A-LNC Milling Controller 1000 Series

Maintenance Manual

2017/04 Version:V01.00.001(LN4408230008)

Leading Numerical Controller

ADVANTECH LNC
Machine Control & Robotics

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1 Description of tuning approach

1.1 Machine tuning sequence

The recommended machine tuning sequence is:

1. Basic settings: Language, keyboard, network, time setting (see section 2)
2. I/O settings and inspect machine structure. (Please refer to Chapter 3)
3. Set the servo driver. (Please refer to Chapter 4)
4. Complete system parameter settings. (Please refer to Chapter 5)
5. Carry out zero point return or setting absolute mode for the zero point. (Please refer to Chapter 5.8)
6. Complete the software limit setting. (Please refer to Chapter 6)
7. Complete the adjustment of backlash compensation. (Please refer to Chapter 7.1)
8. Complete high-speed high precision cutting adjustment.
9. Complete the adjustment of rigid tapping cutting. (Please refer to Chapter 7.2)
10. Complete the parameter backup. (Please refer to Chapter 8)

1.2 Milling machine tuning checklist

Fill-in the progress: ○, X (not used)

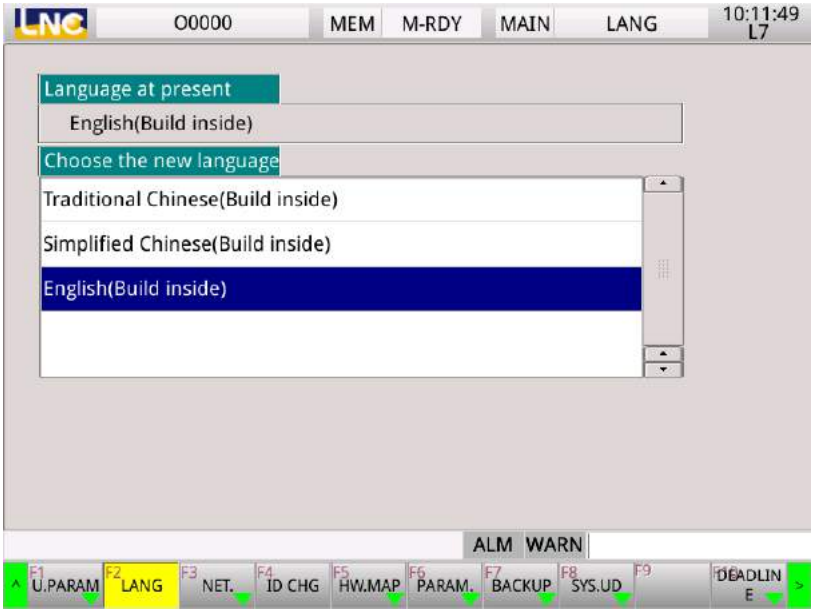
Item number	Classification	Item	Description	Progress
1.	Basic Setting	Language settings	Check the language to see if it is correct	
2.		MDI keyboard settings	Make sure the MDI keyboard selection matches the model	
3.		Network settings	Confirm that the network IP and controller name are set	
4.		Time settings	Confirm whether the controller time is set correctly	
5.	I/O settings	Operation panel I/O setting	Confirm whether all keys on the operating panel are working normally, and confirm keys and indicators	
6.		Peripheral I/O panel functions	Peripherals connected to the I/O panel should be checked with OP or M code to confirm if they working properly	
7.		Hardware limit functions	Please confirm whether hardware limits are in effect	
8.	Mechanism Checks	Check the coupling	Confirm whether the coupling is securely fastened	
9.		Checking the telescoping cover	Confirm whether the telescopic cover is stuck during movement	
10.	Driver	Adjusting servo driver parameters	Confirm whether driver parameter settings are completed	
11.		Servo driver gain adjustment	Confirm whether or not the driver position and speed gain are adjusted in accordance with SOP	
12.	Controller Parameters	System parameter settings	Confirm that the setting of system parameter page of section 5.2is completed	
13.		Axis group configuration settings	Confirm whether or not the settings of parameters on the axis group configuration page of section 5.3are completed	
14.		Settings of each axis	Confirm whether or not the settings of parameters of each axis setting page of the section 5.4 are completed	

Item number	Classification	Item	Description	Progress
15.		**M9999 execution**	Whether or not M9999 has been executed in MDI to initialize parameter settings	
16.		Gear ratio settings	Confirm whether or not the parameter settings of the gear ratio setting page of section 5.6are completed	
17.		Speed parameter settings	Confirm whether or not the parameter settings of the speed parameter page of section 5.7are completed	
18.		Zero point parameter settings	Confirm whether or not the parameter settings of the zero point parameter page of section 5.8are completed	
19.		Return to zero point	Whether zero point return along all axial directions have been completed	
20.		Zero point grid amount adjustment (only incremental encoder needs to be checked)	Whether or not the grid amount has been adjusted to be within 45%-55%	
21.		Software limits	Confirm whether software limit settings along various axial directions of the machine are completed	
22.	Cutting Adjustments	Shape cutting	Confirm whether or not G01, G02, G03 is normal, and whether or not the repeated size is correct	
23.		Backlash compensation adjustment	Carry out arc cutting to confirm whether backlash compensation is completed	
24.		Spindle rigid tapping cutting	Carry out spindle rigid tapping cutting to confirm whether rigid tapping adjustments are normal	
25.	Backup	Parameter backup	Confirm whether parameter backup is completed	

2 Language, network, and time settings

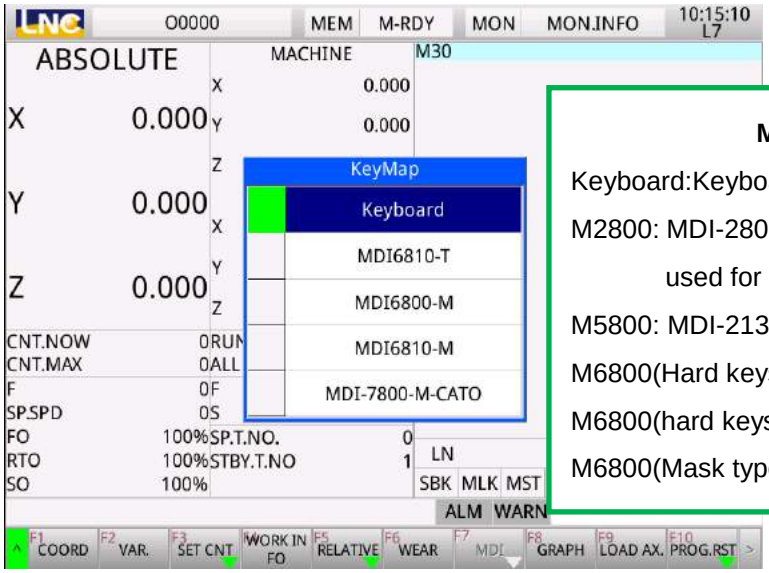
2.1 Language settings

Press **<Maintenance>** key group ➔**[Language Settings]**to show the language settings screen. Press the **<Up/Down>** keys to select a language, then press **<Enter>** to change the display language immediately.



2.2 Key settings

Switch to the monitoring page and press **<Up, Down, Left, Right, Enter>** to select the type of keyboard and confirm if it is correct.



MDI selection

Keyboard:Keyboard

M2800: MDI-2800 (numeric keypad can be used for entering numbers)

M5800: MDI-2130-M

M6800(Hard keys upright): MDI6800-M

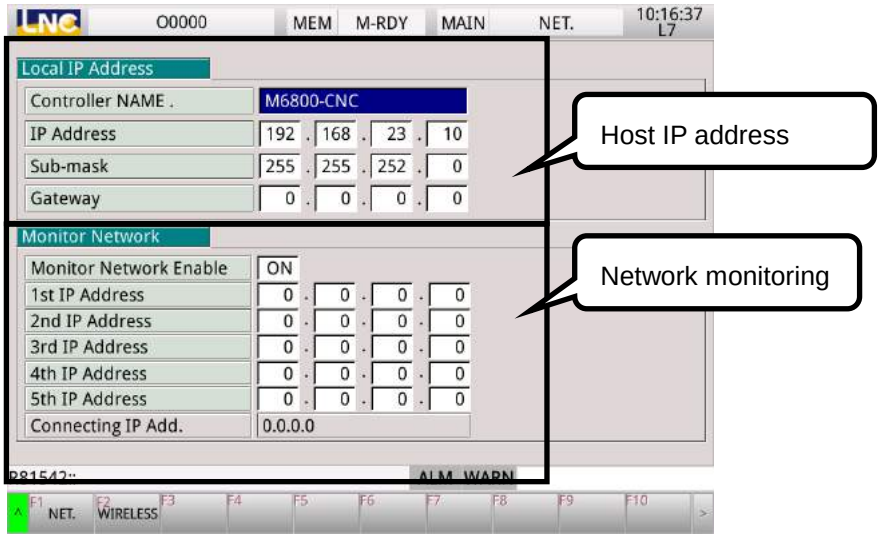
M6800(hard keys horizontal): MDI6810-M

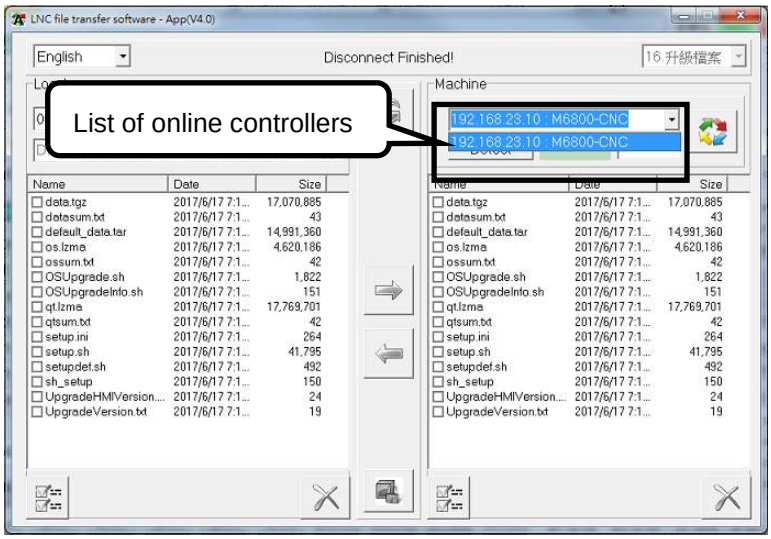
M6800(Mask type): MDIOP-6500-M

2.3 Network settings

Press **<Maintenance>** key group ➔**[Network Settings]**to show the network settings screen. It is used to assign a name to the controller as well as the IP address of the host. The names of online controllers will be listed when the LNC uploading/downloading software "ReconFTP" is used on a PC for connecting to the controller.

It can be used in coordination with the network monitoring function, and it allows as many as 5 sets of simultaneous connections.

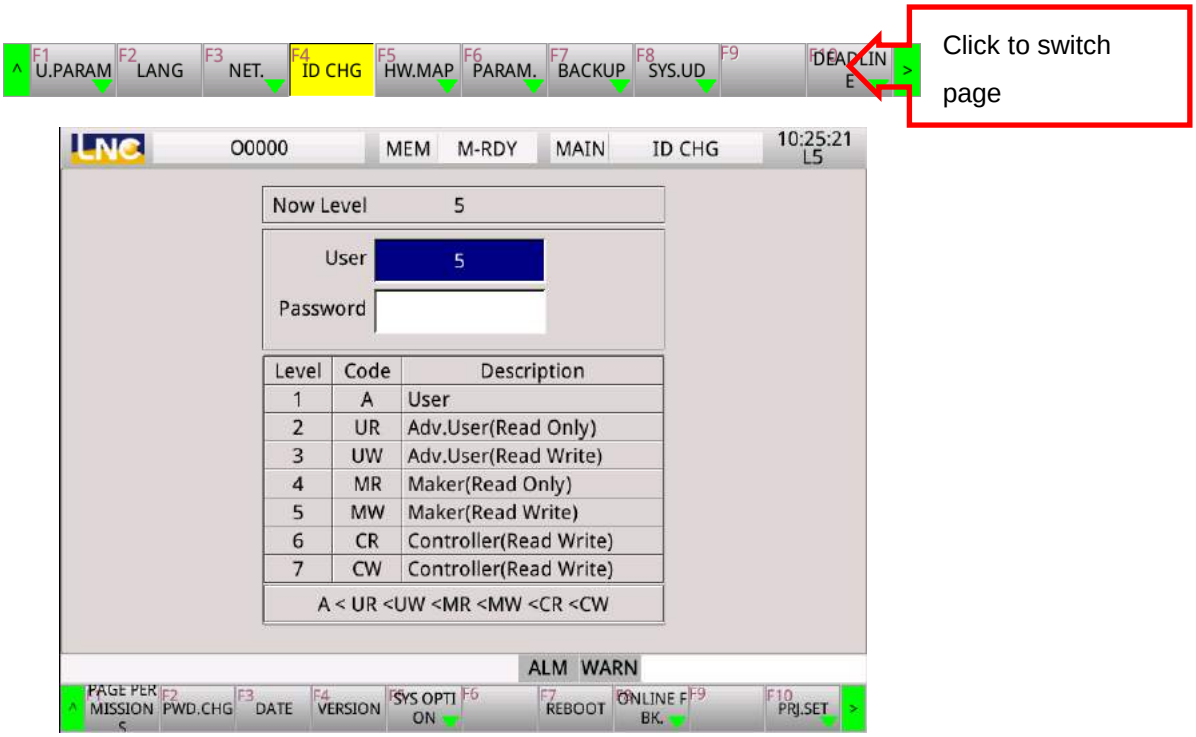




The LNC uploading/downloading software "ReconFTP" for PC

2.4 Date and time

Press the **<Maintenance>** key group ➔ **[Date/Time],** for the date/time page to appear on the screen for adjustment of system time. Time change is only allowed when the stage setting is not being used or when the state of stage setting is canceled.

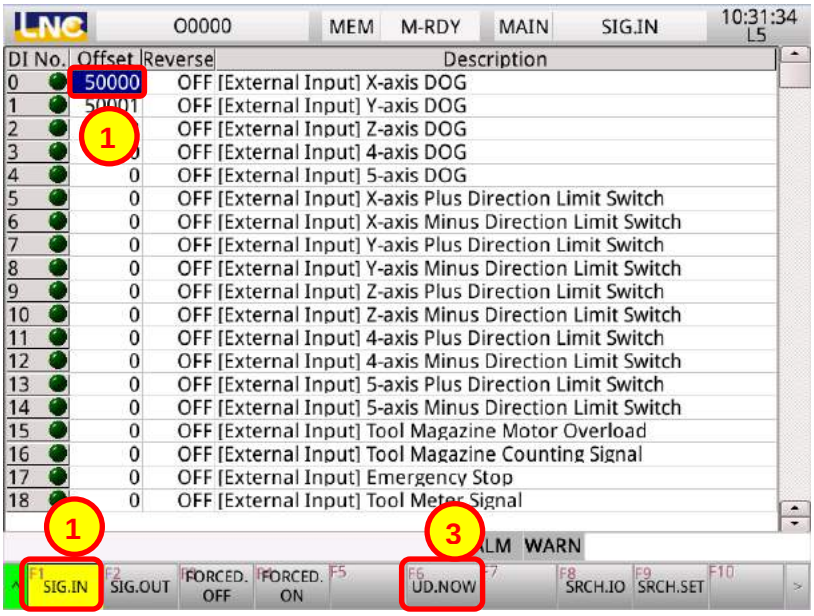


3 I/O settings and mechanism checks

3.1 I/O settings

3.1.1 OP panel Input point settings

- Press the **<Maintenance>** key group ➔ **[Hardware contact]** ➔ **[Signal input]** for the I/O corresponding setting screen to be shown.



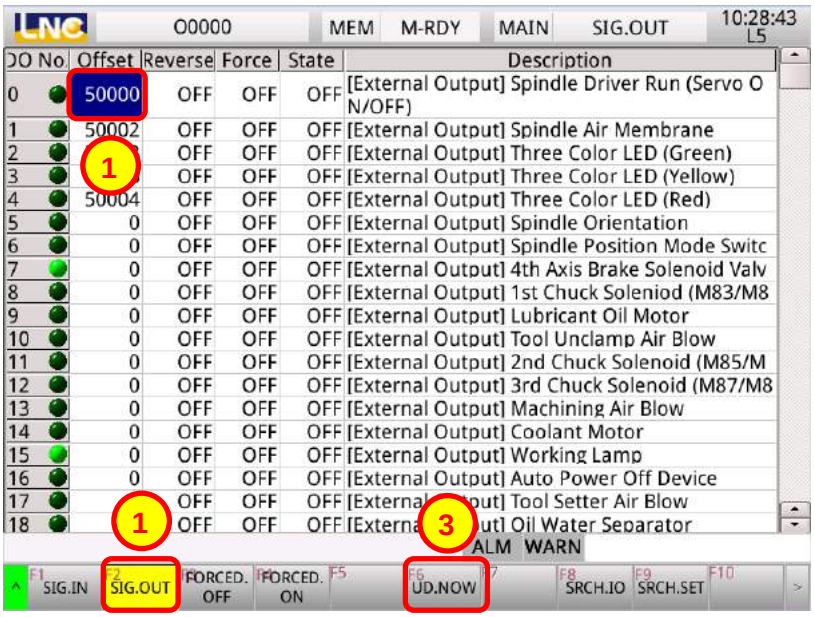
Field	Description
DI No.	PLC's logical input point
Offset	For the corresponding hardware number please refer to the Hardware Manual I/O Mapping section.
Reverse	It is for setting whether the input at that point is reversed
Description	Logical point I long annotation (need to be edited via the PLC editor)

- Enter the hardware number to the Offset corresponding to the DI No. and press **[Update Now]** to match the PLC logic point I to the hardware.
- For the hardware number please refer to the I/O Mapping Section of hardware manual

3.1.2 OP panel Output point settings

- Press the **<Maintenance>** key group ➔ **[Hardware contact]** ➔ **[Signal output]** The I/O setting

screen is displayed.



Field	Description
DO No.	PLC's logical O point
Offset	For the corresponding hardware number please refer to the Hardware Manual I/O Mapping section.
Reverse	It is for setting whether the input at that point is reversed
Description	Logical point O long annotation (need to be edited via the PLC editor)

- Enter the hardware number in the Offset corresponding to DO No., and then press**[Update Immediately]**to link logic point O of PLC to the hardware.
- For the hardware number please refer to the I/O Mapping Section of hardware manual

3.2 Mechanism checking

A. Confirm whether the coupling is securely fastened.

B. The telescopic cover must not be stuck during movement.

C. After turning on the driver's power and placing it under the emergency stop mode, the axial direction should be tested to see if it can be pushed easily by hand. If not, the coupling mechanism should be checked for eccentric locking or see if there is any interference with the mechanism.

Please note: If the mechanism's protective cover at the user end is locked, the coupling should be reconfirmed by personnel from the machinery factory to be properly fastened with normal concentricity

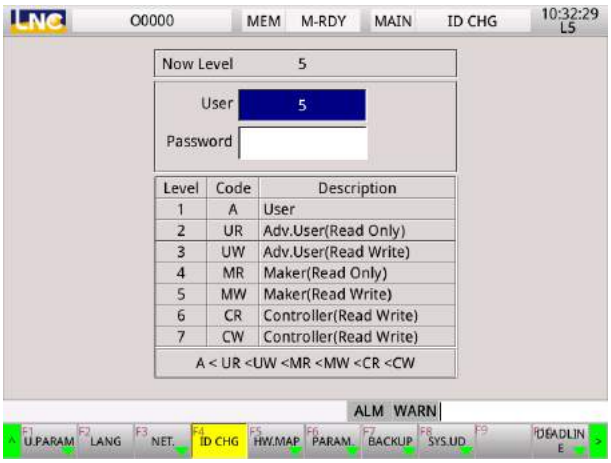
4 Common servo/spindle driver settings

Frequently used parameters of the servo/spindle driver should be set in accordance with the steps listed in the following section.

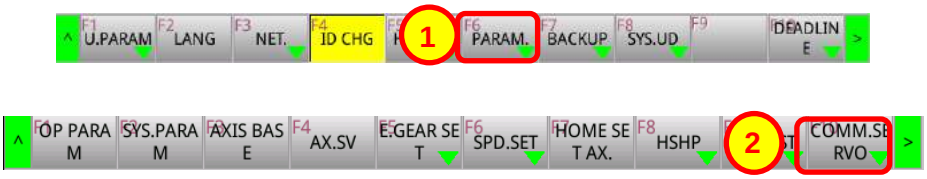
4.1 Start the filedbus servo settings page

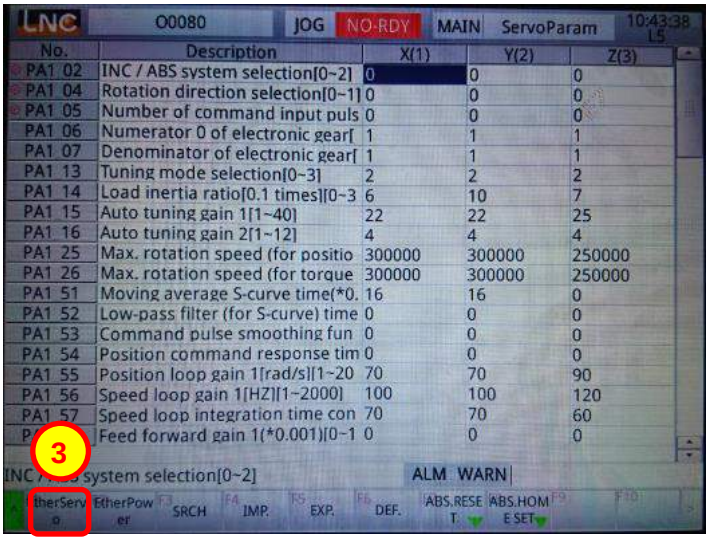
Switch the operation level to above machinery level.

- [Maintenance] group ➔[Change Identity] page.
- User permission changed to 5 with password of 2222 (initial password).
- If the password is correct, the message "User Changed Successfully" will be displayed.



- Switch to **【Tuning Parameter】➔【COMM. Servo】** settings page.

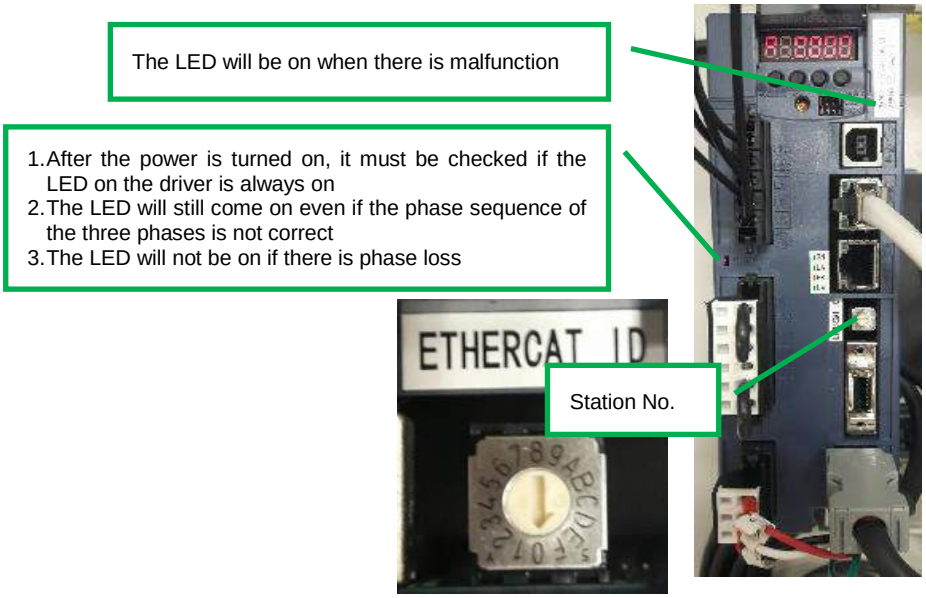




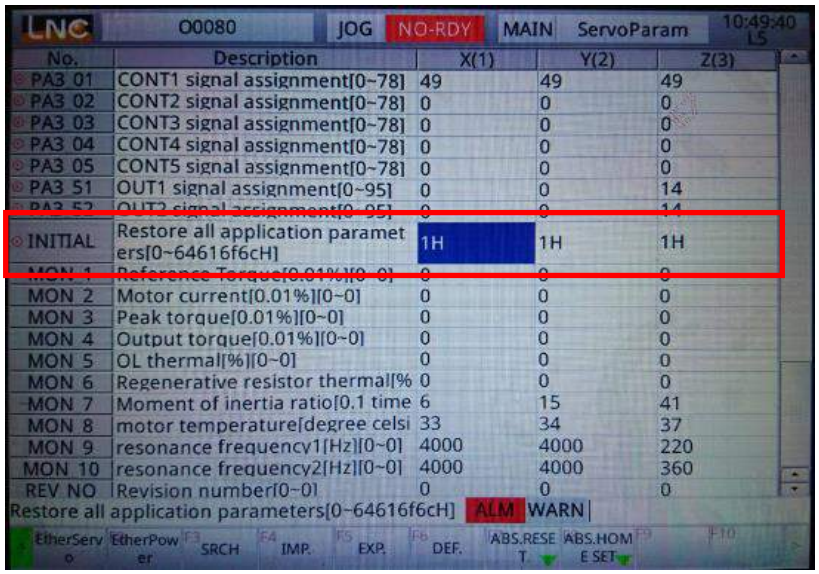
4.2 EtherServo servo driver settings

4.2.1 Initialization settings of the EtherServo

- For setting controller **parameter 40010 EtherCAT station number scanning method (0: Switch, 1: in accordance with wiring sequence)**, the set value must be 0, and a driving dip switch should be used to determine the station number.
- Station No. setting: Set the first station at position 1, and set parameter settings in coordination with controller hardware number. Please refer to Section 5.2 Axis Group Configuration Settings
  It is suggested that X to be set as 101, Y to be set as 102, Z to be set as 103, axis 4/5 to be set as 104 and 105, and servo tool magazine to be set as 107.

