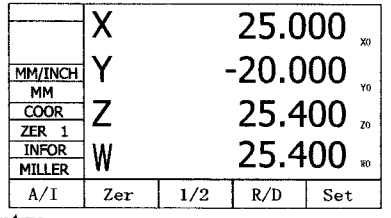
Operating steps:

1. In the absolute coordinate system (ALE), move the machine and aim the tool at the center point 0 as shown in Figure 3.1.

Press keys X0 and Y0 for zero clearing for data on axis X and axis Y and to determine the zero position of the absolute coordinate.

2. Press the "ZER" function key to enter the user coordinate system.

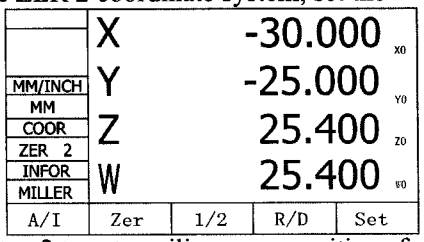
Enter the ZER 1 coordinate, set the position of point A, and enter its coordinate value (-25,20). If you find that the entry is wrong, press the axis key to cancel the entry.



push [X] → [2] → [5] → [%] → [ENTER]
push [Y] → [2] → [0] → [ENTER]

3. Press the key to enter the ZER 2 coordinate system, set the position of point B, and enter its coordinate value (30,25).

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

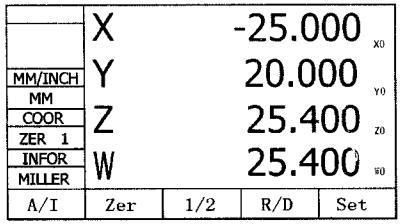


4. In a similar way, follow Step 2 to set auxiliary zero positions for points C and D.
5. After setting the auxiliary zero positions, you can process the work-piece in the coordinate system of corresponding auxiliary zero position. As shown in the figure, you can process equally divided holes for an arc in point B's coordinate system of auxiliary zero position.
6. After the processing is completed, press the "A/I" function key to quit the ZER coordinate system.

4.2 Zero Clearing in Place

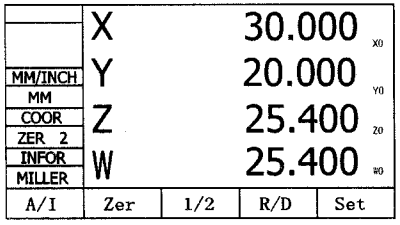
1.Move the tool to the absolute coordinate.
2. In the absolute coordinate system (ALE), as shown in Figure 3.1, move the tool to point 0, press keys X0 and Y0 for zero clearing for the data on axis X and axis Y, and determine the zero position of the absolute coordinate. (If reprocessing the work-piece, the user can clear all of the ZER coordinate system and then conduct setting again.)

3.Press the "ZER" function key to enter the ZER 1 coordinate, set the position of point A, and move the tool to point A. The display shows



Press keys X0 and Y0, and the ZER coordinate of point A is set successfully.

4.Press the ⇧ key to enter ZER 2, set the position of point B, and move the tool to point B. The display shows



Press keys X0 and Y0, and the ZER

coordinate of point B is set successfully.

5. In a similar way, follow Step 3 to set auxiliary zero positions for points C and D.

6. After the processing is completed, press the "A/I" function key to quit the ZER coordinate system.

7. When work-pieces of the same size are processed, as long as the set ALE zero point is behind point 0, the ZER zero point is set automatically. As shown in Figure 3.1, enter the ZER 1 coordinate system, move to a position where the displayed values on both axis X and axis Y are 0, and this position is the benchmark point of the ZER 1 coordinate system. The user can process work-pieces based on this. In mass processing, with these user coordinates, the time spent in setting the coordinate zero point can be saved greatly, so that the processing efficiency is improved.

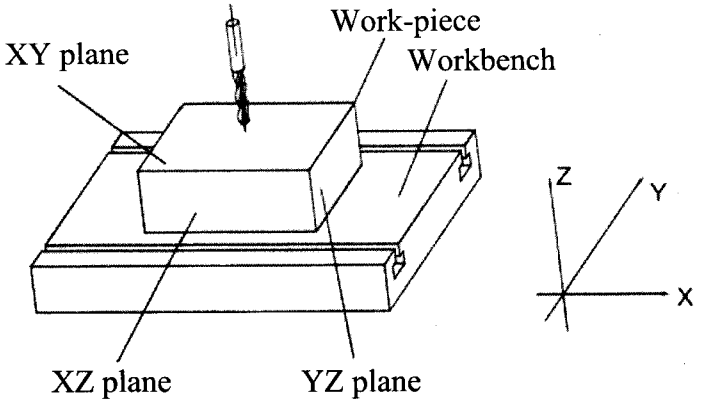
Attention:

- When the user coordinate is used, zero clearing in corresponding user coordinate system is actually resetting the auxiliary zero position. The position at which zero clearing is conducted is the new user coordinate origin, and the coordinate origin set originally is replaced by the new coordinate origin.
- When the user coordinate is used, middling in corresponding user coordinate system is also resetting the auxiliary zero position. The new coordinate origin is at its middle point, and the coordinate origin set originally is replaced by the new coordinate origin.
- Press the "REF" key for ten times to clear all of the ZER coordinate system. After clearing, the 200 group coordinate is the same as the ALE coordinate.
- When resetting the ZER coordinate, you must conduct zero clearing for the data on axis X and axis Y in the ALE coordinate system, and set the absolute coordinate zero position. Otherwise, the set ZER coordinate is wrong.

Chapter V Special Functions

Besides the functions of detection and positioning, at the display, the following special processing functions are also provided: making holes along a line (at an equal interval), making holes along a circle (at an equal interval), inclined plane machining, and arc machining.

