INCON CNC Series

INCON–TE2H

SAN-SHING Version

Lathe CNC Controller

User Manual

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Preface

SAN-SHING lathe controller system is user friendly system, it using ICON to conduct user puts in all data then system will auto calculate and finish this auto cycle cutting control. For user this system provides two MPG (X and Z) on manual operation, and Auto Cycle with icons, the system also provides G code for complicate work piece cutting.

Manual mode:

User moves X-axis and Z-axis by MPG, sets original position, sets offset.

Auto cycle mode:

User selects one of icons to enter this auto cycle and puts all data for cutting. System automatic calculates and finishes this auto cycle cutting control.

G code mode:

The system is using standard ISO G code. And the NC part program usually comes from host computer through FTP. More detail of G code has been on TE2H manual.

Auxiliary devices control:

Except motion control, system also controls auxiliary devices, and user can go to auxiliary page to turn on or off auxiliary devices.

Notice:

Please read this manual carefully in order to use the controller properly, and be sure to keep this manual handy for future reference.

Disclaimer of Warranties:

Please note that information shown here are for informational purposes only. Although every effort has been made to ensure all the information in this manual is correct, inaccuracies or typographical errors may still occur. The information are provided on an "as is" and "as available" basis.

Accordance with customer product accuracy requirements, this product is divided into traditional with CNC, CNC with traditional, pure CNC three types. The controller is purely for the action instruction has nothing to do with the processing precision, according to customer functional requirements are divided into the standard version, G code version, special edition (according to customer needs to design a dedicated graphics control interface) three types.

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Content

Chapter 1 Power On The Note and Operating Interface

1.1 Power On The Note

1. Before power on, please push "**A**" into neutral in Figure 1-1, otherwise the machine will issue an alarm and cannot be operated.
2. Before power on, please push down the handle shown in "**D**" to engage with the lead screw, otherwise the machine cannot feed.
3. In Figure 1-1, "**B**" is a button for switching between manual and CNC mode.
4. In the following figure, "**C**" is the CNC operation interface and the back is the manual operation interface.
5. In Figure 1-2, "**E**" is the electronic control box.
6. In Figure 1-2, "**F**" is the total power switch.
7. In Figure 1-2, "**G**" is the button for setting bed rail lubrication time and the oil.
8. If the spindle oil cooler is installed, please pay attention to the oil cooler is working properly.

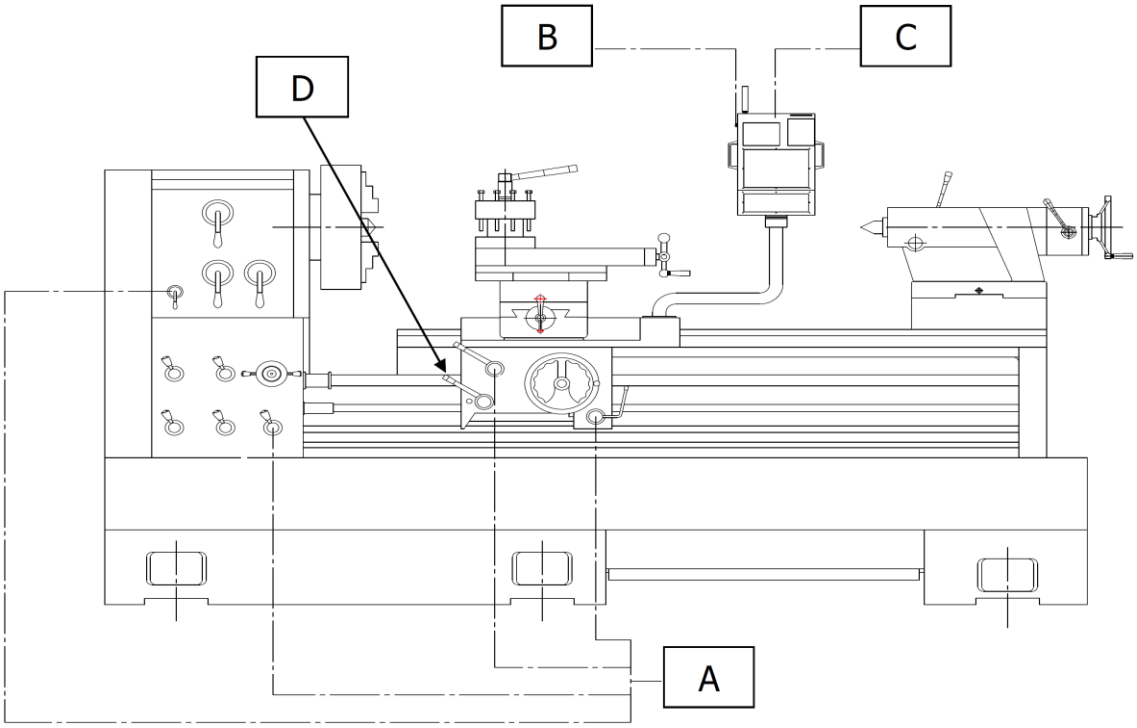


Figure 1-1 Operation of The Machine (A)

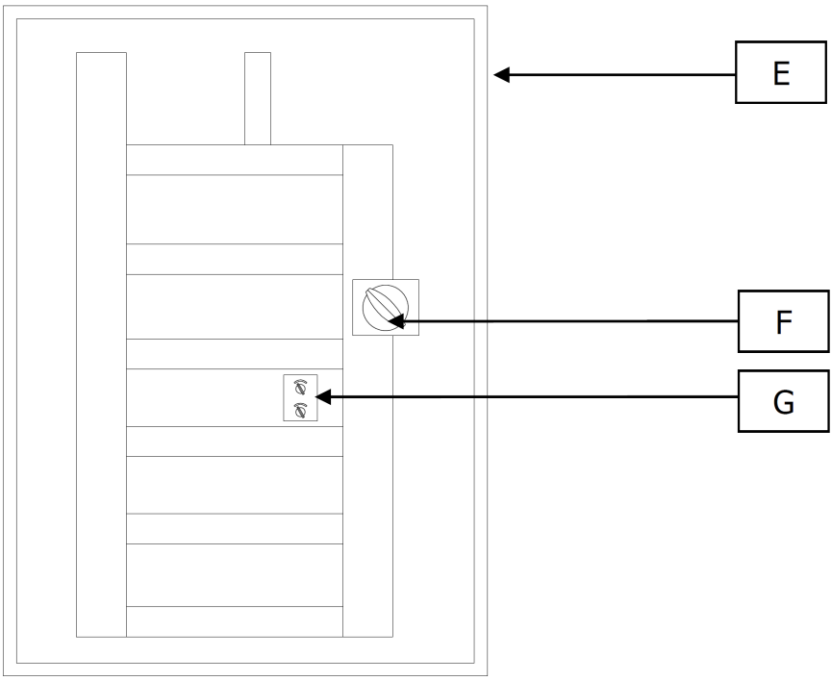
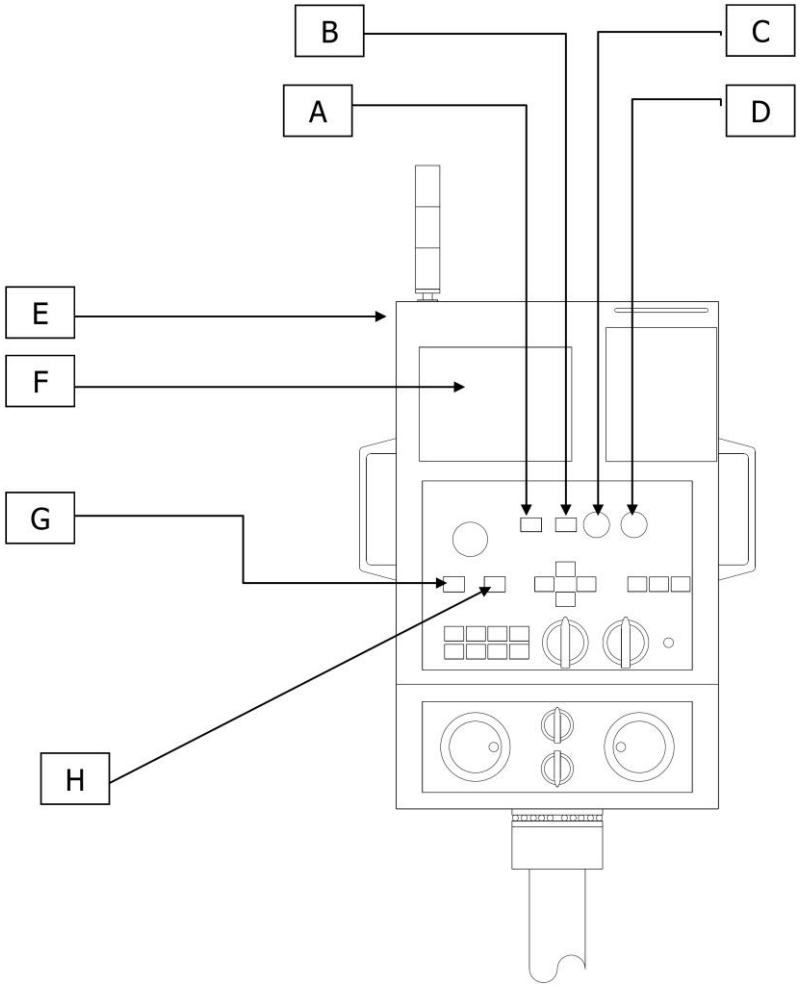


Figure 1-2 Operation of The Machine (B)

1.2 Operation Interface



A: The HMI screen on

B: The HMI screen off

C: Execute the machining program

D: Suspend processing program

E: CNC and manual switch buttons

F: HMI operation screen

G: Servo motor start

H: Servo motor over travel release

Figure 1-3 Operation of The Machine (C)

Sequence of operation:

E→A→G (Wait for the HMI display the metric and Inch screen before pressing).

Chapter 2 Limit Position

1. X-axis limit point

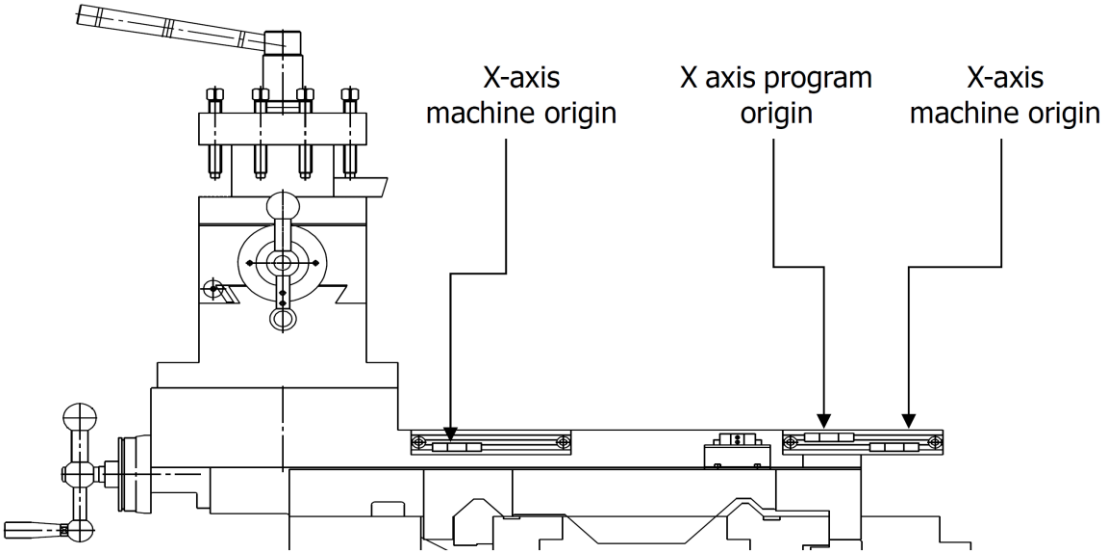


Figure 2-1 X-Axis Limit Position Drawings

2. Z-axis limit point

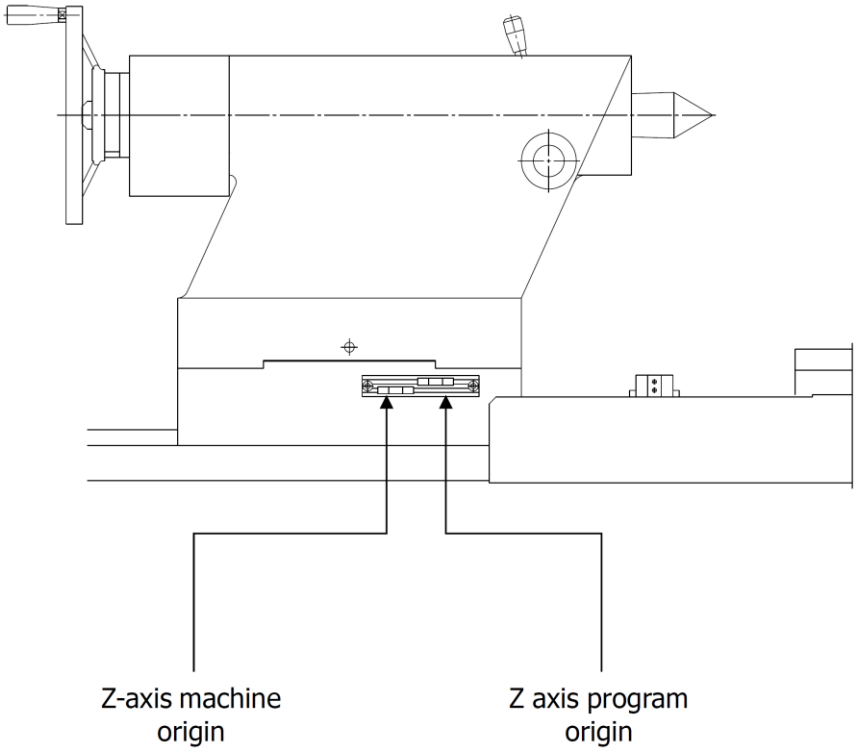


Figure 2-2 Z-Axis Limit Position Drawings (A)

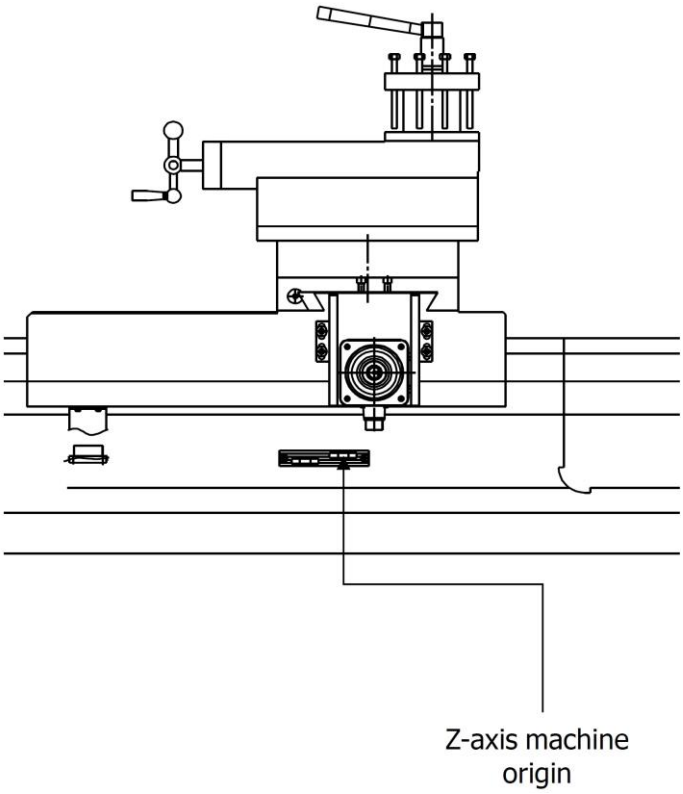


Figure 2-3 Z-Axis Limit Position Drawings (B)

Chapter 3 Power On Page

System displays power on page after power on, this page shows all information of SAN-SHING Machinery.

This page is starting page, user decides unit system in this page. After unit has been decided, system enters mode selection page for future operating.

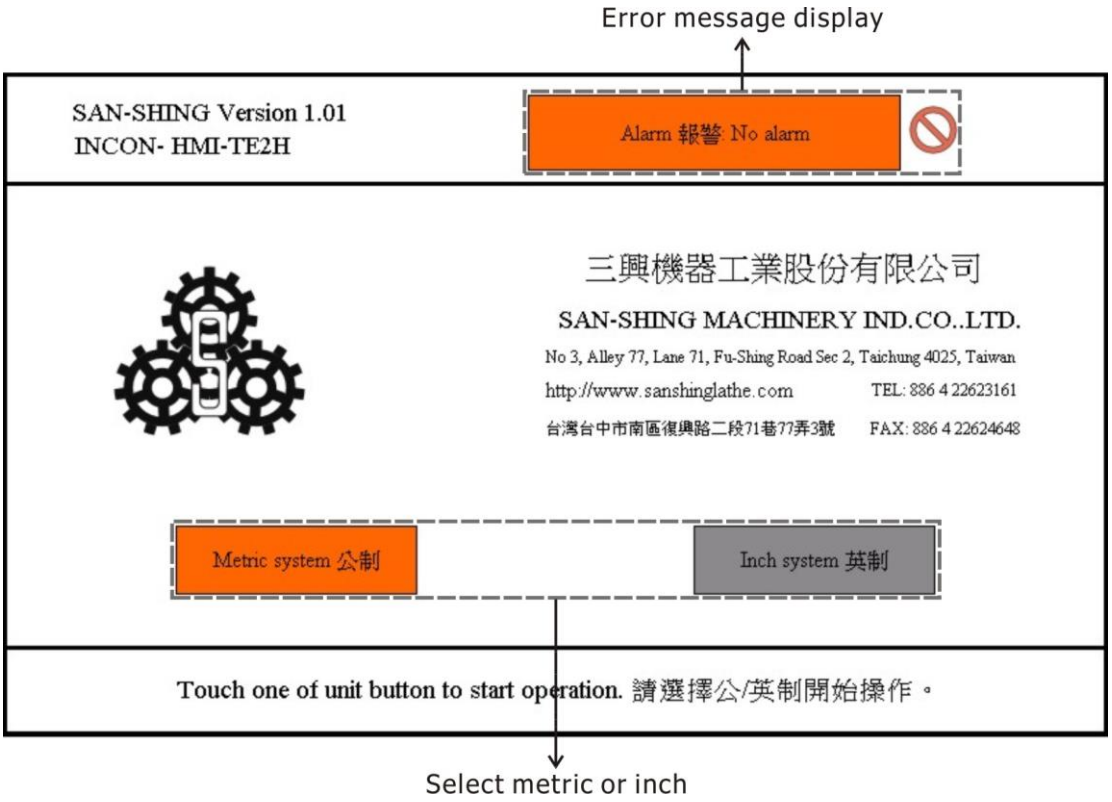


Figure 3-1 Power On Page

3.1 Alarm Indicator and Alarm Reset

This indicator is for any alarm message displays, touch alarm reset button will clear the alarm message.

Figure 3-2 Alarm Indicator and Alarm Reset

Caution: When unit system is changed will display an alarm message: "Warning!! the unit system has been changed, the previous setting data is invalid!".

NOTE: Refer to Appendix 1 for a description of the alarm signals.

Chapter 4 Mode Selects

This page has three modes for user, user just touches one of mode buttons will enter relatives mode. This page totally has three mode buttons there are manual mode button, auto cycle button and G code mode button.