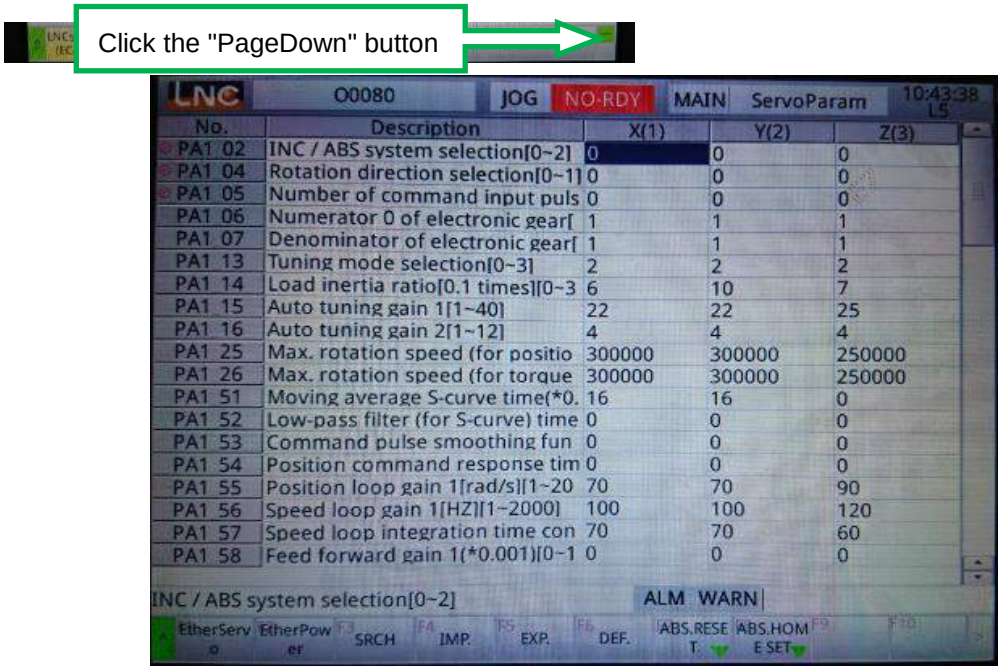


- Initialization of EtherServo parameters
  If you want to initialize EtherServo, you only need to set this parameter to the maximum (64616f6cH)



4.2.2 Description of absolute function of EtherServo

1. Battery installation
2. Set the driver parameter PA1_02 to 1: ABS, and for the controller parameter please refer to 1.1Zero point parameter setting section
3. Restarting heavy electricity
4. At this point the driver will send the ABS data loss alarm (AL-DL1)
5. After restarting heavy electricity again, this alert will be cleared automatically after entering the system
6. Another way to clear the alarm is to switch to the [Machine tuning parameters] ➔ [COMM Servo] ➔ [EtherServo] settings page. Press ABS reset, which will zero the machine coordinate in addition to clearing the alert.



4.2.3 EtherServo parameter settings

Parameters	Set value	Description
PA1_02	1	Absolute equation is set as 1
PA1_06	1	Numerator of electronic gear ratio
PA1_07	1	Denominator of electronic gear ratio
PA1_13	2	Automatic gain is set as 0, and the manual gain adjustment valid must be set as 2
PA1-14	20~60	Rotational inertia ratio. A higher ratio indicates greater rigidity, a lower ratio indicates weaker rigidity
PA1_51	2~32	Time for movement by an average S-shape
PA1_55	60~300	Position loop gain 1. This parameter must be set as identical when the X and Z axes are synchronized
PA1_56	60~550	Speed loop gain 1. A higher ratio indicates greater rigidity, a lower ratio indicates weaker rigidity
PA1_57	50~550	Speed loop integral time constant 1. A smaller constant indicates faster response, and a greater constant indicates slower response
PA1_59	4~50	Torque filter time constant
PA1_95	2	It is set as 2 to close model torque
PA1_98	2	Speed feedforward compensation (0: on, 2: off)
PA2_64	50	Brake command - servo OFF delay time, which can be used to

		improve the lathe servo OFF sliding situation; unit: 10ms
PA2_65	1	1: internal resistance,2:external resistance
PA2_91	7	Position command delay
PA3_51	14	Set 14 for activating the brake signal output function
PA3_52	14	Set 14 for activating the brake signal output function

4.2.4 EtherServo driver gain adjustment

- EtherServo driver gain adjustment process flow (adjusting PA1_55-PA1_57)
  1. Upon starting, the driver position gain (Kp) should be set as PA1_55=80; (80 rad/s)；
     The position loop gain (0.1/s) of 70100-70131 axial position mode corresponding to the controller must be set as 800.
  2. Driver PA1_56 speed gain (Kv) is set to be increasing gradually (until there is noise and the coupling cannot be rotated manually);
     and then the value of driver PA1_56 speed gain (Kv) should be multiplied by 0.7 and set back to Pn100.
  3. Driver PA1_57 speed integral time (Ti) is set to be decreasing gradually until the machine vibrates; and then the value of driver PA1_56 speed integral time (Ti) multiplied by 1.3 should be set back to Pn101.
  4. Driver PA1_55 position gain (Kp) is set to increase gradually until there is noise. In general, it is recommended to be set below 200 (single-handed rapid clockwise and counterclockwise rotations should be applied by using MPG x100 to confirm that there are no strange noises);
     The value of driver PA1_55 position gain (Kp) multiplied by 0.7 should be set back to Pn102.
     The position loop gain (0.1/s) of 70100-70131 axial position mode corresponding to the controller must be subject to the same setting, yet it must be noted that the unit should be 0.1/s
  5. Trial machining
- Important items related to adjusting the gain for EtherServo drivers
  1. The PA1_56 speed gain (Kv) of drivers of the X, Y, and Z axes can be different from each other.
  2. The PA1_57 speed integral time (Ti) of drivers of the X, Y, and Z axes can be different from each other.
  3. Confirm that the PA1_55 position gain (Kp) of drivers of the X, Y, and Z axes are all identical.
  4. Confirm that the position loop gain (0.1/s) of the 70100-70131 axial position mode corresponding to the controller must be based on the identical setting

4.2.5 Suppressing EtherServo's oscillation and noise

- Description of oscillation and noise suppressing parameters

Parameters	Set value	Description
PA1_70	0	Select automatic notch
PA1_71	4000	Notch filter 1 frequency ➔ low filter frequency
PA1_72	0	Notch filter 1 attenuation
PA1_73	2	Notch filter 1 width
PA1_74	4000	Notch filter 2 frequency ➔ high filter frequency
PA1_75	0	Notch filter 2 attenuation
PA1_76	2	Notch filter 2 width

- Flow of the EtherServo driver filter adjustment process (adjusting PA1_70-PA1_74)
  1. When there is noise or vibration during axial movement, PA1_70 should be set as 1 for the axial direction with noise or vibration, and the back and forth axial movement should be continued until the noise disappears (with full stroke movements for longer than 10 seconds).
  2. The parameter should be read again to see if the value is reasonable:
  3. In principle, PA1_71 should be less than 300. If PA1_74 is 4000, it means the driver only captured one set.
  4. In principle, PA1_74 must be 7-8 times greater than PA1_55.
  5. If the value is reasonable, set PA1_70 to 0 to turn off auto filter and re-read the parameter for confirmation.
  6. Continue with the next axis.

5 System settings

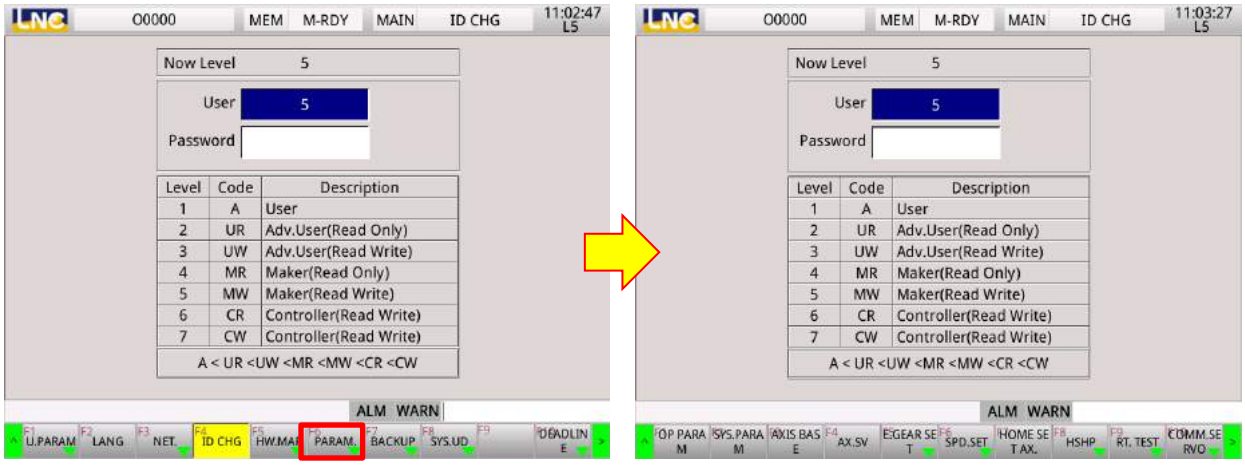
Quick system settings should be completed in accordance with the steps listed in the following section.

5.1 Start the parameters page

Switch the operation level to above machinery level.

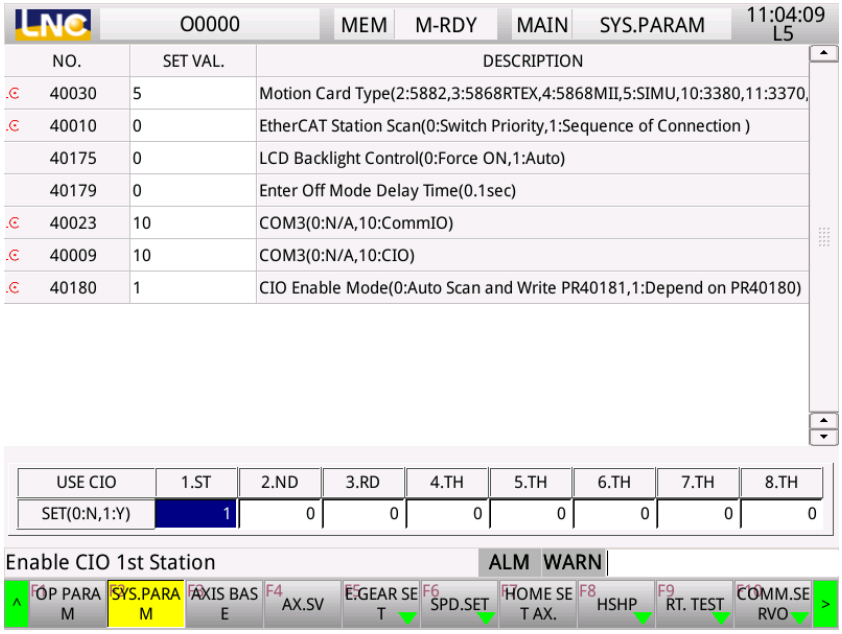
- Press the **<Maintenance>** key group ➔ **[** Identity change **]** page.
- Change user permission to 5 with password of 2222 (initial password).
- If the password is correct, the message "User Changed Successfully" will be displayed.

- Press **[Parameter] to** enter the adjustment page.



5.2 System parameter settings

- Switch to【**System Parameters**】setting page.



- Hardware parameter description.

Parameter number	Description	Recommended value	Description
40030	Hardware type	None	Description of set values 5: To be used in a simulated environment 10: EtherCAT bus system 11: RTEX bus system 12: M-II bus system 15: Pulse system
40010	EtherCAT station number scanning method (0: Switch with priority, 1: according to wiring sequence)	0	Please use 0: Switch for the milling machine. The station number is set by the driver dip
40023	COM4 function (0: N/A, 10: CommOP)	10	Please set the recommended value

- CIO parameter description.

Parameter number	Description	Recommended value	Description
40009	COM3 function(0:N/A,10:CIO)	10	For IO boards connected to CIO, please set as 10
40180	CIO starting mode (0: complete automatic scan once before filling in parameter 40181, 1: determined in accordance with parameter 40181)	1	When it is set as 0, the connected CIO board will be automatically detected after reboot, and it will be restored to set value 1.
	Start CIO station 1-8	None	The started CIO is detected and shown in stations 1-8 below. It can also be set manually. When there is only 1 IO board,

Parameter number	Description	Recommended value	Description
			station 1 is set as 1. Station 2 must also be set as 1 if there are 2 IO boards. There are also station number dip settings on the IO board, which should be set at corresponding positions

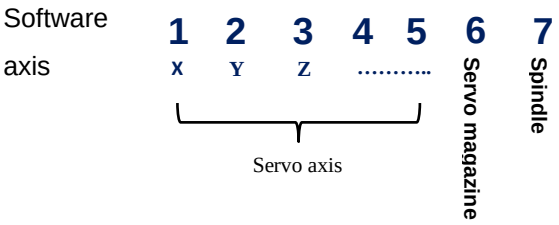
- Description of LCD backlight parameters.

Parameter number	Description	Recommended value	Description
40175	LCD backlight mode (0: always ON, 1: timed automatic shutoff)	0	Description of set values 0:LCD backlight is always ON 1: LCD backlight can be set to a delayed shutdown when there are no MDI operations in progress. The delay time can be set by parameter 40179
40179	Enter backlight shutdown delay time (0.1sec, -1: kept at sleep mode of backlight)	0	It must be used in coordination with switch parameter 40175

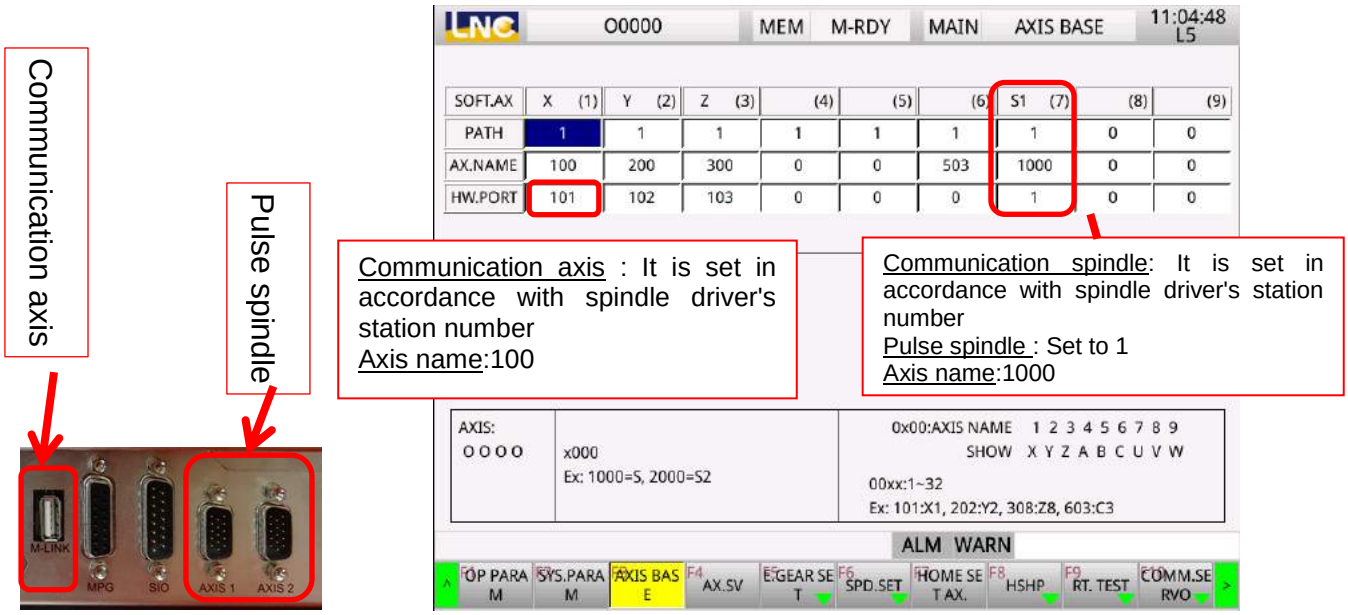
5.3 Axis group configuration settings

- Standard Milling Machine M Series software axis is planned as shown below:

  The 1st to 5th software axes are preserved for servo axis (X, Y, Z, 4th axis, 5th axis), the 6th software axis is reserved for the servo magazine (axis control), and the 7th software axis is reserved for the first spindle.



- Switch to**[Axis Group Configuration]**setting page.



- Description of path parameters.

Parameter number	Description	Recommended value	Description
69000	Total number of paths 1-6	1	Setting the number of system paths. Standard milling machine is a single system, please set is as 1,

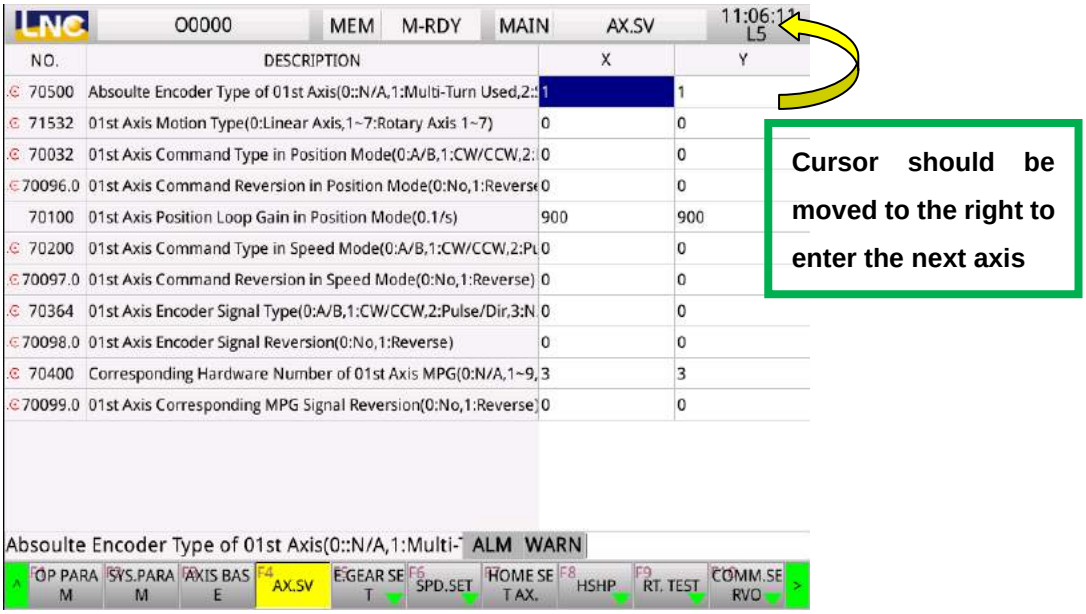
- Description of axis group configurations.

Description	Description
Corresponding path	Paths corresponding to software axis (X, Y, Z axis). It is set as 1 if it corresponds to the first path, and so on. (Unused software axis should be set as 0)
Axis name	The naming method for axis names is as shown on the page. (Unused axis should

Description	Description
	be set as 0)
Hardware number	1. The hardware number of communication axis is set as the station number corresponding to the driver. For example, if the address of driver axis of the X axis is 1, the corresponding hardware number should be set as 101, and so on. 2. Settings of the pulse axis should be according to the port position of the connected system's AXIS interface. The hardware number should be set as 1 when it is connected to the first (AXIS 1).The hardware number should be set as 1 when it is connected to the second (AXIS 2). (Unused axis should be set as 0)

5.4 Settings of each axis

- Switch to【**Settings of Each Axis**】settings page.



- Description of parameters of the absolute encoder

Parameter number	Description	Recommended value	Description
70500 +0~31	Types of absolute encoder on the axis (0: Not used, 1: Communication axis) The first axis - the 32nd axis	None	It is for setting whether an absolute encoder is adopted along the axial direction. 0: Not used. 1: The absolute encoder of communication axis (bus type) is used. Please note that the driver also has to be set in absolute encoder mode.

- Description of rotary axis parameters.

Parameter number	Description	Recommended value	Description
71532 +0~31	Axial movement pattern (0: linear axis, 1-7: rotary axis type 1-7) The first axis - the 32nd axis	1	The linear axis is set as 0 The rotary axis is usually set as 1

Set the movement pattern of axial direction.

0: Linear axis

- Both machine coordinates and absolute coordinates are in the form of a linear axis.
- Accept metric/imperial coordinate conversion function

- G28 and G30 reference point return commands will reset to the initial zero point of the machine zero point reset operation.
- It supports backlash compensation, pitch compensation, and finding zero point grid amount checking functions.

1: Rotational axis 1

- Both machine and absolute coordinates are in the form of rotational axis.
- The coordinate value is always kept between 0 to 360 degrees.
- Absolute coordinate (G90) movement command +/-, where + represents forward rotation and - represents reversed rotation.
- "Degrees" is the unit for both metric and imperial coordinate systems.
- G28 and G30 reference point return commands will be reset to the 0 point of machine coordinate within one rotation.
- It supports backlash compensation, pitch compensation, and finding zero point grid amount checking functions.
- Absolute coordinate (G90) movement command supports the function of automatic selection of the shortest path.

2: Rotational axis 2

- Both machine and absolute coordinates are in the form of rotational axis.
- The coordinate value is always kept between 0 to 360 degrees.
- Absolute coordinate (G90) movement command +/-, where + represents forward rotation and - represents reversed rotation.
- "Degrees" is the unit for both metric and imperial coordinate systems.
- G28 and G30 reference point return commands will be reset to the 0 point of machine coordinate within one rotation.
- It supports backlash compensation, pitch compensation, and finding zero point grid amount checking functions.

3: Rotational axis 3

- Both machine and absolute coordinates are in the form of rotational axis.
- The coordinate value is always kept between -360 to +360 degrees.
- "Degrees" is the unit for both metric and imperial coordinate systems.
- G28 and G30 reference point return commands will be reset to the 0 point of machine coordinate within one rotation.
- It supports backlash compensation, pitch compensation, and finding zero point grid amount checking functions.
- Bus absolute servo does not support this form.

4: Rotational axis 4

- Machine coordinates are in the form of rotary axis, and absolute coordinates are in the form of linear

axis.

- The machine coordinate value is always kept between 0-+360 degrees.
- "Degrees" is the unit for both metric and imperial coordinate systems.
- G28 and G30 reference point return commands will reset to the initial zero point of the machine zero point reset operation.
- It supports backlash compensation, pitch compensation, and finding zero point grid amount checking functions.

5: Rotational axis 5

- Both machine coordinates and absolute coordinates are in the form of a linear axis.
- "Degrees" is the unit for both metric and imperial coordinate systems.
- G28 and G30 reference point return commands will reset to the initial zero point of the machine zero point reset operation.
- It supports backlash compensation, pitch compensation, and finding zero point grid amount checking functions.

6: Rotational axis 6:

- Both machine coordinates and absolute coordinates are in the form of a linear axis.
- "Degrees" is the unit for both metric and imperial coordinate systems.
- "Degrees" is the unit for both metric and imperial coordinate systems.
- It supports backlash compensation, pitch compensation, and finding zero point grid amount checking functions.
- In the next zero point return, it will return to the zero point via the shortest path.

7: Rotational axis 7

- Both machine and absolute coordinates are in the form of rotational axis.
- The coordinate value is always kept between 0 to 360 degrees.
- +/- of absolute coordinate (G90) movement command both represent forward rotation.
- "Degrees" is the unit for both metric and imperial coordinate systems.
- G28 and G30 reference point return commands will lead to forward rotation to 0 point of machinery coordinate.
- It supports backlash compensation, pitch compensation, and finding zero point grid amount checking functions.

Set value	1	2	4	5	6(Note 1)	7	3(Note 2)
Workpiece coordinates Display	0~+360°		0~±360000°			0~+360°	0 to ±360°, and it will return to 0°after passing ±360°

<table>
<tr><th>Set value</th><th>1</th><th>2</th><th>4</th><th>5</th><th>6(Note 1)</th><th>7</th><th>3(Note 2)</th></tr>
<tr><td>Machine coordinates Display</td><td colspan="3">0~+360°</td><td colspan="2">0~±360000°</td><td>0~+360°</td><td>0 to ±360°, and it will return to 0°after passing ±360°</td></tr>
<tr><td>Absolute amount command</td><td>Shortest distance (within half a revolution)</td><td>Move to the nearest command's correspondi ng angle position with the positive and negative sign of the command as the movement direction (within one revolution)</td><td colspan="3">Move to the command position as the behavior of linear axis (can be more than one revolution)</td><td>Move forward to the target position</td><td>Directly move to the target position (within two revolutions)</td></tr>
<tr><td>Incremental command</td><td colspan="7">It is for incremental shift with the positive and negative sign of the command as the movement direction.</td></tr>
<tr><td>Reference point return</td><td colspan="7">It is for shifting to the mid point in accordance with the incremental or absolute form of the command,
Returning from the mid point to the zero point is the same as positioning the machine coordinate</td></tr>
<tr><td>Machine coordinates Positioning</td><td colspan="3">Shortest distance (within half a revolution)</td><td colspan="2">Identical to the behavior of linear axis (can be more than one revolution)</td><td>Shortest distance (within half a revolution)</td><td>Directly move to the target position (within two revolutions)</td></tr>
</table>

Note 1: In the next zero point return of rotary axis 6 (set value = 6), it will return to the Zero point via the shortest path.

Note 2: Rotary axis 3 (set value 3) is based on special specifications for specialized machines.

- Description of command format parameters (Servo axis).

Parameter number	Description	Recommended value	Description
70032 +0~31	Axial position mode command format (0:A/B, 1:CW/CCW, 2:Pulse/Dir) The first axis - the 32nd axis	0	Signal input format while setting axial direction execution position mode control. (Please also set the bus driver as 0:A/B)
70364 +0~31	Axis encoder signal format (0:A/B, 1:CW/CCW, 2:Pulse/Dir, 3: unused) The first axis - the 32nd axis	0	Set the axial direction feedback encoder signal format. (Please also set the bus driver as 0:A/B)
70096 +.00~.31	Axial position mode command in inverted phase (0: non-inverted phase, 1: inverted phase) The first axis - the 32nd axis	0	When this parameter is set as 1, it indicates that the movement direction along the axial direction should be in inverted phase under the control of position mode.
70098 +.00~.31	Axial encoder signal in inverted phase (0: non-inverted phase, 1: inverted phase) The first axis - the 32nd axis	0	When this parameter is set as 1, it indicates the encoder feedback signal of this axial direction must be in inverted phase.