The functions make the existing equipment of the users be more effectively utilized. Before using the special functions of the display, acquaint yourself with the coordinates system first.



As shown in the figure, in the horizontal plane, the direction parallel with the operator is X axis, and in the horizontal plane, the direction vertical to the X axis is Y axis, and that vertical to the horizontal plane is Z axis. The direction to which the arrow is pointed is the positive direction of the coordinate. Users can also change the positive direction for counting in the internal parameter setting according to their own use habits.

5.1 Holes along a line

Function introduction: At the display, the function of making holes along a line at an equal interval is provided. It is used for making holes which are equally distributed and whose circle centers are along the same straight line in the XY plane. The operator only needs to input the following parameters:

LineLth : The length (the distance from the circle centers of the first hole to that of the last hole)

Angle : The angle (the angle between the oblique line and the positive direction of X axis)

Pots : The number of holes (**the number of holes shall be larger than 1**)

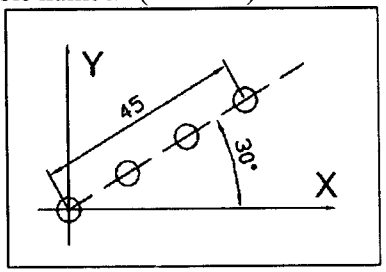
After the parameters are input, the display automatically calculate the positions of the holes along the oblique line. The operator press the ⇧ or ⇩ key to select the hole number. And then the lathe tool moves to the position the displayed values at X axis and Y axis are both 0.000, which is the position of the hole.

Example: For the work piece as shown in the figure, the parameters are set as follows:

Line distance (LineLth): 45mm

Line angle (Angle): 30 °

Hole number (Pots): 4



Operation steps:

1. In the status of normal display, metric system is selected (in the metric system/British system option).

Move the machine tool, the peak of the lathe tool is aligned to the circle center of the first hole. Zero clearing is carried out for X axis and Y axis.

2. Press ⌨. The function of making holes along a line (at an equal interval) is displayed.

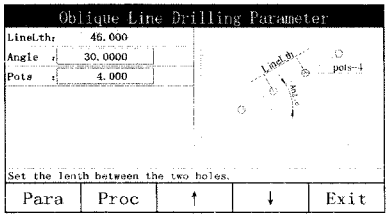
If there is no need to change the parameters input previously, Press the function key of "Proc". The processing of holes along the oblique line (at an equal interval) is directly started.

3. Input the length of the oblique line.

Press [4]→[5]→[ENTER] in sequence.

4. Input the angle of the oblique line.

Press [3]→[0]→[ENTER] in sequence.



5. Input the number of holes to be made along the oblique line (at an equal interval).

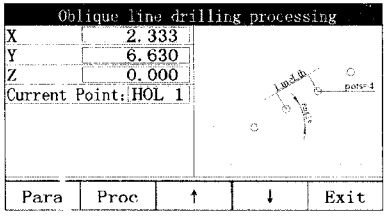
Press [4]→[ENTER] in sequence.

6. The interface of "Proc" is displayed.

Press [⇧] or [⇩] to switch over between the numbers of the processing points.

Move the machine tool to the position where 0 is displayed in both the X window and Y window.

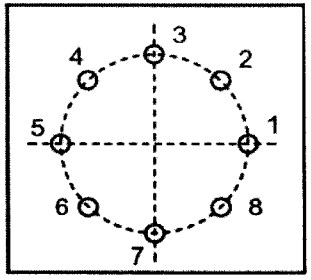
Punching can be started at that point.



7.After processing is completed, press [⇲] to return to the normal display status.

5.2 Making holes along a circle

Function introduction: The function of making holes along a circle (at an equal interval) is provided at the display. With this function, holes equally distributed along a arc (or circle) in the XY plane can be processed



After the interface of the function of making holes along a circle (at an equal interval) is displayed, the parameters that the user has to defined are shown in the information window.

PCD Rad : The radius of the arc (the radius of the arc to be equally divided)

Point Tot : number of points (number to which the arc is to be equally divided) (**the number of points shall be larger than 1**).

Start Ang : Starting angle (the angle of the center of the first circle)

End Ang : End angle (the angle of the center of the last circle)

Mach Direc : Processing direction

(Note: When the starting angle is the end angle, it is indicated that the holes are distributed equally along the whole circle.)

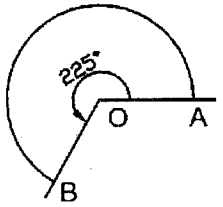


Diagram A

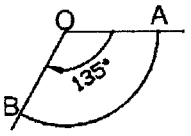


Diagram B

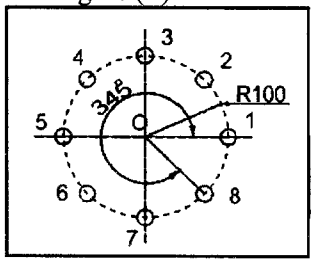
In any of the XY, ZX, and YZ planes, the directions include the anti-clockwise direction and clockwise direction. Input the angle direction when processing is required.

When the direction is set to be "0", it is indicated that the direction from the starting angle to the end angle is the anti-clockwise direction, as the arc shown in Figure A. The angle from point A to point B is 225° at anti-clockwise direction.

When the direction is set to be "1", it is indicated that the direction from the starting angle to the end angle is the clockwise direction.As the arc shown in Figure B. The angle from point A to point B is 135° at clockwise direction.

After the preceding parameters are input, the positions of the equally-distributed holes are automatically calculated out at the displayed, and the positions of the holes are set to 0. The user only has to press xx or xx key to select the position of the hole to be process and move the cutting tool to the position of which the displayed values at X axis and Y axis are both 0. Then the processing is started.