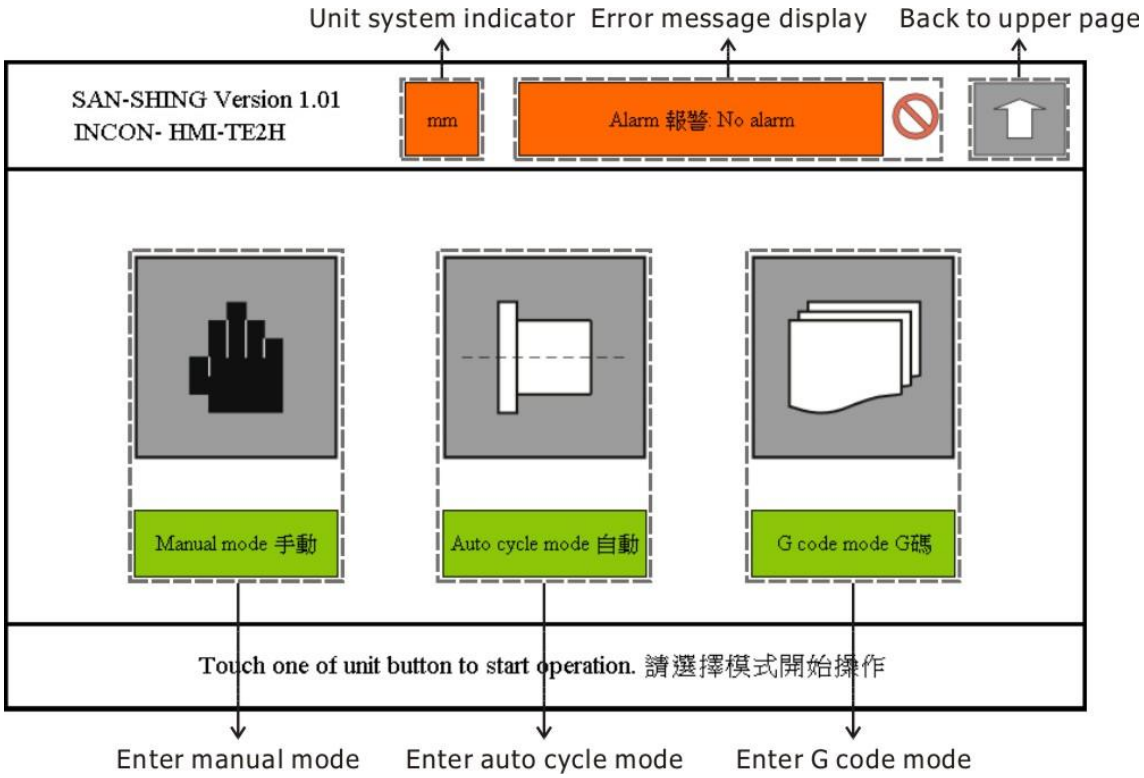


Figure 4-1 Mode Selects Page

4.1 Back to Upper Page

This button is for system goes back upper page, the upper page is power on page in this page.

Figure 4-2 Back to Upper Page Button

Chapter 5 Manual Mode

This page is designed for user to move axes, set original position, set offset and set tool table.

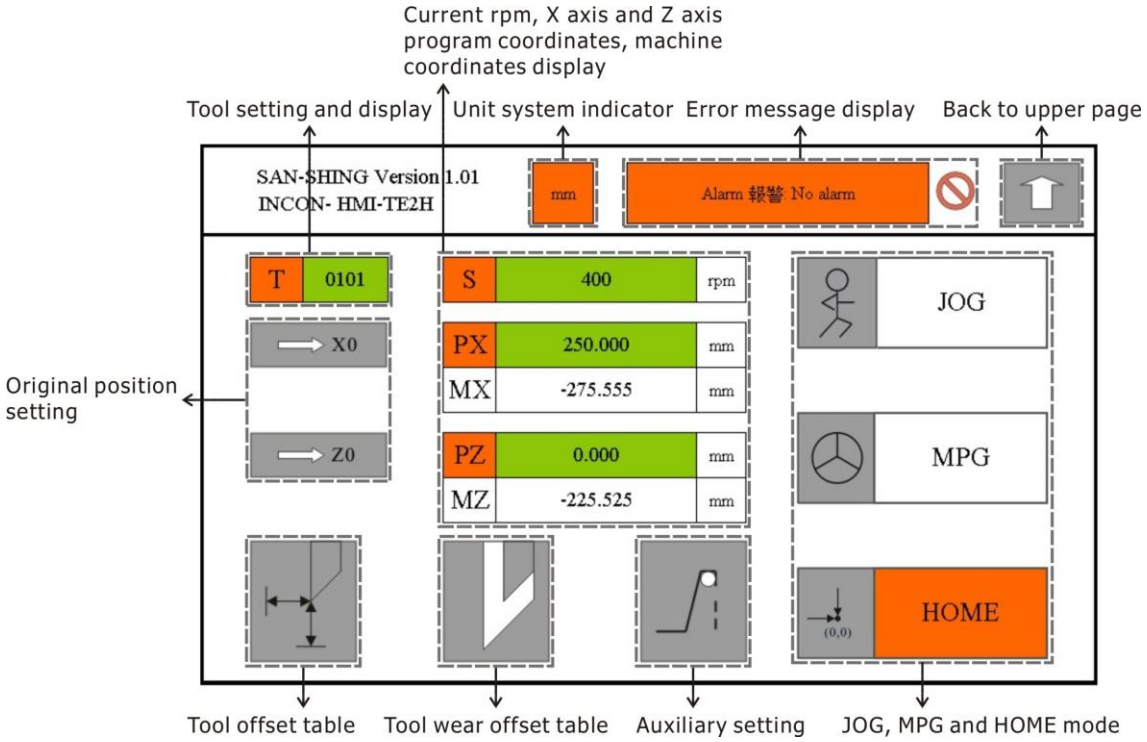


Figure 5-1 Manual Mode

5.1 Unit System Indicator

The unit system indicator is specified current unit system that has been selected at power on page. In here that is mm for example.

Figure 5-2 mm Unit System Indicator

5.2 Alarm Indicator and Alarm Reset

This indicator is for any alarm message displays, touch alarm reset button will clear the alarm message.

Figure 5-3 Alarm Indicator and Alarm Reset

5.3 Back to Upper Page

Please refer to 4.1 .

5.4 Tool Number Indicator and Tool Change Input

Tool number indicator indicates current tool number; its data field is used to input new tool number for tool change. The system changes tool by input data, tool change procedure is depend on what kind auto tool change on lathe and PLC.

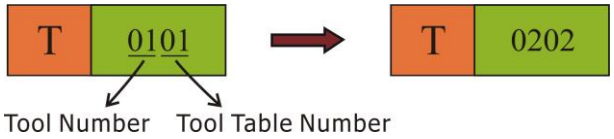


Figure 5-4 Tool Change Button

Tool setting and display:

Total eight tools: 0101, 0202, 0303, 0404, 0505, 0606, 0707, 0808. When this is set to 0101, **"5.14 Tool Offset Data Setting"** is only active for 0101, and so on.

5.5 Spindle rpm Indicator

Spindle rpm indicator shows current rpm (revolution per minute) of spindle.

Figure 5-5 Spindle rpm Indicator

NOTE: Only all CNC model can set the speed by the operator.

5.6 PX Program Position Indicator

PX program position indicator shows current program position of X axis.

Figure 5-6 PX Program Position Indicator

5.7 MX Machine Position Indicator

MX machine position indicator shows current machine position of X axis.

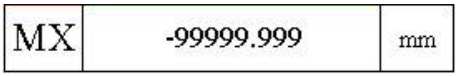


Figure 5-7 MX Machine Position Indicator

5.8 PZ Program Position Indicator

PZ program position indicator shows current program position of Z axis.

Figure 5-8 PZ Program Position Indicator

5.9 MZ Machine Position Indicator

MZ machine position indicator shows current machine position of Z axis.

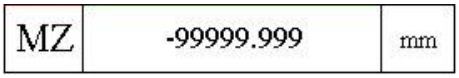


Figure 5-9 MZ Machine Position Indicator

5.10 Original Position Setting

There are two buttons at front of X and Z program position indicators, when user wants to set X or Z program position as original position, just touches X or Z button to set X or Z program position to Zero, user also can input a new program position of current program positon, by touches X or Z program position indicator then a key pad prompt out and user key in new program positon.

X/Z button X/Z program position indicator

Figure 5-10 Original Position Setting Button

5.11 JOG Button

Touch this button to select JOG, after selected JOG, user can press X+ or X- or Z+ or Z- switch on machine panel to move X axis or Z axis, the JOG override also can change by rapid rotary switch on machine panel.

Figure 5-11 JOG Button

5.12 MPG Button

Touch this button to select MPG, after selected MPG, user can using X axis MPG or Z axis MPG to move X axis or Z axis, the feed of MPG can select by MPG feed rotary switch on machine panel.

Figure 5-12 MPG Button

5.13 HOME Button

Touch this button to select HOME, after selected HOME, user must reset the X-axis before the Z-axis resets, and the reset operation must be performed after power on. (user can press X+ or X- to do X axis homing, and press Z+ or Z- to do Z axis homing)

Figure 5-13 HOME Button

Caution: If the X or Z axis is not fully homed, do not press any other key. It will cause the two axes to keep moving to the spindle. Please reboot if accidentally pressed.

5.14 Tool Offset Data Setting

System provides a tool table for eight tools, each tool has X offset, Z offset, tool nose radius and tool type. Usually we use first tool to find out original position, then others tool needs to find out offset based on original position, when the different finds out we will put it to tool table. System will offset position from original position according to each tool offset. The tool table button is key for user to get in tool table for set each tool offset, radius, and type of tool.

User touches this button will enter tool offset table.

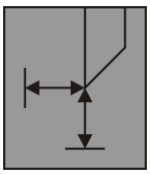


Figure 5-14 Tool Offset Data Button

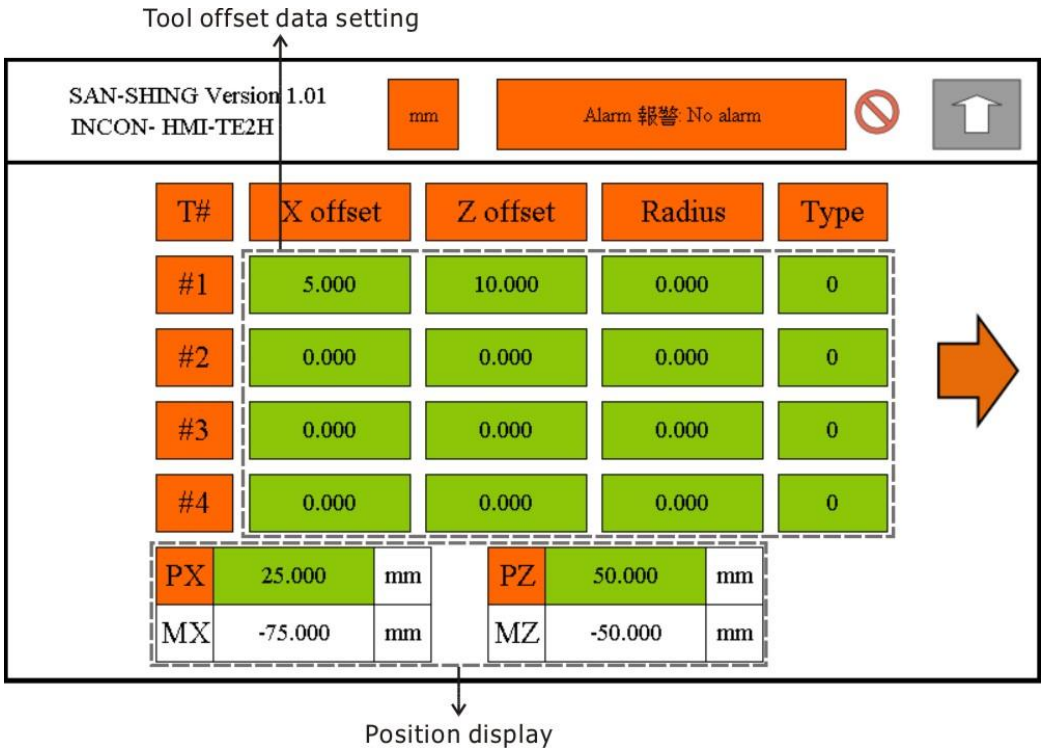


Figure 5-15 Tool Offset Table (First Page)

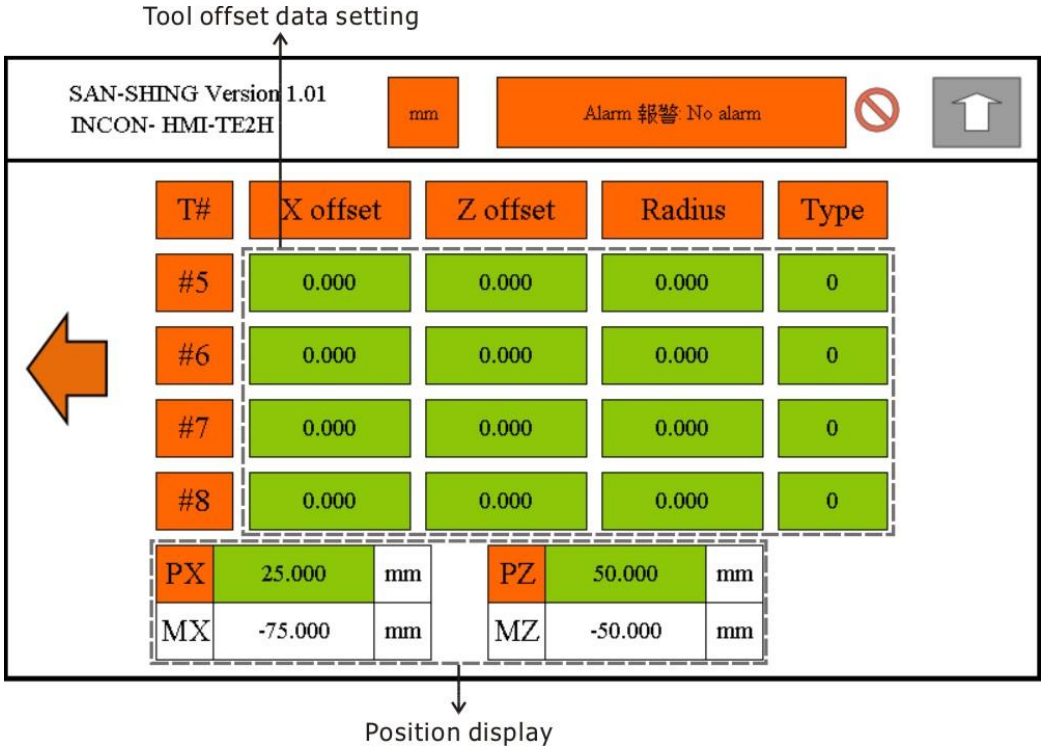


Figure 5-16 Tool Offset Table (Second Page)

On the bottom of page has X axis program position, X axis machine position, Z axis program position and Z axis machine position indicator for user key in offset reference.

"**Type**" is the direction of tool nose. It should be set in order to make sure the direction of the tool nose compensation. It has eight tool types as below:

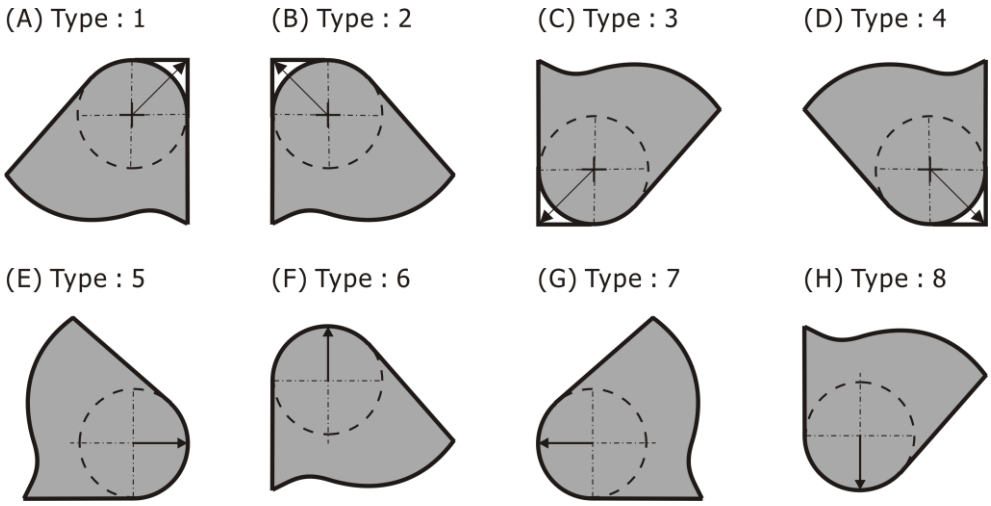


Figure 5-17 8 Kinds of Tool Types

5.14.1 Z axis tool teaching calculation

For example: To teach the 0101 tool.

1. Move Z axis to let the tool nose touch the right end of work piece.
2. Press "**1**" and then enter 0.
3. At this time, the data of "**1**" becomes 0.
4. Press "**1**" again and enter the data which is shown in "**2**".
5. Now, the data of "**2**" becomes 0, tool teaching for the Z direction is finish.

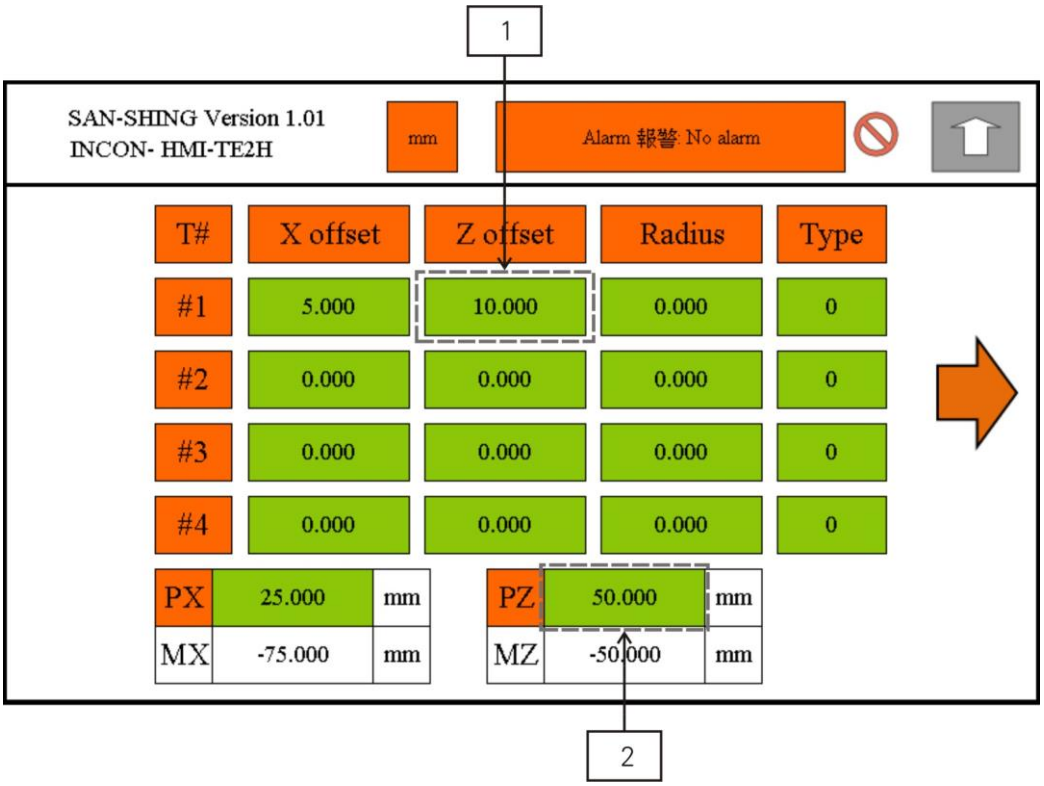


Figure 5-18 Tool Offset Table (Z Axis Tool Teaching)

5.14.2 X axis tool teaching calculation

For example: To teach 0101 tool.

1. To measure the outside diameter of the workpiece (Assuming diameter A).
2. Move X axis to let the tool nose touch the outside diameter of the workpiece.
3. Press **"3"** and then enter 0..
4. At this time, the data of **"3"** becomes 0.
5. Assumed B is the data that obtained by subtracting the diameter A from the data at **"4"**
6. Press **"3"** again and then enter the **"B"** data.
7. Noe, the data of **"4"** becomes the diameter A (need positive), tool teaching for the X direction is finish.