- Description of command format parameters (Spindle).

Parameter number	Description	Recommended value	Description
70200 +0~31	Axial speed mode command format (0:A/B, 1:CW/CCW, 2:Pulse/Dir ,3:DA+0~10V,4:DA+-10V) The first axis - the 32nd axis	3	**Pulse control spindle** : Parameters related to speed mode must be set. Speed mode command and encoder signal format are set to 0: A/B **Voltage Control Spindle:** The spindle speed mode command format is set in accordance with the type of analog voltage of the inverter. 3: DA 0~10V 4: DA -10V~10V
70097 +.00~.31	Axis speed mode command in inverted phase (0: non-inverted phase, 1: inverted phase) The first axis - the 32nd axis	0	If the spindle rotation direction is reversed, then the corresponding **speed mode command** is set to be in inverted phase before calibration.

- Description of rigid tapping/positioning mode command format parameter.

Parameter number	Description	Recommended value	Description

70132 +0~31	Axial speed rigid tapping/positioning mode command format (0: A/B, 1: CW/CCW, 2: Pulse/Dir) The first axis - the 32nd axis	0	**This parameter is designed for switching to pulse control when the spindle is performing the rigid tapping/positioning mode.** Signal input format for setting axial direction execution speed rigid tapping/positioning mode control. Please also set the busbar driver as 0: A/B
70196 +.00~.31	Axial speed rigid tapping/positioning mode command in inverted phase (0: in non-inverted phase, 1: inverted phase) The first axis - the 32nd axis	0	When this parameter is set as 1, it indicates that the movement direction along the axial direction should be in inverted phase under the control of speed rigid tapping/positioning mode. It indicates the direction of the spindle during actual rigid tapping process. If the rigid tapping spindle rotation direction is reversed, this parameter should be modified.

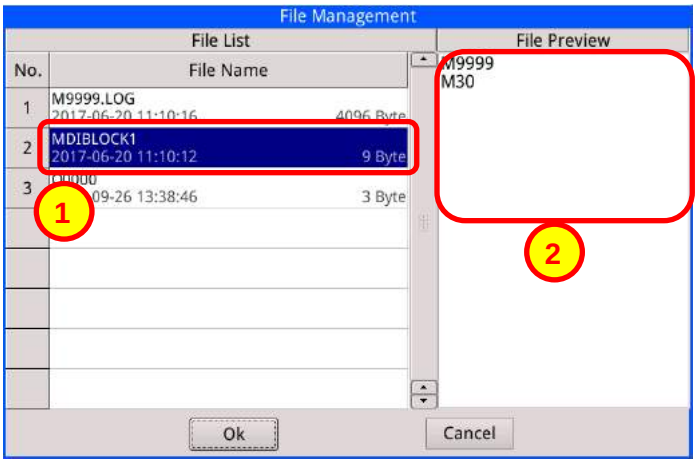
- Description of MPG parameters.

Parameter number	Description	Recommended value	Description
70400 +0~31	Hardware number of MPG corresponding to axis (0: not used, 1 ~ 9, ...) The first axis - the 32nd axis	0	Set the hardware port of MPG corresponding to axial direction in MPG position function and MPG interruption function.
70432 +0~31	Format of axes corresponding MPG signal (0:A/B,1:CW/CCW,2:Pulse/Dir) The first axis - the 32nd axis	0	The setting of signal format of axial direction corresponding MPG under MPG position function and MPG interruption functions.

5.5 Executing M9999

- Default values of relevant parameters can be set during execution of M9999 by MDI A message will appear on the lower left corner when it is completed.

- After the execution is completed, the "PARAM_CHECK" file will appear in Windows Explorer; in the file, there will be records of parameter numbers automatically modified by M9999 as well as their original values. To be confirmed by personnel.



- **The machine must be restarted after it is completed.**

5.6 Gear ratio settings

5.6.1 Gear ratio settings (servo axis)

- Switch to**[Gear Ratio Settings]➔[Servo Gear]**settings page.

If the CMR or DMR is red, the correct gear ratio parameter needs to be reset.

Set the number of motor encoder pulses and screw pitch, and numerator denominator gear ratio, the above CMR and DMR will automatically be calculated.

- The steps for setting the servo gear ratio are as shown below:

  Step 1: Press "Gear Ratio Setting" on the tuning page, which can be divided into "Servo Axis" and "Spindle". The red CMR and DMR need to be re-configured;

  Step 2: Select servo axis and set gear ratio of servo axis.

  Step 3: The corresponding position of number of axis pulses should be set in accordance with the resolution of actual motor encoder to the resolution of external encoder, and the corresponding position should be set in accordance with actual thread pitch (please set is as 360000 for rotational axis) and gear ratio.

  Step 4: Select the corresponding preset axis number.

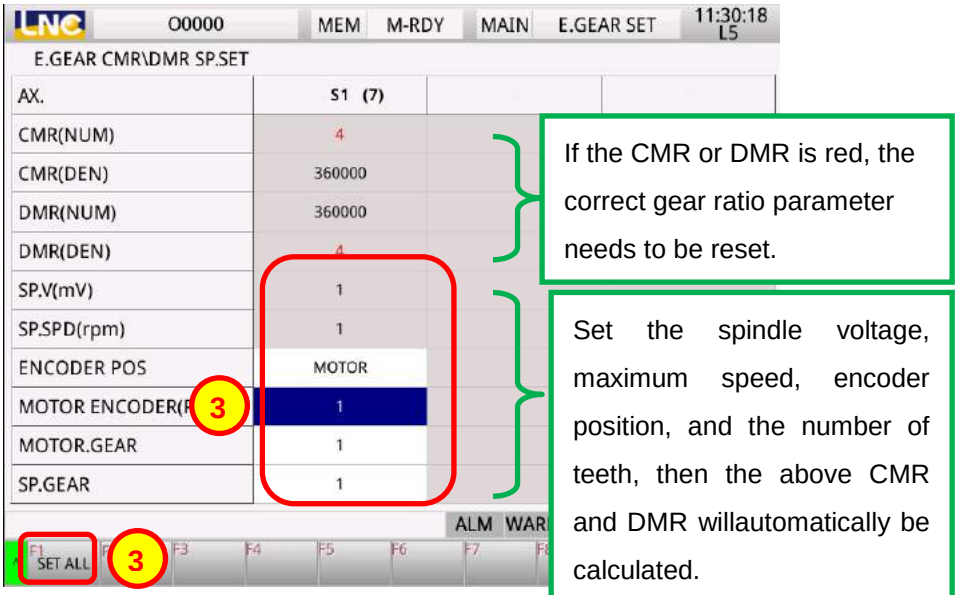
  Step 5: Select whether or not to confirm the change. By selecting "Yes", CMR, DMR will immediately turn gray, indicating successful setting.

- **Frequently seen servo resolutions:**

Model number	Resolution
EtherServo	262144
Yaskawa 5 series	1048576
Yaskawa 7 series	16777216
Thinkvo 23-bit	8388608
DEALOURM	131072

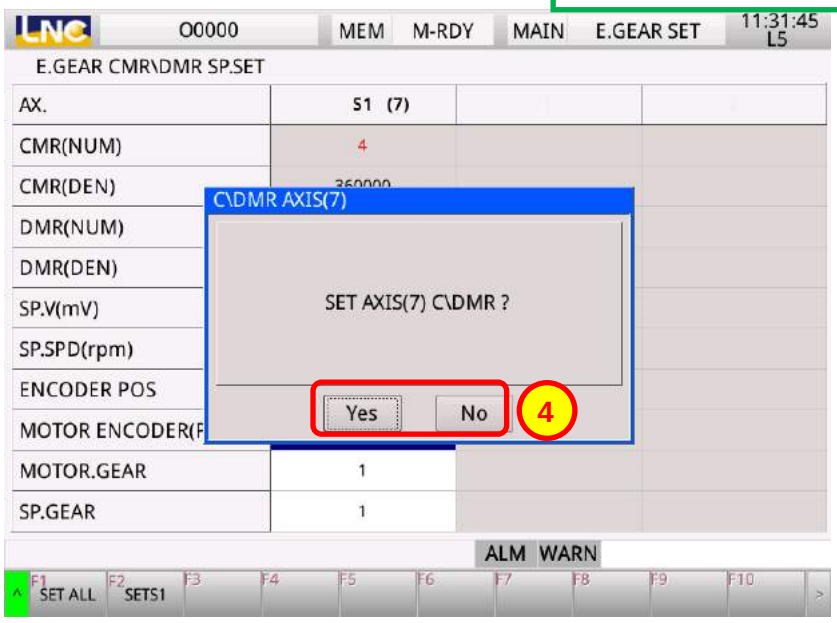
5.6.2 Gear ratio settings (spindle)

- Switch to **[Gear ratio setting]➔ [Spindle speed]** setting page.



If the CMR or DMR is red, the correct gear ratio parameter needs to be reset.

Set the spindle voltage, maximum speed, encoder position, and the number of teeth, then the above CMR and DMR willautomatically be calculated.



- **Pulse/bus servo spindle**:

  It should be set into "Motor encoder" in accordance with the resolution of the actual motor encoder.

  "Spindle voltage" and "Maximum spindle rotational speed" do not have to be set.

  “Encoder position” is for setting the position of actual encoder. For the motor side please set as 0, and

for the spindle side please set as 1.

"Motor encoder" is for setting the resolution of the motor encoder.

- **Inverter spindle under the control of simulated amount:**

  "Spindle voltage" is for setting the voltage value corresponding to the spindle, which is generally set as 10000.

  "Spindle maximum rotational speed" is for setting the maximum rotational speed (RPM) of spindle corresponding to 10V.

  "Encoder position" is for setting the position of actual encoder, and it should be set as 1: Spindle side.

  "Motor encoder" is for setting the resolution of an external encoder.

- After confirming the spindle and motor transmission ratio, press the lower right corner of the " Setting S1" on the lower right corner and the screen for confirmation on modification will appear. Select "Yes" and CMR, DMR will both turn gray, indicating successful setting.

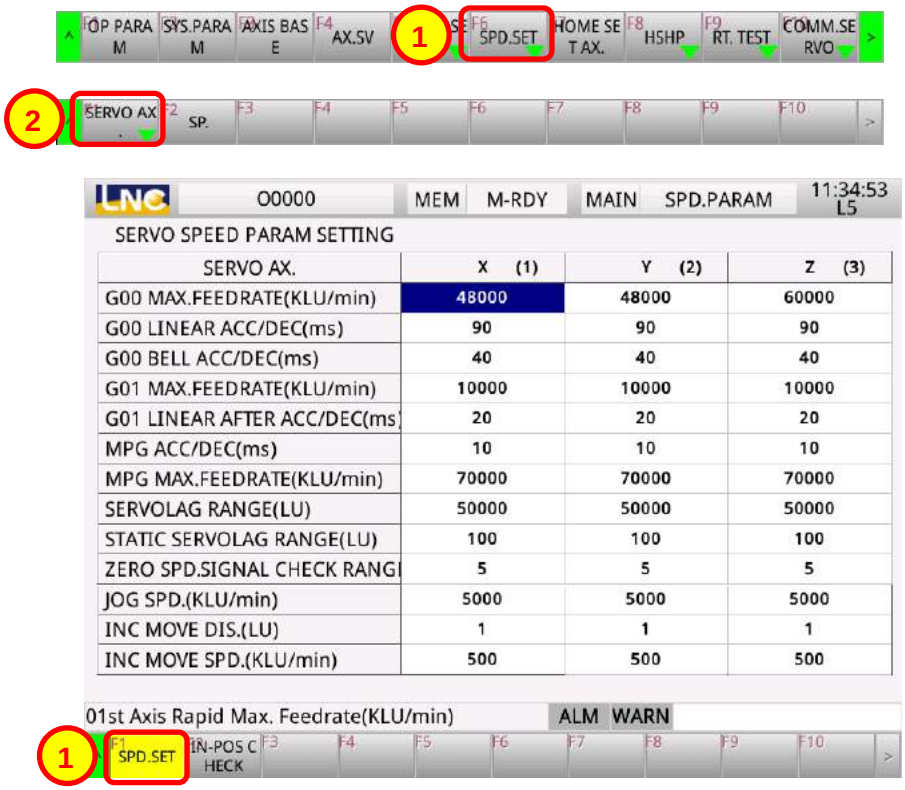
- When the spindle speed is set, the rigid tapping/positioning spindle gear ratio will also be set at the same time.

5.7 Speed parameter settings

5.7.1 Speed parameter setting (servo axis)

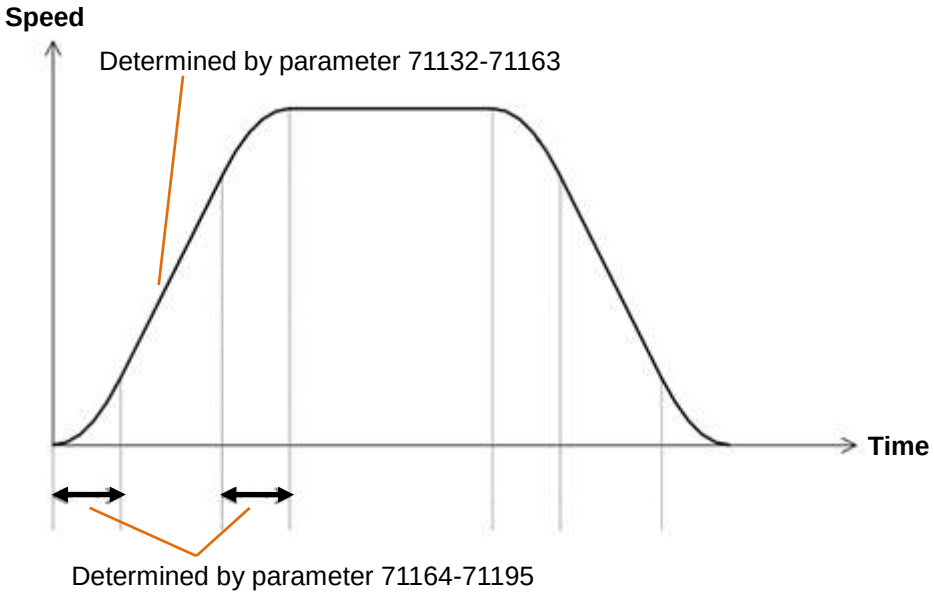
5.7.1.1 Speed parameter settings (servo axis/speed setting)

- Switch to **[Speed setting] ➔ [Servo axis] ➔ [Speed setting]** setting page.



- Rapid positioning (G00) speed parameter.

Parameter number	Description	Recommended value	Description
60286 +0~31	Maximum permissible speed of rapid positioning (KLU / min) The first axis - the 32nd axis	None	This parameter is for setting the maximum movement speed of each axis under the rapid movement command (G00/G28/G29/G30/G53).
71132 +0~31	Rapid positioning linear acceleration/deceleration time (ms) The first axis - the 32nd axis	80	Please refer to the figure below.
71164 +0~31	Rapid positioning bell-shape acceleration/deceleration time (ms) The first axis - the 32nd axis	40	Please refer to the figure below



- Cutting feed speed parameter.

Parameter number	Description	Recommended value	Description
60286 +0~31	Maximum permissible speed of cutting feed (KLU/min) The first axis - the 32nd axis	18000	This parameter is for setting the maximum movement speed of each axis under the cutting feed command (G01/G02/G03/G31).
71200 +0~31	Cutting feed linear acceleration/deceleration time (ms) The first axis - the 32nd axis	20	This parameter is for setting axis position mode cutting feed linear acceleration/deceleration time.

- MPG movement speed parameters.

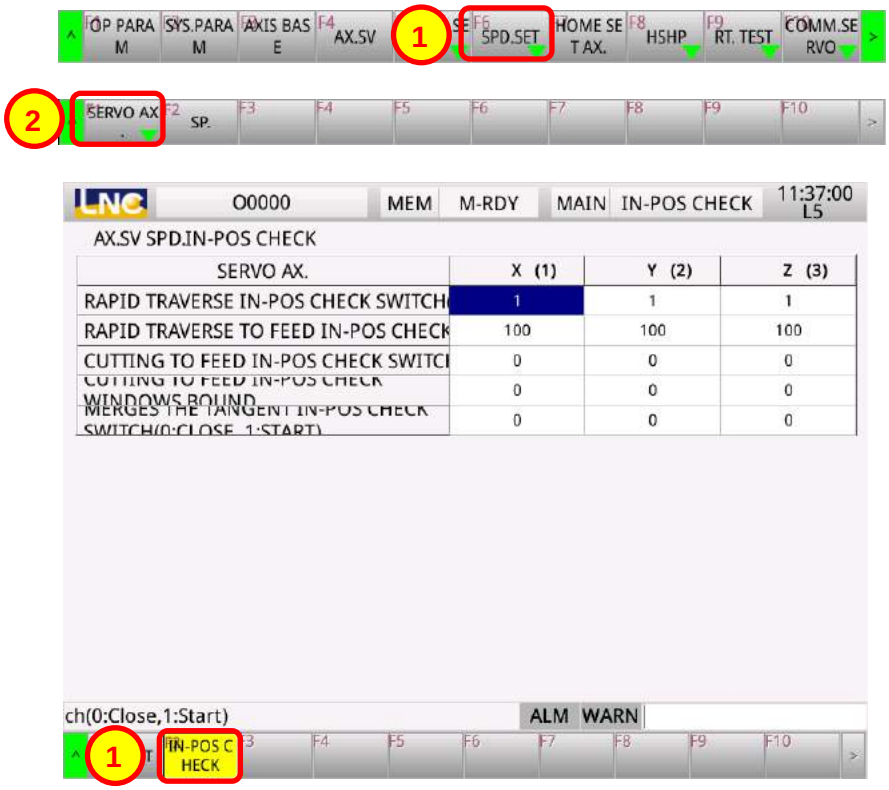
Parameter number	Description	Recommended value	Description
71332 +0~31	MPG movement acceleration/deceleration time (ms) The first axis - the 32nd axis	10	The acceleration/deceleration time of MPG movement along the axial direction under the MPG position function and MPG interruption function.
71364 +0~31	Maximum speed of MPG movement (KLU/min) The first axis - the 32nd axis	10000	The maximum speed of MPG movement along the axial direction under the MPG position function and MPG interruption function.

- Command/feedback error check parameters.

Parameter number	Description	Recommended value	Description
71400 +0~31	Maximum error of command and feedback (LU) The first axis - the 32nd axis	50000	This parameter is used for setting the range for checking the maximum servo lag along the axial direction. Once the servo lag along the axial direction surpasses this parameter's set value, it will trigger alarm [80500.x-MOT: axial command and feedback exceeding the maximum error].
71432 +0~31	Maximum error of command and feedback of a stationary state (LU) The first axis - the 32nd axis	50	This parameter is used for setting the range for checking the servo lag along the stationary axial direction. Once the servo lag along the axial direction surpasses this parameter's set value, it will trigger alarm [80501.x-MOT: command and feedback of a stationary axis exceeding the maximum error].
71464 +0~31	Range of encoder pulse checking by axis zero speed signal (Pulse) The first axis - the 32nd axis	300	This parameter is for setting the servo axis to determine whether it has reached the range of zero speed checking. When the feedback speed of servo axis is less than this parameter set value, the system will regard the servo axis as in stationary state. This parameter setting will affect the axial movement feedback state (R10,006/R10,021/R10,022). This parameter should be properly magnified for the bus driver with a higher resolution.

5.7.1.2 Speed parameter settings (servo axis/arrival check)

- Switch to**[Speed Settings]➔[Servo Axis]➔[Arrival check]**settings page.


OP PARA M
SYS.PARA M
AXIS BASE
AX.SV
SPD.SET
HOME SET AX.
HSHP
RT. TEST
COMM.SERVO
1
SERVO AX.
SP.
2
O0000
MEM
M-RDY
MAIN
IN-POS CHECK
11:37:00
L5
AX.SV SPD.IN-POS CHECK
SERVO AX.
X (1)
Y (2)
Z (3)
RAPID TRAVERSE IN-POS CHECK SWITCH
RAPID TRAVERSE TO FEED IN-POS CHECK
CUTTING TO FEED IN-POS CHECK SWITCH
WINDOWS ROUND
SWITCH(0:CLOSE,1:START)
1
1
1
100
100
100
0
0
0
0
0
0
0
0
0
ch(0:Close,1:Start)
ALM
WARN
IN-POS CHECK

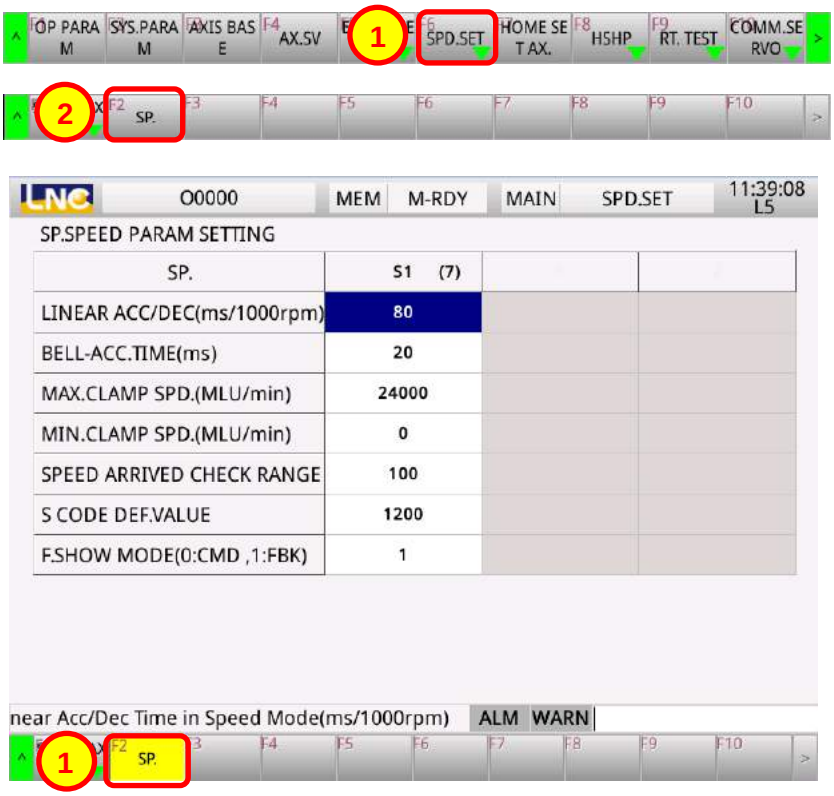
- Arrival check parameter.

Parameter number	Description	Recommended value	Description
56033 +.00~.31	Switch of rapid movement arrival check (0: Off, 1: On) The first axis - the 32nd axis	1	Parameter 50090 is the master switch for performing arrival check of software axis rapid movement. When this parameter is set as "Each axis", each individual switch must be in coordination with parameter 56033 for each axis' arrival check switch, and the range of checking must be in coordination with the arrival check range of parameters 56096-56127. The setting of rapid movement arrival check function can be changed by macro function C_INPOS(...), and this parameter will be restored to its default value after a RESET of the NC system. This parameter can be used to control the activation and type of arrival check under rapid movement mode. Once the arrival check function is activated and the interpolation is completed for any rapid movement command, the NC system will only execute the next single block when the check type condition has been met.
56096 +0~31	Range of rapid movement arrival check (0-2100000000LU) The first axis - the 32nd axis	500	
56032 +.00~.31	Switch of cutting feed arrival check (0: Off, 1: On) The first axis - the 32nd axis	0	Parameter 50084 is the master switch for arrival check of software axis cutting feed. When this parameter type is set as "Each axis", each individual switch must be in coordination with parameter 56032 for each axis' arrival check switch, and the range of checking must be in coordination with parameters 56064-56095's arrival check range. When this parameter type is set as "Tangent", each individual switch must be in coordination with parameter 56034 for each axis'
56064 +0~31	Range of cutting feed arrival check (0-2100000000LU) The first axis - the 32nd axis	0	

Parameter number	Description	Recommended value	Description
56034 +.00~.31	Whether or not it is merged with tangent line's arrival check (0: Off. 1: On) The first axis - the 32nd axis	0	merging with tangent arrival check switch, and the range of checking must be in coordination with parameters 50096-50101's tangent arrival check range. The setting of cutting feed arrival check function can be changed by macro function RP_INPOS(...), and this parameter will be restored to its default value after a RESET of the NC system. This parameter can be used to control the activation and the type of arrival check under cutting feed mode (including linear and arc cutting feeds). Once the arrival check function is activated and the interpolation is completed for any cutting feed command, the NC system will execute the next single block only when the condition of check type has been met.

5.7.2 Speed parameter settings (spindle)

- Switch to**[Speed Settings]➔[Spindle]**settings page.



- Spindle speed parameter.

Parameter number	Description	Recommended value	Description
72132 +0~31	Linear acceleration/deceleration time (ms/1000rpm) The first axis - the 32nd axis	100	This parameter is for setting the linear acceleration/deceleration time of the axis under speed mode control. Usually the linear acceleration/deceleration time of spindle or servo spindle under pulse control will be longer. While adjusting this parameter, it must be confirmed that whether or not there is vibration when the spindle is accelerated to a high rotational speed, or when it is decelerated from a high rotational speed to 10

Parameter number	Description	Recommended value	Description
			revolutions.
72164 +0~31	Bell-shape acceleration/deceleration time (ms) The first axis - the 32nd axis	20	This parameter is for setting the bell-shape acceleration/deceleration time of axis under speed mode control.
72264 +0~31	Maximum clamp speed (MLU/min) The first axis - the 32nd axis	None	This parameter can be used to set the maximum speed value along axial direction under speed mode control. (Please set according to the actual spindle maximum speed)
72300 +0~31	Minimum clamp speed (MLU/min) The first axis - the 32nd axis	0	This parameter can be used to set the minimum speed value along axial direction under speed mode control.
72332 +0~31	Range of speed arrival check (0.01%) The first axis - the 32nd axis	1500	This parameter can be used to set the target speed range along axial direction under speed mode control. When the speed reaches the assigned range, R11298.x will be ON. For example, when the command's rotational speed is 6000 MLU/min, this parameter will be set as 1500 (representing 15%). Which means when the rotational speed reaches the range of 5100-6900 MLU/min, R11298.x will be ON.