Example: Processing the holes along the circle at the spare part as shown in Figure (E)



Arc radius (PCD Rad) : 100mm

Number of equally-distributed points (HOLE NUM): 8 (the number of holes to be processed shall be larger than 1)

Starting angle (Start Ang) : 0°

End angle (End Ang) : 315°

Processing direction (Mach Direc) : anti-clockwise direction (0)

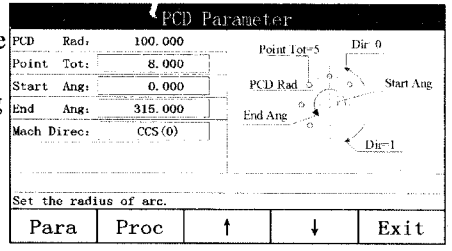
Operation steps:

1. In the normal display status, select metric system for the display size unit.

Move the machine tool. Set the origin of coordinates to be at the 0 point.

2. Press [⊕]. The interface of the function of making holes along a circle (at an equal interval) is displayed.

If there is no need to change the parameters input previously, press the function key of "Proc". The processing of holes along the oblique line (at an equal interval) is directly started.



3. Input the radius of the circle

Press [1]→[0]→[0]→[ENTER] in sequence.

4. Input the number of points (number to which the circle is to be equally divided)

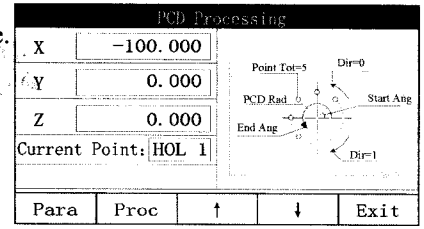
Press [8]→[ENTER] in sequence.

5. Input the starting angle

Press [0]→[ENTER] in sequence.

6. Input the end angle

Press [3]→[1]→[5]→[ENTER] in sequence.



7. Input the processing direction

Press [0]→[ENTER] in sequence.

8. The interface of "Proc" is displayed.

Press [⇧] or [⇩] to switch over between the numbers of the processing points.

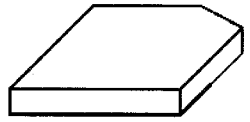
Move the machine tool to the position where 0 is displayed in both the X window and Y window.

Punching can be started at that point.

9. After the processing is completed, press [⊕] to return to the normal display status.

5.3 Oblique plane (slope) processing

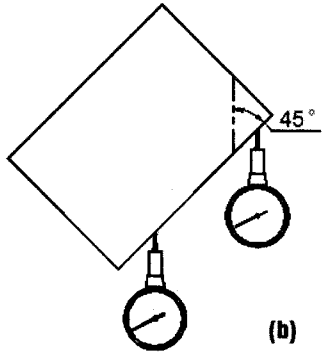
When an oblique plane of relatively large slant angle is to be processed, it is the most easy and simple to use the function of oblique plane processing.



(a)

I. Oblique plane calibration:

When processing the spare part as shown in Figure (a) in the XY plane, before processing the oblique plane, calibrate the slant angle of the work piece first. At this time, the function of oblique plane processing plays the role of calibrating the oblique plane.



(b)

Steps for calibrating oblique planes:

First of all, put the work piece on the workbench, approximately according to the required slant angle.

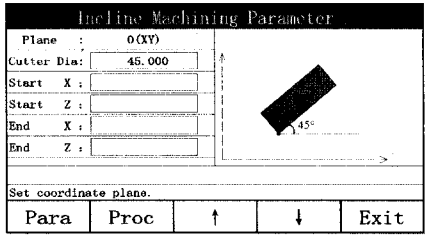
1. Press [N]. The interface of the function of oblique plane processing is displayed.
2. Select the plane to be processed, 0 (XY) plane.
3. Input the angle of the oblique plane.
4. Move the workbench, so that the measurement tool (such as the dial indicator) which has been properly installed (clamped) at the milling machine lightly contacts the oblique plane, and adjust it to zero point, and move the workbench along the X-axis direction for any distance.
5. Press [Y] key. Move according to the display along the Y-axis direction until zero is displayed.
6. Adjust the angle of the work piece, so that the work piece contact the measurement tool. And continue until zero is displayed.

For example: Calibrate the angle of the work piece to 45° , as shown in Figure (b).

1) Put [N] the work piece on the workbench at approximately 45°
push

2) Select the plane to be processed.
Press [0] to select the XY plane.
push [ENTER]

3) Input the angle of the oblique plane.
push [4] → [5] → [ENTER]



4) The interface of "Proc" is displayed.

Press [↑] or [↓] to switch over between the numbers of the processing points.

Move the machine tool to the position where 0 is displayed in both the X window and Y window.

Punching can be started at that point.

5) Move the workbench along the X-axis direction until the measurement tool lightly contacts the work piece. After zero adjustment, move along the X-axis direction for any distance.

6) Press [Y] to display the movement distance along the Y-axis direction.

7) Move the workbench along the Y-axis direction. Adjust the angle of the work piece so that the calibrated oblique plane contacts the measurement tool until zero is displayed.

8) Move the workbench until zero is displayed at Y axis.

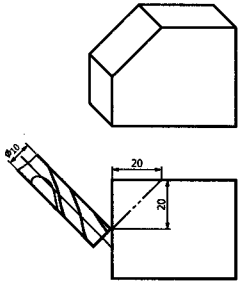
9) After the processing is completed, press [⊕] to return to the normal display status.

II. Oblique plane processing

When the plane to be processed is in the XZ or YZ plane, through the function of oblique plane processing, the operator is gradually directed to process the oblique plane.

The steps of the function of oblique plane processing:

When the plane to be processed is in the XZ or YZ plane, first of all calibrate the oblique angle of the main spindle head of the machine tool and align the cutting tool.



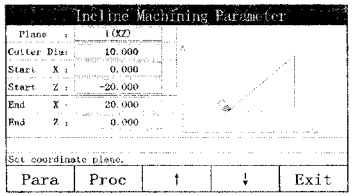
Press [N] to display the interface of oblique plane processing.