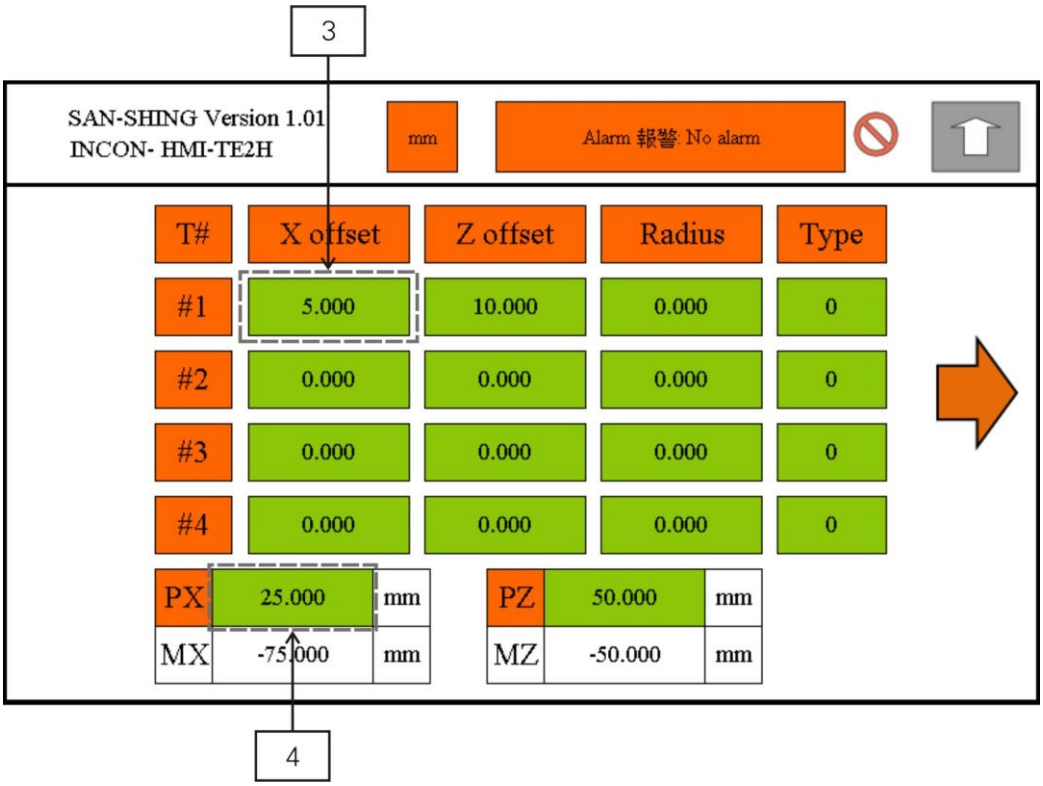


Figure 5-19 Tool Offset Table (X Axis Correction Tool)

5.15 Tool wear offset data setting

Users press this button to enter the tool wear offset table to set tool wear offset and radius. There can be at most 8 tools.

Figure 5-20 Tool wear offset data button

Figure 5-21 Tool wear table (First Page)

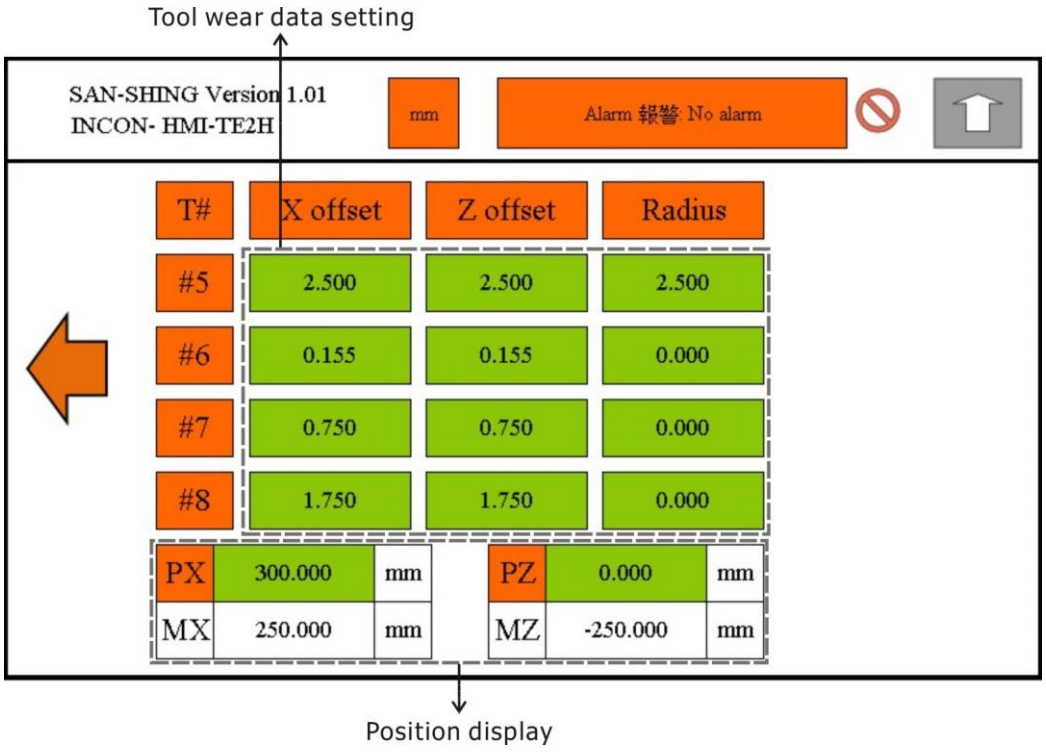


Figure 5-22 Tool wear table (Second Page)

NOTE 1: The addition and subtraction of the compensation data is based on the positive and negative direction of the mechanical origin.

NOTE 2: The compensation is progressive.

NOTE 3: X-axis compensation data need to be twice the wear of X direction.

NOTE 4: Z-axis compensation data is the wear of Z direction.

NOTE 5: The compensation data does not disappear due to shutdown, therefore do home first when you power on.

NOTE 6: Total eight tools: 0101, 0202, 0303, 0404, 0505, 0606, 0707, 0808. When **"5.4 Tool Number Indicator and Tool Change Input"** is set to 0101, **"5.14 Tool Offset Data Setting"** only has a function for 0101 setting, and so on.

5.16 Auxiliary Button

This button is designed to enter auxiliary setting table.

Figure 5-23 Auxiliary Button

Auxiliary page has auxiliary devices control icons for user control auxiliary devices.

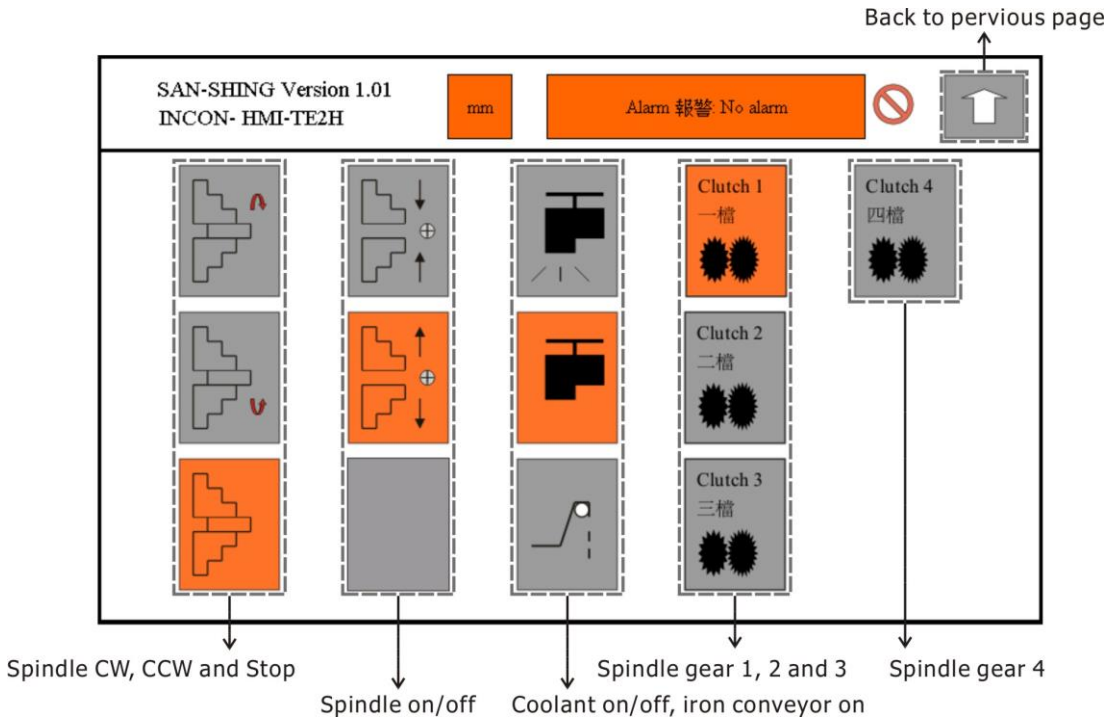


Figure 5-24 Auxiliary Page

This page provides spindle CW, spindle CCW, spindle stop, spindle off, spindle on, coolant on, coolant off, iron conveyor on, spindle first gear, spindle second gear, spindle third gear and spindle fourth gear. Each one auxiliary device control has an icon for user turns it on or off.

Caution 1: Must choose detection spindle gear before auxiliary device control, otherwise it will display an alarm message when run the program.

Caution 2: When detection spindle gear and actual spindle gear is different, it will display an alarm message when run the program or spindle CW or spindle CCW.

NOTE: Spindle automatically clamping and spindle gear changing are for CNC models dedicated, coolant is optional.

Chapter 6 Auto Cycle Mode

Each icon has two same can cycle and user can select one of two by two number buttons. When above buttons have been touched on auto cycle mode page will enter single can cycle page to set data.

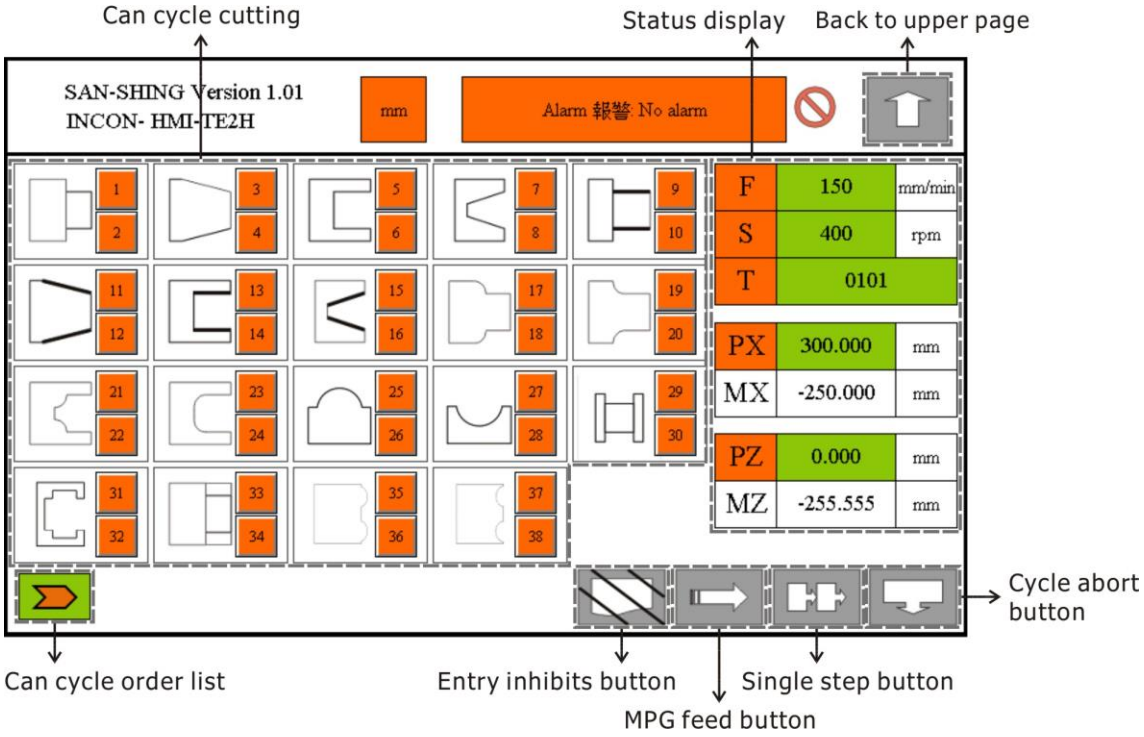


Figure 6-1 Auto Cycle Mode

6.1 Executing Order List

SAN-SHING lathe provides a seventeen executing order list for user to arrange continue executing order. When data field of list is 0 that is null and no one can cycle will call for execution, and if data field of list is between 1 ~ 38 will call the can cycle corresponds to data field.

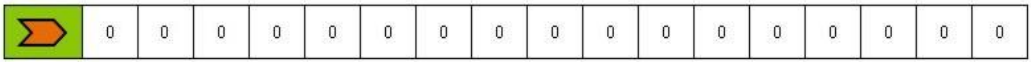


Figure 6-2 Can Cycle Order List

For example:

If the executing order is as follows: external turning, external taper and external Linear Threading, user may organize executing order list as:

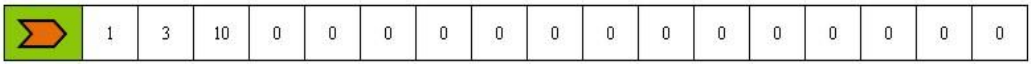


Figure 6-3 Can Cycle Order List Example

Caution 1: User must make sure all data of each cycle have been input correct, otherwise will make machine damage, SAN-SHING lathe will not responsible such wrong operation.

Caution 2: When arranging the processing stroke, the tool zero position and the range of machining must be checked again, because the choice of difference tool size may make crash. If you need to do more complex machining, we recommend you to purchase the G code function.

6.2 Data Entry Inhibits

This button is used to inhibit or allow input data, user can input data when it is off, and cannot input data when it is on. The can cycle just can execute when data entry inhibit button is on.

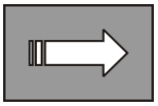
Data entry inhibit off Data entry inhibit on

Figure 6-4 Data Entry Inhibit Button

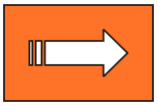
Caution: If you would like to modify the processing data size, please jump to **"Figure 3-1"** and re-enter the processing page, then the memory will be cleared.

6.3 Feed by MPG or Feed by Parameter

The can cycle can feed by MPG or feed by parameter, when feed by MPG button pressed the can cycle feed by MPG, otherwise feed by parameter.



Feed by MPG off



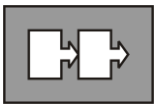
Feed by MPG on

Figure 6-5 MPG Feed Button

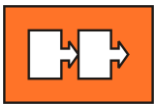
Caution: Threading could not feed by MPG.

6.4 Single Step (S.S.)

The system provides single step execution, that is to execute a step of can cycle (a can cycle has several steps) by each time that Cycle Start has been pushed when S.S. on. And can cycle continue executes when S.S. off.



Single Step off



Single Step on

Figure 6-6 Single Step Button

6.5 Abort Execution

To touch this button will force can cycle abort from execution.

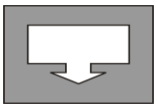


Figure 6-7 Abort Execution Button

Processing stop midway:

Suppose a workpiece has six processes, the blade wears or breaks when machining is performed to the fifth process, or an input data error is detected, please press the program to stop. Then jump into manual mode, start the spindle rotation and exit the tool with the hand wheel. After changing the tool, enter the auto cycle mode, and go to the fifth and sixth processes of the unfinished pattern control screen, to complete the unfinished process.

6.6 External Turning Single Can Cycle

Press one of number buttons on ICON of external turning can cycle will enter this can cycle's data setting page.

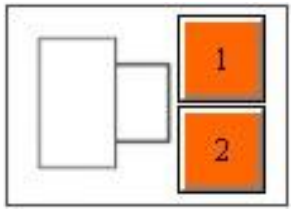


Figure 6-8 ICON of External Turning

External turning data setting:

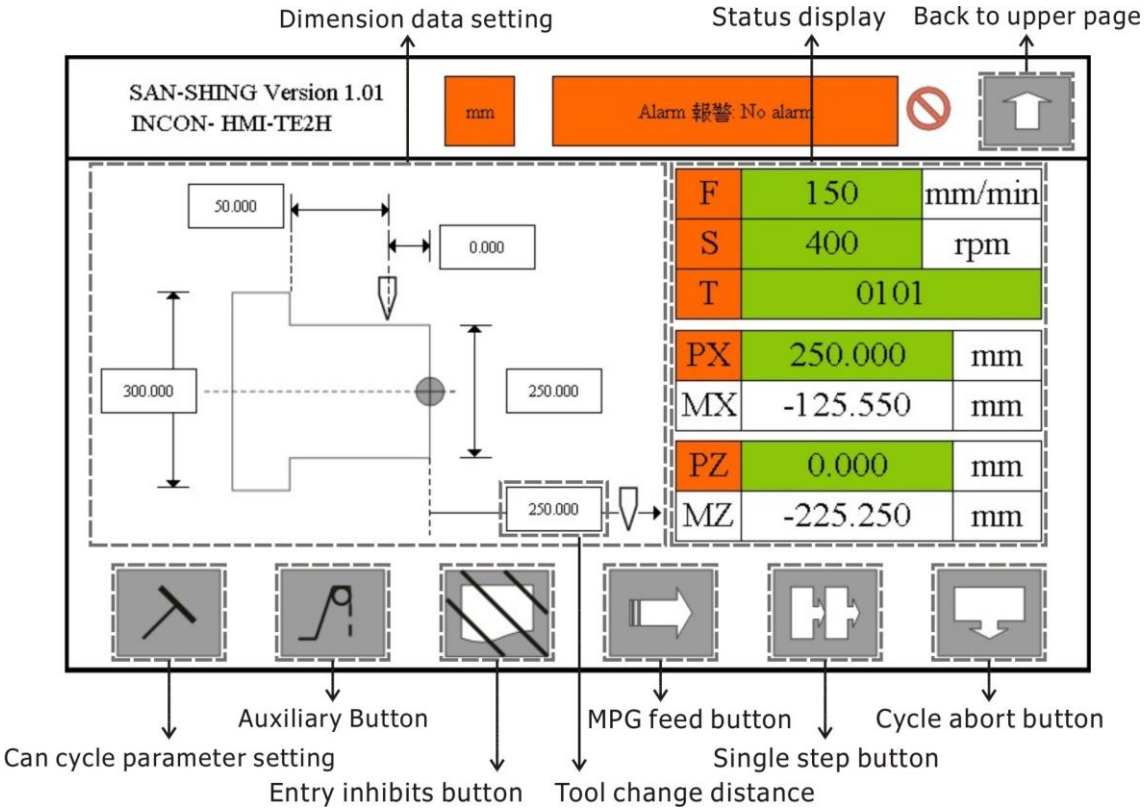


Figure 6-9 External Turning Data Setting

The typical single can cycle page arrangement is as above diagram, this page is an example of external turning. The other single can cycle only different is the ICON. This page shows ICON is external turning work piece drawing, and data fields. User fills these data quickly and easily.

6.6.1 Can Cycle Parameter

Except work piece dimension data also feed, tool, rough cutting and fine cutting must set. Parameter button is used to enter parameter table and set data.

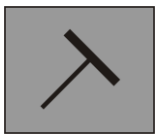


Figure 6-10 Can Cycle Parameter Button

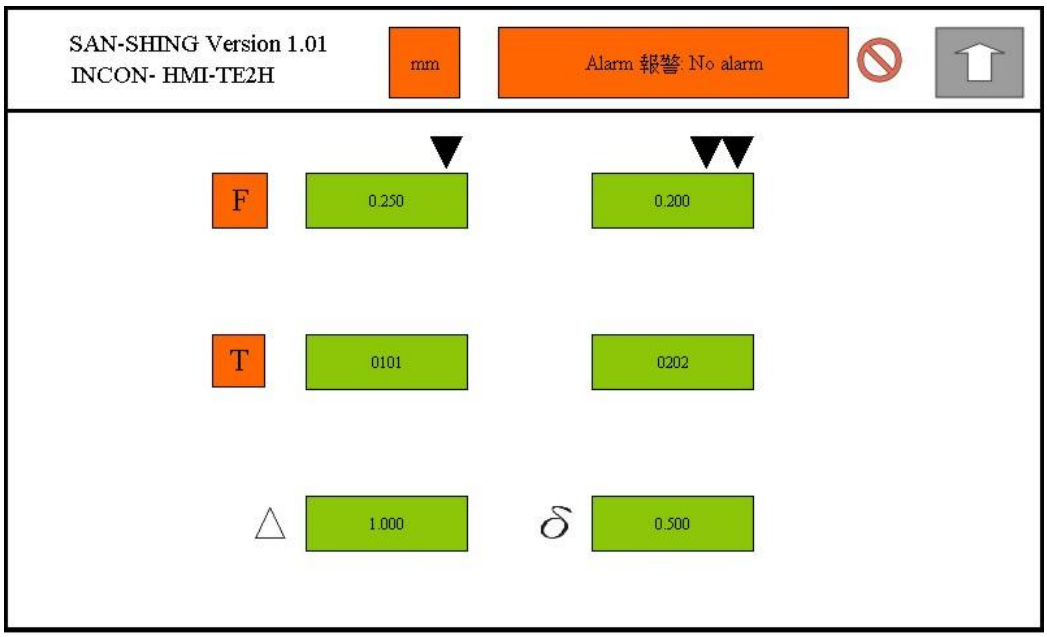


Figure 6-11 Can Cycle Parameter Page

Usually rough cutting and fine cutting have different feed, tool and rpm, user may input rough cutting and fine cutting data in this parameter table.