- Default settings and display of spindle's rotational speed.

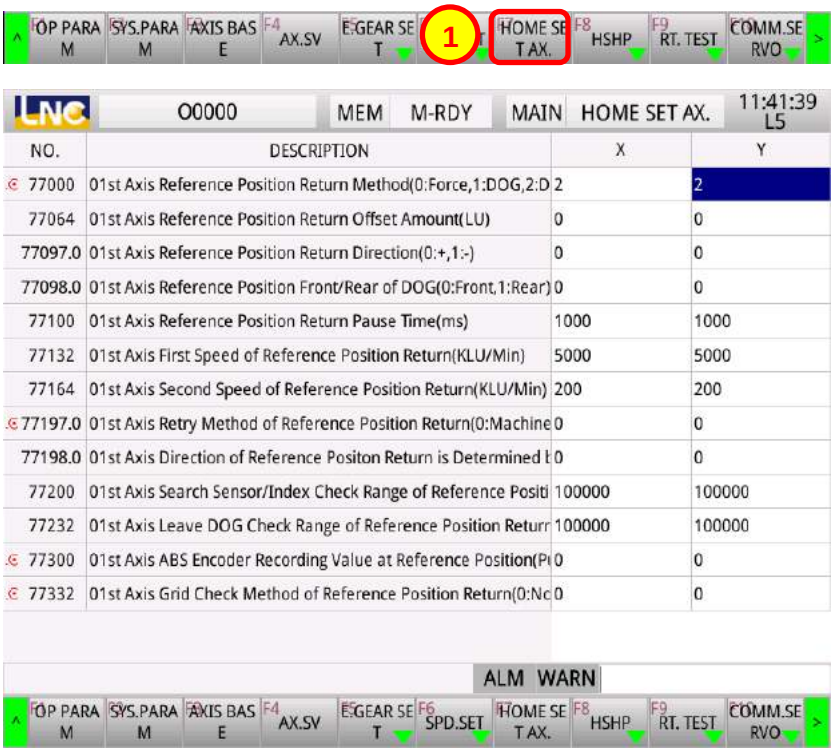
Parameter number	Description	Recommended value	Description
72364 +0~31	Default value of startup default S code The first axis - the 32nd axis	100	This parameter can be used for setting the default S code value of system initialization along the axial direction under speed mode control. Default values can be read via R11,900-R11,931 after the system

			startup
72096 +.00~.31	Display of speed in axial speed mode (0: command, 1: detected value) The first axis - the 32nd axis	1	This parameter can be used for setting the source of speed display under axial speed mode control. 0: Command value. 1: Sensed value.

5.8 Zero point parameter settings

5.8.1 Incremental encoder setting

- Switch to**[Zero Point Settings]**settings page.

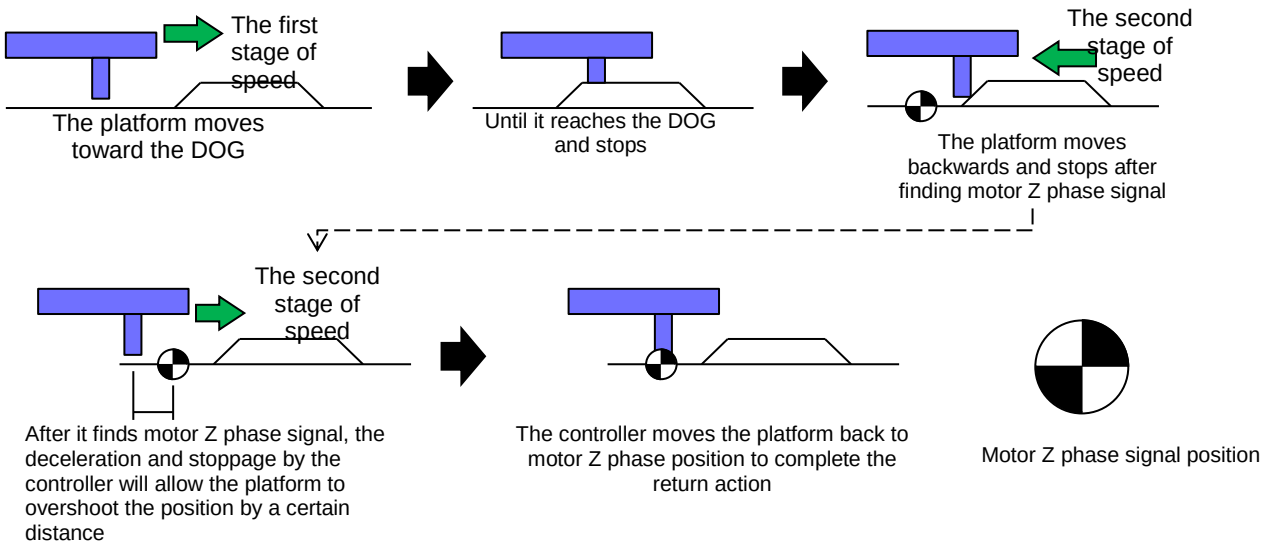


- Zero point return parameters

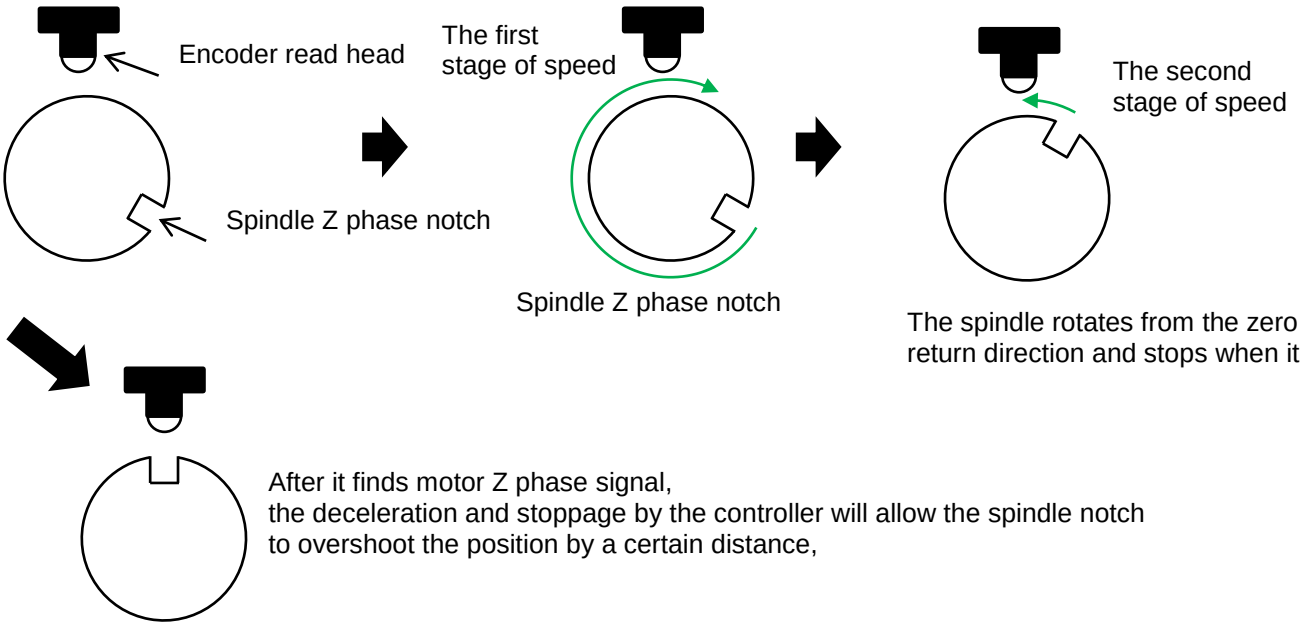
Parameter number	Description	Recommended value	Description
77000 +0~31	Axis zero point return method (0: forced, 1: DOG, 2: DOG+INDEX, 3; INDEX, 4: quick input point) The first axis - the 32nd axis	2	It is for setting the method for executing zero point return 0: It is forced to be set as the zero point 1: It moves at the first stage of speed and stops when the DOG signal is ON, and then it moves at the second stage of speed until the DOG signal is OFF. Finally, it moves by the zero point offset amount at the first stage of speed to complete the zero point return program. 2: It moves at the first stage of

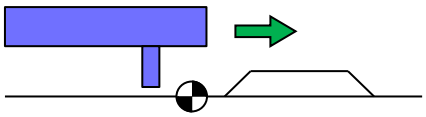
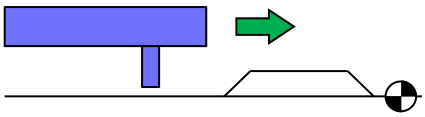
Parameter number	Description	Recommended value	Description
			speed and stops when the DOG signal is ON, and then it moves at the second stage of speed and stops after finding the encoder's INDEX signal. Finally, it moves by the zero point offset amount at the first stage of speed to complete the zero point return program. 3: It moves at the first stage of speed and stops after meeting the INDEX signal, and then it moves by the Zero point offset amount at the first stage of speed to complete the zero point return program. 4: It moves at the first stage of speed and stops after meeting the quick input point's ON signal, and then it moves by the zero point offset amount at the first stage of speed to complete the zero point return program.

- DOG + encoder Z phase



- Encoder Z phase

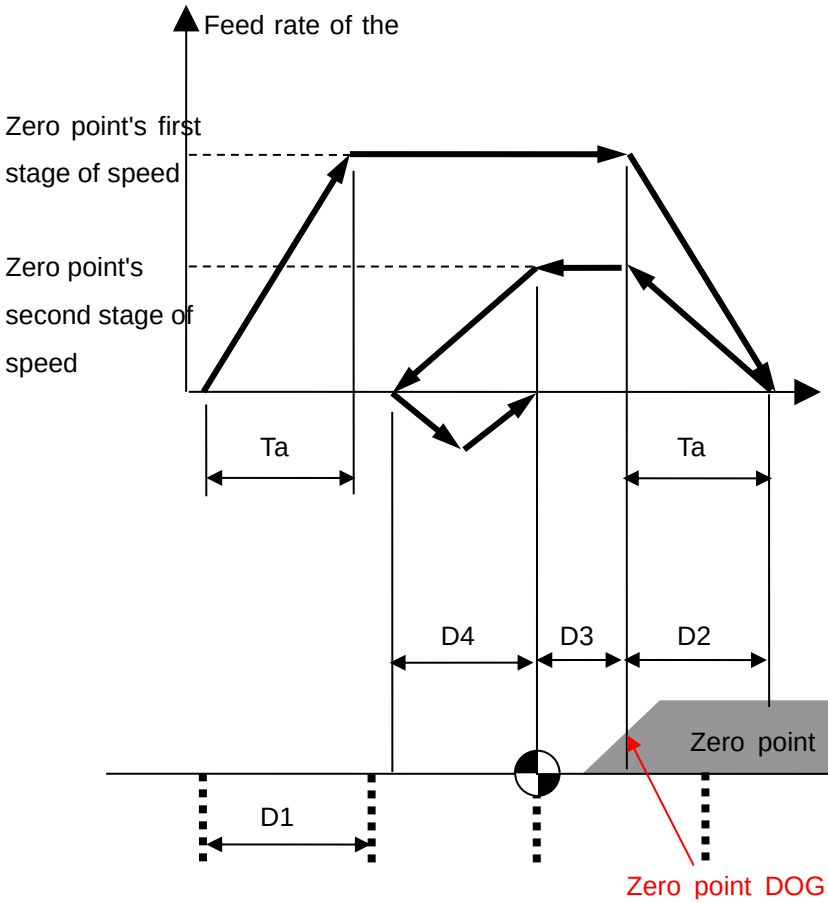


Parameter number	Description	Recommended value	Description
77097 +.00~.31	Axis zero point return direction (0:+, 1:-) The first axis - the 32nd axis	0	It is for setting the direction of zero point return. In the ladder diagram, the R Bit system information of R11,797.x can be used to determine the movement direction to be triggered during the execution of zero point return.
77098 +.00~.31	Is the axis zero point ahead of or behind the DOG (0: ahead, 1: behind) The first axis - the 32nd axis	0	It is for setting the zero point position of the axial direction to be ahead of or behind the DOG: 0: Zero point is ahead of DOG, and after reaching DOG along the axial direction, it will movement in the opposite direction to search for the zero point. 1: Zero point is behind DOG, and after reaching DOG along the axial direction, it will move in the same direction to search for the zero point.  **Ahead of DOG**  **Behind DOG**
77100 +0~31	The pause time of axis zero point return (ms) The first axis - the 32nd axis	1000	It is for setting the pause time while executing zero point return. The pause time set by this parameter can be used in the following four locations: a. When the initial position of zero point return is located at the zero point DOG or the reference point, it

Parameter number	Description	Recommended value	Description
			can serve as the pause time for deceleration and stopping after each axis moves away from the zero point DOG or the reference point along the direction not leading to the Zero point at first stage of speed. b. It can serve as the pause time for deceleration and stopping after each axis moves toward the zero point and reaches the zero point DOG or the reference point at the first stage of speed. c. It can serve as the pause time for deceleration and stopping after each axis moves away from the zero point and leaves zero point DOG or the reference point at the second stage of speed. d. It can serve as the pause time for deceleration and stopping after each axis returns to the zero point DOG found or the reference point.

- Zero point return speed

Parameter number	Description	Recommended value	Description
77132 +0~31	The first stage of speed of axis zero point return (KLU/Min) The first axis - the 32nd axis	1500	It is the set value of the first stage of speed along the axial direction during the execution of zero point return program.
77164 +0~31	The second stage of speed of axis zero point return (KLU/Min) The first axis - the 32nd axis	200	It is the set value of the second stage of speed along the axial direction during the execution of Zero point return program.



Plot legends: **The zero point is ahead of DOG**
Ta : Servo axis G00 acceleration/deceleration time
D1 : The INDEX interval distance per motor revolution
D2 : When the DOG signal is ON, it is the stopping distance for the deceleration of the first stage of speed
The distance traveled from a stationary state to be accelerated to the second stage of speed until reaching zero point DOG OFF
D3 : When the zero point DOG signal is OFF, it is the distance traveled (D1/2) until the next motor INDEX appears
D4 : When the motor INDEX signal is ON, it is the distance traveled after deceleration is stopped

- Zero point return offset amount

Parameter number	Description	Recommended value	Description
77064 +0~31	Axis zero point return offset amount (LU) The first axis - the 32nd axis	0	It can be used to assign the position of machine zero point to be the offset position after the Index is found. For example, if zero point DOGs are installed on both sides of the machine, this parameter can be used to assign the machine zero point to be at the center of machine.

- Parameters of zero point return approach

Parameter number	Description	Recommended value	Description
77197 +.00~.31	The return method after the axial zero point return is completed (0: machine zero point, 1: coordinate zero	1	If it is set as 0, it means the execution of zero point return when the axial direction is under zero point mode

Parameter number	Description	Recommended value	Description
	point) The first axis - the 32nd axis		will be searching for the zero point again (DOG+Index signal); If it is set as 1, it means the execution of zero point return when the axial direction is under zero point mode will be returning to the position where the machine coordinate is 0.
77198 +.00~.31	Axis zero point return direction is automatically determined according to the machinery coordinates (0: not activated, 1: activated) The first axis - the 32nd axis	0	When this function is activated, the direction of the zero point return will be determined based on the current machinery coordinates at the time of the current zero point return. When the machinery coordinates is positive, the zero point return will be along the negative direction; When the machinery coordinates is negative, the zero point return will be along the positive direction; In addition, the setting of zero point being ahead or behind DOG will changed to self-determined by the system. During zero point return along the negative direction, the system will set the zero point position to be behind the DOG; During zero point return along the positive direction, the system will set the zero point position to be ahead of the DOG;

- Zero point check parameter

Parameter number	Description	Recommended value	Description
77200 +0~31	Reference point check distance during axis zero point return (LU) The first axis - the 32nd axis	20000	This parameter will only be valid when parameters 77,000-77,031 are set as 2-4. This parameter can

			be used to set the check movement distance while searching for encoder Index signal during the execution of zero point return. When the distance traveled surpasses the distance set by this parameter and the encoder Index has not been found, the system will issue alarm [80503.x-MOT: Reference point cannot be found by axis zero point return].
77232 +0~31	Check distance while leaving DOG during axis zero point return (LU) The first axis - the 32nd axis	50000	This parameter will only be valid when parameters 77,000-77,031 are set as 1-2. This parameter can be used to set the check movement distance when it touches the zero point DOG signal and leaves the zero point DOG signal during the execution of zero point return. When the distance traveled surpasses the distance set by this parameter and it has not left the zero point DOG signal, the system will issue the alarm of [80521.x-MOT: Axis zero point return not leaving DOG].

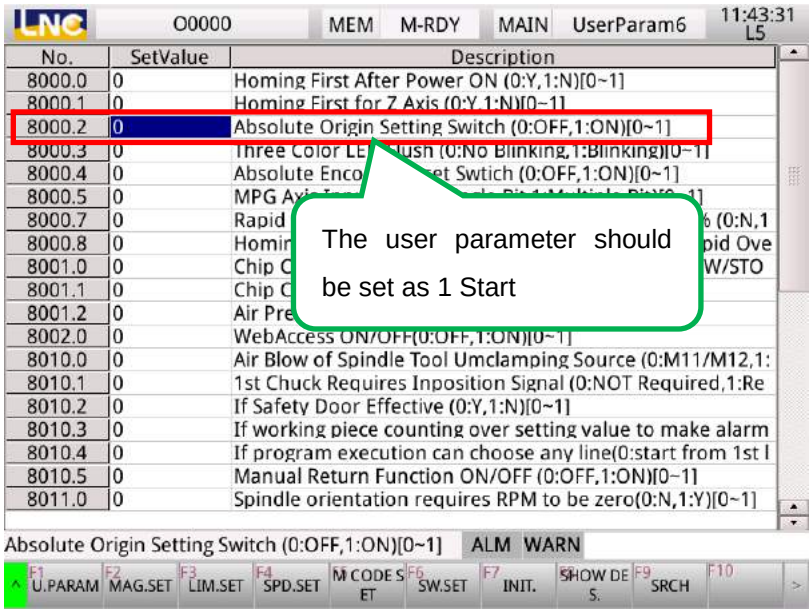
- Grid amount parameter

Parameter number	Description	Recommended value	Description
77332 +0~31	Method for checking the grid amount of axis zero point return (0: Do not check, 1: 20%-80%, 2: >3%) The first axis - the 32nd axis	0	Method for checking the grid amount of zero point return after executing zero point return 0: The system will not perform grid amount checking. 1: The system will automatically check whether the grid amount of zero point return along the axial direction is between 20%-80%. If

Parameter number	Description	Recommended value	Description
			it surpasses this range, the system will issue alert[80523-MOT: Axis zero point return grid amount is less than 20% or greater than 80%]. 2: The system will automatically check whether the difference between the grid amount of zero point return along the axial direction and the previous grid amount is greater than 3%. If so, the system will issue alarm [80524.x-MOT: The difference between the grid amounts before and after axis zero point return is greater than 3%].

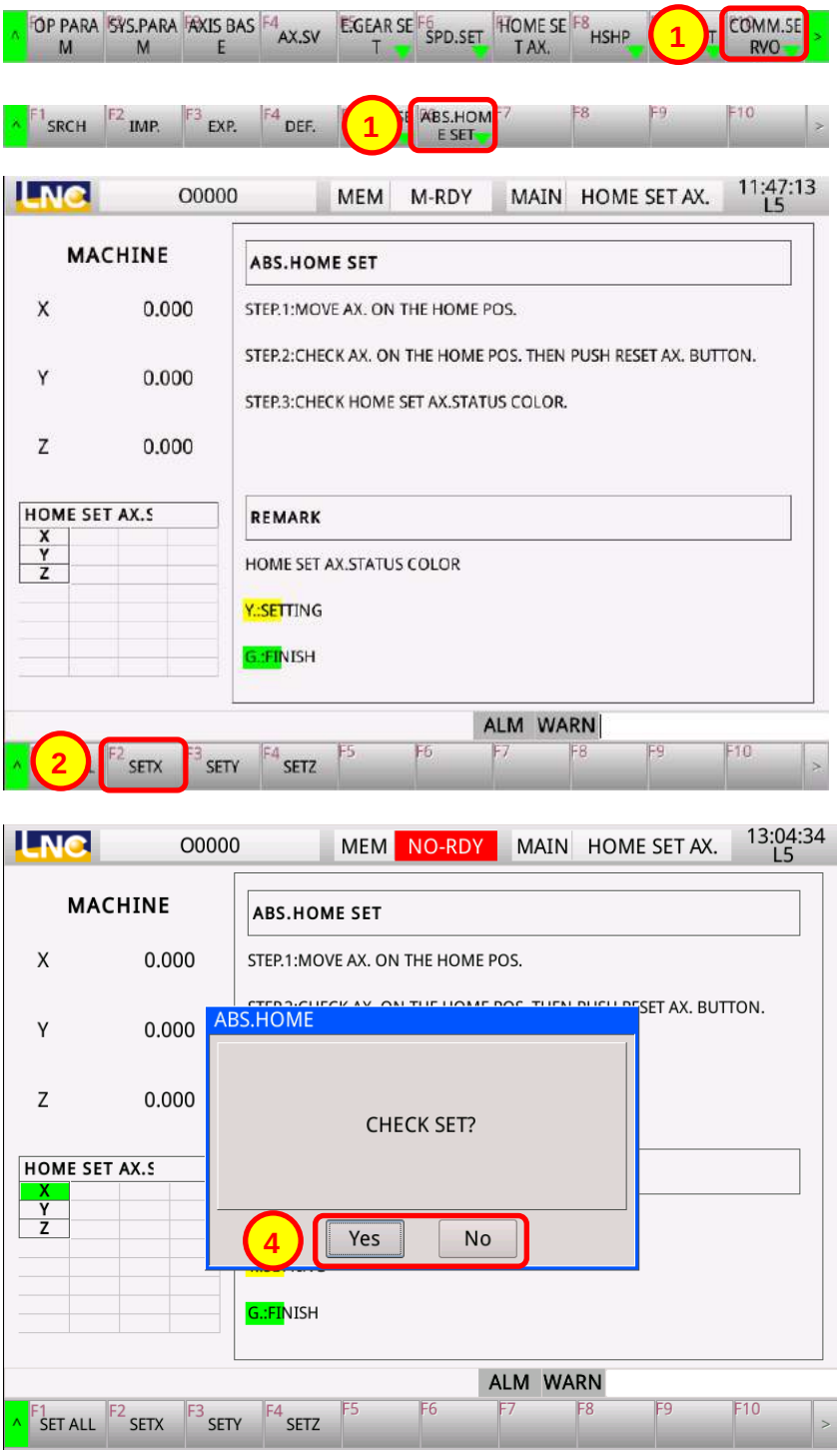
5.8.2 Absolute encoder setting

- Absolute encoder zero point setting steps
  1. Press**<Maintenance>** key group ➔**[**User Parameter**]**➔**[Switch Setting]** page.
  2. Set the user parameter R8000.2 (absolute origin setting switch) to 1 (on).



  3. Switch to manual mode, move the axis to the preset zero point position.

4. The system needs to be in [Not Ready] state to be able to perform the zero point setting, so the emergency stop button must be pressed to put the system into the [Not Ready] state.
5. Switch to **[Bus Servo]➔[Absolute Zero Point Setting]** setting page.



6. Select the menu corresponding to the preset axial direction and press it for the confirmation dialog box to pop up. Enter [Yes] to start setting the absolute zero point. When the axial direction on the

screen appears to be green, it indicates that the setting is completed. (Yellow indicates that it is being set).

7. Restart heavy electricity and re-confirm that the machine coordinate remains near zero.
8. Move along the axial direction and restart heavy electricity to confirm that the machine coordinate remains in the same position.
9. Completed.

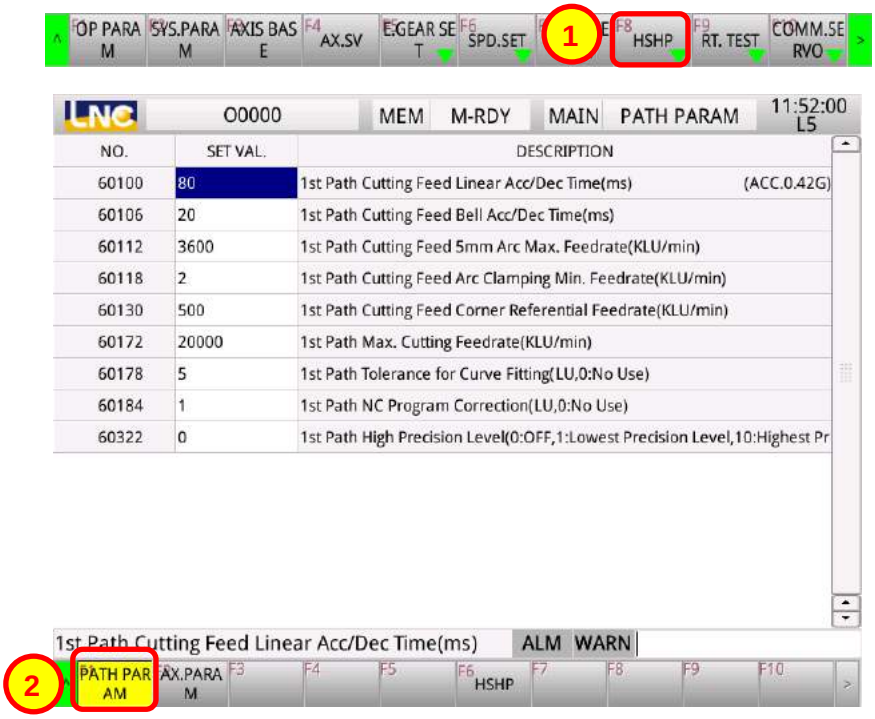
- Zero point return speed

Parameter number	Description	Recommended value	Description
77132 +0~31	The first stage of speed of axis zero point return (KLU/Min) The first axis - the 32nd axis	1500	It is the set value of the first stage of speed along the axial direction during the execution of zero point return program.

5.9 High-speed high-precision settings

5.9.1 High speed high precision settings (path type)

- Switch to **[High Speed High Precision]** ➔ **[Path parameter]** setting page.