1. Select XZ or YZ to be the plane to be processed.
2. Input the diameter of the cutting tool.
3. Input the starting point (XZ/YZ)
4. Input the end point (XZ/YZ)
5. Press xx to quit the function of oblique plane processing at any time

Please see the actual example:

1) Calibrate the oblique angle and align the cutting tool.

push [N]



2) Select the plane to be processed.

Press [1] to select the XZ plane.

Press [ENTER].

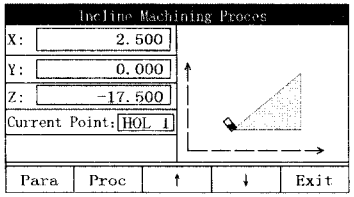
3) Input the diameter of the cutting tool.

push [1]→[0]→[ENTER]

4) Input the coordinates of the starting point.

Z axis [2]→[0]→[Z]→[ENTER]

X axis [0]→[ENTER]



5) Input the coordinates of the end point.

X axis: [2]→[0]→[ENTER]

Z axis: [0]→[ENTER]

6) The interface of "Proc" is displayed.

Press [⇧] or [⇩] to switch over between the numbers of the processing points.

Move the machine tool to the position where 0 is displayed in both the X window and Y window.

Punching can be started at that point.

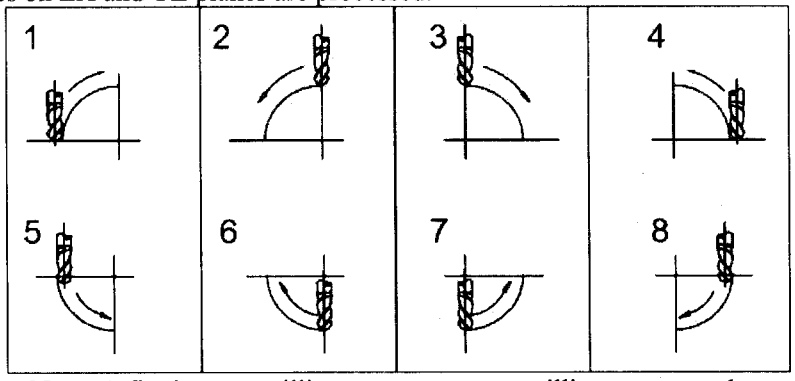
7) After the processing is completed, press [N] to return to the normal display status.

5.4 Simple arc processing

When processing moulds, it is often required to process arcs. In case the shape is simple and the production quantity is very small, resources may be wasted if a numerically-controlled machine tool is used. The function of simple arc processing is provided at the display so that a single work piece such as a copper pole of a mould can be conveniently and quickly processed at a general milling machine. With the control parameter "MAX CUT", make the arc to be cut every time equal. Control the smoothness of the arc. When MAX CUT is smaller, the cutting volume each time is smaller, and the arc to be processed is smoother, the processing time is longer; when the MAX CUT is larger, the cutting volume each time is larger, and the arc to be processed is rougher, the processing time is shorter.

A: Processing ZX and YZ planes

There are 8 processing methods as shown in the following figure when arcs on ZX and YZ planes are processed.



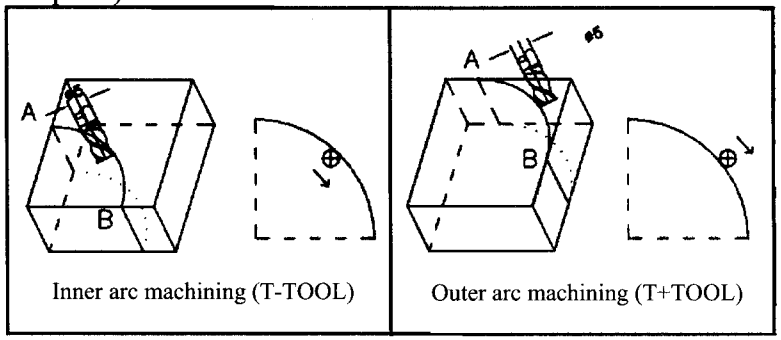
Note: A flat-bottom milling cutter or an arc milling cutter can be used for processing. When a flat-bottom milling cutter is used for processing the arc, set the diameter of the cutter to be 0.000.

B: Processing the XY plane

When processing the XY plane, there are also the preceding eight processing methods. The cutter is vertical to the plane to be processed. Each method is further divided into inner arc processing and outer arc processing. Therefore, when processing the XY plane, select the cutter compensation mode: processing of outer arc (1: T+T00L) and processing of inner arc (0: T-T00L).

Note: When processing the XY plane, no matter round-head cutter or flat-head cutter, set the radius of the cutter according to the actual value.

Select the cutter compensation direction (to be used when processing in the XY plane)



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

The following parameters shall be input for simple arc processing:

Plane to be processed: 0-XY, 1-XZ, 2-YZ

Processing mode: Select one of the eight modes according to the indication as shown in the figure.

Arc radius: The radius value of the arc to be processed

Cutter diameter: The diameter value of the cutter used for processing

Max. cutting volume: The length of arc at each processing interval

Inner or outer arc: mode of arc to be processed (this parameter is especially for XY plane processing)

Example 1: The arc AB of 90° as shown in Figure 4.4-1 is to be processed from point A (starting) to point B (end).