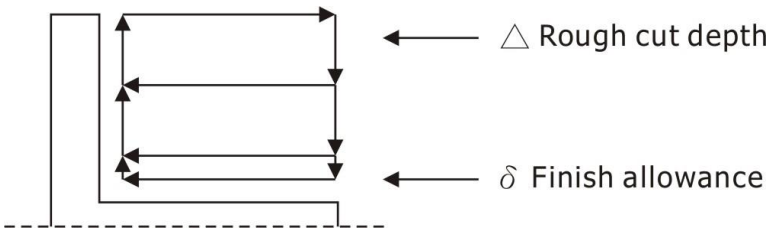


Figure 6-12 Cutting Dimension

6.7 External Taper Single Can Cycle

Press one of number buttons on ICON of external taper can cycle will enter this can cycle's data setting page.

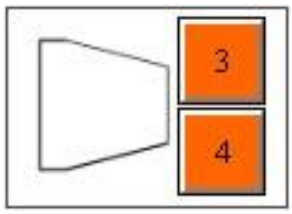


Figure 6-13 ICON of External Taper

External taper data setting:

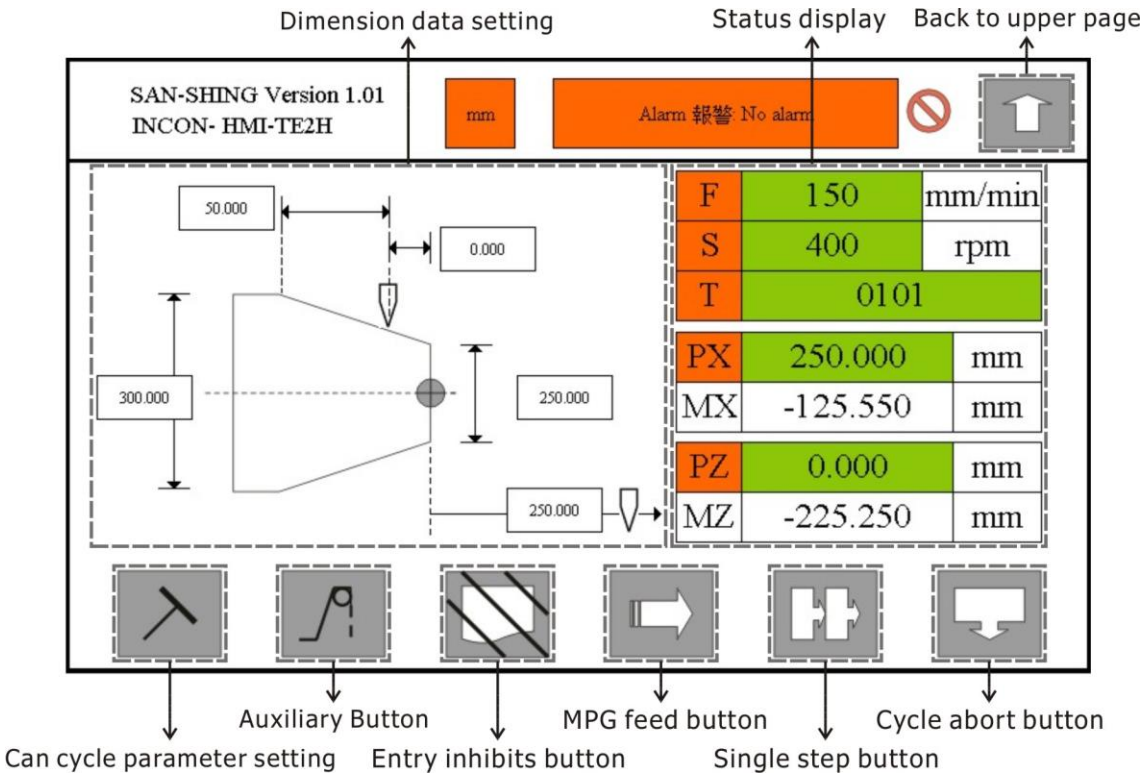


Figure 6-14 External Taper Data Setting

All operations are same as external turning data setting.

6.7.1 Taper Conversion

- **Taper conversion formula:**

Formula 1: (big head diameter - small head diameter) / (2 × taper total length) = degree

Formula 2: (big head diameter - small head diameter) / 28.7 / total length = degree

- **Decimal and sixty conversion:**

1 Round = 360 degrees

1 Degree = 60 min

1 Minute = 60 sec

- **Fraction angle formula (only fractional part):**

Fraction angle × 60 min = ___min, then the remaining part of the fraction × 60 sec = ___ sec, it can be obtained___ degrees ___ min ___ sec.

For example: The non-integer degree is 36.235 degrees = 36 degrees.

0.235 degrees × 60 (min / degree) = 14.1 min, 0.1 min × 60 (sec / min) = 6 sec, therefore 36.235 degrees = 36 degrees 14 min 6 sec.

6.8 Internal Turning Single Can Cycle

Press one of number buttons on ICON of internal turning can cycle will enter this can cycle's data setting page.

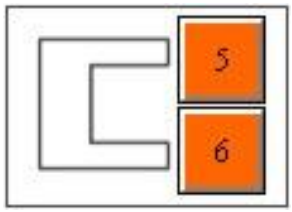


Figure 6-15 ICON of Internal Turning

Internal turning data setting:

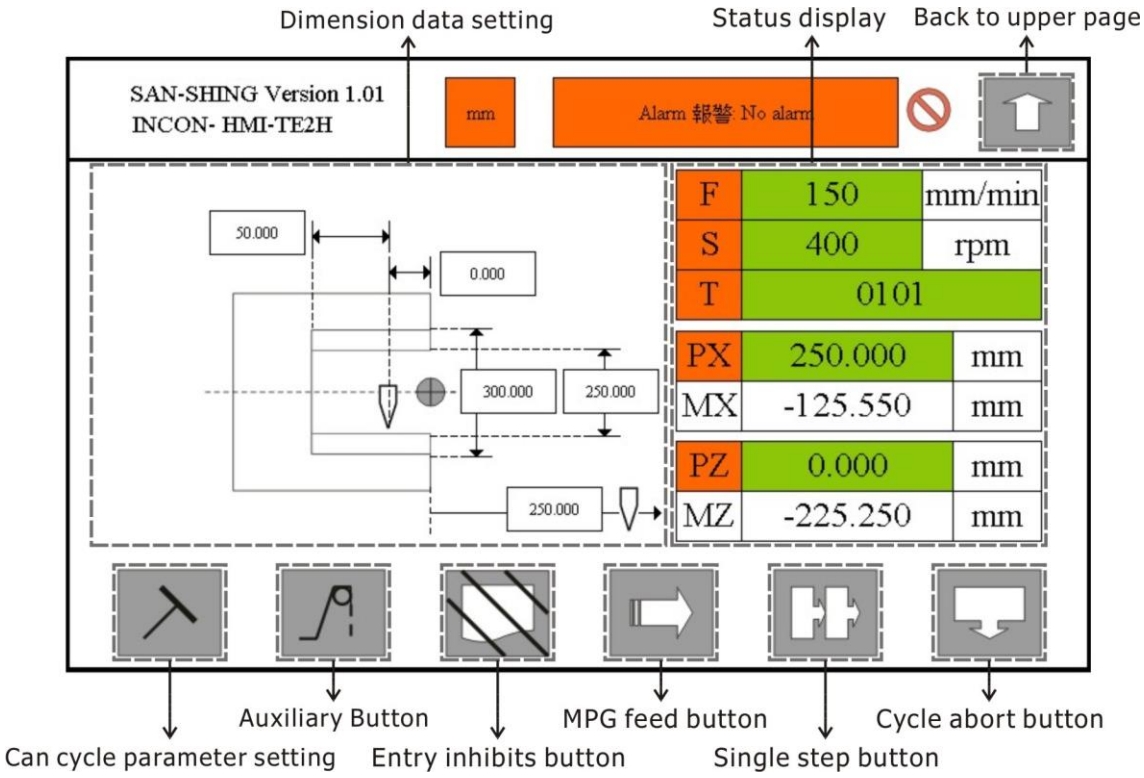


Figure 6-16 Internal Turning Data Setting

All operations are same as external turning data setting.

Caution: Before using internal functions has to drill a hole first, and diameter of inner must able to put tool into the hole, otherwise tool will be knocked down when turning.

6.9 Internal Taper Single Can Cycle

Press one of number buttons on ICON of internal taper can cycle will enter this can cycle's data setting page.

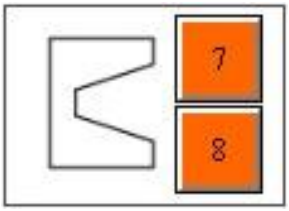


Figure 6-17 ICON of Internal Taper

Internal taper data setting:

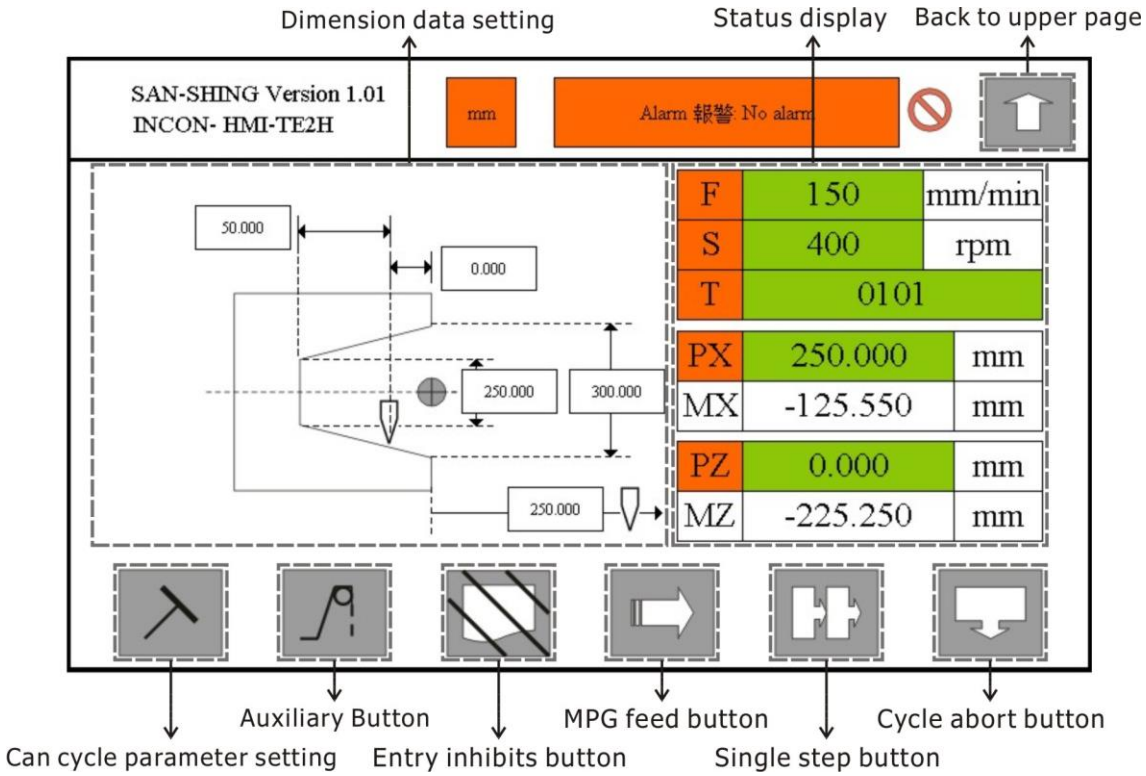


Figure 6-18 Internal Taper Data Setting

All operations are same as internal turning data setting.

6.10 External Linear Threading Single Can Cycle

Press one of number buttons on ICON of external linear threading can cycle will enter this can cycle's data setting page.

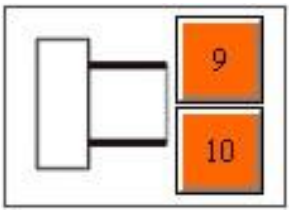


Figure 6-19 ICON of External Linear Threading

External linear threading data setting:

The threading has two system one is metric and other is inch, the metric thread is defined by pitch and high of thread and how long of threading. But the inch thread is defined by how many thread per inch (TPI) and high of thread and how long of threading, so user must care different of these two unit systems.

Metric system:

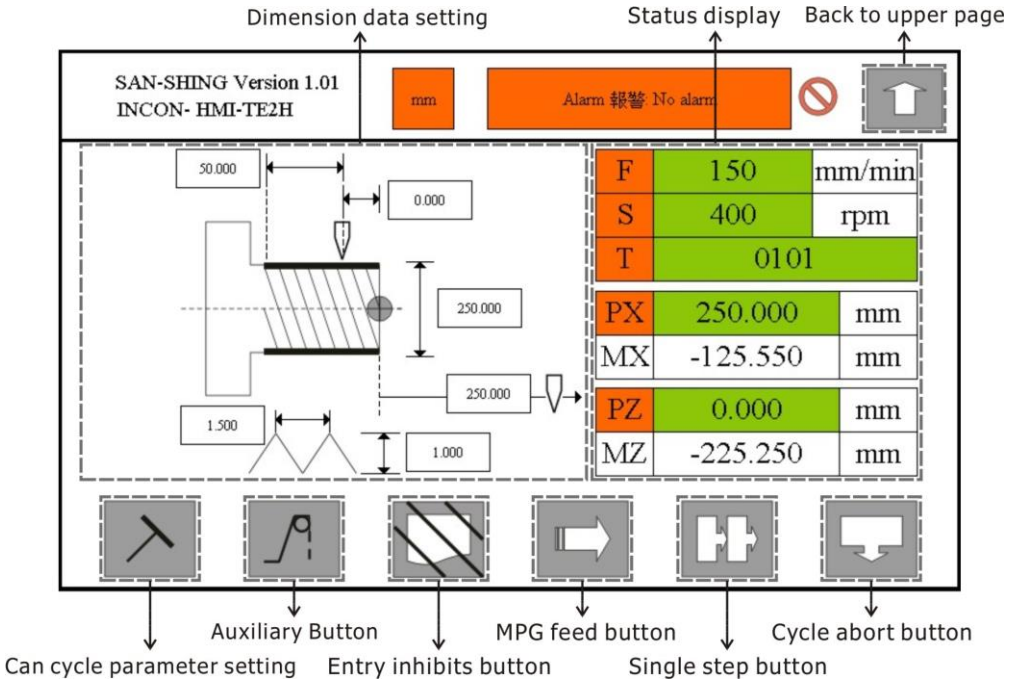


Figure 6-20 External Linear Threading Data Setting (Metric System)

Inch system:

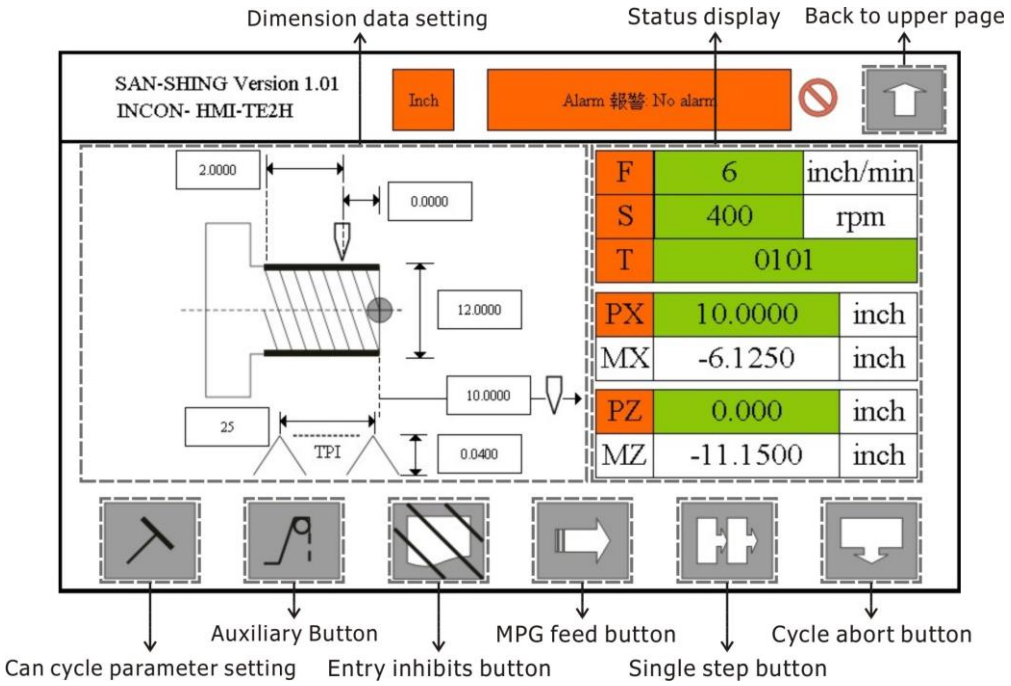


Figure 6-21 External Linear Threading Data Setting (Inch System)

All operations are same as external turning data setting.

6.10.1 Can Cycle Parameter

In this can cycle, user can set spindle rpm, tool number, △ and δ data field.

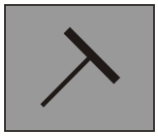
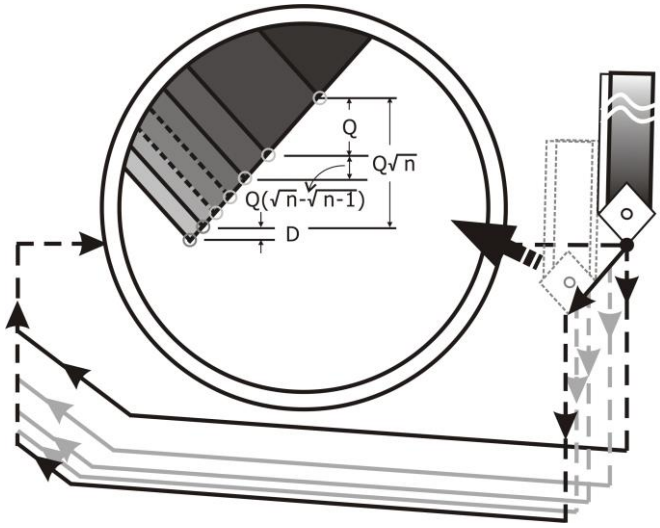


Figure 6-22 Can Cycle Parameter Button

When parameter button was touched, the parameter page will prompt:

Figure 6-23 Can Cycle Parameter Page

The definitions of △ and δ are represented as follows:



△: Q value

δ: D value

Figure 6-24 Definition of △ and δ

NOTE 1: When threading, finishing volume must be less than one-tenth of the rough volume.

NOTE 2: There is no need for a tool change when the fine turning.

6.11 External Taper Threading Single Can Cycle

Press one of number buttons on ICON of external taper threading can cycle will enter this can cycle's data setting page.

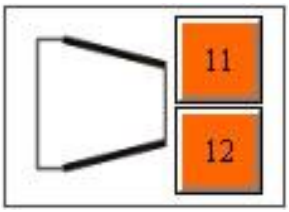


Figure 6-25 ICON of External Taper Threading

External taper threading data setting:

The threading also has metric system and inch system, two unit systems. Definitions of these two unit systems are same as external linear threading.