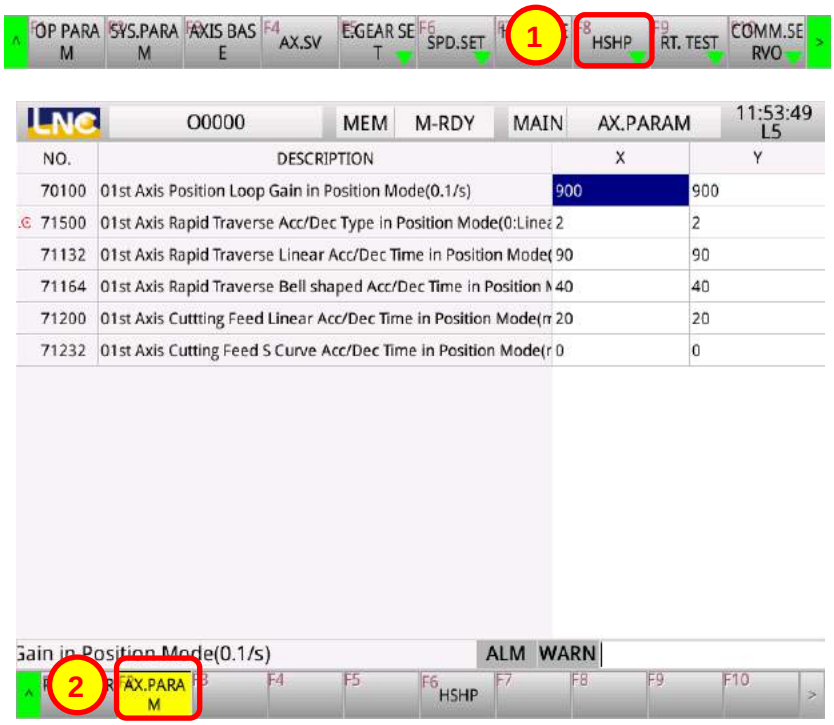
Parameter number	Description	Recommended value	Description
60100 +0~5	Path cutting feed linear acceleration/deceleration time (ms) The first path - the sixth path	100	Set high speed, high precision cutting feed linear acceleration/deceleration time.
60106 +0~5	Path cutting feed bell-shape acceleration/deceleration time (ms) The first path - the sixth path	20	Set high speed, high precision cutting feed bell-shape acceleration/deceleration time.
60112 +0~5	Path cutting feed 5 mm arc permissible speed (KLU/min) The first path - the sixth path	3600	This parameter is based on the reference set value of arc radius at 5 mm, and the actual arc clamp speed system will calculate the result in accordance with the machining path. During arc movement, the error of servo lag will result in less actual arc cutting (circular shrinkage). Circular

Parameter number	Description	Recommended value	Description
			shrinkage can be improved by increasing driver gain (reducing post-servo error), or reducing arc movement speed (which will also reduce servo error).
60118 +0~5	Minimum arc clamping speed of path cutting feed (KLU/min) The first path - the sixth path	200	It is for setting the minimum speed under high speed high precision arc clamping. When the arc speed calculated by the controller is less than this parameter, the speed will be replaced by this parameter. Which can avoid the arc movement speed to become too slow.
60130 +0~5	Corner reference speed of path cutting feed (KLU/min) The first path - the sixth path	100	Set the corner reference speed of high speed high precision function When parameter 60124-60129 is set as 2, this parameter will be used by the system in coordination with the path to calculate corner speed.
60172 +0~5	Maximum speed of path cutting feed (KLU/min) The first path - the sixth path	10000	The set value for this parameter will determine the following numerical values: 1. Maximum feed rate of the linear cutting command (G01/G31); 2. Maximum feed rate of the arc cutting command (G02/G03); 3. The feed rate of cutting command (G01/G02/G03/G31) under the mechanism of a program dry run. When the F code command assigned by the user surpasses the set value for this parameter, the cutting feed rate will be automatically kept at this parameter value.

Parameter number	Description	Recommended value	Description
60178 +0~5	Path curve fitting permissible error (LU, 0: off) The first path - the sixth path	3	This parameter is for setting the tolerable error of the path curve fitting. The system will carry out the curve fitting function with respect to consecutive short segments.
60184 +0~5	Path machining program problem modification amount (LU, 0: off) The first path - the sixth path	5	It is for the automatic modification of unreasonable parts of CAD/CAM machining paths. It is suggested to set this parameter to 5.
60322 +0~5	Path high precision grade (0: off, 1: lowest precision grade, 10: highest precision grade). The first path - the sixth path	0	This parameter is for setting the high precision grade of path axis. High precision functions can be used to compensate for servo lag along each axial direction in order to reduce the servo lag value along each axial direction. (This compensation value is associated with parameters 70100 to 70131. When using this function, make sure that the parameter 70100 to 70131 is set to the same as the driver position loop gain setting)

5.9.2 High speed and high precision setting (axis type)

- Switch to **[High Speed High Precision]** ➔ **[Axis Parameter]** setting page.



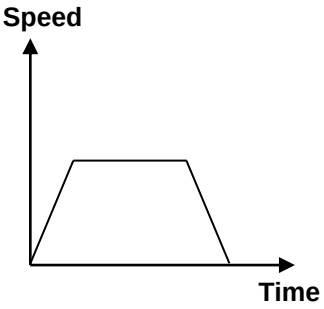
- Parameters related to position loop gain of position mode.

Parameter number	Description	Recommended value	Description
70100 +0~31	Axial position mode position loop gain (0.1/s) The first axis - the 32nd axis	1000	Please set the value of position loop gain for the axis driver to this parameter (please pay attention to the gain unit of driver). This parameter is only for internal system assessment and calculation, and the position closed loop control cannot be implemented via the system.

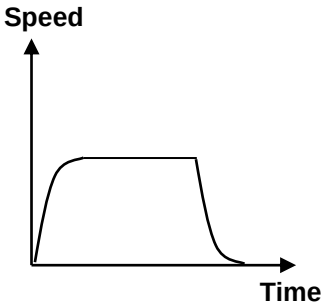
- Parameters related to rapid positioning.

Parameter number	Description	Recommended value	Description
70100 +0~31	Axial position mode position loop gain (0.1/s) The first axis - the 32nd axis	1000	Please set the value of position loop gain for the axis driver to this parameter (please pay attention to the gain unit of driver). This parameter is only for internal system assessment and calculation, and the position closed loop control cannot

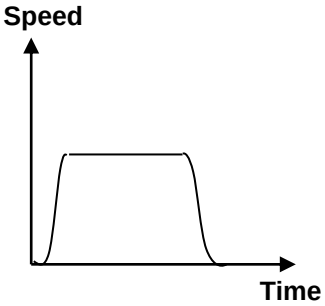
Parameter number	Description	Recommended value	Description
			be implemented via the system.
70500 +0~31	Axis position mode rapid movement acceleration/deceleration type (0: linear, 1: exponential, 2: bell-shape) The first axis - the 32nd axis	2	This parameter is for setting the type of acceleration/deceleration of rapid movement. (Please refer to the figure below) 0: Linear type. The linear type acceleration/deceleration time is determined by parameter 71132-71163. 1: Exponential type. The exponential type acceleration/deceleration time is determined by parameter 71664-71695. 2: Bell-shape. The bell-shape acceleration/deceleration time is determined by parameter 71132-71163 and parameter 71164-71196.



Linear type



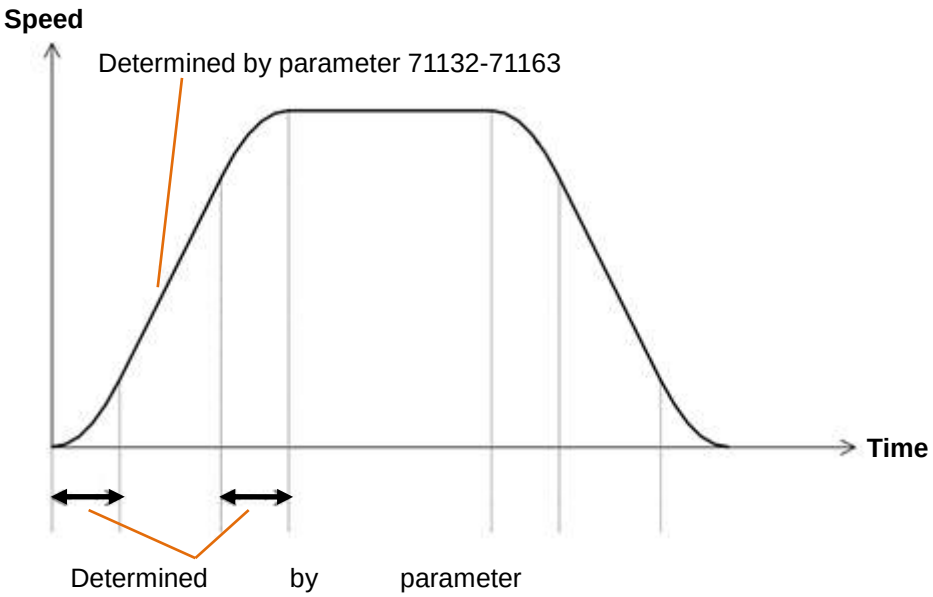
Exponential type



Bell-shape

Parameter number	Description	Recommended value	Description
71132 +0~31	Axis position mode rapid movement linear acceleration/deceleration time (ms) The first axis - the 32nd axis	100	Please refer to the figure below.
71164 +0~31	Axis position mode rapid movement bell-shape acceleration/deceleration time (ms)	20	Please refer to the figure below

	The first axis - the 32nd axis		



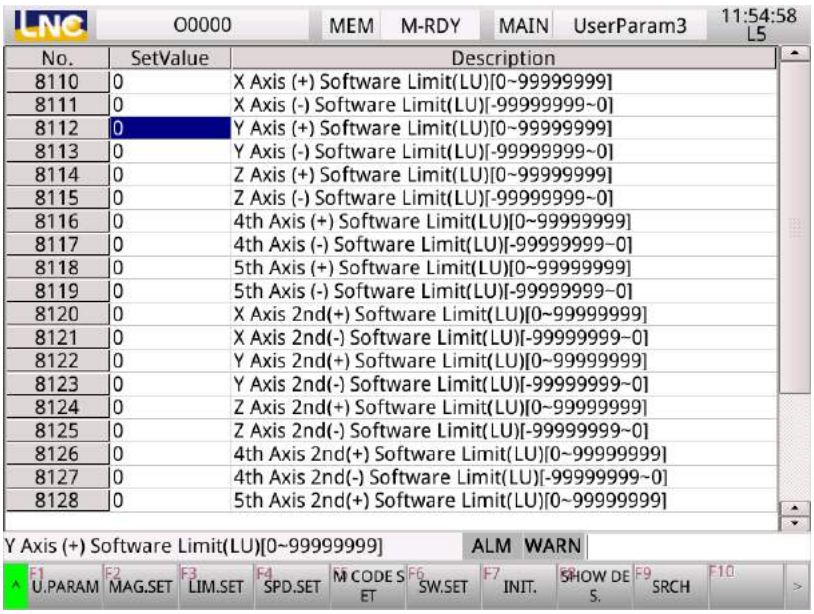
- Parameters related to cutting feed

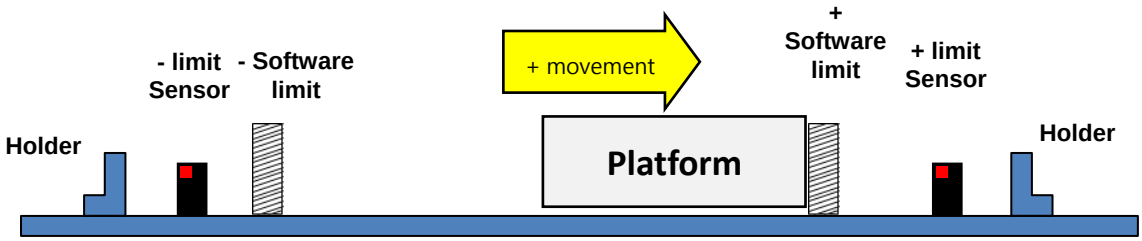
Parameter number	Description	Recommended value	Description
71200 +0~31	Axis position mode cutting feed linear acceleration/deceleration (ms) The first axis - the 32nd axis	20	This parameter is for setting axis position mode cutting feed linear/bell-shape acceleration/deceleration time. The recommended default value is 20. Any set value greater than that will result in error on the contours.

6 Software limit settings

- Description of software limit settings:
  1. When the machine coordinate surpasses the limit setting, it will issue an "warning" to reach the second level of protection along the axial direction
  2. MPG or JOG can be used to turn the axis in the opposite direction to clear this warning
  3. If it does not return to the zero point, and the limits along positive and negative directions are both zero, then this software limit is invalid

- Steps for setting software limit:
  1. Press **<Maintenance>** key group➔**[User Parameter]**➔**[Limit Setting]** page.
  2. Move the platform to the position of the set software limit, and fill the machinery coordinate values into user parameter by the unit of LU.



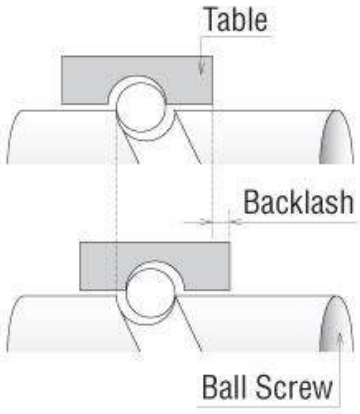


7 Cutting adjustment

7.1 Backlash compensation

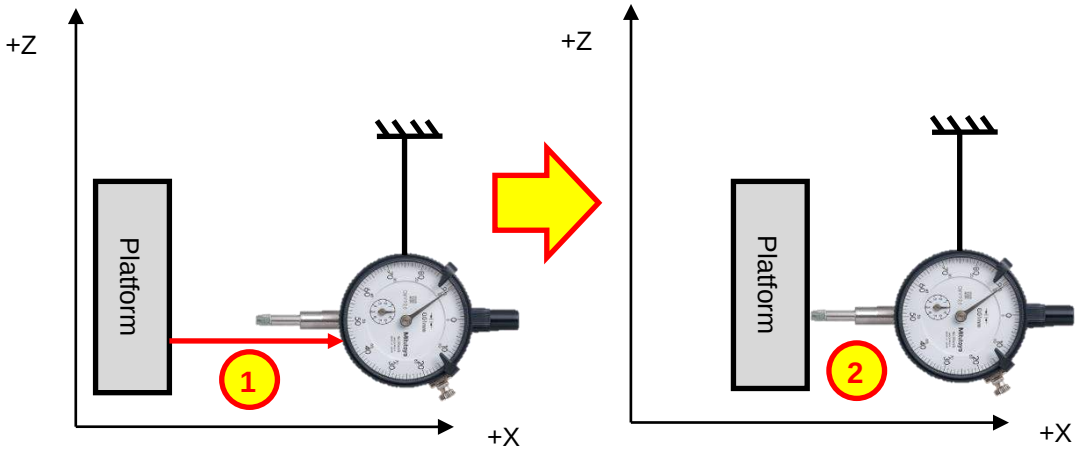
- Description of backlash:

  When the platform moves toward a certain axis, stops, then moves in the opposite direction, it does not move immediately; instead, it will stay at the original position to wait for the movement command to reach a certain amount before starting the movement, and this is the lathe platform backlash deviation amount.



- Backlash compensation

  1. Secure the micrometer on the Z axis moving column and use MPG to control the platform along X axis or Y axis to move towards the direction of the micrometer.

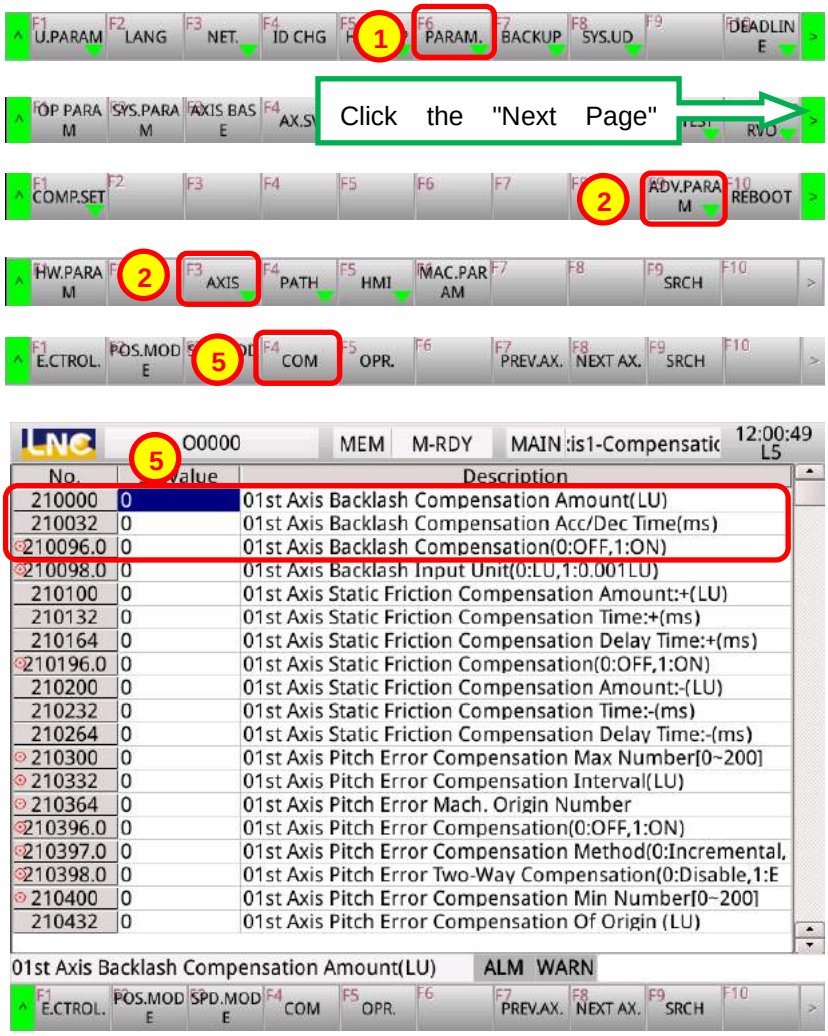


  2. When the probe of micrometer comes in contact with the DOG, movement will be stopped when there is position change for the micrometer's pointer, and relative coordinates of the X axis or Y axis on the controller will be cleared to 0.
  3. Adjust the MPG resolution to 1um per grid, and use MPG to control the X axis or Y axis to move away from the DOG. Stop the movement when there is another position change for the micrometer's pointer.

4. Observe the movement distance of relative coordinates; this distance can be regarded as the amount of backlash deviation.

- Backlash parameter settings

1. Switch to [Parameter]➔[Advanced Parameter]➔[Axis]➔[Compensation] setting page.



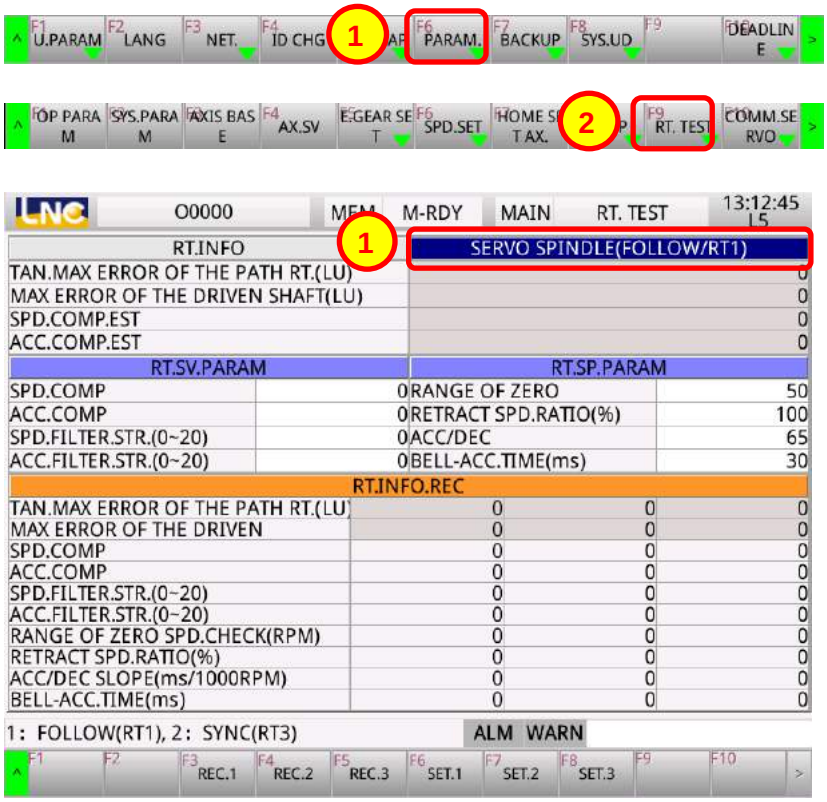
2. Start backlash compensation function (valid after system restart). Also, set the measurement into the backlash compensation amount (LU, valid immediately).

Parameter number	Description	Recommended value	Description
210096 +.00~.31	Axis backlash compensation switch (0:OFF, 1:ON) The first axis - the 32nd axis	0	The backlash compensation function switch; this parameter will be valid after restarting the machine.
210096 +.00~.31	Axis backlash compensation input unit (0: LU, 1: 0.001LU)	0	It is for setting the input unit of

Parameter number	Description	Recommended value	Description
	The first axis - the 32nd axis		backlash compensation along the axial direction; this set value will affect the unit of input value of parameter 210,000-210,031. 0: LU 1: 0.001LU
210000 +0~31	Axis backlash compensation amount (LU) The first axis - the 32nd axis	None	It is for setting the amount of axial direction backlash compensation.
210032 +0~31	Backlash compensation acceleration/deceleration time (ms) The first axis - the 32nd axis	0	It is for setting the acceleration/deceleration time of the backlash compensation function along the axial direction. When the setting for backlash compensation is too large, it will cause vibration when the axial direction is changed. Acceleration/deceleration time can be set to mitigate the compensation.

7.2 Adjustment of rigid tapping effect

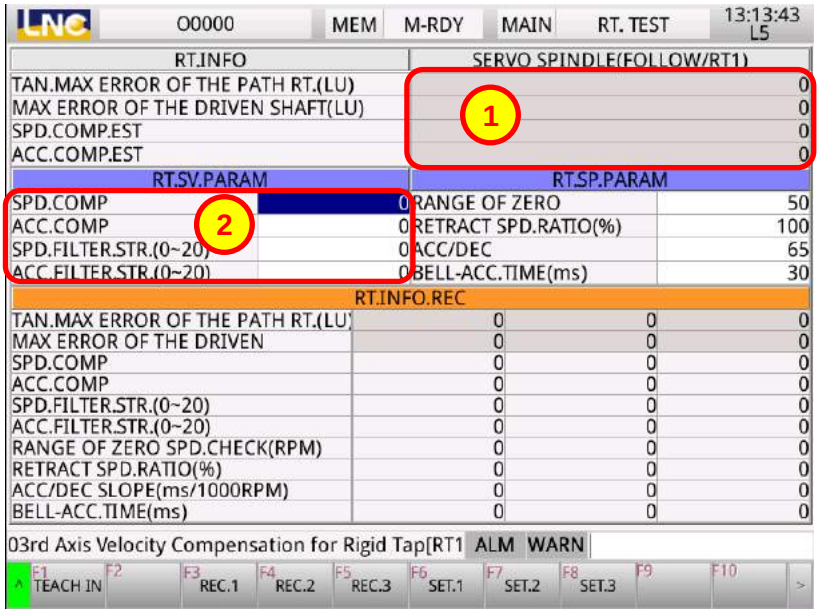
- Switch **[Parameter]➔[Rigid Tapping Setting]➔[Rigid Tapping Tuning Information]** setting page.



- Set rigid tapping mode (1:Servo spindle follow rigid tapping/RT1, 2:synchronized rigid tapping/RT3)
- Suggestions for the rigid tapping mode

	Servo spindle/follow rigid tapping (RT1)	Synchronized rigid tapping (RT3)
Pros and cons	Pros: ➢ Rigid tapping up to 4000 rpm ➢ Good effect of hole bottom deviation Cons: ➢ Z axis is prone to vibration in high rotational speed rigid tapping	Pros: ➢ Rigid tapping up to 8000 RPM ➢ Good effect of hole bottom deviation Cons: ➢ Very high requirement of spindle performance
Suitable for the spindle	It can switch position mode inverter	Servo axis serves as the spindle

7.2.1 Servo spindle (follow rigid tapping/RT1):



- Setting of rigid tapping spindle parameters

Parameter number	Description	Recommended value	Description
72406	Spindle zero speed check range (RPM)	50	This parameter is used to set the check range for the spindle to reach the zero speed when performing rigid tapping
72444	Exit speed ratio (%)	100	This parameter is used to set the percentage of the rollback ratio during execution of rigid tapping
72470	Acceleration/deceleration slope (ms/1000rpm)	100	Set the linear acceleration/deceleration time of the spindle during execution of rigid tapping
72506	Bell-shape acceleration/deceleration time (ms)	60	Set the bell-shape acceleration/deceleration time of the spindle during execution of rigid tapping

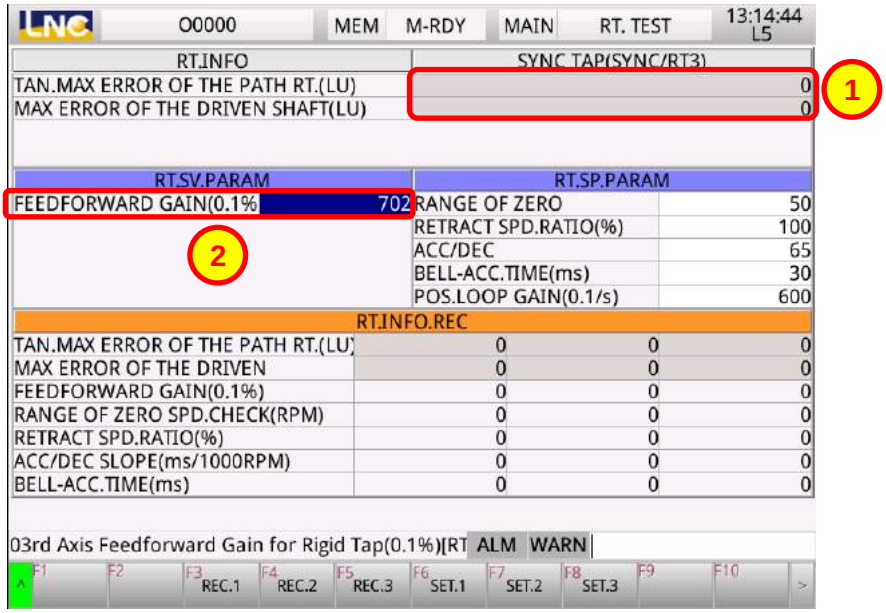
- Rigid tapping adjustment steps

1. Enter the following rigid tapping tuning program in MDI mode.

Rigid tapping machine tuning program	
Feed per revolution	Feed per minute
G40 G49 G80	G40 G49 G80
G90 G53 G00 Z-30	G90 G53 G00 Z-30
M00	M00
S1000	S1000
G95 G91 G84 Z-100. F1. P1000	G94 G91 G84 Z-50. F1000 P1000
G80	G80
M5	M5
M99	M99

2. After the execution is completed, the maximum tangent error during rigid tapping process, maximum error of slave rigid tapping, the estimated value of rigid tapping speed compensation, and the estimated value of rigid tapping acceleration compensation should be examined at position ①as shown in the figure.
3. Move the cursor to the ②position in the figure,
4. Speed compensation, use F1 to instruct the input to automatically fill in the numerical value, and then move the cursor to the speed filter strength to set it as 3, and execute rigid tapping tuning program again. If the response vibration is too loud during machine rigid tapping process, the numerical value of speed filter strength can be slowly increased. (It is recommended that the filter strength to be set as 3 to 5 to avoid high set value leading to increased follow error)
5. Acceleration compensation, use F1 to instruct the input to automatically fill in the numerical value, and then move the cursor to the acceleration filter strength to set it as 10, and execute rigid tapping tuning program again. If the response vibration is too loud during machine rigid tapping process, the numerical value of acceleration filter strength can be slowly increased. (It is recommended that this filter strength to be set to 10 to 15)
6. Repeat step 4 and step 5 and examine the maximum tangent error during rigid tapping process; the smaller the value, the better it is.