The parameters are set as follows:

The plane to be processed: XY

Processing mode: 3

Arc radius: 20mm

Cutter diameter: 5m

Max. cutting volume: 1mm

Inner or outer arc: 1-T+TOOL

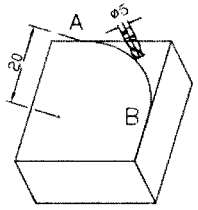


Diagram 4.4-1

Operation steps:

1. In normal display status, select metric system in the metric system/British system option.

2. Move the drilling machine. Align the cutter to A point. Carry out zero clearing respectively for X axis and Y axis.

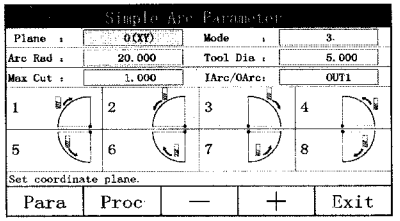
3. The interface of simple arc processing is displayed.

Press [▣]. The interface of simple arc processing is displayed.

If there is no need to change the parameters input previously, press the function key of "Coordinates" or "Figure". The arc processing is directly started.

4. Select the plane to be processed.

Press [0] to select the XY plane.



5. Select the processing mode

Eights processing modes are shown in the window figure.

Press [3]→[ENTER] in sequence.

Select the processing mode 3.

6. Input the arc radius.

Press [2]→[0]→[ENTER] in sequence. Input the arc radius.

7. Input the cutter diameter.

Press [5]→[ENTER] in sequence. Input the cutter diameter.

8. Input the max. cutting volume.

Press [1]→[ENTER] in sequence. Input the max. cutting volume.

9. Select the inner arc/outer arc mode.

Press [1]→[ENTER]. Select the outer arc for processing.

10. The interface of "Proc" is displayed.

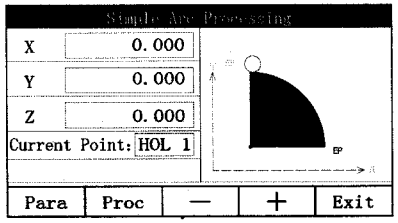
Press [↑] or [↓] to switch over between the numbers of the processing points.

Move the machine tool to the position where 0 is displayed in both the X window and Y window.

Move the machine tool to the position at which 0 is displayed in both X window and Y window. Then the processing of this point is completed.

11. The processing is completed.

Press [▣] to exit.



Example 2

The arc AB as shown in Figure 4.4-2 is to be processed from point A (starting). The parameters are set as follows:

The plane to be processed: XZ

Processing mode: 3

Arc radius: actual value

Cutter diameter: 0 (flat-head cutter)

Max. cutting volume: to be determined by the user himself/herself.

Inner/outer arc: This parameter is meaningless at Z direction

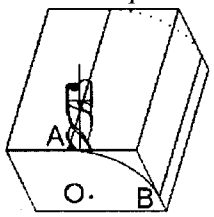


Diagram 4.4-2

Example 3

The arc CD as shown in Figure 4.4-3 is to be processed from point D (starting). The parameters are set as follows:

The plane to be processed: XZ

Processing mode: 5

Arc radius: actual value

Cutter diameter: actual value (round-head cutter)

Max. cutting volume: to be determined by the user himself/herself.

Inner/outer arc: This parameter is meaningless at Z direction

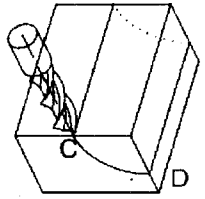


Diagram 4.4-3

Example 4

The arc EF as shown in Figure 4.4-4 is to be processed from point E (starting). The parameters are set as follows:

Processing plane: YZ

Processing mode: 7

Arc radius: actual value

Cutter diameter: actual value (round-head cutter)

Max. cutting volume: to be determined by the user himself/herself.

Inner/outer arc: This parameter is meaningless at Z direction

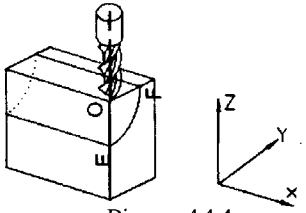


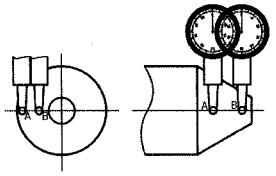
Diagram 4.4-4

5.5 The Function of measure for taper

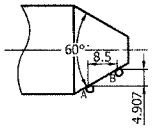
The taper of work piece can be measured when turning the taper work piece.

Operation:

As figure shows, the nod of lever meter is touched the position A of work piece surface. Pressing it to make the lever meter point to zero.



1) Then entering the function of measure for taper.
press



2) Move the lever meter to position B of work piece surface, press it to make the lever meter point to zero.

3) Compute.
press ENTER

4) Quit
key

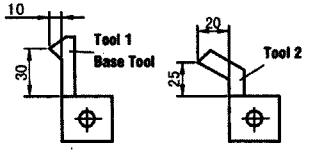
Taper measurement			
Current coordinates		Measurement result	
X:	10.005	Taper:	53.1415
Z:	20.005	Angle:	26.5707
Move scale, press ENT get measure value.			
			Remea Exit

5.6 200 tool storeroom

It will need to use different tools when turning different work pieces or different surface of work pieces, so it is necessary to uninstall and adjust the tools, SDS6 digital readout has the function of 200 tools storeroom, which makes the operation simple.

Notice: The function of 200 tools storeroom can't be used but the lathe has the frame of adjusting tool. Please don't use this function if you haven't the frame of adjusting tool.

1、 Set a base tool. In the state of "ALE", to clear the display value of the X axis or the Y axis when moving the base tool to touch the frame of adjusting tool.

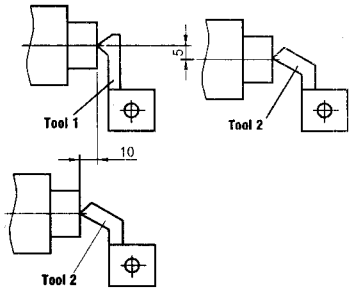


(a)

2、Ensure the other tool position relative to the base tool position, which is also the zero point of "ALE" coordinate system, as the figure (a) shows, the relative position of the second tool is:
X-axis 25-30=-5, Y-axis 20-10=10.