Metric system:

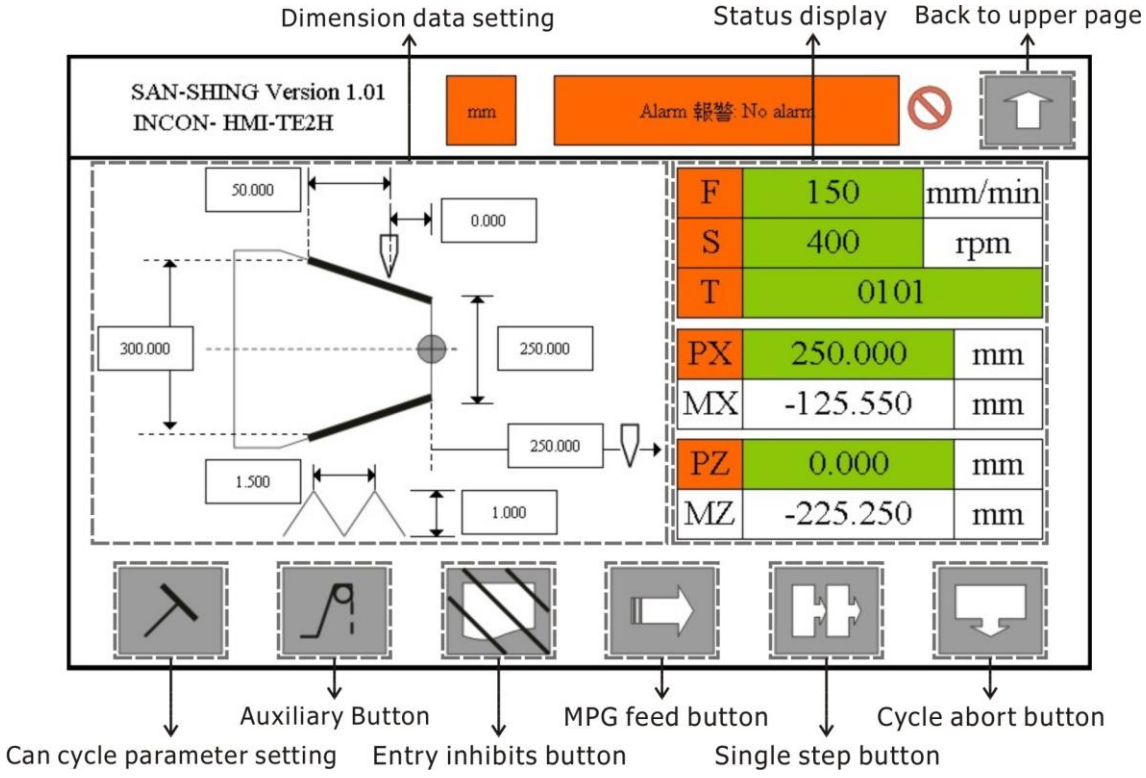


Figure 6-26 External Taper Threading Data Setting (Metric System)

Inch system:

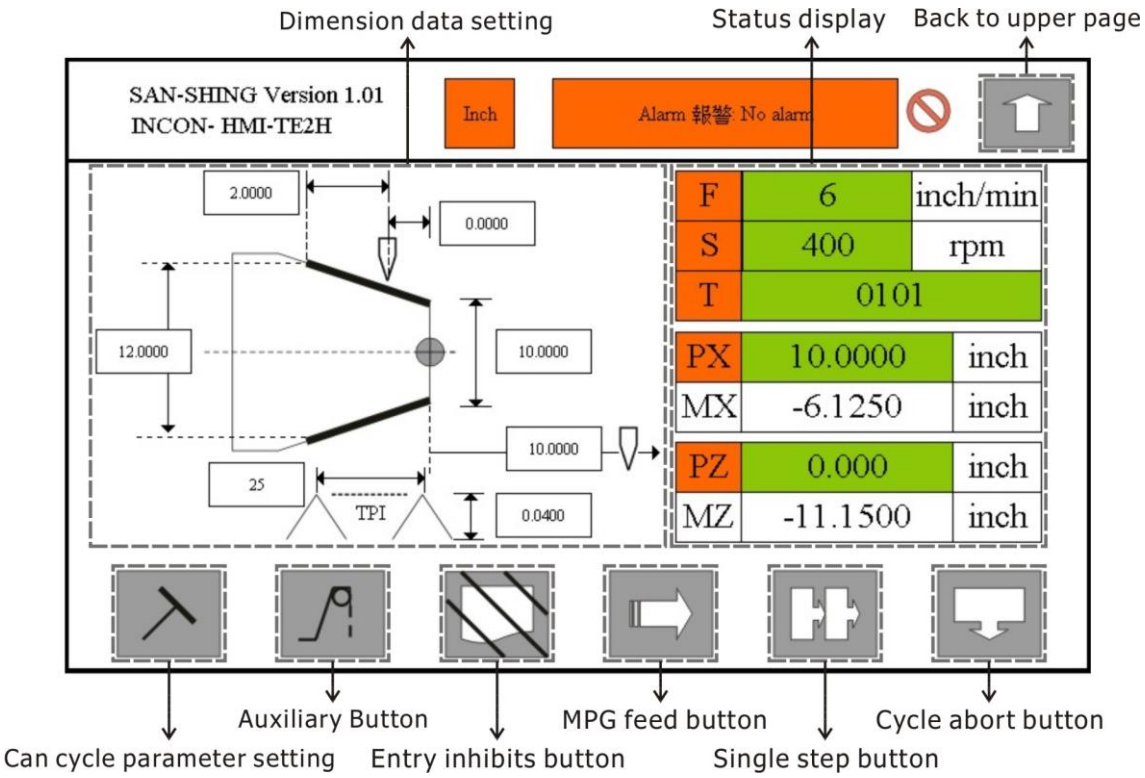


Figure 6-27 External Taper Threading Data Setting (Inch System)

All operations are same as external linear threading data setting.

6.12 Internal Linear Threading Single Can Cycle

Press one of number buttons on ICON of internal linear threading can cycle will enter this can cycle's data setting page.

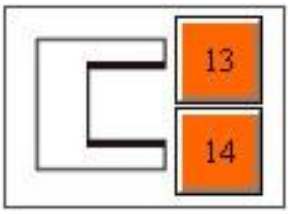


Figure 6-28 ICON of Internal Linear Threading

Internal linear threading data setting:

The threading also has metric system and inch system, two unit systems. Definitions of these two unit systems are same as external linear threading.

Metric system:

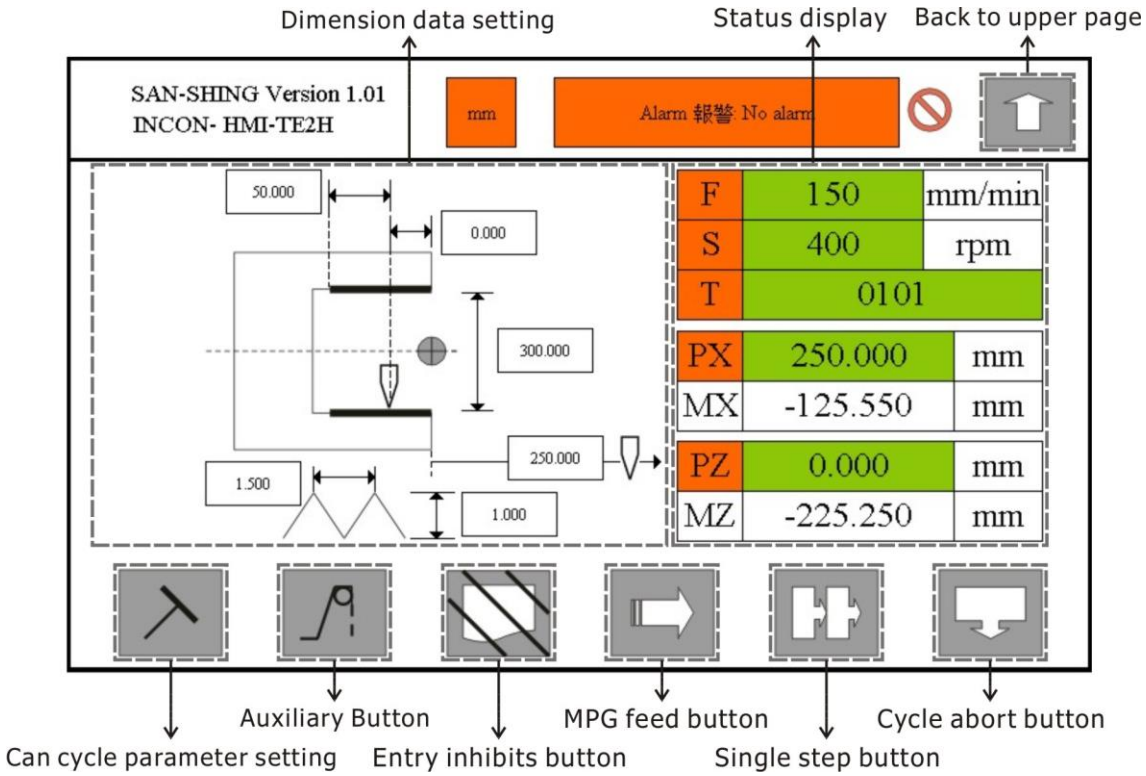


Figure 6-29 Internal Linear Threading Data Setting (Metric System)

Inch system:

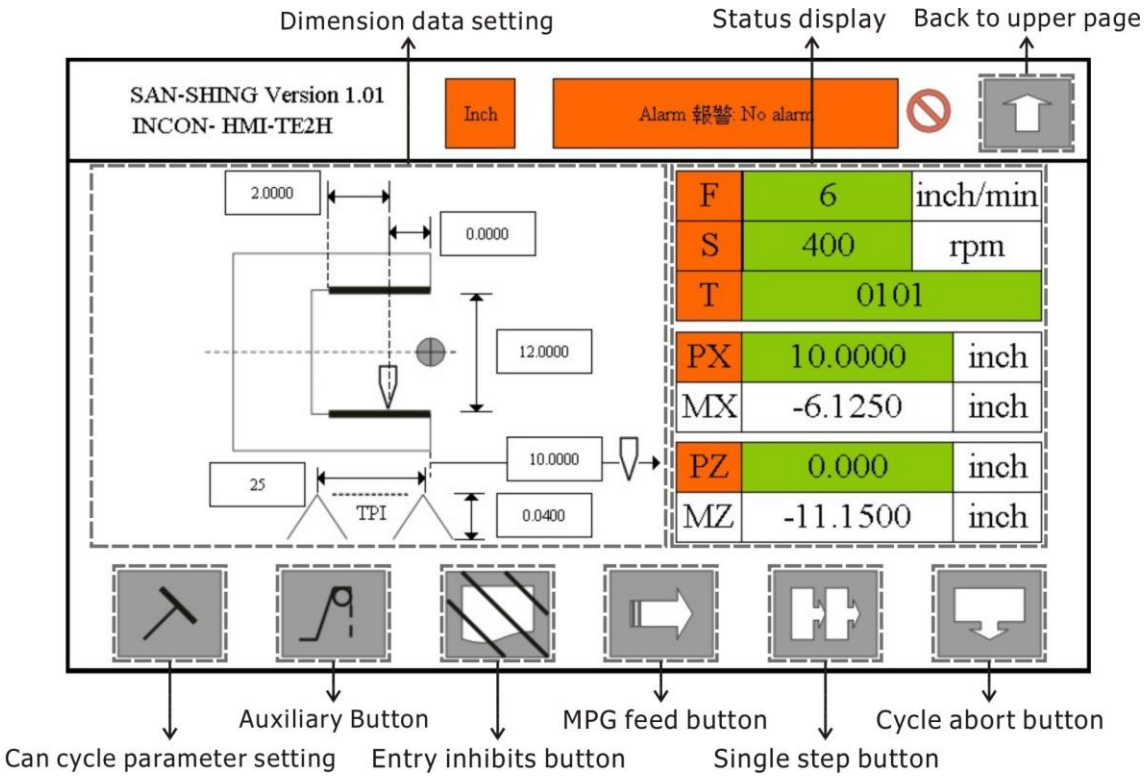


Figure 6-30 Internal Linear Threading Data Setting (Inch System)

All operations are same as external linear threading data setting.

6.13 Internal Taper Threading Single Can Cycle

Press one of number buttons on ICON of internal taper threading can cycle will enter this can cycle's data setting page.

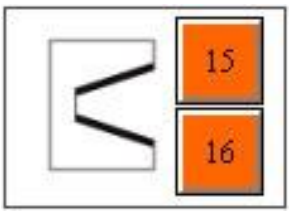


Figure 6-31 ICON of Internal Taper Threading

Internal taper threading data setting:

The threading also has metric system and inch system, two unit systems. Definitions of these two unit systems are same as external linear threading.

Metric system:

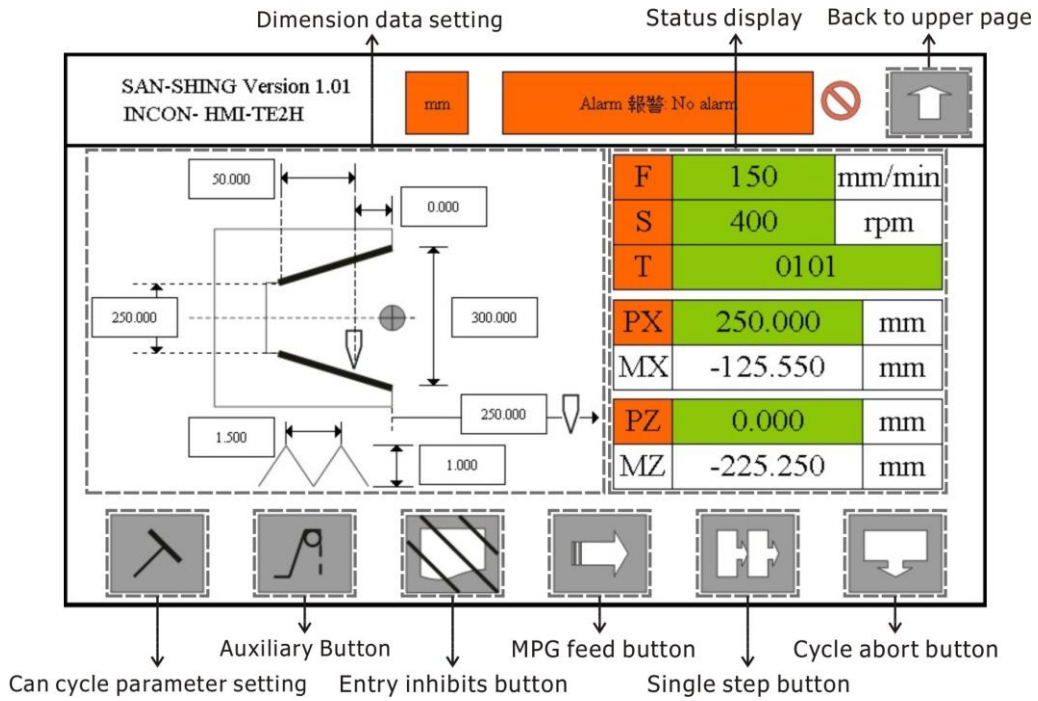


Figure 6-32 Internal Taper Threading Data Setting (Metric System)

Inch system:

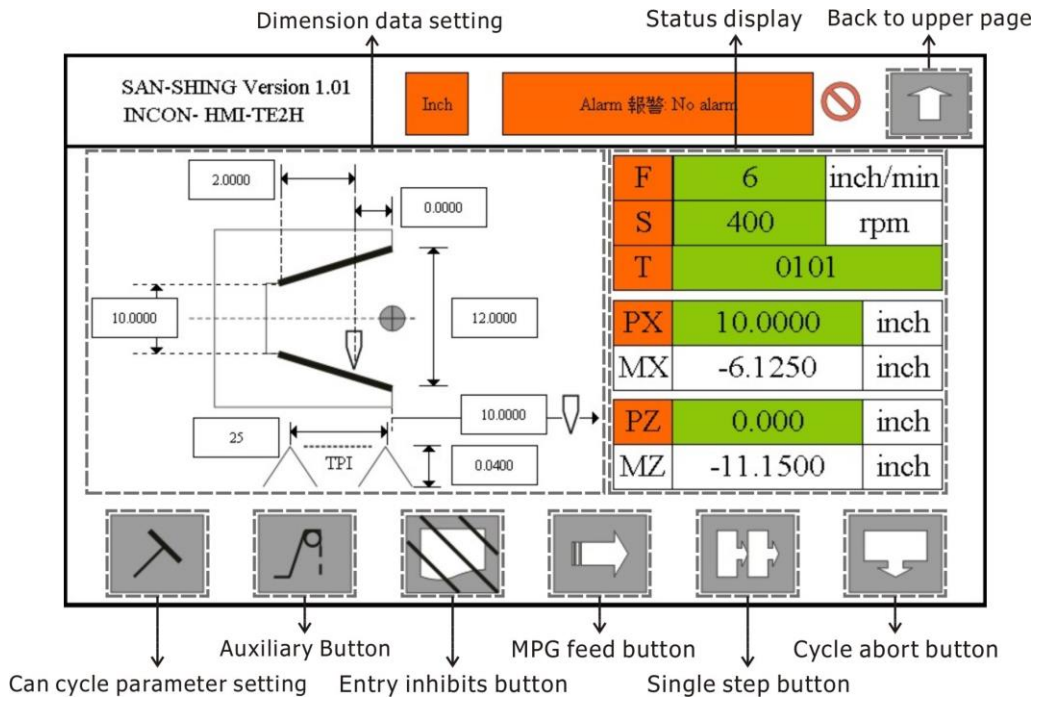


Figure 6-33 Internal Taper Threading Data Setting (Inch System)

All operations are same as external linear threading data setting.

6.14 External CCW Fillet Single Can Cycle

Press one of number buttons on ICON of external CCW fillet can cycle will enter this can cycle's data setting page.

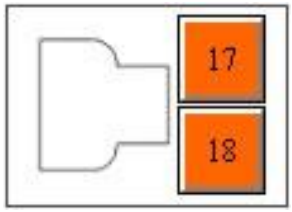


Figure 6-34 ICON of External CCW Fillet

External CCW fillet data setting:

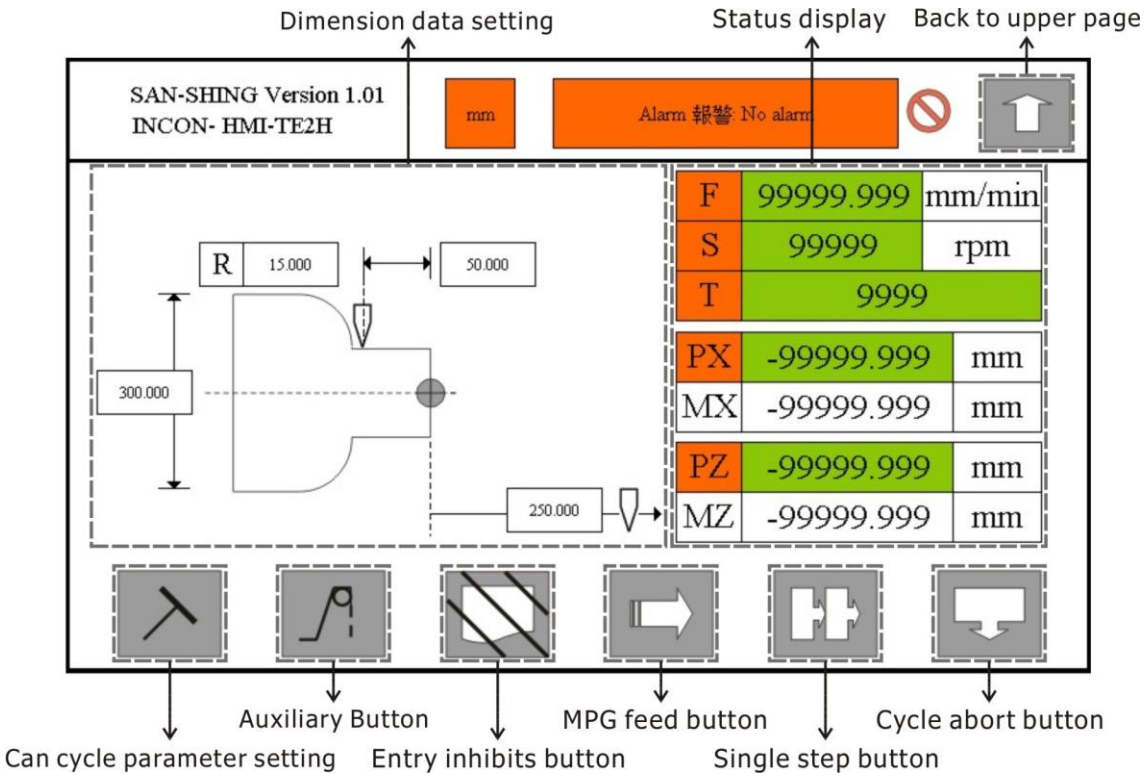


Figure 6-35 External CCW Fillet Data Setting

All operations are same as external turning data setting.

6.15 External CW Fillet Single Can Cycle

Press one of number buttons on ICON of external CW fillet can cycle will enter this can cycle's data setting page.