7.2.2 Synchronized rigid tapping (RT3):



- Setting of rigid tapping spindle parameters

Parameter number	Description	Recommended value	Description
72406	Zero speed checking range (rpm)	10	
72444	Exit speed ratio (%)	100	
72470	Acceleration/deceleration slope (ms/1000rpm)	60	The set value is identical to the linear acceleration/deceleration of the spindle's rotational speed
72506	Bell-shape acceleration/deceleration time (ms)	25	The set value is identical to the bell-shaped acceleration/deceleration of the spindle's rotational speed

- Rigid tapping adjustment steps

1. Rigid tapping system information set at 2: Synchronized rigid tapping (RT3).
2. Confirm that the first spindle position loop gain is based on the same setting as the spindle driver.
3. Execute the rigid tapping machine tuning program.

Rigid tapping machine tuning program	
Feed per revolution	Feed per minute
G40 G49 G80	G40 G49 G80
G90 G53 G00 Z-30	G90 G53 G00 Z-30
M00	M00
S1000	S1000
G95 G91 G84 Z-100. F1. P1000	G94 G91 G84 Z-50. F1000 P1000
G80	G80
M5	M5
M99	M99

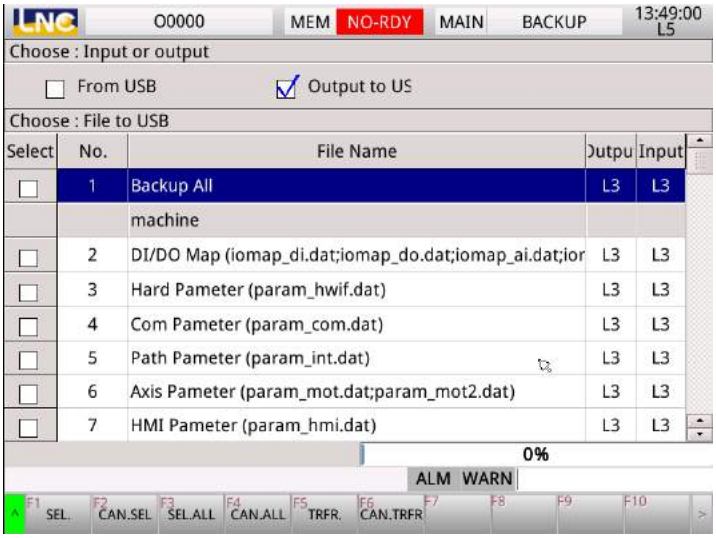
4. After the execution is completed, the maximum tangent error during rigid tapping process should be examined at position ①as shown in the figure.
5. Enter the upper and lower limit of current numerical value in the rigid tapping slave axis feedforward compensation gain column at the ②position as shown in the figure, and execute rigid tapping tuning program again.
6. Repeat step 5 and step 4 and examine the maximum tangent error during rigid tapping process; the smaller the value, the better it is.

8 Parameter backup and update

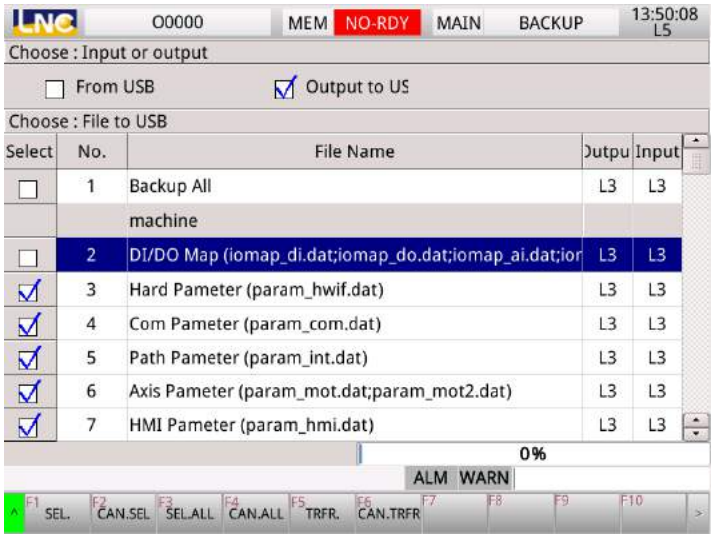
8.1 Backing up from the "Controller" to a "USB disk"

- Press the **<MAINTE>** key to enter the maintenance group, then press [Backup] to enter the menu in the next level for the backup screen to be shown. Users can use this function to backup parameter data or export data.
- Press **[Export to USB]** and a blue highlight bar will appear; there are 2 ways to export data.

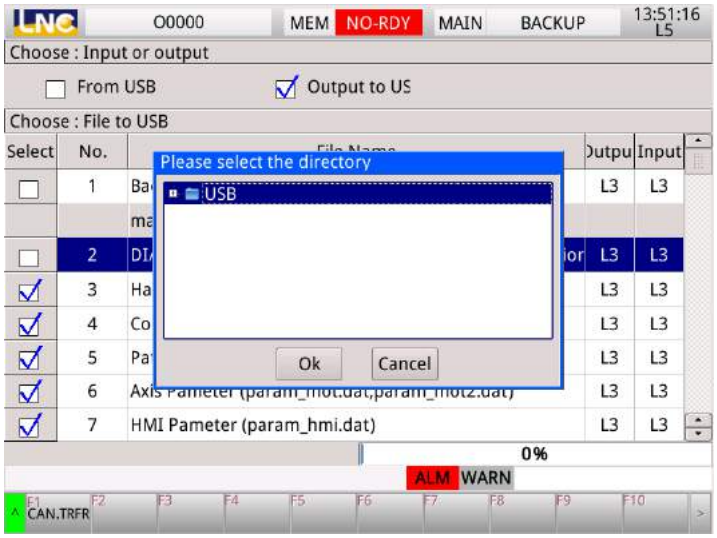
1. Select No. 1 to backup all data. All backup projects will be packaged into a file to facilitate the machine copy.
2. Select all data items following number 2. Selected projects will be exported into individual files to facilitate the modification.

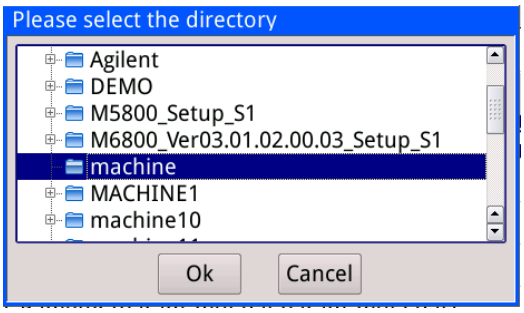


- Use arrow keys and press【**Select, Cancel selection, Select all, Cancel all**】to proceed with file selection.

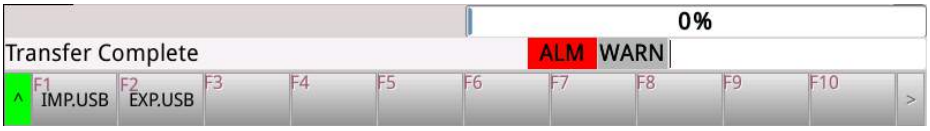


- Press **[** Transfer **]** for the directory selection message box to pop up. Select the directory to be exported. There is this  on the left of directory, meaning the folder can be opened by pressing <Right Click>. After the folder is selected, press **<OK>** .



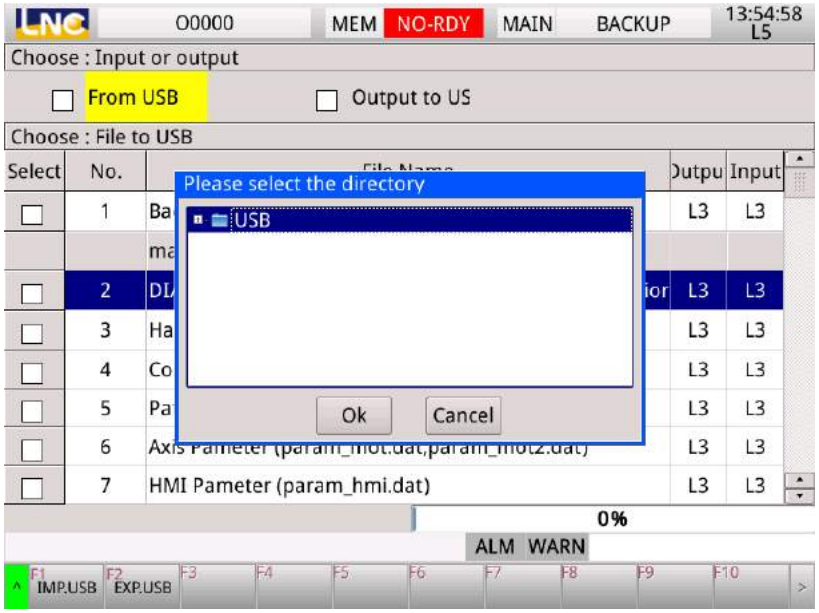


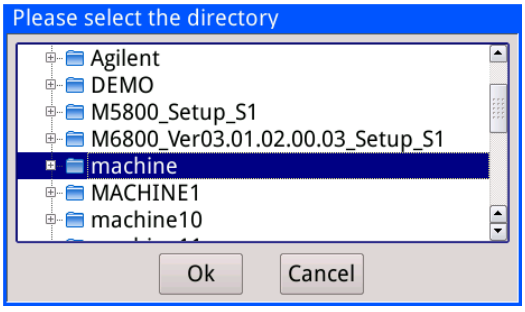
- The message of "Transfer Complete" will be shown after it is completed.



8.2 Importing from a "USB disk" to the "Controller"

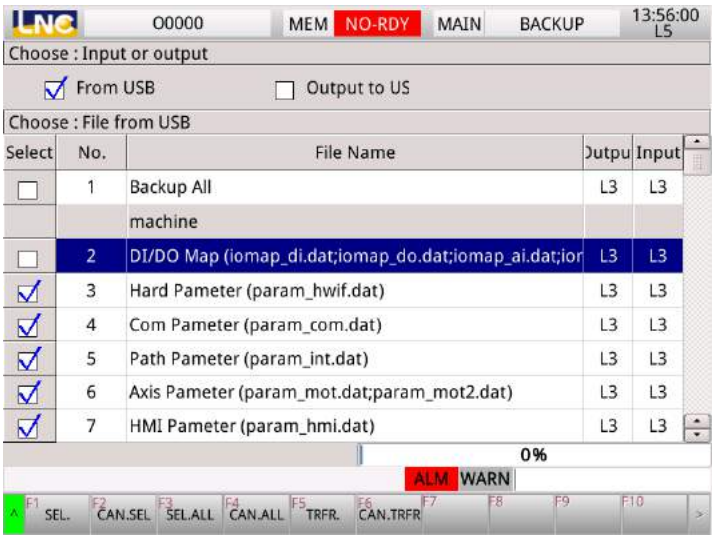
- Press **<MAINTE>** key to enter the maintenance group, and press **[Backup]** to enter the menu in the next level for the backup screen to be shown. Users can use this function to backup parameter data or export data.
- Press **[Import from USB]** for the director selection message box and blue cursor to be shown. and on the left side of directory there is ⊞, indicating that **<Right Click>** can be used to open the folder. After the folder is selected, press **<OK>** . **Please note that the parent director of machine folder must be selected as the folder to be imported.**



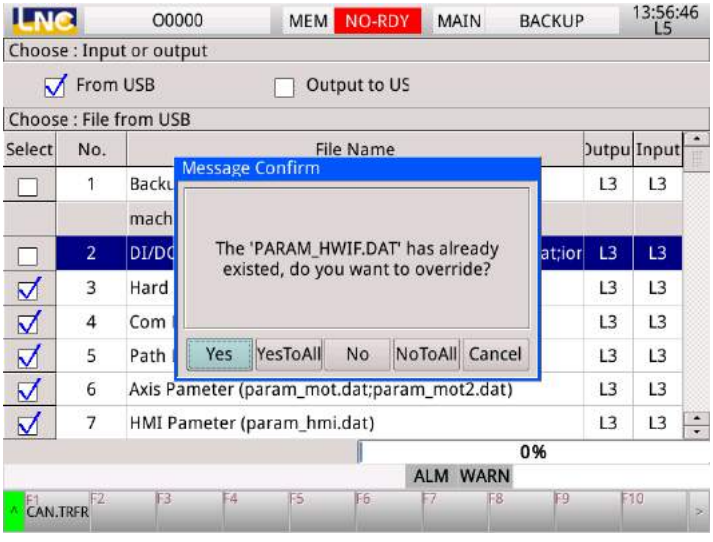


- Use arrow keys and press**[Select, Cancel selection, Select all, Cancel all]**to proceed with file selection. Press **[**Transfer**]** to start the transfer, and the prompt message of "Transfer Completed" will be shown after it is completed. There are two ways to import data.

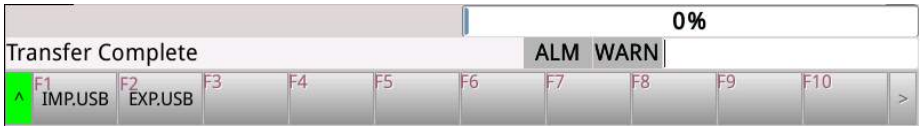
  1. Select No. 1 to backup all data. It will import the backup project which is packaged into one single file.
  2. Select all data items following number 2. It will import individual files of selected projects.



- Press **[** Transfer **] to** start the transfer, and message box for confirmation of overwrite as a reminder of file existence will be shown. You can select "Yes to All" and press <Input>.



- The message of "Transfer Complete" will be shown after it is completed.

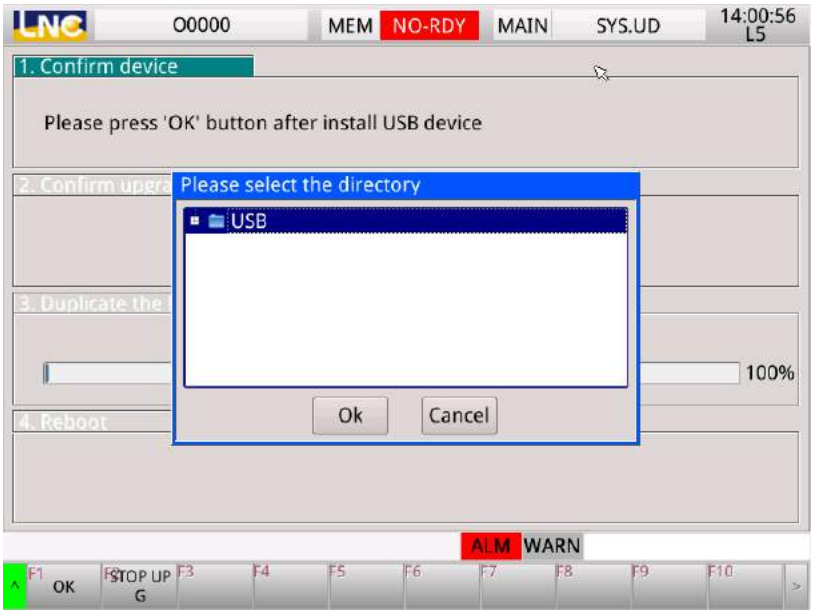


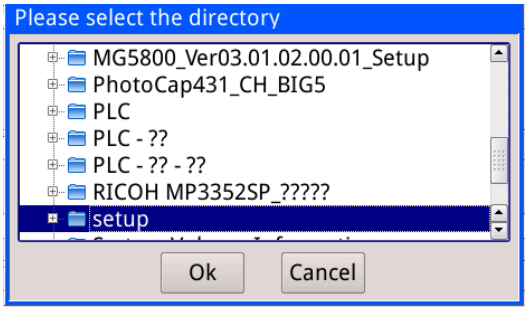
8.3 System update

- Press **<MAINTE>** key to enter the maintenance group, press **[System Update]** will enter the menu in

the next level, and the system update screen will be shown. Users can use this function to upgrade the system.

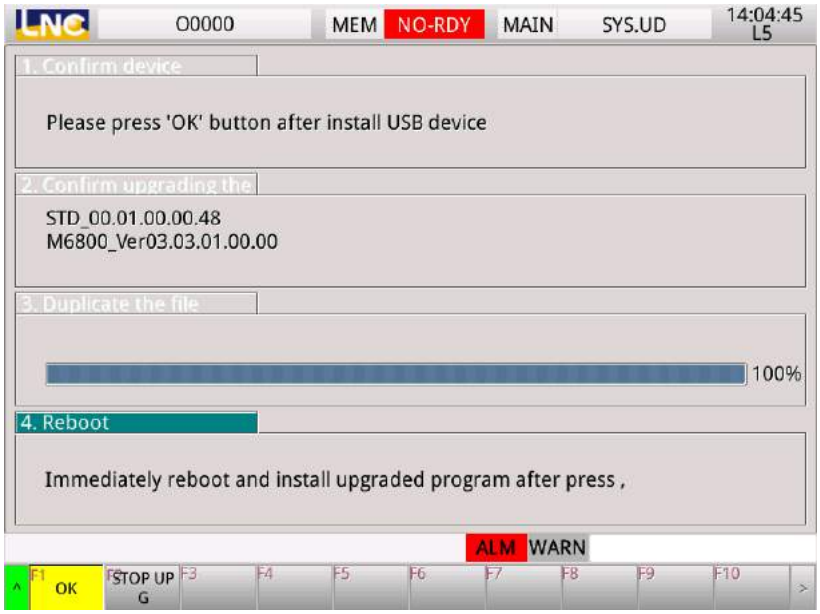
- **Step 1 Device Confirmation**: Press **[OK]** for the director selection message box to pop up. Select the software upgrade folder, and on the left side of the directory there is ⊞, meaning that <Right Click> can be used to open the folder. After a folder is selected, press <Confirm>.





- **Step 2 Confirm the upgrade version**: You will then see the upgrade version in the USB folder and press **[OK] to** start copying the file.

- **Step 3 Restart** : After the file is copied, you will be prompted to restart, and then you can press <OK> again to restart the system and to start the installation of new version of program.



9 Alert description

9.1 CNC HMI alarm

Number	Message prompt
80000.00-HMI	**Error in parameter definition file**
Cause: Failed to open or save data into the parameter definition file. Troubleshooting method: Restart.	

Number	Message prompt
80000.02-HMI	**There is no parameter definition file**
Cause: No parameter definition file can be found in the system. Troubleshooting method: 1. Restart. 2. Please contact service personnel from the original factory.	

Number	Message prompt
80000.04-HMI	**DI repeated reflection**
Cause: Repetitive reflected number is found in the signal input (DI). Troubleshooting method: Find the number with repeated reflection of signal input (DI) in accordance with the number shown in the alarm message.	

Number	Message prompt
80000.05-HMI	**DO repeated reflection**

Cause:

Repetitive reflected number is found in the signal output (DO).

Troubleshooting method:

Find the number with repeated reflection of signal output (DO) in accordance with the number shown in the alarm message.

Number	Message prompt
80000.06-HMI	**Failed to load the string file**

Cause:

Failed to load the string file.

Troubleshooting method:

1. Restart.
2. Please contact service personnel from the original factory.

Number	Message prompt
80000.09-HMI	**User parameter definition file error**

Cause:

Failed to open or save data into the user parameter definition file.

Troubleshooting method:

Restart.

Number	Message prompt
80000.10-HMI	**Incorrect password for open HMI**

Cause:

The password set for open HMI does not match the password set for the controller.

Troubleshooting method:

1. Confirm again whether the password set for open HMI matches the password set for controller.
2. Restart.

Number	Message prompt
80000.11-HMI	**Error while loading onto open HMI**

Cause: Decryption error or other relevant errors while loading the open HMI. Troubleshooting method: 1. Restart. 2. Please contact service personnel from the original factory.

9.2 System alarm (MAIN, COM)

Number	Message prompt
80050.00-MAIN	**System module does not exist**
Cause: The system module does not exist, thus preventing core functions from being activated. Troubleshooting method: Please contact service personnel from the original factory.	

Number	Message prompt
80050.01-MAIN	**System initialization failure**
Cause: Failure in system initialization causing core functions to be unresponsive. Troubleshooting method: Please contact service personnel from the original factory.	

Number	Message prompt
80050.03-MAIN	**Core module initialization failure**
Cause: Failed to load core module causing core functions to be unresponsive. Troubleshooting method: Please contact service personnel from the original factory.	

Number	Message prompt
80050.04-MAIN	**Parameter definition file does not exist**
Cause: Parameter definition file does not exist. Troubleshooting method: 1. Please check if param_define.txt in the machine is correct. 2. Please contact service personnel from the original factory.	

Number	Message prompt
80050.05-MAIN	**Quantity of parameter definitions is not equal**
Cause: The quantity of parameter definitions is not equal. Troubleshooting method: 1. Please check the size and quantity of parameter files. 2. Please contact service personnel from the original factory.	

Number	Message prompt
80050.06-MAIN	**Data loss in the parameter file**
Cause: Data loss in the parameter file. Troubleshooting method: 1. Please check the parameter file for errors. 2. Please contact service personnel from the original factory.	

Number	Message prompt
80050.07-MAIN	**Error in the size of the parameter file**

Cause:

Error in the size of the parameter file.

Troubleshooting method:

1. Please check the parameter file for errors.
2. Please contact service personnel from the original factory.

Number	Message prompt
80050.08-MAIN	**PLC load failure**

Cause:

PLC load failure.

Troubleshooting method:

1. Please check the PLC file.
2. Please contact service personnel from the original factory.

Number	Message prompt
80050.09-MAIN	**INT module initialization failure**

Cause:

INT module initialization failure.

Troubleshooting method:

Please contact service personnel from the original factory.

Number	Message prompt
80050.10-MAIN	**INT module execution failure**

Cause:

INT module execution failure.

Troubleshooting method:

Please contact service personnel from the original factory.

Number	Message prompt
80050.11-MAIN	**ReCON module initialization failure**

Cause: ReCON module initialization failure. Troubleshooting method: Please contact service personnel from the original factory.

Number	Message prompt
80050.12-MAIN	**ReCON module execution failure**
Cause: ReCON module execution failure. Troubleshooting method: Please contact service personnel from the original factory.	

Number	Message prompt
80050.13-MAIN	**HMI module initialization failure**
Cause: HMI module initialization failure. Troubleshooting method: Please contact service personnel from the original factory.	

Number	Message prompt
80050.14-MAIN	**HMI module execution failure**
Cause: HMI module execution failure. Troubleshooting method: Please contact service personnel from the original factory.	

Number	Message prompt
80050.15-MAIN	**Failure of previous system activation**

Cause: Failure of previous system activation. Troubleshooting method: 1. Check R40003 for setting error. 2. Restart.

Number	Message prompt
80050.16-MAIN	**Hardware authentication failure**
Cause: Hardware authentication failure. Troubleshooting method: Please contact service personnel from the original factory.	

Number	Message prompt
80050.18-MAIN	**In the parameter definition file (param_define.txt), there is repeated definition of parameter ranges or repeated system parameters.**
Cause: In the parameter definition file (param_define.txt), there is repeated definition of parameter ranges or repeated system parameters. Troubleshooting method: Please contact service personnel from the original factory.	

Number	Message prompt
80050.19-MAIN	**NetConf module initialization failure**
Cause: NetConf module initialization failure. Troubleshooting method: Please contact service personnel from the original factory.	

9.3 Driver alarm (SERVO)

Please refer to "1000 System Driver Setting Manual"

9.4 Motion control alarm (OP, MOT)

9.4.1 Path category

Number	Message prompt
80301.00-MOT	**Signal of the input point has been triggered when SKIP is executed by %s axis of the first path**
Cause: The corresponding signal of input point has been triggered when the SKIP function is used. Troubleshooting method: **1.** Check if the signal of the input point has been triggered. **2.** Check if the normally on and normally off states of the signal have been set correctly.	

Number	Message prompt
80302.00-MOT	**Error in the number of the first path waiting for point O**
Cause: When W_MLC_O_AT is used, the argument of O_No is less than 0. Troubleshooting method: Check if the O_No argument of W_MLC_O_AT is less than 0.	