3、Number the tool, and store the relative position to the base tool into the digital readout.

4、In process, the operator can input the numbers of using tool, the digital readout will display the relative position dimension of using tool to the zero point of "ALE" coordinate system, moving the lathe platform to make the display of X axis and Y axis become zero.



5、The tool storeroom can store datum of 200 tools.

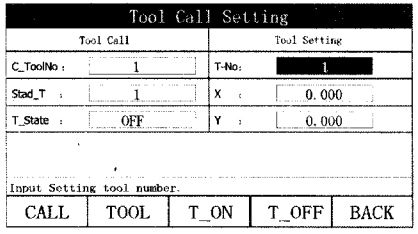
Notes: the Y-axis value mentioned above is the integrated value of Y-axis with Z-axis, namely the Z/Z0-axis in the former lathe machine readout.

The operation of inputting the datum of tools and calling tool:

1) Please input the datum of tools, in the "ALE" coordinate system, clear the display value when moving the base tool to touch the frame of adjusting tool, set the first tool to the base tool.

2) Enter the inputting stare.
press (r)

3)press key"F2"set tool para.



4) Input the numbers of tool
press [1] → [ENTER]

5)input the tool offset
X offset: press [0] → [ENTER]
Y offset: press [0] → [ENTER]

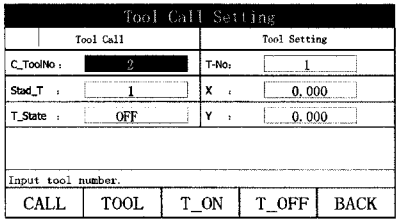
6) Input the numbers of tool
press [2] → [ENTER]

5) input the tool offset
X offset: press [5] → [+/-] → [ENTER]
Y offset: press [1] → [0] → [ENTER]

6) you can set others tools like this.

You can operate the tool storeroom as below after you input the datum of tools, first install the second tool.

1) press key"F1"switch the set window.



2) Ensure the base tool.
Default the first tool as the base tool, you can also set the other tool as the base tool, key number is OK.

3) Call the second tool.
Move Cursor to "call tool",
press [2] → [ENTER]

4) open the tool
Move cursor to"tool state"
press"F3"or "F4",can switch the tool state between on and off.

5)quit, press"F5" back to coor windows.
Move the flat-from to make the display value of X axis and Z/Z_0 axis become zero.
The second tool has reached the datum mark, in like manner, the operator can input and call 200 tools.

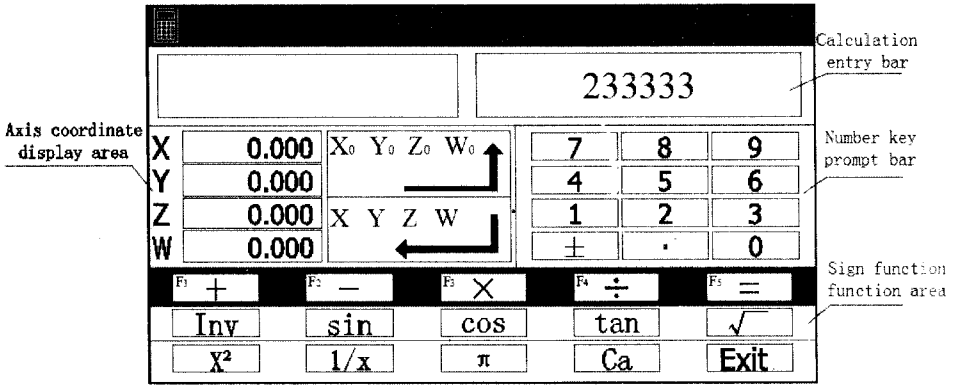
Chapter VI Calculator Function

In the process of processing work pieces, users may need to calculate some values. The calculator function provided at the display make the users more convenient when processing according to the drawings. With this calculator, the calculation results can be directly transferred to the axis to be processed. The user only needs to move the drilling machine to the position at which 0 is displayed, which is the calculation results indicate.

In the normal display status, press . The interface of calculator function is displayed.

After the interface of calculator function is displayed, press to return to the normal display status.

6.1 Interface introduction



Sign function area:

The signals of the first tier	+	-	×	÷	=
Meaning	Plus sign	Minus sign	Product sign	Division sign	Computed result

The signals of the second tier	Inv	sin	cos	tan	√
Meaning	Anti-trigonometric function sign	Sinus	Cosine	Tangential	Radication
The signals of the third tier	X~2	1/X	π	CA	EXIT
Meaning	Square	Reciprocal of the calculation result	pi	Scavenging	Disengaging

6.2 Calculation examples

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

2 → + → 3 → 0 → × → 2 → − → 6 → + → 2 → =

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

3 → 4 → 5 → + → 2 → × → 0 → . → 5 → +/- → Inv → sin → =

Note: In case of a digit input error, press CA key to input again.

In case of any mistake in the calculation process, the system sends out the alarm voice indicating the error. At that time, press CA key to input again.

The absolute value of the input value and the calculation result shall not be larger than 9999999 or smaller than 0.000001. Otherwise, the display fails.

6.3 Calculation result transfer

After the calculation is completed, press X, Y, Z, or W key. The calculation results are respectively transferred to the X, Y, Z, or W axis for display (**the values beyond the display scope cannot be transferred**); when the calculation function is on, press X0, Y0, Z0, or W0 key to respectively transfer the values displayed in the X, Y, Z, or W axis windows to the calculator.

Chapter VII Error Compensation Function

7.1 Linear error compensation

There is an error between the measured value and standard value of the grating rule. If the two measurement curves are in an identical shape within the grating ruler's range of travel but not in coincidence, this is called a linear error.

Linear correction: To compensate the linear error so that the displayed value is equal to the standard value.