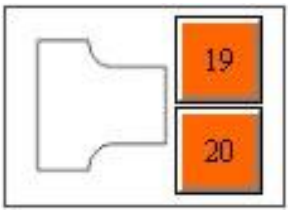


Figure 6-36 ICON of External CW Fillet

External CW fillet data setting:

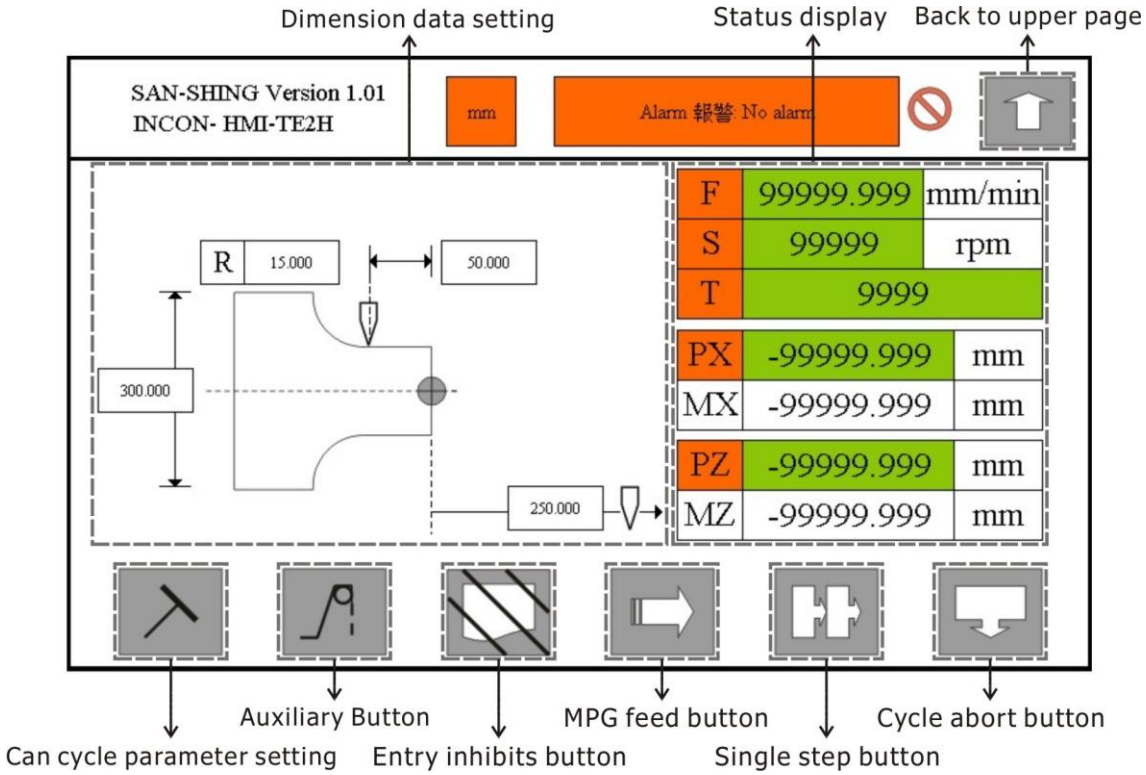


Figure 6-37 External CW Fillet Data Setting

All operations are same as external turning data setting.

6.16 Internal CW Fillet Single Can Cycle

Press one of number buttons on ICON of internal CW fillet can cycle will enter this can cycle's data setting page.

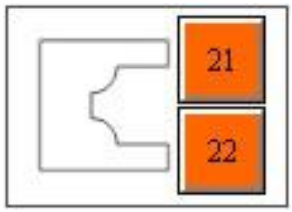


Figure 6-38 ICON of Internal CW Fillet

Internal CW fillet data setting:

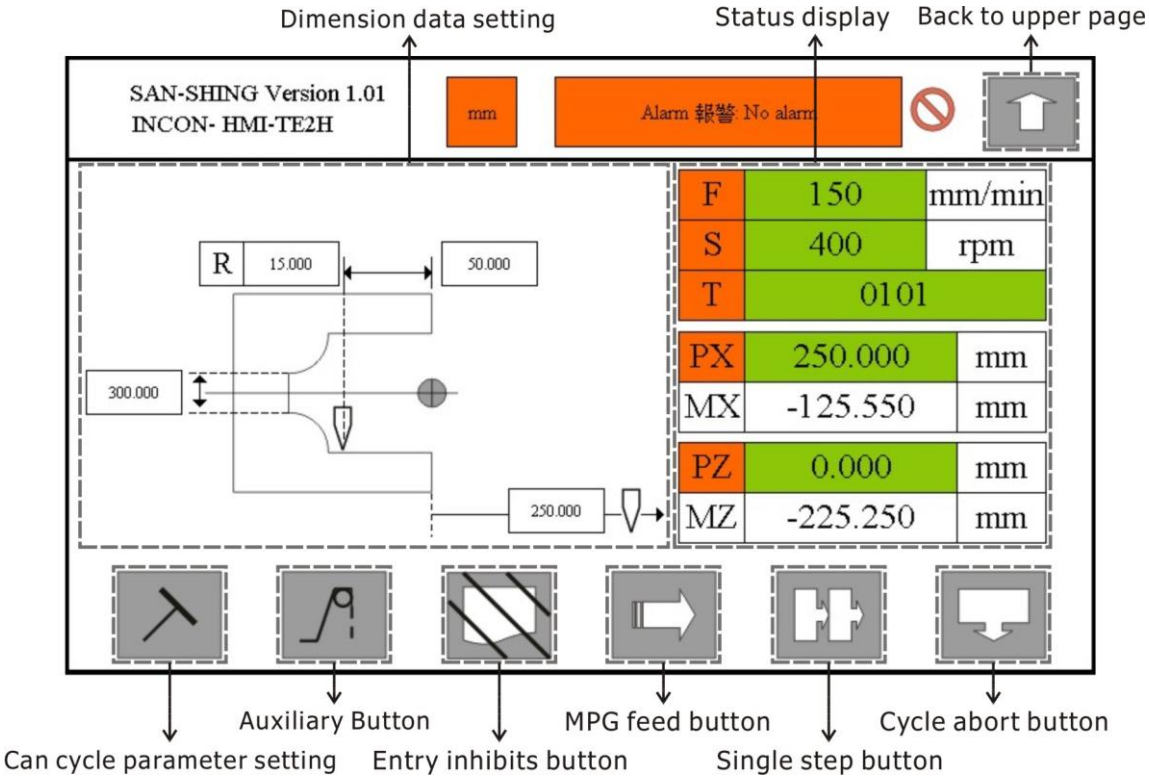


Figure 6-39 Internal CW Fillet Data Setting

All operations are same as internal turning data setting.

6.17 Internal CCW Fillet Single Can Cycle

Press one of number buttons on ICON of internal CCW fillet can cycle will enter this can cycle's data setting page.

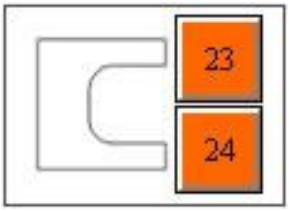


Figure 6-40 ICON of Internal CCW Fillet

Internal CCW fillet data setting:

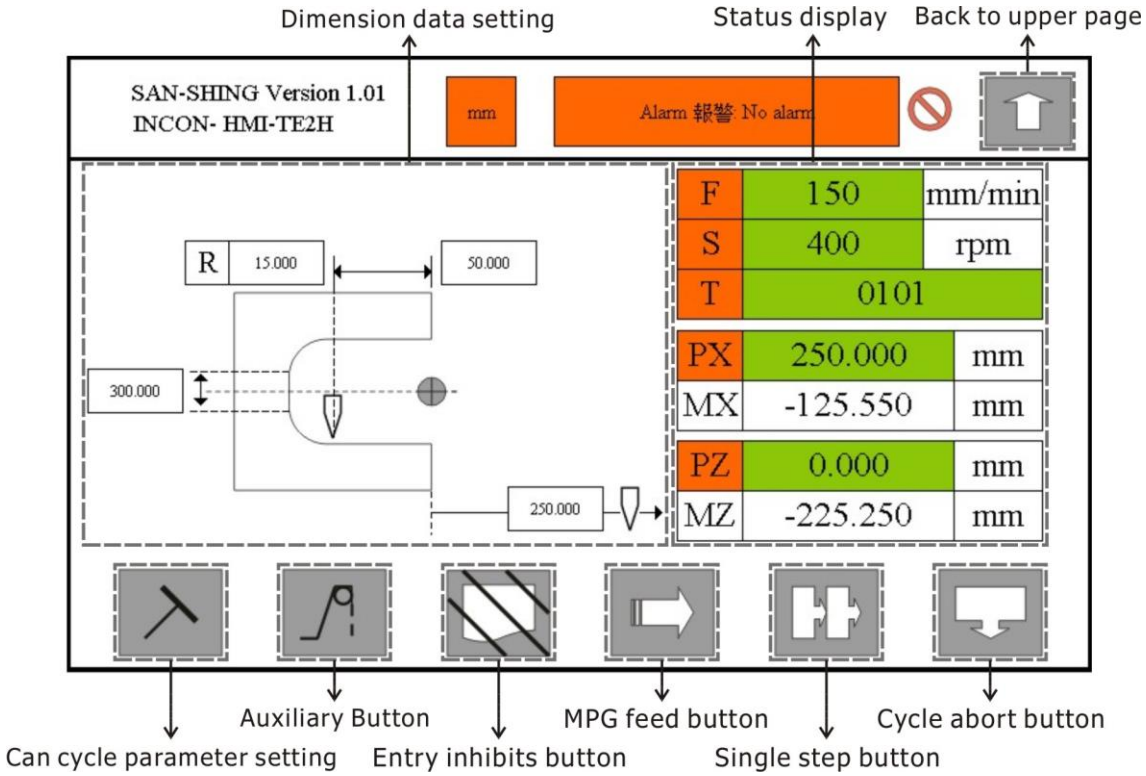


Figure 6-41 Internal CCW Fillet Data Setting

All operations are same as internal turning data setting.

6.18 Outer Arc Single Can Cycle

Press one of number buttons on ICON of outer arc can cycle will enter this can cycle's data setting page.

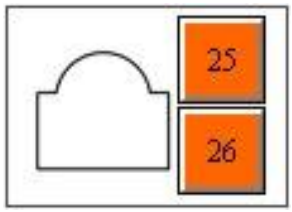


Figure 6-42 ICON of Outer Arc

Outer arc data setting:

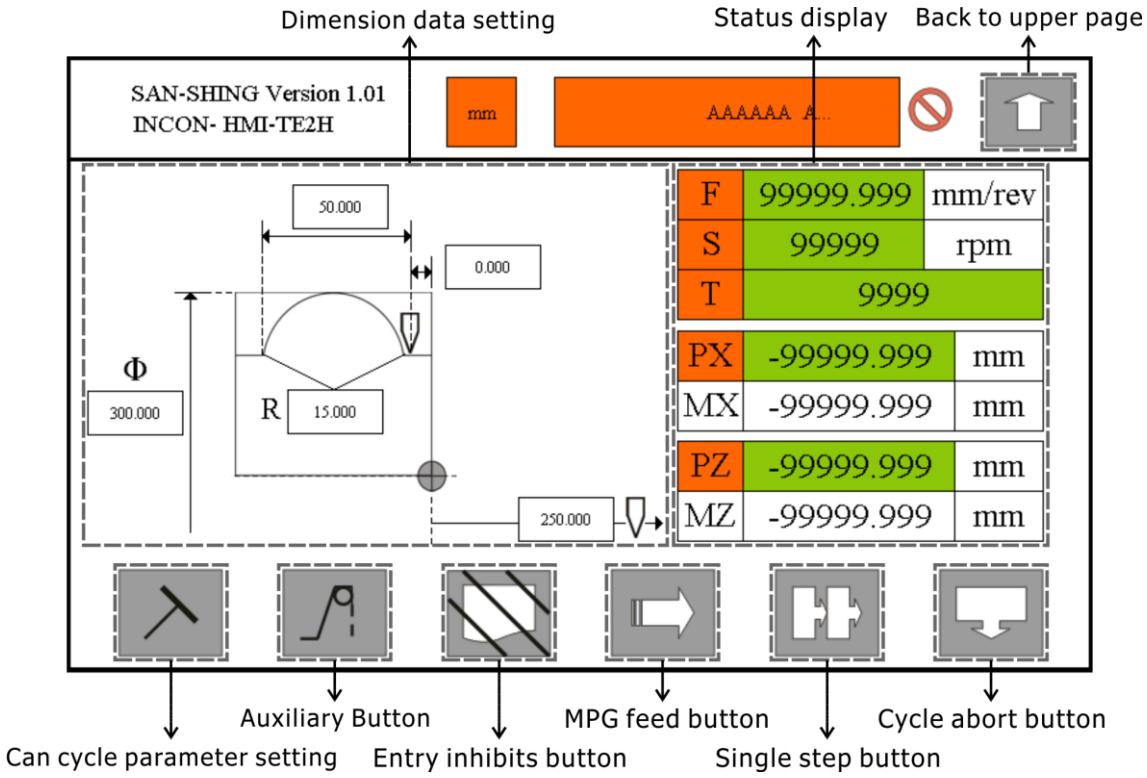


Figure 6-43 Outer Arc Data Setting

All operations are same as external turning data setting.

6.19 Inner Arc Single Can Cycle

Press one of number buttons on ICON of inner arc can cycle will enter this can cycle's data setting page.

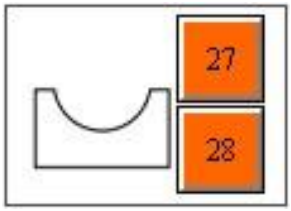


Figure 6-44 ICON of Inner Arc

Inner arc data setting:

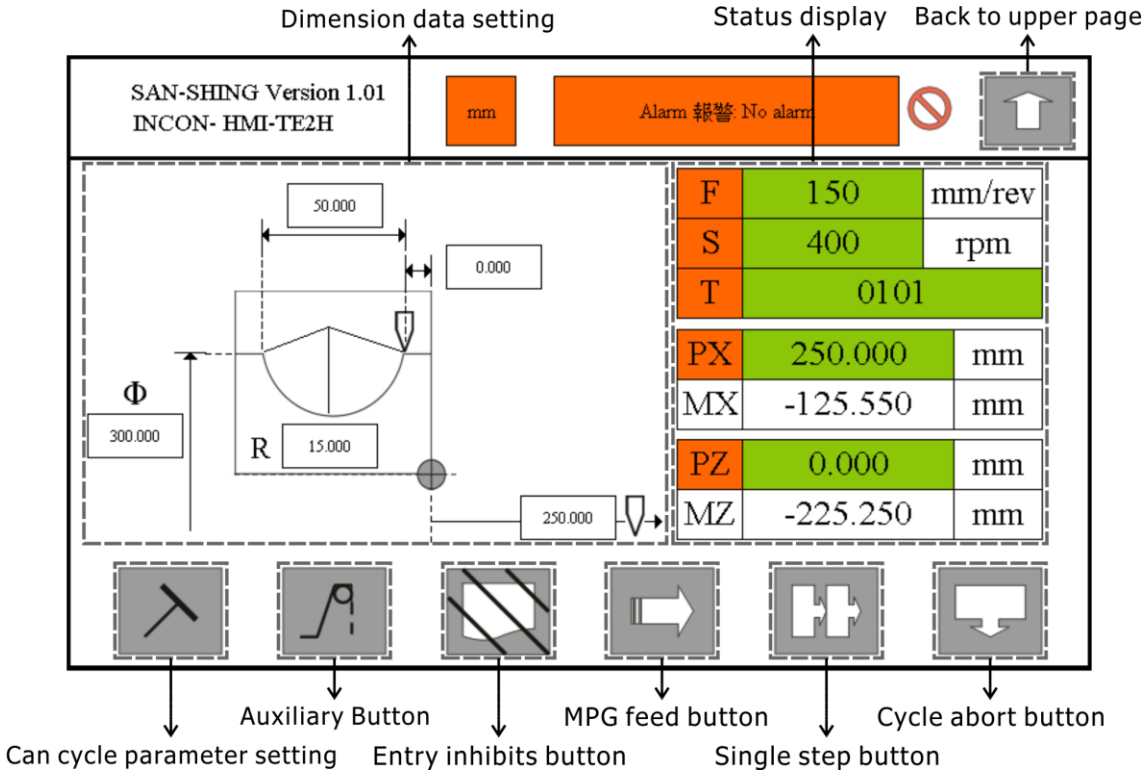


Figure 6-45 Inner Arc Data Setting

All operations are same as internal turning data setting.

Caution: When processing wavy arcs, must be confirmed whether the starting point of the next arc will cut to the previous arc, otherwise it will cause the arc overcut notch.

6.20 External Grooving Single Can Cycle

Press one of number buttons on ICON of external grooving can cycle will enter this can cycle's data setting page.

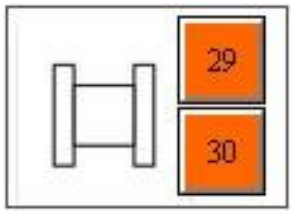


Figure 6-46 ICON of External Grooving

External grooving data setting:

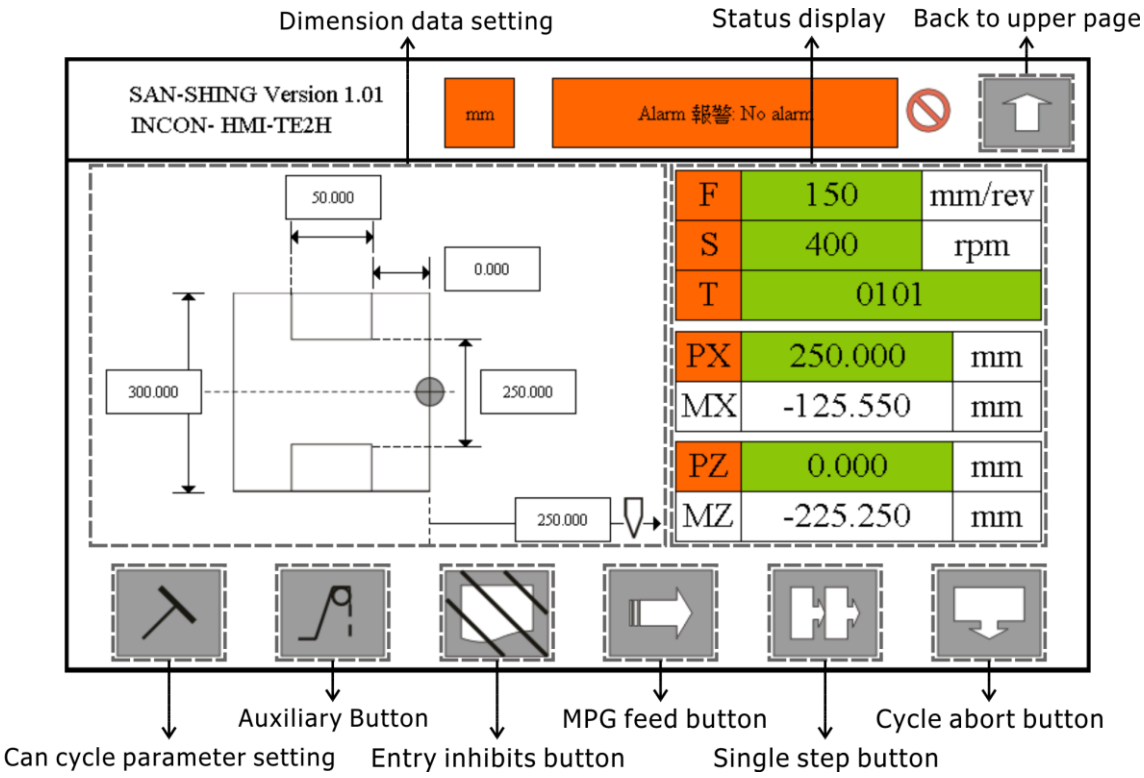


Figure 6-47 External Grooving Data Setting

All operations are same as external turning data setting.

6.20.1 Can Cycle Parameter

In this can cycle, user can set cutting feed, tool number, I and K data field.