Number	Message prompt
80304.00-MOT	**Error in W_SV_LATCH command argument of the first path**
Cause: Error in input argument while using W_SV_LATCH. Troubleshooting method: Check if there is an error in the argument used by W_SV_LATCH as shown below: 1. Check if the path number (PATH) is incorrect 2. Check if the type of signal source (TYPE) is incorrect 3. Check if the axis number of assigned path (AXIS) is incorrect 4. Check if the input point No. (I_No) is incorrect **5.** Check if the signal source triggering method (Ri_Fa) is incorrect	

Number	Message prompt
80305.00-MOT	**The first path tangent arrival check time out**

Cause:

When the tangent arrival check function is being used and the axial direction did not arrive within the check time (5 seconds).

Troubleshooting method:

1. Check if there is a bad connection in the wiring of the encoder on the axial direction issuing the alert.
2. Check the value of parameter 50096 for any errors.

Number	Message prompt
80306.00-MOT	**Error in W_I_LATCH command argument of the first path**

Cause:

Error in input argument while using W_I_LATCH.

Troubleshooting method:

Check if there is an error in the argument used by W_I_LATCH as shown below:

1. Check if the path number (PATH) is incorrect
2. Check if the type of signal source (TYPE) is incorrect
3. Check if the axis number of assigned path (AXIS) is incorrect
4. Check if the input point No. (I_No) is incorrect
5. Check if the signal source triggering method (Ri_Fa) is incorrect

Number	Message prompt
80307.00-MOT	**The first path %s axis arrival check timeout**

Cause:

When the axial direction arrival check function is being used and the axial direction did not arrive within the check time (5 seconds).

Troubleshooting method:

1. Check if there is a bad connection in the wiring of the encoder on the axial direction issuing the alert.
2. Check if there is any error in the setting of numerical values of parameters 56064 - 56095
3. Check if there is any error in the setting of numerical values of parameters 56096 - 56127

Number	Message prompt
80308.00-MOT	**The second path %s axis arrival check timeout**

Cause:

When the axial direction arrival check function is being used and the axial direction did not arrive within the check time (5 seconds).

Troubleshooting method:

1. Check if there is a bad connection in the wiring of the encoder on the axial direction issuing the alert.
2. Check if there is any error in the setting of numerical values of parameters 56064 - 56095
3. Check if there is any error in the setting of numerical values of parameters 56096 - 56127

Number	Message prompt
80309.00-MOT	**The third path %s axis arrival check timeout**

Cause:

When the axial direction arrival check function is being used and the axial direction did not arrive within the check time (5 seconds).

Troubleshooting method:

1. Check if there is a bad connection in the wiring of the encoder on the axial direction issuing the alert.
2. Check if there is any error in the setting of numerical values of parameters 56064 - 56095
3. Check if there is any error in the setting of numerical values of parameters 56096 - 56127

Number	Message prompt
80310.00-MOT	**The fourth path %s axis arrival check timeout**

Cause:

When the axial direction arrival check function is being used and the axial direction did not arrive within the check time (5 seconds).

Troubleshooting method:

1. Check if there is a bad connection in the wiring of the encoder on the axial direction issuing the alert.
2. Check if there is any error in the setting of numerical values of parameters 56064 - 56095
3. Check if there is any error in the setting of numerical values of parameters 56096 - 56127

Number	Message prompt
80311.00-MOT	**The fifth path %s axis arrival check timeout**

Cause:

When the axial direction arrival check function is being used and the axial direction did not arrive within the check time (5 seconds).

Troubleshooting method:

1. Check if there is a bad connection in the wiring of the encoder on the axial direction issuing the alert.
2. Check if there is any error in the setting of numerical values of parameters 56064 - 56095
3. Check if there is any error in the setting of numerical values of parameters 56096 - 56127

Number	Message prompt
80312.00-MOT	**The sixth path %s axis arrival check timeout**

Cause:

When the axial direction arrival check function is being used and the axial direction did not arrive within the check time (5 seconds).

Troubleshooting method:

1. Check if there is a bad connection in the wiring of the encoder on the axial direction issuing the alert.
2. Check if there is any error in the setting of numerical values of parameters 56064 - 56095
3. Check if there is any error in the setting of numerical values of parameters 56096 - 56127

Number	Message prompt
80313.00-MOT	**In the first path, the negative direction limit of world coordinates along the X direction is greater than the positive direction limit**

Cause:

In the first path, the negative direction limit of world coordinates along the X direction is set to be greater than the positive direction limit.

Troubleshooting method:

1. Check if R17408 is greater than R17407.
2. Press reset to clear the alert.

Number	Message prompt
80314.00-MOT	**In the first path, the negative direction limit of world coordinates along the Y direction is greater than the positive direction limit**
Cause: In the first path, the negative direction limit of world coordinates along the Y direction is set to be greater than the positive direction limit. Troubleshooting method: **1.** Check if R17410 is greater than R17409. **2.** Press reset to clear the alert.	

Number	Message prompt
80315.00-MOT	**In the first path, the negative direction limit of world coordinate along the C direction is greater than the positive direction limit**
Cause: In the first path, the negative direction limit of world coordinates along the C direction is set to be greater than the positive direction limit. Troubleshooting method: 1. Check if R17412 is greater than R17411. 2. Press reset to clear the alert.	

Number	Message prompt
80316.00-MOT	**The first path surpassed the positive direction limit of world coordinates along the X direction**
Cause: Positive direction movement of machinery coordinates along the X direction exceeds the set value of positive direction software limit. Troubleshooting method: **1.** Check if the machine coordinates surpass R17407's set value. **2.** Press reset to clear the alert. **3.** Move the servo axis towards the negative direction under manual mode.	

Number	Message prompt
80317.00-MOT	**The first path surpassed the negative direction limit of world coordinates along the X direction**

Cause: Negative direction movement of machine coordinates along the X direction exceeds the set value of negative direction software limit. Troubleshooting method: 1. Check if the machine coordinates surpass R17408's set value. 2. Press reset to clear the alert. 3. Move the servo axis towards the positive direction under manual mode.

Number	Message prompt
80318.00-MOT	**The first path surpassed the positive direction limit of world coordinates along the Y direction**
Cause: Positive direction movement of machinery coordinates along the Y direction exceeds the set value of positive direction software limit. Troubleshooting method: 1. Check if the machine coordinates surpass R17409's set value. 2. Press reset to clear the alert. 3. Move the servo axis towards the negative direction under manual mode.	

Number	Message prompt
80319.00-MOT	**The first path surpassed the negative direction limit of world coordinates along the Y direction**
Cause: Negative direction movement of machine coordinates along the Y direction exceeds the set value of negative direction software limit. Troubleshooting method: 1. Check if the machine coordinate surpasses R17410's set value. 2. Press reset to clear the alert. 3. Move the servo axis towards the positive direction under manual mode.	

Number	Message prompt
80320.00-MOT	**The first path surpassed the positive direction limit of world coordinates along the C direction**

Cause: Positive direction movement of machine coordinates along the C direction exceeds the set value of positive direction software limit. Troubleshooting method: 1. Check if the machine coordinate surpasses R17411's set value. 2. Press reset to clear the alert. 3. Move the servo axis towards the negative direction under manual mode.

Number	Message prompt
80321.00-MOT	**The first path surpassed the negative direction limit of world coordinates along the C direction**
Cause: Negative direction movement of machine coordinates along the C direction exceeds the set value of negative direction software limit. Troubleshooting method: 1. Check if the machine coordinate surpasses R17412's set value. 2. Press reset to clear the alert. 3. Move the servo axis towards the positive direction under manual mode.	

Number	Message prompt
80322.00-MOT	**Rigid tapping spindle number is not assigned for the first path**
Cause: The rigid tapping spindle number is not assigned while using the rigid tapping function. Troubleshooting method: 1. Press reset to clear the alert. 2. Re-assign rigid tapping spindle and then continue with the rigid tapping function.	

9.4.2 Axis type

Number	Message prompt
80500.00-MOT	**1st axis command and feedback exceed maximum error**

Cause:

The servo lag value is greater than the set value of parameter 71400 during axial movement.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Check if there is a bad connection in the encoder's wiring.
3. Check if the set value of parameter 71400 is appropriate.

Number	Message prompt
80501.00-MOT	**When the first axis is stationary, the command and feedback exceed the maximum error**

Cause:

The servo lag value is greater than the set value of parameter 71432 when the axis is stationary.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Check if there is a bad connection in the encoder's wiring.
3. Check if the set value of parameter 71432 is appropriate.
4. Check if there is sufficient setting for driver rigidity.

Number	Message prompt
80502.00-MOT	**Switch the servo axis/spindle control mode when the first axis is not stationary**

Cause:

When the axis control mode is switched from spindle mode to servo axis mode, the axis has not been completely stopped (the feedback signal is not zero).

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. After the axis is completely stopped (the feedback signal is zero), the axial mode switching is repeated.

Number	Message prompt
80503.00-MOT	**Reference point cannot be found during zero point return of the first axis**

Cause:

The motor Z phase signal cannot be found during zero point return.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Check if there is a bad connection in the encoder's wiring.
3. Check encoder Z phase signal wire to see if there is a connection error.
4. Check the value of parameter 77200 to see if the value is too small (the value must be at least the encoder value of one motor revolution).

Number	Message prompt
80504.00-MOT	**DOG is too short for zero point return of the first axis**

Cause:

After the DOG signal is triggered during zero point return, the DOG signal is gone before decelerating and stopping along the axial direction is completed.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Increase the size of the DOG.
3. Decrease the set value of the first stage speed of zero point return (parameter 77132).
4. Check whether or not the zero point DOG signal is inadvertently triggered by interference (can be processed via PLC filtering).

Number	Message prompt
80505.00-MOT	**In the first axis, the negative direction software limit is greater than the positive direction limit**

Cause:

The set value of positive direction software limit along the axial direction is greater than the set value of negative direction.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Check if the set value of R11532 is greater than R11500.

Number	Message prompt
80506.00-MOT	**Positive direction hardware limit triggered by the first axis**

Cause:

The machine touches the switch of positive direction hardware limit.

Troubleshooting method:

1. Press the system emergency stop switch and manually move the machine toward the negative direction.
2. Press the system over-travel button and move the machine toward the negative direction via manual mode.

Number	Message prompt
80507.00-MOT	**Negative direction hardware limit triggered by the first axis**

Cause:

The machine touches the switch of negative direction hardware limit.

Troubleshooting method:

1. Press the system's emergency stop switch and manually move the machine towards the positive direction.
2. Press the system over-travel button and move the machine towards the positive direction via manual mode.

Number	Message prompt
80510.00-MOT	**The settings of the maximum and minimum clamp speed of the first axis in speed mode are not appropriate**

Cause:

The set value of parameter 72300 is greater than the set value of parameter 72264.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Check if the set value of parameter 72300 is greater than the set value of parameter 72264.

Number	Message prompt
80511.00-MOT	**Emergency stop signal triggered during output command of the first axis**

Cause:

There is servo axis command output during the coordinate reverse transform of the system (under emergency stop state or spindle mode state).

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Release the emergency stop button or clear spindle mode before conducting servo axis command output.

Number	Message prompt
80513.00-MOT	**The command of the first axis is beyond the speed limit**
Cause: Output command is greater than the set value of parameter 71564. Troubleshooting method: 1. Press the system reset button to lift the alarm. 2. Check the setting of parameter 71564 to see if it is unreasonable.	

Number	Message prompt
80514.00-MOT	**The first axis is beyond the positive direction software limit**
Cause: Positive direction movement of machinery coordinate exceeds set value of positive direction software limit at the start of machining in automatic mode. Troubleshooting method: 1. Press the system reset button to lift the alarm. 2. Switch to manual mode. 3. Move the axial direction towards the negative direction.	

Number	Message prompt
80515.00-MOT	**The first axis is beyond negative direction software limit**
Cause: Negative direction movement of machinery coordinate exceeds set value of negative direction software limit at the start of machining in automatic mode. Troubleshooting method: 1. Press the system reset button to lift the alarm. 2. Switch to manual mode. 3. Move the axial direction towards the positive direction.	

Number	Message prompt
80516.00-MOT	**The first axis is beyond the input point's signal of the positive direction hardware limit**

Cause: The machine moves in the positive direction and reaches hardware positive direction limit input point at the start of machining under memory mode. Troubleshooting method: 1. Press the system reset button to lift the alarm. 2. Switch to manual mode. 3. Move the axial direction towards the negative direction.

Number	Message prompt
80517.00-MOT	**The first axis is beyond the signal of input point of negative direction software limit**
Cause: The machine moves in the negative direction and reaches hardware's negative direction limit input point at the start of machining under memory mode. Troubleshooting method: 1. Press the system reset button to lift the alarm. 2. Switch to manual mode. 3. Move the axial direction towards the positive direction.	

Number	Message prompt
80518.00-MOT	**Repeated output of manual and automatic commands of the first axis**
Cause: Simultaneous output of the path command (rapid feed, cutting feed, tooth milling, SKIP feed) and the axial command (return to zero point, JOG, MPG movement, positioning, rigid tapping). Troubleshooting method: 1. Press the system reset button to lift the alarm. 2. Check if axial movement is used under in automatic mode.	

Number	Message prompt
80519.00-MOT	**The first axis positioning function arrival check timeout**

Cause:

When using the axial positioning function, this alarm will be issued when the axial feedback check has not arrived with 5 seconds after the system command output is completed.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Check the setting of R11832 to see if it is consistent with actual conditions.
3. Check if the encoder cable is loose.
4. Check if the gear ratio settings are correct.

Number	Message prompt
80520.00-MOT	**The first axis is not in spindle (speed) mode during rigid tapping**

Cause:

The axial direction is not switched to spindle (speed) mode while rigid tapping is being used.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Resume rigid tapping operation after rigid tapping axial direction is switched to spindle (speed) mode.

Number	Message prompt
80521.00-MOT	**Zero point return of the first axis has not left DOG**

Cause:

After searching for Zero point DOG and moving away from DOG in the opposite direction, it cannot leave the DOG after operating for a certain distance (parameter 77232).

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Check if the DOG's signal is abnormal.
3. Check the setting of parameter 77232 to see if it is reasonable.

Number	Message prompt
80522.00-MOT	**1st axis without encoder feedback while using the Z-phase zero point return function**

Cause: Z phase zero point return function is used when there is no encoder along the axial direction. Troubleshooting method: 1. Press the system reset button to lift the alarm. **2.** Check the setting of axial direction encoder parameter 70364 for any errors. **3.** Check if there is any error in the setting of parameter 77000 of zero point return approach along axial direction.

Number	Message prompt
80523.00-MOT	**Grid amount of zero point return of the first axis is less than 20% or greater than 80%**
Cause: The zero point grid amount of system information is greater than 80% or less than 20% after the zero point return along the axial direction is completed. Troubleshooting method: 1. Press the system reset button to lift the alarm. **2.** Re-calibrate the position of zero point DOG. **3.** If it cannot be adjusted, parameter 77332 can be set to 0 to skip the check.	

Number	Message prompt
80524.00-MOT	**The difference in grid amounts of two adjacent zero point returns of the first axis is greater than 3%**
Cause: The difference in zero point grid amounts of two adjacent zero point returns is greater than 3% after zero point return along the axial direction is completed. Troubleshooting method: 1. Press the system reset button to lift the alarm. **2.** Check if the coupling of the screw and the motor is loose. **3.** If it cannot be adjusted, parameter 77332 can be set to 0 to skip the check.	

Number	Message prompt
80525.00-MOT	**The tilt axis must independently return to the zero point under tilt axis control of the first axis**

Cause:

The tilt axis did not independently return to the zero point before zero point return of other axes while tilt axis function is being used.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. The tilt axis should have priority during zero point return (which must not be carried out along all axial directions at once).

Number	Message prompt
80526.00-MOT	**When spindle position function is executed by the first axis, it must be switched to spindle control mode**

Cause:

The axial direction should be in servo axis control mode while the spindle position function is being used.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. The axial direction using spindle positioning function should be switched to spindle control mode (R10004.0=1) before the spindle position function can be started.

Number	Message prompt
80527.00-MOT	**The first axis' servo/spindle driver alarm not defined**

Cause:

When using a bus driver, the driver issues an undefined alarm.

Troubleshooting method:

1. Press the system reset button to lift the alarm
2. Report this situation and the operation motion line when the alarm is issued to R&D Department of Advantech LNC for clarification.

Number	Message prompt
80528.00-MOT	**The first axis' servo/spindle driver communication connection failure**

Cause:

When the communication axis starts its communication, that axis no longer exists.

Troubleshooting method:

1. Press the system reset button to lift the alarm.
2. Check for errors in the wiring.
3. Check the setting of hardware parameter 70000 for errors.

Number	Message prompt
80529.00-MOT	**Disconnected communication of the first axis servo/spindle driver**
Cause: After the communication axis is working normally, the axis is disconnected. Troubleshooting method: 1. Press the system reset button to lift the alarm. 2. Check the wiring for errors or see if it was moved by mistake. 3. Re-establishing communication and connection.	

Number	Message prompt
80530.00-MOT	**Error in the quick point I setting used by zero point return of the first axis**
Cause: The quick point I is to be used during zero point return, yet there is error in parameter setting such that it cannot be used. Troubleshooting method: 1. Press the system reset button to lift the alarm. 2. Check the settings of parameter 77032 and 77096 to see if they are correct.	

9.4.3 Other

Number	Message prompt
80700.00-MOT	**Conflict between axis type and hardware number corresponding to group 01 analog voltage output**
Cause: If axis control is used, and Vcmd is used in position mode or Vcmd or DA is used in speed mode, there will be conflict with analog voltage output function. Troubleshooting method: 1. Press the system reset button to lift the alarm. 2. Check whether or not parameter 70200 is set to 3 or 4 (3: DA + 0~10V, 4: DA + -10V).	

9.5 Alarm interpretation (INT)

Number	Message prompt
80800.01-INT	**The first path program flow initialization failure**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80800.02-INT	**The first path coordinate system initialization is failed**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80800.03-INT	**The first path interpretation initialization failure**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80800.04-INT	**The first path interpretation output initialization failure**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80801.18-INT	**The first path program single block capture failure**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80801.19-INT	**The first path is missing the name of the program to be called**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80801.20-INT	**There is syntax error in the annotation of workpiece program of the first path**
➢ There are unpaired annotation symbols for a single block, for example: Left parenthesis without right parenthesis. ➢ Fill in the paired annotation symbols.	

Number	Message prompt
80801.21-INT	**There is no command for returning to the main program (M99) in the sub-program of the first path**

➢ There is no command for returning to the main program in the sub-program. ➢ Add a command for returning to the main program in the sub-program.

Number	Message prompt
80801.22-INT	**The file to be executed in the first path does not exist**
➢ The file to be executed is not in the system. ➢ Produce the file to be executed or modify the file to be executed.	

Number	Message prompt
80801.23-INT	**The single block referenced by the serial number of the first path does not exist**
➢ The single block referenced by the serial number does not exist. ➢ Check if the single block referenced by the serial number exists.	

Number	Message prompt
80801.24-INT	**The number of lines skipped by the first path is beyond the specification limit, so this skip is not supported**
➢ The assigned line number which can be skipped must be within the first 10000 lines of the program.	

Number	Message prompt
80801.25-INT	**Failed to allocate the first path's file read-ahead memory**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80801.26-INT	**The first path has reached the end of the machining program file with no ending code**
➢ The main program or subprogram has reached the end of the machining program file without any program return or program ending command. ➢ Please check the program and add the necessary command for returning or ending the program.	

Number	Message prompt
80801.27-INT	**The first path program cannot find the starting point after a restart**

➢ When the end of main program file or subprogram file has been found before the end of program restart, or when the program ending command is found, the system will determine that the search is failed. ➢ Please check if the assigned restarting conditions are normal.

Number	Message prompt
80801.28-INT	**Termination command single block assigned by the restarted the first path program**
➢ Program restart condition is assigned to the program termination command. Even though the restarting condition is met, it is unreasonable. ➢ Please check if the assigned restarting conditions are normal.	

Number	Message prompt
80801.29-INT	**The first path in the path mode ($ 1 ~ $ 6), the number of rows of machining program exceeds the maximum limit**
➢ If parameter 50000 "To be used by machining program (0: independent file used by each path, 1: a file shared by multiple paths)" is set to 1, and $1 ~ $6 are used by the machining program, the program only supports 10000 lines. ➢ Please check the machining program to prevent the number of lines from exceeding the limit.	

Number	Message prompt
80803.24-INT	**The first path program single block interpretation failure**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80803.25-INT	**The first path workpiece program contains illegal characters or symbols**
➢ There are characters or symbols not permitted by the system in the input data of the machining program. ➢ Debug the error inside the program.	

Number	Message prompt
80803.26-INT	**There are syntax errors in the first path workpiece program**
➢ There are syntax errors in the input data of the workpiece program. ➢ Debug the error inside the program.	

Number	Message prompt
80803.27-INT	There is an over-complicated expression in the first path MACRO, such as having too many parentheses
➢ There is an over-complicated expression in the MACRO syntax, such as too many parentheses, addition, subtraction, multiplication, and division symbols, or too many variables in the arguments of the calling macro. ➢ It should be simplified or accomplished in two single blocks.	

Number	Message prompt
80803.28-INT	The first path executed an illegal expression
There is a prohibited expression being executed in the single block of the workpiece program.	

Number	Message prompt
80803.29-INT	The first path calls an illegal function
An unknown function is being executed by the single block of the workpiece program.	

Number	Message prompt
80803.30-INT	The denominator is 0 in the first path MACRO
➢ A division by 0 has occurred in the macro. ➢ Modify the denominator of the division part so that it is not zero.	

Number	Message prompt
80803.31-INT	The first path macro variable counter has exceeded the permissible range
➢ The counter for a local or global variable is beyond the permissible range. ➢ Modify the variable whose counter exceeded the permissible range.	

Number	Message prompt
80804.00-INT	The first path macro function error
➢ Error while using functions in macro syntax. For example: The argument of the square root (SQRT) is negative, or the two arguments of arc-tangent (ATAN) are both 0. ➢ When the alarm is issued, please refer to the function return value in the macro application manual to determine the cause of the error message.	

Number	Message prompt

80804.01-INT	The digital bit part of the input bit address of the first path contains illegal decimal point
➢ The numerical section of the address entered contains a decimal point which is not allowed. ➢ Modify the numeric part in the address.	

Number	Message prompt
80804.02-INT	The digital bit part of the input bit address of the first path exceeds the permissible range
➢ The numerical section of the address entered is beyond the permissible range. ➢ Modify the numeric part in the address.	

Number	Message prompt
80804.03-INT	The first path MACRO contains illegal arguments (G,N)
➢ An incorrect argument (G, N) is used in the macro program. ➢ Modify these arguments.	

Number	Message prompt
80804.04-INT	The first path system macro's alarm function number is beyond value range
➢ Please refer to the range of function argument definitions and domain in the macro's usage document. ➢ Modify the argument that is causing the alert.	

Number	Message prompt
80804.05-INT	Erroneous repetition of argument assignment of the first axis
➢ There are repeatedly assigned arguments in the program single block, for example: G01 X10 Y20 X30. ➢ Debug the error inside the program.	

Number	Message prompt
80804.06-INT	Only the first path system macro program is allowed to use this command
This command can only be used by a system macro.	

Number	Message prompt
80804.07-INT	The first path LABEL name does not exist

➢ LABEL name does not exist. ➢ Please confirm the LABEL name.

Number	Message prompt
80804.08-INT	**The first path syntax unknown return value**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80804.09-INT	**The first path skip serial number N assignment is beyond the valid range**
➢ The skip serial number N should be assigned in the range 0 to 999999. ➢ Please modify the serial number to skip.	

Number	Message prompt
80804.10-INT	**The first path skip line number is identical to the current line number**
➢ If the skip line number is the same as the existing line number, an infinite loop will be generated. ➢ Please modify the serial number to skip.	

Number	Message prompt
80804.11-INT	**The first path has exceeded the number of lines which can be processed by the macro**
➢ Macro commands can only support the first 10000 lines of the program. ➢ Please check the machining program.	

Number	Message prompt
80804.12-INT	**This narrative of the first path is not allowed to be in coordination with serial number N**
➢ There is a prohibited N serial number in the narrative ➢ Delete the prohibited N serial number ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.13-INT	**The first path IF_ELSE statement syntax error**

➢ IF_ELSE statement syntax error ➢ Correct the error in the IF_ELSE syntax ➢ Press RESET to clear the error warning

Number	Message prompt
80804.14-INT	**END_IF cannot be found in the first path**
➢ The corresponding END_IF cannot be found for the IF statement ➢ Add the missing END_IF ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.15-INT	**The value of the first path SELECT must be an integer**
➢ The value of SELECT is not an integer ➢ Modify the error of selected value ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.16-INT	**The first path SELECT statement syntax error**
➢ SELECT statement syntax error ➢ Correct the syntax error in the SELECT statement ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.17-INT	**END_SELECT cannot be found in the first path**
➢ The corresponding END_SELECT cannot be found for the SELECT statement ➢ Add the missing END_SELECT ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.18-INT	**The first path WHILE loop syntax error**
➢ WHILE loop syntax error ➢ Correct the syntax error in the WHILE loop ➢ Press RESET to clear the error warning	

Number	Message prompt

80804.19-INT	The WHILE syntax cannot be found in the first path
➢ Syntax errors of using the WHILE loop in coordination with single block skip ➢ Cancel or do not use selective skip ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.20-INT	The END_WHILE syntax cannot be found in the first path
➢ The corresponding END_WHILE cannot be found for the WHILE loop ➢ Add the missing END_WHILE ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.21-INT	The first path UNTIL statement syntax error
➢ UNTIL statement syntax error ➢ Correct the syntax error in the UNTIL statement ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.22-INT	The DO syntax cannot be found in the first path
➢ Syntax error of using the DO statement in coordination with single block skip ➢ Cancel or do not use selective skip ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.23-INT	The UNTIL syntax cannot be found in the first path
➢ Syntax error of using the UNTIL statement in coordination with single block skip ➢ Cancel or do not use selective skip ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.24-INT	The first path FOR loop syntax error
➢ FOR loop syntax error ➢ Correct the syntax error in the FOR loop ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.25-INT	**FOR syntax cannot be found in the first path**
➢ Syntax error of using the FOR loop in coordination with single block skip ➢ Cancel or do not use selective skip ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.26-INT	**The END_FOR syntax cannot be found in the first path**
➢ Syntax error of using the END_FOR statement in coordination with single block skip ➢ Cancel or do not use selective skip ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.27-INT	**The first path SUB statement syntax error**
➢ SUB statement syntax error ➢ Correct the syntax error in the SUB statement ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.28-INT	**The SUB syntax cannot be found in the first path**
➢ Syntax error of using the CALL_SUB statement in coordination with single block skip ➢ Cancel or do not use selective skip ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.29-INT	**The END_SUB syntax cannot be found in the first path**
➢ The corresponding END_SUB cannot be found for the SUB statement ➢ Add the missing END_SUB ➢ Press RESET to clear the error warning	

Number	Message prompt
80804.30-INT	**The name called by the first path's SUB syntax surpasses the maximum number of characters (15)**

➢ The maximum number of characters for the name called by the SUB statement is 15. ➢ Reduce the number of characters for the name to be called ➢ Press RESET to clear the error warning

Number	Message prompt
80804.31-INT	**The nested use of the first path's SUB syntax is beyond the maximum number of layers (2)**
➢ The nested call of the SUB syntax (the SUB is calling itself again) ➢ Modify the program design of the SUB range to reduce nested calls ➢ Press RESET to clear the error warning	

Number	Message prompt
80805.00-INT	**The prohibited GOTO syntax is used in the first path's SUB syntax**
➢ The syntax for the GOTO statement cannot jumps into the range of the SUB statement, which will to the execution of END_SUB without knowing how to return to the original statement ➢ Change the GOTO statement to CALL_SUB ➢ Press RESET to clear the error warning	

Number	Message prompt
80805.01-INT	**A stacked variable of the first path macro has exceed the maximum number**
➢ The stack of macro command variables is greater than or equal to 50 ➢ Reduce the number of stacks for the macro variable ➢ Press RESET to clear the error warning	

Number	Message prompt
80805.02-INT	**The first path macro function error. Path number is beyond the value range**
➢ Syntax error while using functions in the macro. The assigned path number in function argument is beyond the valid range. ➢ Modified the path argument in the macro function.	