Note: The linear error correction value is set by the installation personnel, and must not be modified by the user at will, which otherwise would affect measurement accuracy.

Step I: The interface of display system parameter setting is displayed. Set the compensation mode of the corresponding axis to be "Linear compensation". (See Chapter 2.6 for the detailed setting method)

Step II: Input the linear error compensation value. There are two setting methods:

1. To calculate the correction factor with a formula according to the standard value and the digital display value.

2. Move the grating ruler to the standard value (the value shall be the integral multiple of 10mm). After the current position is confirmed, the system automatically calculate the compensation factor.

Example: Install the standard measurement device (such as block gauge and laser, etc.) at the X axis of the workbench. Move the grating ruler

corresponding to the workbench until 1000mm is displayed as the standard measured value. At that time, the displayed value at the display is 999.98mm.

Method 1: Manually input the correction system. Calculate with the following formula:

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

L---Actual measured length. Unit: mm

L'---Displayed value at the display. Unit: mm

S---When the correction factor mm/m is "+", lengthening is indicated; when the correction factor mm/m is "-", shortening is indicated.

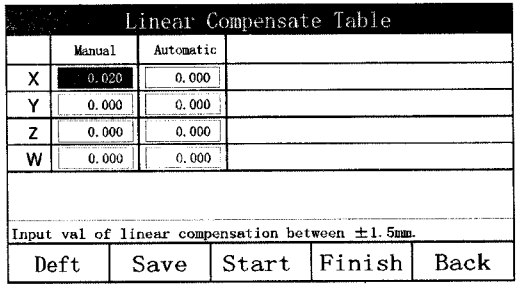
Compensation scope: -1.500 mm/m~+1.500 mm/m

The actually-measured length of the machine tool workbench is 1000, while the finally displayed value at the display is 999.98.

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

After the correction factor is got through calculation, press the axis key.

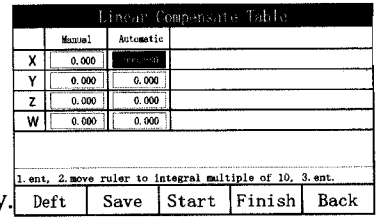
Press  key. Then the setting interface is displayed.



Method 2: Automatic calculation correction system

1. The interface for setting the linear compensation tale is displayed. Move the cursor to the "automatic setup" area at X axis.

2. Move the X-axis grating rule on the workbench until 1000mm is displayed as The standard measured value. At that time, 999.98mm is the displayed value at the display.



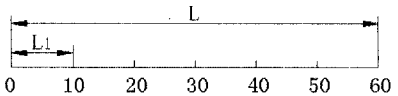
3. Press the  button. The error correction is completed.

7.2 Non-linear error compensation

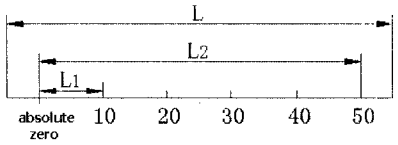
Attention: The non-linear compensation function can only be set up in the status of metric display. After the setup is completed, metric system or British system can be selected for display.

There are two methods for setting the starting point when making non-linear error compensation at the display:

1. To make error compensation with the starting point as the mechanical origin (Figure 1)
2. To make error compensation with the first actual zero point of the grating ruler as the mechanical origin (Figure 2)



(Figure 1)



(Figure 2)

L: The distance of the effective range of the grating ruler

L1: The length of the compensation section

L2: The effective distance of compensation

Note: The user can set the preceding distance at vill according to the actual requirement. There is no requirement on interval distance.

Step I: The interface of display system parameter setting is displayed. Set the compensation mode of the corresponding axis to be "Non-linear compensation".(See Chapter 2.6 for the detailed setting method)

Step II: The compensation interface is displayed. Set the non-linear error compensation value.

1. At the coordinates interface, press the axis key, and then press the INCH/MM key. The non-linear compensation interface is then displayed.

2. "Step 1" is displayed at the display:

Compensation setting: Use the axis compensation function. Find the reference point in the next step.

Restore the compensation table: Delete the last compensation value. The default values are restored at the compensation table.

Check the compensation table: check the compensation value set last time.

3. "Step 1": Select the compensation setting function.
Press ENTER key. Find the reference point in the next step.

4. Move the grating ruler at the positive direction. After the reference point is found, the cursor skips to "Step 3".

5. According to Figure 1, the grating ruler has to be moved to the max. position at the negative direction. Press the axis zero clearing key. It is indicated that the compensation starts at this point.

According to Figure 2, directly display the position with 0.000 as the coordinates value. Press the axis zero clearing key. It is indicated that the compensation starts at the absolute zero position of the current grating ruler.

6. The compensation table is displayed. Move the grating ruler at the positive direction to the compensation point position. Input the standard value at the "X-Coor" column.(Repeat this step to input several points)

No.	X-Tool	X-Coor	Y-Tool	Y-Coor	Z-Tool	Z-Coor	W-Tool	W-Coor
0	0.000	0.000						
1								
2								
3								
4								
5								
6								
7								
8								
9								
	X-Num		Y-Num		Z-Num		W-Num	

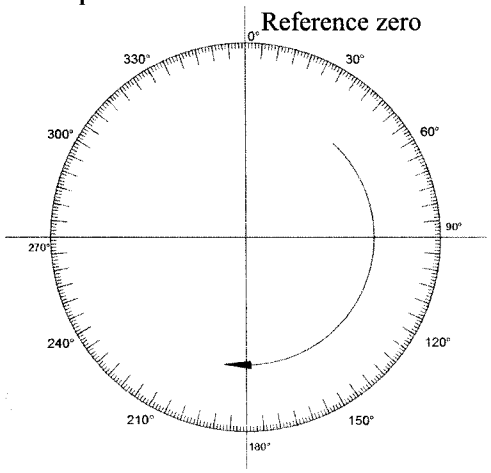
7. After the compensation setting is completed, press "Save" function key to save and exit.