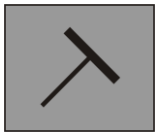
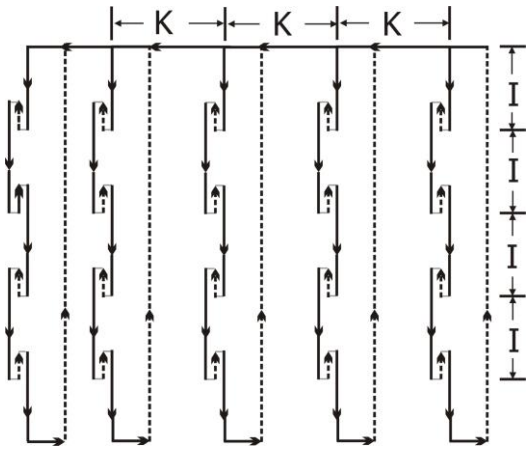


Figure 6-48 Can Cycle Parameter Button

When parameter button was touched, the parameter page will prompt:

Figure 6-49 Can Cycle Parameter Page

The definitions of I and K are represented as follows:



I: X axis step in depth

K: Z axis step in depth

Figure 6-50 Definitions of I and K

6.21 Internal Grooving Single Can Cycle

Press one of number buttons on ICON of internal grooving can cycle will enter this can cycle's data setting page.

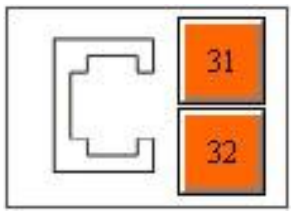


Figure 6-51 ICON of Internal Grooving

Internal grooving data setting:

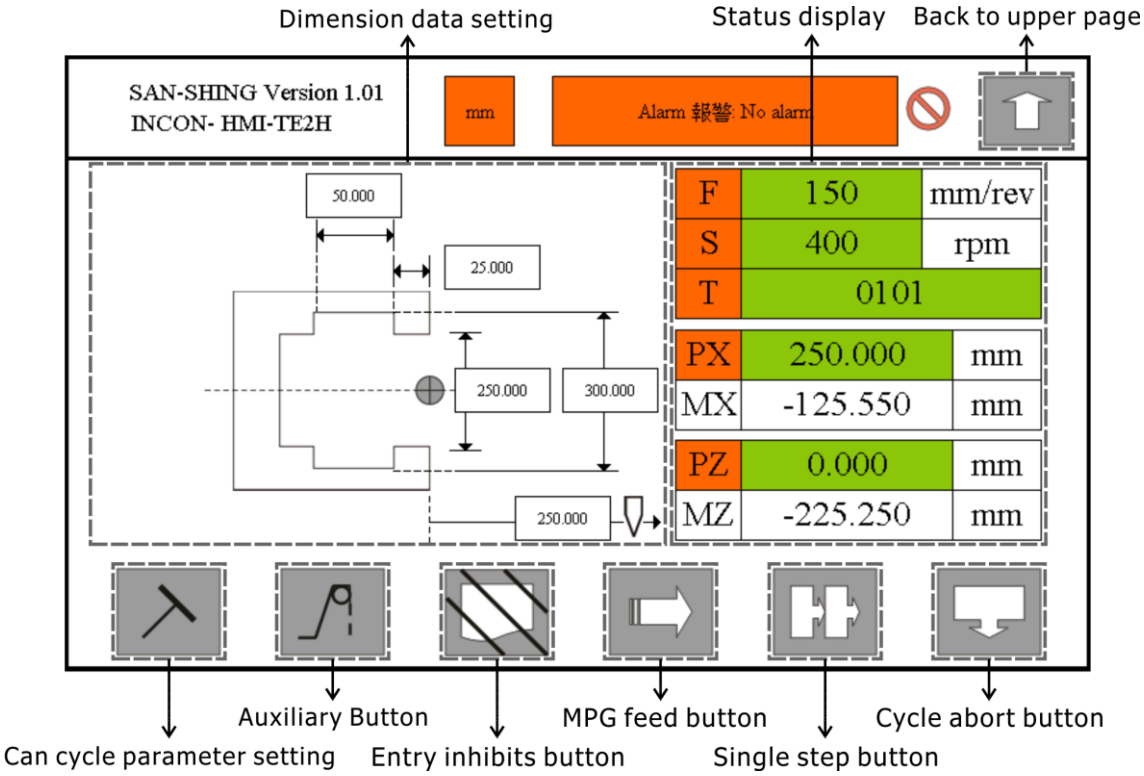


Figure 6-52 Internal Grooving Data Setting

All operations are same as external grooving data setting.

6.22 Facing Single Can Cycle

Press one of number buttons on ICON of facing can cycle will enter this can cycle's data setting page.

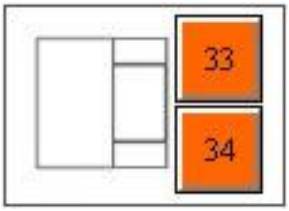


Figure 6-53 ICON of Facing

Facing data setting:

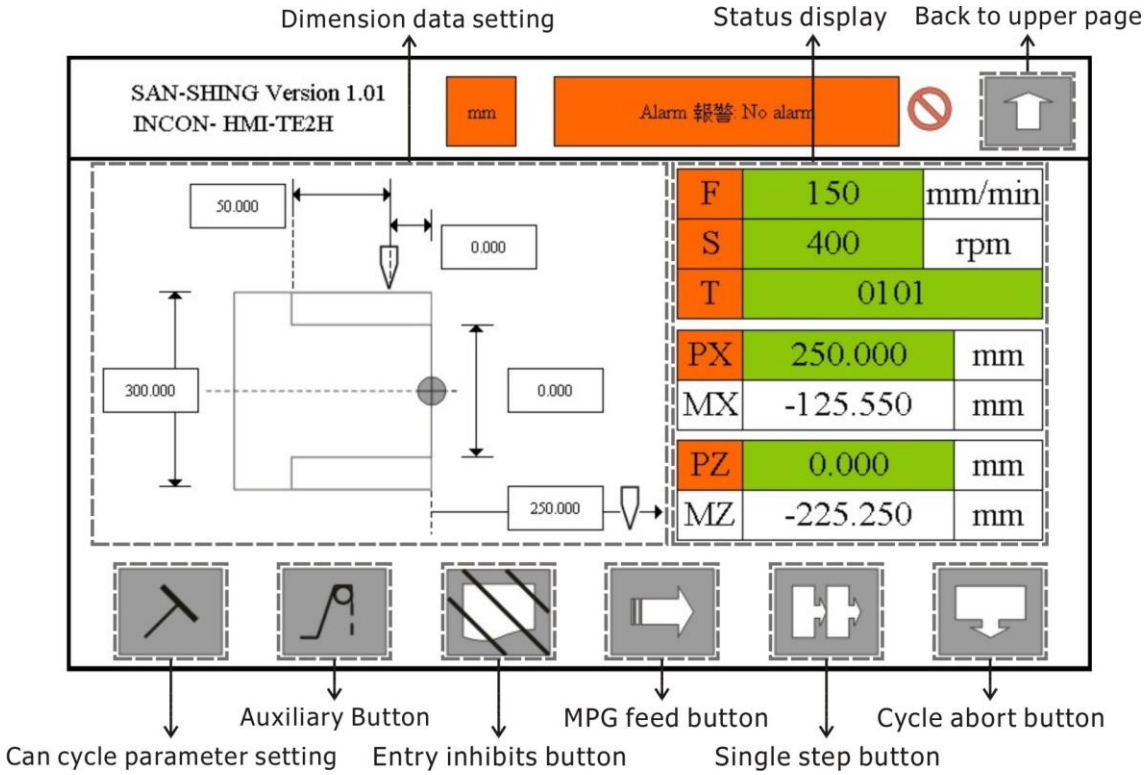


Figure 6-54 Facing Data Setting

All operations are same as external turning data setting.

6.23 Outer Arc Facing Single Can Cycle

Press one of number buttons on ICON of outer arc facing can cycle will enter this can cycle's data setting page.

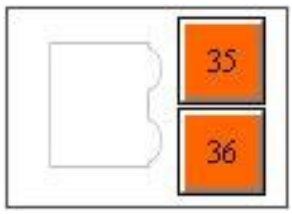


Figure 6-55 ICON of Outer Arc Facing

Outer arc facing data setting:

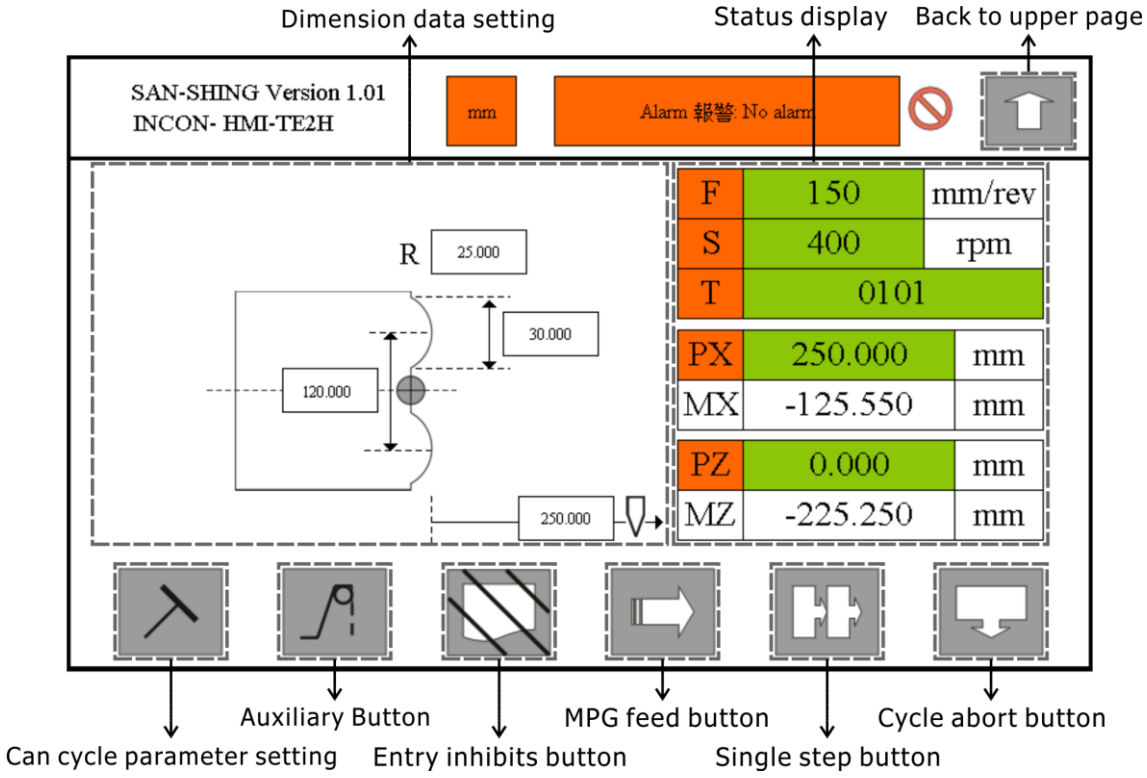


Figure 6-56 Outer Arc Facing Data Setting

All operations are same as external turning data setting.

6.24 Inner Arc Facing Single Can Cycle

Press one of number buttons on ICON of inner arc facing can cycle will enter this can cycle's data setting page.

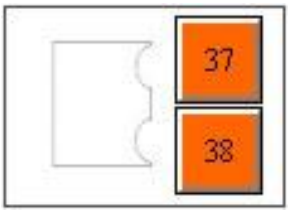


Figure 6-57 ICON of Inner Arc Facing

Inner arc facing data setting:

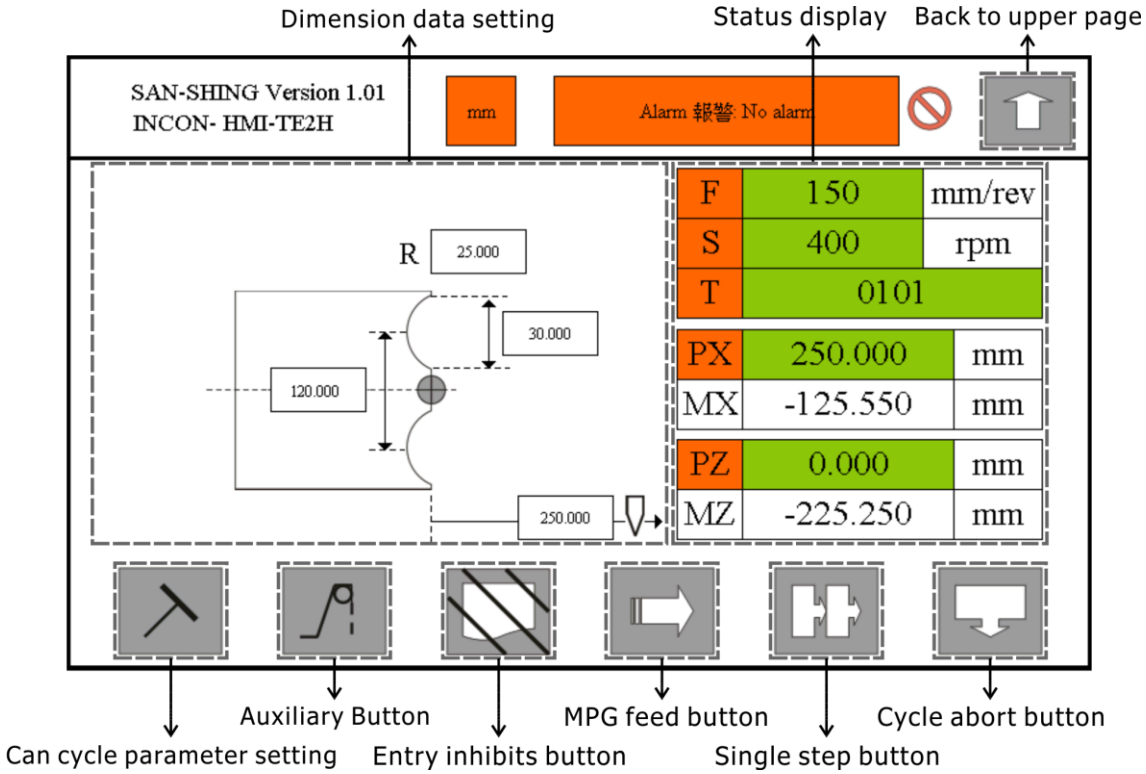


Figure 6-58 Inner Arc Facing Data Setting

All operations are same as internal turning data setting.

Chapter 7 G Code Mode

SAN-SHING Version INCON-TE2H is based on INTEK TE2 CNC lathe controller. The TE2 provides all facilities of CNC lathe. It can execute ISO G, M, S, T CNC code, so user can edit a part program for cutting and download this part program to SAN-SHING lathe by Ethernet. The part program extension has to be .cnc otherwise controller cannot recognize this part program. To download or up load part program is using FTP (Port 21) and you can find a lot of free FTP on web. Before download part program to SAN-SHING lathe, SAN-SHING lathe needs setting IP address. The IP has four address fields.

For example: 192.168.1.2.

First three IP address fields must same as host computer, but fourth address field must different.

For example: Host computer IP is 192.168.1.0

SAN-SHING lathe IP is 192.168.1.1

When part program has been loaded to SAN-SHING lathe then this part program can choose from program list and can execute in G code mode.

The system accepts NC part program which program by ISO G code. NC part program download from host computer to system through FTP, and user selects NC part program then runs it.

Caution: SAN-SHING lathe IP has been set before shipping. If needs to change IP please contact your agent.

NOTE: This is for the optional function. It needs to be purchased from our company and installs by the engineers.

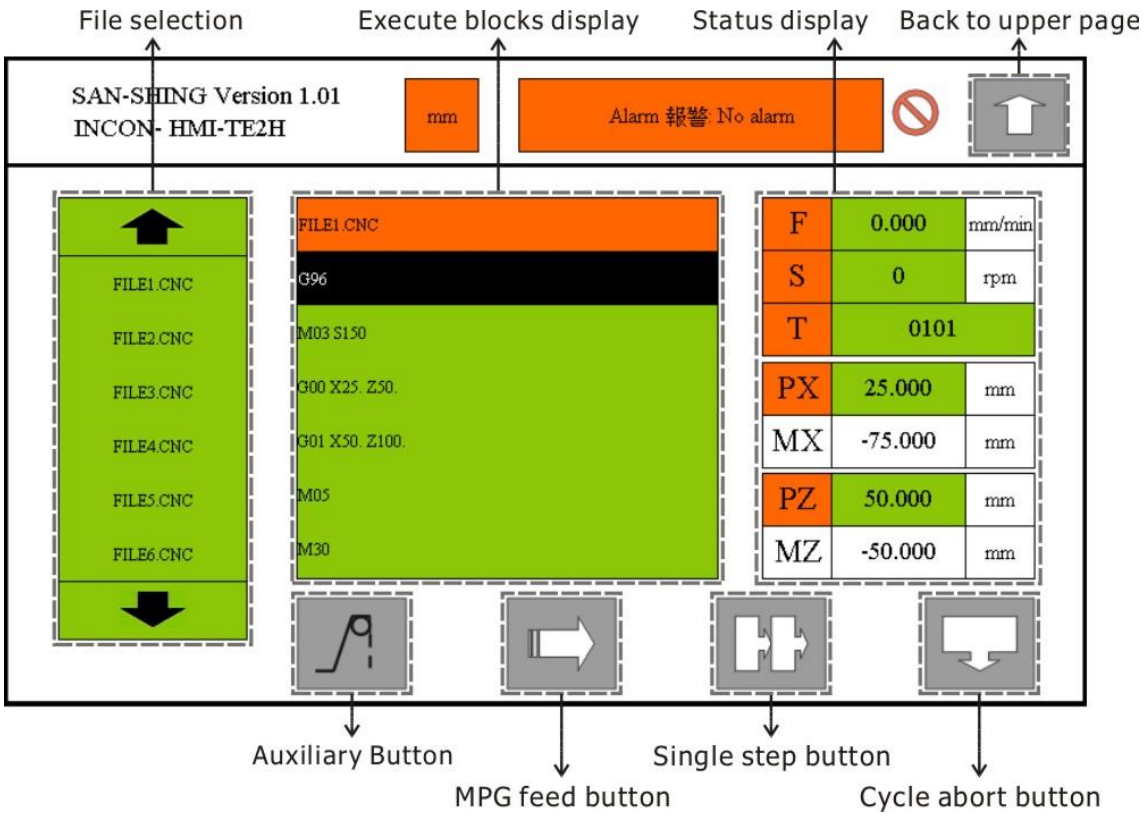


Figure 7-1 G Code Mode Window

Caution: M code depend on machine maker designed, the list provides by machine maker of this machine.

7.1 G Code List

Group	G code	Format	Function
01	G00	G00 X(U)_Z(W)_	Positioning
01	G01	G01 X(U)_Z(W)_F_; G01 X(U)_Z(W)_R_F_; G01 X(U)_Z(W)_L_F_;	Linear interpolation With corner rounding With angle chamfering
01	G02	G02(G03)X(U)_Z(W)_R_F_; G02(G03)X(U)_Z(W)_I_K_F_; G02(G03)I_K_A_F_;	**G02** CW circular interpolation **G03** CCW circular interpolation
00	G04	G04 P_; or G04 X_;	Dwell
00	G10	G10;	Set tool data
06	G20	G20;	Inch
06	G21	G21;	Metric
00	G28	G28 X(U)_Z(W)_;	Return to reference point
00	G29	G29 X(U)_Z(W)_;	Return from reference point
00	G30	G30 X(U)_Z(W)_P_;	Second reference point return
00	G31	G31 X(U)_Z(W)_;	Skip
01	G32	G32 X(U)_Z(W)_F_;	Thread cutting
07	G40	G40;	Cancel **G41** and **G42**
07	G41	G41;	Tool nose left compensation
07	G42	G42;	Tool nose right compensation
00	G50	G50 X_Z_;	Coordinate setting
00	G70	G70 P_;	Final finish cutting

Group	G code	Format	Function
00	G71	G71 P_U_W_Q_E_F_S_T_;	Repetitive cycle turning
00	G72	G72 P_U_W_Q_E_F_S_T_;	Repetitive cycle surface
00	G73	G73 P_U_W_I_K_L_F_S_T_;	Repetitive cycle pattern
00	G74	G74 X(U)_Z(W)_I_K_E_R_F_;	Repetitive cycle peck drilling
00	G75	G75 X(U)_Z(W)_I_K_E_R_F_;	Repetitive cycle grooving
00	G76	G76 X(U)_Z(W)_I_K_L_R_A_E_D_Q_F_;	Repetitive cycle threading
01	G90	G90 X(U)_Z(W)_I_Q_F_;	Cutting outer diameter
01	G92	G92 X(U)_Z(W)_I_F_;	Threading cycle
01	G94	G94 X(U)_Z(W)_I_Q_F_;	Cutting end face
02	G96	G96	Constant surface speed
02	G97	G97;	Cancel **G96**
05	G98	G98;	Feed by mm/min
05	G99	G99;	Feed by mm/rev

For more detail of G code please study TE2 user manual.