Number	Message prompt
80805.03-INT	**The first path macro function error. The assigned axis number is beyond the valid range**

➢ Syntax error while using functions in the macro. The assigned path axis number in function argument is beyond the valid range. ➢ Modify the axis number argument in the macro function.

Number	Message prompt
80805.04-INT	**The first path macro function error. The assigned type is beyond the valid range**
➢ Syntax error while using functions in the macro. The assigned type in function argument is beyond the valid range. ➢ Modify this type of argument in the macro function.	

Number	Message prompt
80805.05-INT	**Insufficient variable resources for the first path**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80805.06-INT	**The first path system command format does not support this command**
➢ This system command format does not support the commands for program design. For example, the milling machine does not support the special command format of robot arm. ➢ Press RESET to clear the error ➢ Delete the unsupported command	

Number	Message prompt
80805.07-INT	**G code is not allowed for the first path polar coordinate interpolation**
➢ Polar coordinate interpolation does not allow the use of G codes other than G01, G02, and G03 ➢ Press RESET to clear the error ➢ Modify the incorrect G code	

Number	Message prompt
80805.08-INT	**The first path polar coordinate interpolation mode G40 end of tool path compensation movement is not completed**

➢ In polar coordinate interpolation mode, the polar coordinate cannot be canceled until G40 end of tool path compensation movement is completed ➢ Press RESET to clear the error ➢ Modify the end point position or tool radius compensation value of the moving single block in coordination with G40

Number	Message prompt
80805.09-INT	**The use of Y axis is not allowed for the first path cylindrical interpolation and polar coordinate interpolation**
➢ Check if the Y axis is used by cylindrical interpolation or polar coordinate program ➢ Press RESET to clear the error ➢ Modify the machining program and delete the Y axis program design of this line	

Number	Message prompt
80805.10-INT	**If there is no C axis in the first path, cylindrical interpolation and polar coordinate interpolation are not allowed**
➢ Cylindrical coordinate or polar coordinate will require C axis indexing. ➢ Press RESET to clear the error ➢ If there is no C axis function, please delete the command for cylindrical interpolation or polar coordinate interpolation	

Number	Message prompt
80806.08-INT	**The first path interpretation output error**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80806.09-INT	**There is no such G command under the first path system**
➢ You can check the G code list in the manual to make sure whether or not the G code is not allowed in the input data of this line of program design of the alarm ➢ Delete the G code that is not allowed.	

Number	Message prompt
80806.10-INT	**The first path machining program contains an improper coordinate transform command**

It will not happen if the system is functioning normally System failure, please contact the supplier

Number	Message prompt
80806.11-INT	**The first path has assigned a prohibited coordinate plane**
➢ Wrong coordinate machining plane is selected during the use of G107 Cylindrical interpolation ➢ Check the machining program and adjust the use of the YZ coordinate plane ➢ Check the coordinate plane of the machining program to see if it is correct ➢ Press RESET to clear the error	

Number	Message prompt
80806.12-INT	**When G02/G03 is used by the first path, the coordinates of the end point are not on the arc**
➢ When using G02 and G03 arc cutting instructions, the end point coordinates are not on the arc, and for the check range please refer to parameter 50048 ~ 50053. ➢ Check the position of the circle's center point, direction, and the coordinate value of the end point.	

Number	Message prompt
80806.13-INT	**Insufficient data for the G code to be executed by the first path**
➢ Insufficient data of G code to be executed (for example: The H argument of G43/G44 has not been assigned.) ➢ Provide all necessary data.	

Number	Message prompt
80806.14-INT	**In the first path's G54 command, P argument has exceeded the valid range**
➢ The range of P argument of the G54 command is 1-100. ➢ Modify the P argument.	

Number	Message prompt
80806.15-INT	**The first path did not issue the typesetting declaration start command**
➢ In the program design, the commands of "PATTERN_BEGIN", "PATTERN_END" can be used to circle the range of typesetting program design. When the system reads the "PATTERN_END" command in the program, it will check if there are any "PATTERN_BEGIN" typesetting declaration start command, and these commands must be used in pairs ➢ Modify the program and add "PATTERN_BEGIN" typesetting declaration start command	

Number	Message prompt
80806.16-INT	The number of push layers of the first path typesetting command exceeded the valid range

- The typesetting command can assign the program design corresponding to the relative number of macro layers to push the layout
- The assigned K argument indicates the number of push layers exceeding the valid range, modify the K argument

Number	Message prompt
80806.17-INT	The first path tool number assignment has exceeded the valid range

- The range of the T code command is 0-400.
- Modify the T code.

Number	Message prompt
80806.18-INT	The first path tool offset number assignment has exceeded the valid range

- Tool length offset number of tool radius offset number assignment exceeded the valid range.
- The range of tool length or tool radius offset number is 0-400.

Number	Message prompt
80806.19-INT	The first path metric/imperial system switch will become valid after reset

- While using G20/G21 metric/imperial system switching, this alert will be issued as a reminder that the switching of metric/imperial system will require a system reset
- Press RESET to reset the system

Number	Message prompt
80806.20-INT	The path's software axis of the first path is being used by other paths

- While using the function of axis call, the software axis to be used by the path has been called by other paths. If the axis has been locked by other paths, a alarm will be issued when the execution of this path reaches the program design of this axis
- This alarm is usually issued to indicate that the other path has not released the axis. Please check whether or not the program design is lacking the axis release command

Number	Message prompt
80806.21-INT	Failure in the first path attempting to borrow software axes of other paths

➢ While using the function of axis call, the axis called by other paths is used in this path. If the called axis has been locked by other paths, a alarm will be issued when the execution of this path reaches the program design of the called axis ➢ For using software axes of other paths, parameters 56034-56040 of those axes must be set to allow the usage by path groups 1 - 6 (0: Off, 1: On). This way, the axis being called can be used by this path ➢ This alarm is usually issued to indicate that the other path has not released the axis. Please check whether or not the program design is lacking the axis release command

Number	Message prompt
80806.22-INT	**The first path assigned position exceeds the maximum travel distance of the robotic arm**
The position assigned by the single block has exceeded the maximum travel distance that can be reached by the robotic arm. Please re-define the position in the single block.	

Number	Message prompt
80806.23-INT	**Error in the stance of the first path robotic arm**
➢ When G10/G11/G12/G13/G16 commands are used, the switching between right and left stances is not allowed. This limitation is due to that fact that it cannot be achieved along a linear movement path. ➢ Please re-define the stance of that single block.	

Number	Message prompt
80806.24-INT	**Error in the matching of the first path robotic arm G code and axis argument format**
➢ JOINT command must be in coordination with the argument format of J1-J4. and the world coordinate command must be in coordination with the argument format of XYZC.	

Number	Message prompt
80806.25-INT	**The first path rigid tapping mode declares a lack of arguments (check S, E)**
➢ Rigid tapping mode command must include S and E arguments ➢ It will not happen if the system is functioning normally ➢ System failure, please contact the supplier	

Number	Message prompt

80806.26-INT	The first path feed rate command value exceeds the valid range, please verify if the unit for the feed is in minutes or revolutions
➢ The feed rate command value is out of range, and the F of feed per revolution is not allowed to exceed 500. Please comply with the G94/G95 and check the feed rate ➢ Press RESET to clear the error warning and adjust the G94, G95, or F value	

Number	Message prompt
80806.27-INT	The first path profile cutting command syntax error
➢ Program design error, which could be the error in command of G71 program in the range of G71 contour cutting program. ➢ Press RESET to clear the error ➢ Debug the machining program	

Number	Message prompt
80806.28-INT	The first path manual return state does not allow the single block movement executed by MDI
➢ Under the manual return state, since return to point was not completed, switching to MDI mode is not allowed, as well as issuing a single block movement command ➢ Press RESET to clear the error	

Number	Message prompt
80806.29-INT	Tool compensation executed by MDI is not allowed during the first path machining
➢ Tool compensation executed by MDI is not allowed during the machining process ➢ Press RESET to clear the error	

Number	Message prompt
80806.30-INT	The first path is not allowed to issue movement commands for prohibited software axis
➢ When the axis is set to axis disable mode via command, the program design is not allowed to issue movement command to the disabled software axis. ➢ Delete the argument of that software axis	

Number	Message prompt
80809.12-INT	The first path program management process flow error

It will not happen if the system is functioning normally System failure, please contact the supplier

Number	Message prompt
80809.13-INT	**Illegal program name called by the first path**
➢ The name of program being called contains more than 32 characters. ➢ The P argument of the program name being called is assigned a negative value. ➢ Please check the name of the program being called.	

Number	Message prompt
80809.14-INT	**The number of layers called by the first path system sub-program and system macro exceeds the limit (12)**
➢ Aggregated calls by system subprogram and system macro exceeds the limit of number of layers (12). ➢ Reduce the number of layers called.	

Number	Message prompt
80809.15-INT	**The number of layers called by the first path system macro exceeds the limit (8)**
➢ The number of layers called by system macro exceed the limit (8) ➢ Reduce the number of layers called.	

Number	Message prompt
80809.16-INT	**The number of layers called by the first path user defined sub-program and user defined macro exceeds the limit (6)**
➢ Aggregated calls user or maker subprogram and user or maker macro exceeds the limit of number of layers (6). ➢ Reduce the number of layers called.	

Number	Message prompt
80809.17-INT	**The number of layers called by the first path user macro exceeds the limit (4)**
➢ The number of layers called by user or maker macro exceeds the limit (4) ➢ Reduce the number of layers called.	

Number	Message prompt
80809.18-INT	**The first path is not allowed to set macro modal call here**

➢ A macro under modal call cannot be allowed to set modal call again in the macro. ➢ Please check the macro program making the modal call.

Number	Message prompt
80809.19-INT	**There are no available local variables in the first path**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80810.10-INT	**The first path interpretation transmission error**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80810.11-INT	**The first path TABLE1 transmission error**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80812.06-INT	**The first path interpretation compensation error**
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80812.07-INT	**In the first path compensation, the unit vector is 0**
➢ In the compensation, the unit vector is 0 ➢ It will not happen if the system is functioning normally ➢ System failure, please contact the supplier	

Number	Message prompt
80812.08-INT	**A vector with length 0 has been found in the first path compensation calculation**
➢ Compensation calculation check reveals that there is no intersection of program design lines due to erroneous program design ➢ Change the path of the workpiece program ➢ Press RESET to clear the error warning	

Number	Message prompt
80812.09-INT	**Plane switching is not allowed in the first path compensation calculation**
➢ In G41/G42 radius compensation mode, plane switching is not allowed. ➢ Please modify the machining program and delete the G17/G18/G19 command within the range of radius compensation mode	

Number	Message prompt
80812.10-INT	**There is no intersection in the arc single block for the start of the first path compensation**
➢ Compensation calculation check reveals that there is no intersection of program design lines due to erroneous program design ➢ Please use a straight line for compensation cancel ➢ Press RESET to clear the error warning	

Number	Message prompt
80812.11-INT	**There is no intersection in the arc single block for canceling the first path compensation**
➢ Compensation calculation check reveals that there is no intersection of program design lines due to erroneous program design ➢ Please use a straight line for compensation start ➢ Press RESET to clear the error warning	

Number	Message prompt
80812.12-INT	**The vector of intersection for the arc and straight line of the first path exceeded the compensation range**
➢ Compensation calculation check reveals that there is no intersection of program design lines due to erroneous program design ➢ Change the path of the workpiece program ➢ Press RESET to clear the error warning	

Number	Message prompt
80812.13-INT	**The vector of intersection for the arc and straight line of the first path exceeded the arc shift vector**

➢ Compensation calculation check reveals that there is no intersection of program design lines due to erroneous program design ➢ Change the path of the workpiece program ➢ Press RESET to clear the error warning

Number	Message prompt
80812.14-INT	**Tool radius offset number in arc command is not allowed in the calculation of the first path compensation**
➢ In G41/G42 radius compensation mode, the switching of tool radius offset number is not allowed in arc command single block. ➢ Please modify the machining program and delete the tool radius offset number of arc command single block within the range of radius compensation mode.	

Number	Message prompt
80812.15-INT	**Over-cutting occurred in the first path compensation calculation**
➢ If parameter 50036 "Radius compensation interference checking function (0: avoid, 1: alarm, 2: invalid)" is set as 1: alarm, this alarm will be issued when over-cutting occurs during the execution of radius compensation calculation. If it is set as 0: avoid, even though the path will be automatically changed during calculation to prevent over-cutting, this alert will still be issued if a new path cannot be generated. ➢ If the aforementioned parameter has been set as 1, it can be changed to 0 and see if an alarm will be issued. ➢ If the aforementioned parameter has been set as 0, this alarm will still be issued, indicating the description path cannot avoid over-cutting. Please check if there are any abnormalities in the path of the machining program. ➢ Modify the machining program to avoid over-cutting.	

Number	Message prompt
80812.16-INT	**Over-cutting cannot be avoided in the first path compensation calculation**
➢ If parameter 50036 "Radius compensation interference checking function (0: avoid, 1: alarm, 2: invalid)" is set as 0: avoid, this alarm will still be issued in the scenario where the path is automatically changed to avoid over-cutting during radius compensation calculation, and a new path cannot be generated. Please check if there are any abnormalities in the path of the machining program. ➢ Modify the machining program to avoid over-cutting.	

Number	Message prompt

80812.17-INT	**The first single block of the first path chamfering function does not contain G01, G02, G03**
➢ Please refer to the chamfering function programming example, where the first single block of the chamfering function must be G01/G02/G03 ➢ Press RESET to clear the error warning, and correct the error in the workpiece program	

Number	Message prompt
80812.18-INT	**The second single block of the first path chamfering function does not contain G01, G02, G03**
➢ Please refer to the chamfering function programming example, where the second single block of the chamfering function must be G01/G02/G03 ➢ Press RESET to clear the error warning, and correct the error in the workpiece program	

Number	Message prompt
80812.19-INT	**There is no movement amount in the first single block of the first path's chamfering function**
Press RESET to clear the error warning, and correct the error in the workpiece program	

Number	Message prompt
80812.20-INT	**There is no movement amount in the second single block of the first path's chamfering function**
Press RESET to clear the error warning, and correct the error in the workpiece program	

Number	Message prompt
80812.21-INT	**Chamfering length of the chamfering function of the first path exceeds the length of the first single block**
➢ Incorrect programming has caused the chamfering length to exceed the length of the first single block ➢ Press RESET to clear the error warning, and correct the error in the workpiece program	

Number	Message prompt
80812.22-INT	**Chamfering length of the chamfering function of the first path exceeds the length of the second single block**
➢ Incorrect programming has caused the chamfering length to exceed the length of the second single block ➢ Press RESET to clear the error warning, and correct the error in the workpiece program	

Number	Message prompt
80812.23-INT	Chamfering length of the chamfering function of the first path exceeds the arc length of the first single block
➢ Incorrect programming has caused the chamfering length to exceed the length of the first single block ➢ Press RESET to clear the error warning, and correct the error in the workpiece program	

Number	Message prompt
80812.24-INT	Chamfering length of the chamfering function of the first path exceeds the arc length of the second single block
➢ Incorrect programming has caused the chamfering length to exceed the length of the second single block ➢ Press RESET to clear the error warning, and correct the error in the workpiece program	

Number	Message prompt
80812.25-INT	Error in the angle between the first and the second single block of the first path's chamfering function
➢ Incorrect programming has caused the chamfering calculation to not be able to find the correct angle ➢ Press RESET to clear the error warning, and correct the error in the workpiece program	

Number	Message prompt
80812.26-INT	The first path geometric pattern input function description syntax error
➢ Confirm that in certain forms of geometric input function (geometric commands), angular commands (A commands), and X and Z syntax cannot be issued simultaneously within the same single block ➢ Press RESET to clear the error warning ➢ Modify the geometric input function of the machining program such that angle (A command) as well as X and Z can be in different single blocks	

Number	Message prompt
80814.23-INT	The number of movement sections exceeds the limit of the first path single block (5)
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt

80814.24-INT	The movement axis of the first path is not included in this path
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80814.25-INT	The first path interpretation module internal alarm - Restore address error
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80814.26-INT	The composite profile cutting cycle of the first path exceeds 1000 sections
➢ Check the description of composite profile cutting to see if it exceeds 1000 sections ➢ Press RESET to clear the error ➢ Debug the machining program	

9.6 Milling machine macro alarm (MACRO)

Number	Message prompt
80900.00-MAC	The first path *String*
The alarm string issued by programming	

Number	Message prompt
80900.01-MAC	P argument of G10 command macro of the first path is beyond the valid range
➢ P argument is beyond the command's legal range. ➢ Modify P argument data.	

Number	Message prompt
80900.02-MAC	Insufficient data for the G code to be executed by the G10 command macro of the first path
➢ Argument description is not for setting tool data, coordinate systems, or extended coordinate systems. ➢ Please check if the P argument is illegal or the L argument is missing.	

Number	Message prompt

80900.03-MAC	Illegal argument is used by the first path's G10 command macro
➢ L20 has not been issued or P argument is illegal during the setting of an extended coordinate system. ➢ Please modify the argument's value.	

Number	Message prompt
80900.04-MAC	The first path G27, G28, G29, G30 command macro CAN CYCLE has not yet been canceled
➢ G27-G30 operations are used during the cutting cycle command state. ➢ The aforementioned G code in a cutting cycle command must be canceled before execution can be resumed.	

Number	Message prompt
80900.05-MAC	Error in the software axis number obtained by the first path
It will not happen if the system is functioning normally System failure, please contact the supplier	

Number	Message prompt
80900.06-MAC	P argument of G30 command macro of the first path is beyond the valid range (2-4)
➢ The reference point number entered in G30 is incorrect. ➢ Modify the reference point number entered.	

Number	Message prompt
80900.07-MAC	The first path G28, G30 command macro - Zero point return has not been executed after machine startup
➢ Zero point return has not been executed by the system when this command is used. ➢ Please execute zero point return before executing this command.	

Number	Message prompt
80900.08-MAC	The first path waiting for M code macro; incorrect number of assigned groups
➢ When the execution of a dual-path system reaches the waiting point for M code, and the number of assigned groups is found to be incorrect, it indicates that there is something wrong with the waiting part of the machining program, and the system will issue this alarm as a protective measure. ➢ Check the program of system wait for M code in the machining program to see if it is reasonable.	

Number	Message prompt
80900.09-MAC	**The first path's G27 command macro zero point return failed**
➢ After inspection, the current position is found not to be at the zero point. ➢ Please check the machining program.	

Number	Message prompt
80900.11-MAC	**The first path's G31 command macro executing G31 in radius compensation mode**
G31 Skip signal termination single block command is not allowed to be used in G41/G42 radius compensation mode. Please adjustment the machining program to prevent G31 from appearing in G41/G42 mode.	

10 Alarm Description

10.1 CNC HMI alarm (HMI)

Number	Message prompt
81000.00-HMI	**Setting record cannot be saved, restarting is recommended**
Cause: Failed to open the setting record file or cannot save. Troubleshooting method: Restart.	

Number	Message prompt
81000.01-HMI	**The abnormal record cannot be saved, restarting is recommended**
Cause: Failed to open or save an abnormal record. Troubleshooting method: Restart.	

Number	Message prompt
81000.02-HMI	**Setting permissions can not be saved, and restart is recommended**

Cause:

Failed to open or save the permission settings file.

Troubleshooting method:

Restart.

Number	Message prompt
81000.03-HMI	**Upgrade failed! The check file does not exist**

Cause:

Incomplete file download or missing packs during the file transmission process can both result in missing upgrade check file in the update pack.

Troubleshooting method:

Please contact service personnel from the original factory to obtain a complete update pack.

Number	Message prompt
81000.04-HMI	**Upgrade failed! The file is corrupted**

Cause:

Incomplete file download or missing packs during the file transmission process can both result in the damaged upgrade file in the update pack.

Troubleshooting method:

Please contact service personnel from the original factory to obtain a complete update pack.

Number	Message prompt
81000.06-HMI	**The network module is disconnected**

Cause:

The network module is disconnected.

Troubleshooting method:

1. Check the connection of the network cable.
2. Check if the network address settings are correct.
3. Restart.

Number	Message prompt
81000.07-HMI	**RDIF data cannot be saved, system reboot is recommended**

Cause: Failed to open or save RDIF data. Troubleshooting method: Restart.

Number	Message prompt
81000.08-HMI	**OS upgrade failed, upgrade file missing**
Cause: OS upgrade file is missing in the update pack. Troubleshooting method: 1. Check the upgrade pack to see if it contains files such as [OSUpgradeInfo.sh], [OSUpgrade.sh], and [os.lzma]. 2. Please contact service personnel from the original factory to obtain a complete update pack.	

Number	Message prompt
81000.09-HMI	**OS upgrade failed due to obsolete version. Please reinstall .iso**
Cause: The current OS version is too old to be upgraded via the update pack. Troubleshooting method: It is recommended to reinstall the system by using the ISO file.	

Number	Message prompt
81000.10-HMI	**OS upgrade failed due to insufficient storage capacity**
Cause: Insufficient storage space in the system has caused system upgrade failure. Troubleshooting method: Please contact service personnel from the original factory.	

10.2 System warning (MAIN, COM)

None

10.3 Driver warning (SERVO)

Please refer to "1000 System Driver Software Maintenance Manual"

10.4 Movement control warning (OP, MOT)

10.4.1 Path category

None

10.4.2 Axis type

Number	Message prompt
81250.00-MOT	**The axis is beyond the positive direction software limit**
Cause: Positive direction movement of the machinery coordinate exceeds the set value of positive direction software limit. Troubleshooting method: 1. Check if the machine coordinate exceeded the set value of R11500. 2. Move the servo axis towards the negative direction under manual mode.	

Number	Message prompt
81251.00-MOT	**The axis is beyond the negative direction software limit**
Cause: Negative direction movement of machinery coordinate exceeds the set value of negative direction software limit. Troubleshooting method: 1. Check if the machine coordinate exceeds the set value of R11532. 2. Move the servo axis towards the positive direction under manual mode.	

Number	Message prompt
81252.00-MOT	**The axis has exceeded hardware limit positive direction input point signal**
Cause: The positive direction hardware limit signal is triggered during machine movement. Troubleshooting method: 1. Check if the machine has triggered the signal of positive direction hardware limit. 2. Check if PLC triggered R11596.00. 3. Move the servo axis towards the negative direction under manual mode.	

Number	Message prompt

81253.00-MOT	**The axis has exceeded hardware limit negative direction input point signal**

Cause:

The negative direction hardware limit signal is triggered during machine movement.

Troubleshooting method:

4. Check if the machine has triggered the signal of negative direction hardware limit.
5. Check if PLC triggered R11597.00.
6. Move the servo axis towards the positive direction under manual mode.

Appendix A HMI->PLC Description of R value

For more information on the C/S/R value, please refer to the "LINUX CNC Application Manual"

R number	Description
20,001.7	[HMI→PLC] Machining time clearance notification signal
20,001.8	[HMI→PLC] Number of pieces to be machined setting notification signal
20,201.0	[HMI→PLC] Tool socket action (upper/horizontal)
20,201.1	[HMI→PLC] Tool socket action (lower/vertical)
20,201.2	[HMI→PLC] Tool socket reorganization triggering signal
20,201.3	[HMI→PLC] Tool magazine pushed forward
20,201.4	[HMI→PLC] Tool magazine withdrawn

Appendix A PLC → HMI R Value Description

For more information on the C/S/R value, please refer to the "LINUX CNC Application Manual"

R number	Description
20,300.0	[PLC→Macro/HMI] Whether or not the tool magazine tool selection action is completed (0: completed, 1: not completed)
20,300.1	[PLC→Macro/HMI] Whether or not the information of tool number of standby tool is shown by the monitoring group (0: shown, 1: hidden)
20,301.0	[PLC→Macro/HMI] Machining air blowing state (0: off, 1: on)
20,301.1	[PLC→Macro/HMI] Cutting water state (0: off, 1: on)
24,000	[PLC→Macro/HMI] Group 1 spindle rotational speed showing source axial number (1 ~ 32; 0: the default setting is the 7th software axis)
24,001	[PLC→Macro/HMI] Group 2 spindle rotational speed showing source axial number (1 ~ 32; 0: the default setting is off with no display)