7.3 Angle error compensation

Attention: The angle compensation function can only be set when the angle display type is decimal.

Setting method for angle error compensation of the display: take the reference zero point of the circular grid ruler as the mechanical origin for error compensation.

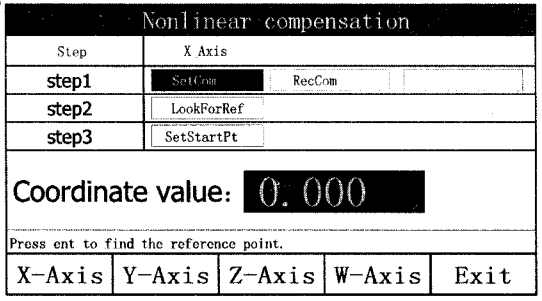
Note: The angle interval is user-defined, divided according to the actual demand, and then compensated.



Step 1: enter the display system parameter setting interface, set the corresponding axis type as "Angle", modify the "resolution" according to the selected product, and modify the compensation method to "Non-linear compensation". (See Chapter "2.6" for specific setting method)

Step 2: enter the compensation interface and set the nonlinear error compensation value.

1. At the coordinates interface, press the axis key, and then press the [INCH/MM] key. The non-linear compensation interface is then displayed.



2. "Step 1" is displayed at the display:

Compensation setting: Use the axis compensation function. Find the reference point in the next step.

Restore the compensation table: Delete the last compensation value. The default values are restored at the compensation table.

3."Step 1": Select the compensation setting function.

Press [ENTER] key. Find the reference point in the next step.

4. Rotate the circular grating ruler to the position where the coordinate value of the selected axis is 0.000. After the reference point is found, the cursor skips to "Step 3".

Enter the compensation table, rotate the circular grid ruler to the compensation point in a positive direction, and enter the standard value in the "X-Coor" column. (Repeat this step to input several points)

No.	X-Tool	X-Coor	Y-Tool	Y-Coor	Z-Tool	Z-Coor	W-Tool	W-Coor
0	0.000	0.000						
1								
2								
3								
4								
5								
6								
7								
8								
9								
	X-Num		Y-Num		Z-Num		W-Num	

5. After the compensation setting is completed, press "Exit" (F5) function key to save and exit.

Attention: after the user uses the angle / linear nonlinear error compensation function, the system will prompt to find the reference origin again after each startup and restart (buzzer reminder).

Press the [INCH/MM] key to enter the compensation interface. After rotating to the reference zero point, the system will automatically exit to the coordinate interface.

Chapter VIII Trouble Shooting

In the following table, simple trouble shooting methods are listed. If the problems cannot be solved through the methods, please do not dismantle the display by yourself for fear of an electric shock. Please contact our company or a corresponding agent promptly for help.

Problem	Cause	Troubleshooting
The display is not show	1: The power is not switched on. 2: The fuse is damaged. 3: 220V power cable is poorly connected. 4: Whether appropriate power voltage is used.	1: Switch on the power.0} 2: Replace the fuse with a new one of the same specification. 3: The power plug shall be in proper condition. 4: Whether the input power is within 100V~240V.
The case of the display is electrified.	1: The machine tool and display is poorly grounded. 2: There is electric leakage of the 220V power.	1: The machine tool case and the display case shall be properly grounded. 2: Check the 220V power.
The displayed value of a certain axis is two times of the normal value.	1: The resolution ration of the grating ruler is not correctly set. 2: The diameter display mode is set for a certain axis.	1: Set the correct resolution. 2: Set the radius display mode.
The display-axis does not count.	1: The grating ruler 2: There is not signal output of the grating ruler. 3: The counting function of the axis of the display fails.	Exchange with the grating ruler of another axis to see whether the counting works normally. If yes, it is judged that the grating ruler is damaged. If not, it is judged that there is a display problem.
The X/Y/Z values displayed in the window are in disorder.	1: There is a disorder of the system memory. 2: The grating ruler is damaged, thus causing missing number.	1: Reset to the set factory defaults of the system. 2: Repair or change the grating ruler.
All keys of the display do not respond.	1: There is a disorder of the system memory. 2: Short circuit of the keys.	1: Reset to the set factory defaults of the system. 2: Replace with a new mainboard.

Problem	Cause	Troubleshooting
There is no response at the display when a single key is pressed.	1: The key is damaged. 2: There is a disorder of the system memory.	1: Change the key block. 2: Reset to the set factory defaults of the system.
The counting function of the display malfunctions—the displayed distance does not agree with the actual distance.	1: The accuracy of the machine tool equipment is in poor condition. 2: The operation speed of the machine tool equipment is too high. 3: The installation of the grating ruler does not meet requirements and the accuracy is insufficient. 4: The mm-display inch-display of the display do not conform to each other. 5: The resolution of the display and the resolution of the grating ruler do not conform to each other. 6: The linear error compensation value of the display is not properly set. 7: The grating ruler is damaged, thus causing missing number.	1: Repair the machine tool. 2: Reduce the speed. 3: Reinstall the grating ruler. 4: Convert mm/inch correctly. 5: Set the correct resolution. 6: Set the correct linear error compensation value (if the compensation value is not needed, then set the linear error compensation value to be 0.) 7: Repair or change the grating ruler.
The data of X and Y axes is displayed normally, but those of Z axis cannot be displayed.	1: The wrong number axis is selected.	1: The system parameter setting interface is displayed. The selected axis is the 3rd axis.
The grating ruler does not move, and the data of the display automatically increase or decrease.	1: The grating ruler is damaged. 2: The display malfunctions.	Exchange with the grating ruler of another axis to see whether the counting works normally. If yes, it is judged that the grating ruler is damaged. If not, it is judged that there is a display problem.