Chapter 8 Machine Panel

The machine panel is part of wiring and makes system easies to operate. The machine panel at least includes Emergency stop, Servo on, over travel release, Power on, Power off, Program start, Cycle stop, JOG button (for X+, X-, Z+, Z-), Coolant on/off, Spindle CW JOG on/off, Spindle CCW JOG on/off, Rapid traverse, Feedrate override, Spindce rpm override push button.

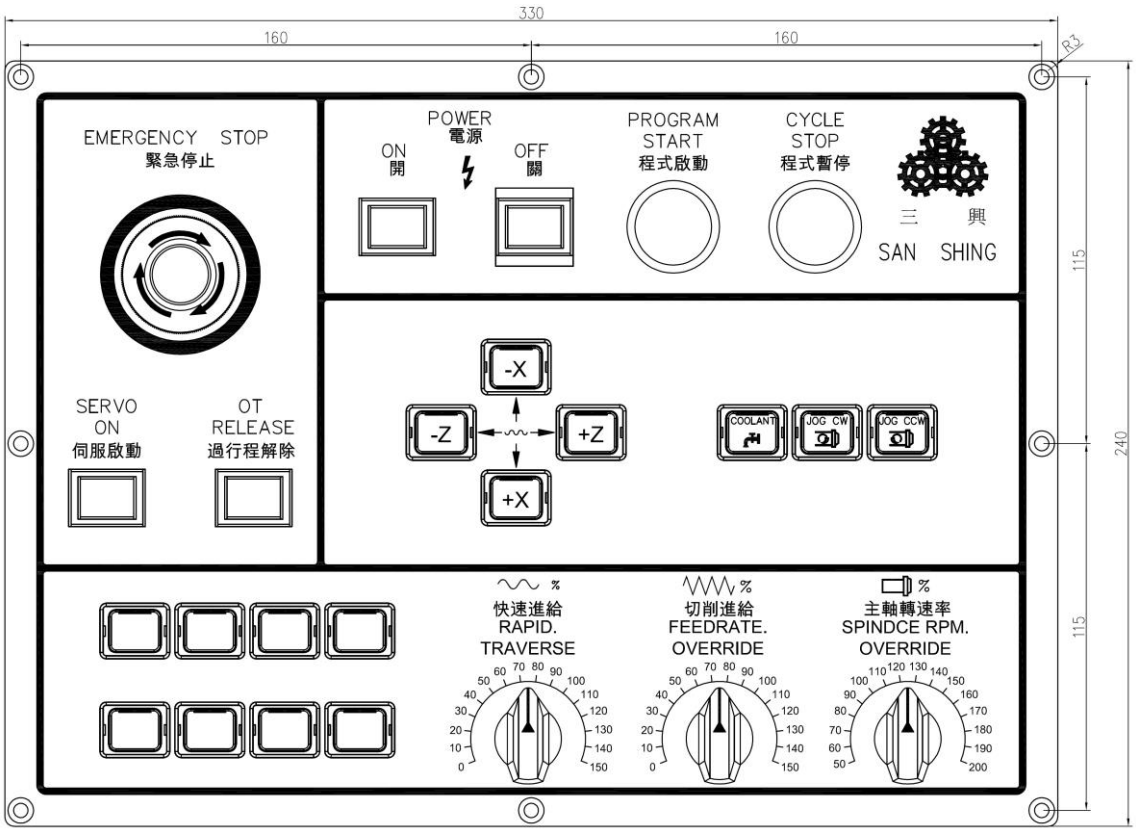


Figure 8-1 SAN-SHING Lathe Machine Panel

Hand wheel panel is also part of the distribution project, Hand wheel panel at least X-axis hand wheel, Z-axis hand wheel, hand wheel selection, hand wheel override selection.

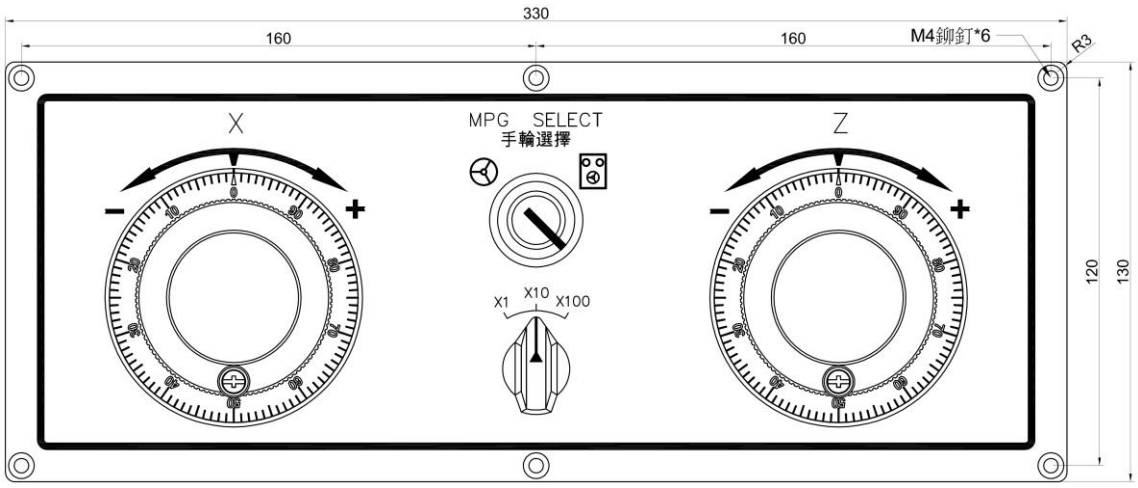


Figure 8-2 SAN-SHING Lathe Hand Wheel Panel

Chapter 9 GMPB2: General Machine Panel Board-2

GMPB2 as member of INET, it is designed to connect with machine panel that has been discussed on chapter 6. GMPB2 has 8 digital input points, 8 digital output points, three rotary switch interfaces and two hand wheel interfaces.

The 8 inputs and 8 outputs usually are used for illumination switch input signals and outputs for lamps of illumination switch, these digital inputs and outputs also can be general digital I/O. Three rotary switch interfaces are designed for spindle rpm override, rapid positon speed override and cutting feed override. Two hand wheel interfaces are for X axis and Z axis hand wheel, user moves two axis by two hand wheels to teach in position or original position or manual cutting.

For above requirements, GMPB2 provides a serial connector, a expand serial connector, an eight points digital input terminal, an eight points digital output terminal, three rotary switch connectors and two hand wheel connectors, and these terminals and connectors detail information will talk in the next of this general section.

Connector positions on GMPB2 illustrate as below:

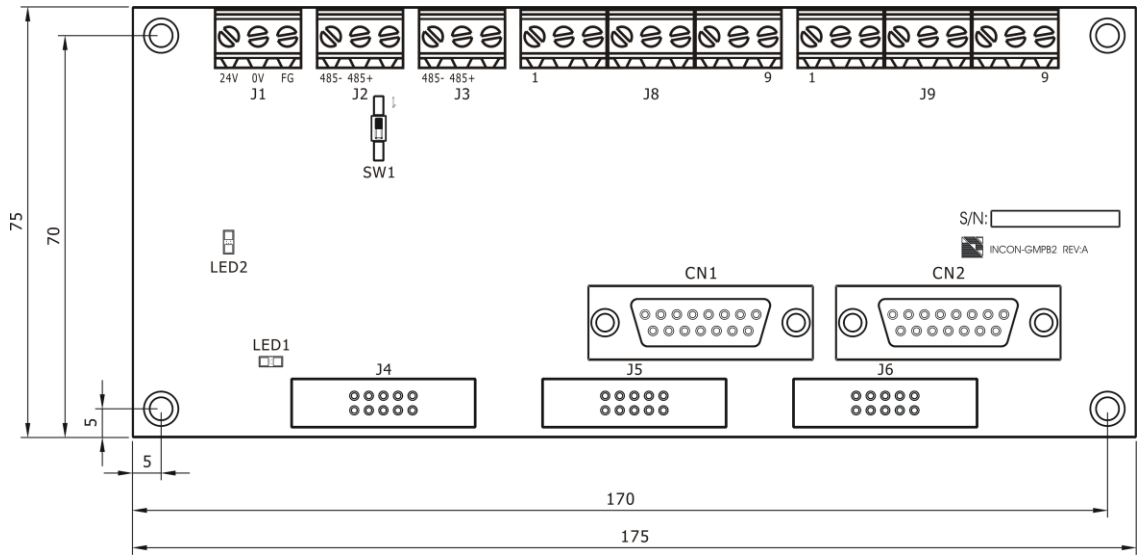


Figure 9-1 GMPB2 Unit

9.1 J1 Power Input Terminal

J1 is a power input terminal, GMPB2 needs 24V DC power from external power suply, and 24V DC power connects to J1 for GMPB2. If the 24V DC power has provided to GMPB2, the LED2 will be lighted.

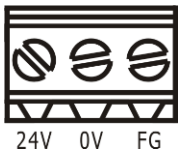


Figure 9-2 J1 Power Input Terminal

Caution: Don't connect DC24V external power for I/O to J1.

9.2 J2 Serial Connector

J2 on GMPB2 is serial connector for communication, this connector connect to previous unit expanded serial connector.

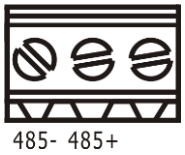


Figure 9-3 J2 Serial Connector

9.3 J3 Expanded Serial Connector

J3 is an expanded serial connector, next serial unit connects with J3 to get communicate signals.

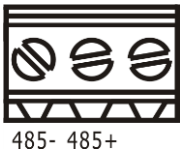


Figure 9-4 J3 Expanded Serial Connector

9.4 SW1 Terminal Resistor

SW1 is terminal resistor ON or OFF switch, if GMPB2 is the ended unit of INET, the SW1 must turn on, otherwise if GMPB2 is not ended unit of INET, the SW1 must turn off.

Figure 9-5 SW1 Terminal Resistor

Illumination switch input terminal and illumination switch indicator output terminal have used optically coupled isolators to isolate external power system. If illumination switch input has been pressed and kept in ON state, then relative illumination switch indicator will shine.

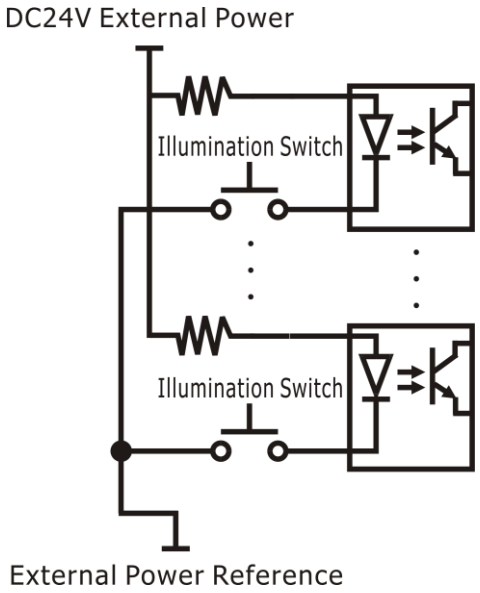


Figure 9-6 GMPB2 Illumination Switch Input Circuit

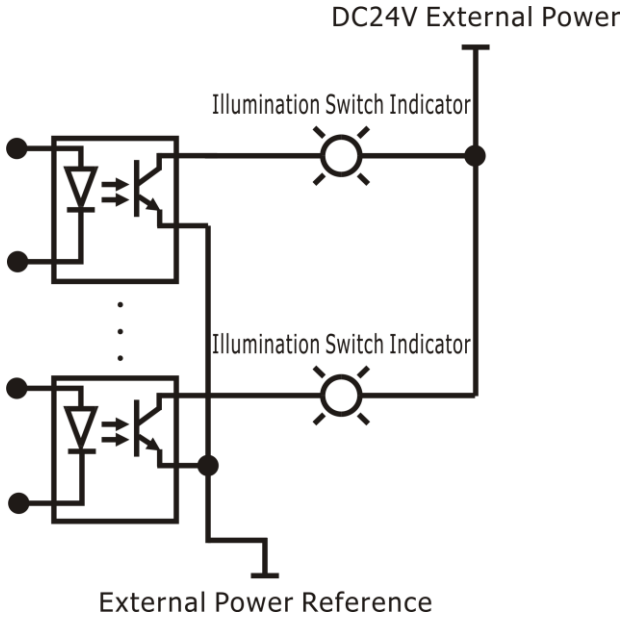


Figure 9-7 GMPB2 Illumination Switch Indicator Output Circuit

9.5 J8 Illumination Switch Input Terminal

J8 is an illumination switch input terminal. It provides 8 input points and 1 common point. Each input point definition is showing as below.

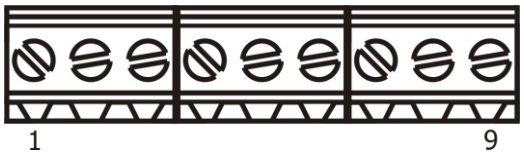


Figure 9-8 J8 Illumination Switch Input Terminal

Point	Name	Definition
1.	I1	#1 Digital input
2.	I2	#2 Digital input
3.	I3	#3 Digital input
4.	I4	#4 Digital input
5.	I5	#5 Digital input
6.	I6	#6 Digital input
7.	I7	#7 Digital input
8.	I8	#8 Digital input
9.	External power (DC24V)	I/O external power

9.6 J9 Illumination Switch Indicator Output Terminal

J9 is an illumination switch indicator output terminal. It provides 8 output points and 1 common point. Each output point definition is showing as below.

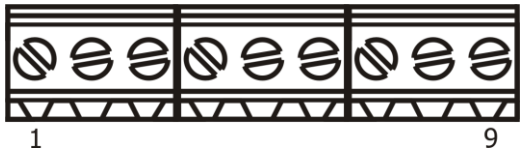


Figure 9-9 J9 Illumination Switch Indicator Output Terminal

Point	Name	Definition
1.	O1	#1 Digital output
2.	O2	#2 Digital output
3.	O3	#3 Digital output
4.	O4	#4 Digital output
5.	O5	#5 Digital output
6.	O6	#6 Digital output
7.	O7	#7 Digital output
8.	O8	#8 Digital output
9.	External power reference (DC0V)	I/O external power reference

9.7 J4, J5, J6 Rotary Switch Input Connector

J4 is an rotary switch input connector, it is used for G00 override. It provides 6 input pins and 1 common pin, the definition of these pins is showing as below.

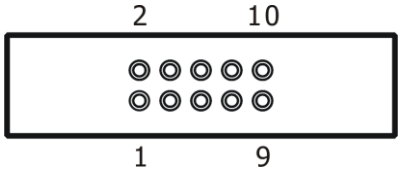


Figure 9-10 J4 Rotary Switch Input Connector

Point	Name	Definition
1.	RT1-1	Rotary switch binary code bit 1
2.	RT1-2	Rotary switch binary code bit 2
3.		
4.	COMMON	Binary code COMMON
5.	RT1-3	Rotary switch binary code bit 3

Point	Name	Definition
6.	RT1-4	Rotary switch binary code bit 4
7.		
8.		
9.		
10.		

J5 is an rotary switch input connector, it is used for Feed rate override. It provides 6 input pins and 1 common pin, the definition of these pins is showing as below.

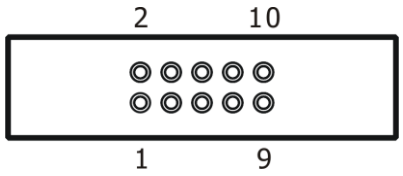


Figure 9-11 J5 Rotary Switch Input Connector

Point	Name	Definition
1.	RT2-1	Rotary switch binary code bit 1
2.	RT2-2	Rotary switch binary code bit 2
3.		
4.	COMMON	Binary code COMMON
5.	RT2-3	Rotary switch binary code bit 3
6.	RT2-4	Rotary switch binary code bit 4
7.		
8.		
9.		
10.		

J6 is an rotary switch input connector, it is used for Spindle override. It provides 6 input pins and 1 common pin, the definition of these pins is showing as below.

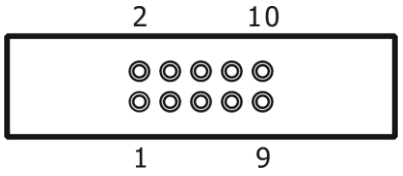


Figure 9-12 J6 Rotary Switch Input Connector

Point	Name	Definition
1.	RT3-1	Rotary switch binary code bit 1
2.	RT3-2	Rotary switch binary code bit 2
3.		
4.	COMMON	Binary code COMMON
5.	RT3-3	Rotary switch binary code bit 3
6.	RT3-4	Rotary switch binary code bit 4

Point	Name	Definition
7.		
8.		
9.		
10.		

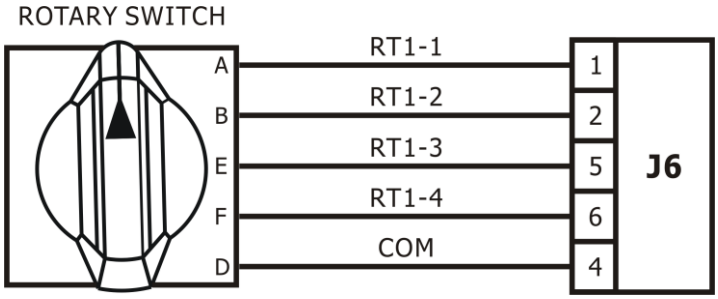


Figure 9-13 Rotary Switch Wiring Diagram

9.8 CN1, CN2 Hand Wheel Connector

CN1 is a hand wheel connector for X axis, it is a D shell 15 pins male connector. It receives A+, A-, B+, B- signals from external hand wheel, the interface of this connector is linear differential, the pin definition is showing as below.

Point	Name	Definition
1.	A+	A+ differential signal of gray code A
2.	A-	A- differential signal of gray code A
3.	B +	B+ differential signal of gray code B
4.	B -	B- differential signal of gray code B
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.	DC5V	Hand wheel power supply
14.	0 V	Hand wheel power supply
15.	F.G.	Shell ground

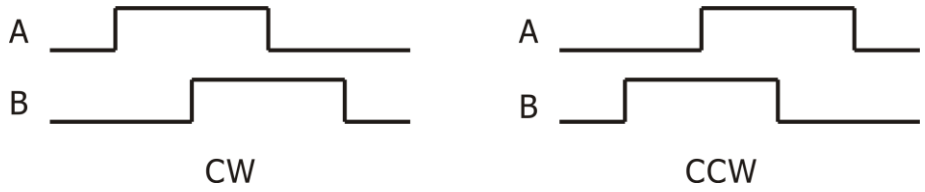


Figure 9-14 Gray Code

CN2 is a hand wheel connector for Z axis, it is a D shell 15 pins male connector. It receives A+, A-, B+, B- signals from external hand wheel, the interface of this connector is linear differential, the pin definition is showing as below.

Point	Name	Definition
1.	A+	A+ differential signal of gray code A
2.	A-	A- differential signal of gray code A
3.	B +	B+ differential signal of gray code B
4.	B -	B- differential signal of gray code B
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.	DC5V	Hand wheel power supply
14.	0 V	Hand wheel power supply
15.	F.G.	Shell ground

Appendix 1 Alarm Signal

number	content
#1	Wrong setting values
#2	Emergency stop tripped
#3	Not correct tool number
#4	Wait Spindle speed arrive signal time out
#5	Wait Spindle zero speed signal time out
#6	X axis servo driver alarm
#7	Z axis servo driver alarm
#8	Spindle driver alarm
#9	Z axis Body Over travel tripped
#10	MOTORS is Overloads
#11	Lube is empty
#12	side cover door is Open
#13	Chuck door is Open
#14	Spindle Oil Coolers is Overloads
#15	Soft limit on X positive side tripped
#16	Soft limit on X negative side tripped
#17	Soft limit on Z positive side tripped
#18	Soft limit on Z negative side tripped
#19	X position control loop fail
#20	Z position control loop fail
#21	EMG input is on
#22	X axis not in-position time out
#23	X axis not in-position time out
#24	Limit on X positive side tripped
#25	Limit on X negative side tripped
#26	Limit on Z positive side tripped
#27	Limit on Z negative side tripped
#28	Do homing first
#29	Probe detected outside of detect zone
#30	Probe not detected
#31	Please home Z axis before this home action
#32	Please home X axis before this home action

number	content
#33	X axis over travel limit, position is lost, please do home after recover
#34	Z axis over travel limit, position is lost, please do home after recover
#35	Spindle close loop control fail as doing rigid tapping