Volume III
Installation and Connection

CHAPTER 1 INSTALLATION

LAYOUT 1.1 GH1000MC system

connection 1.1.1 GH1000MC back cover interface layout

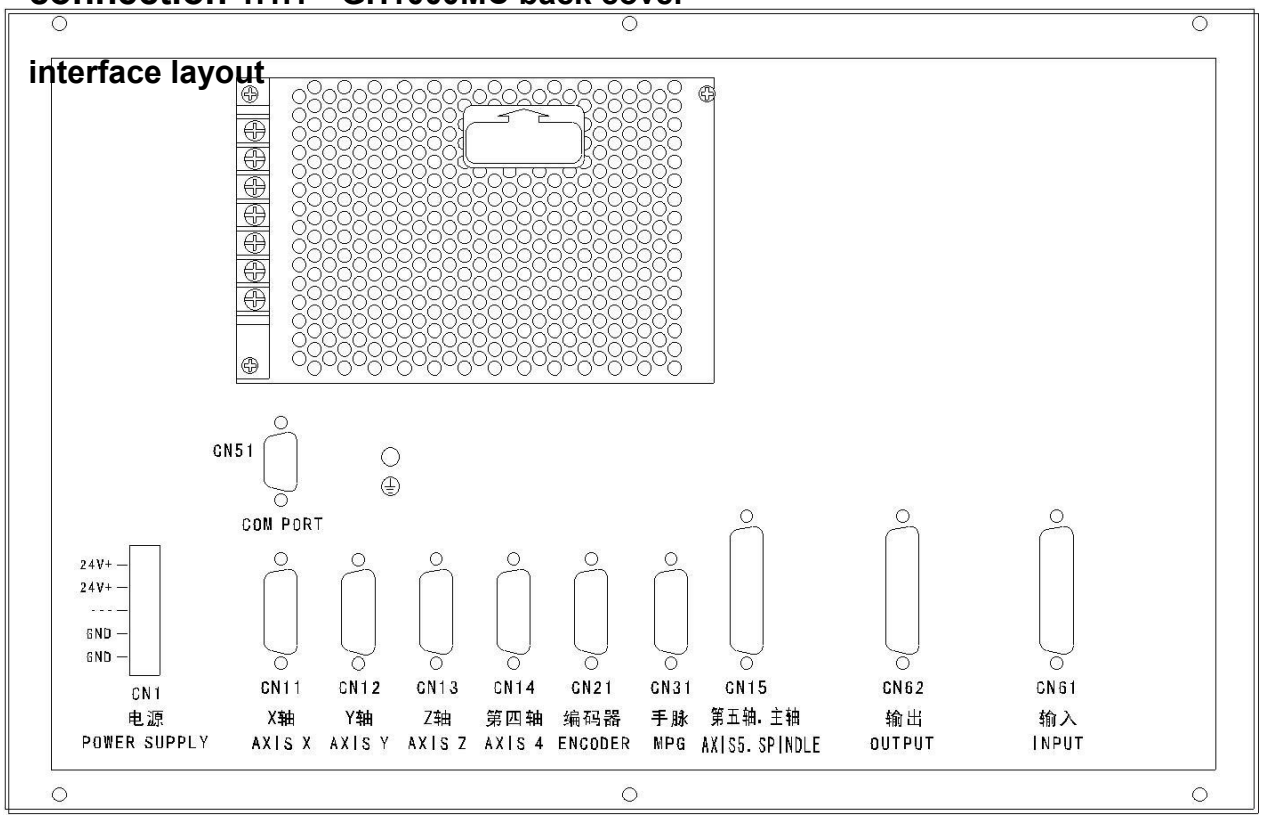


Fig. 1-1 GH1000MC back cover interface layout

■ Interface explanation

1. Power box: for +24V, GND power supply
2. Filter(optional): Input terminals for 220V AC power, PE terminal for grounding, output terminals to L, N terminals of GH-PB2 power box
3. CN1： power supply interface
4. CN11：X axis，pin15 D female, connect with X drive unit
5. CN12：Y axis，pin15 D female, connect with Y drive unit
6. CN13：Z axis，pin15 D female, connect with Z drive unit
7. CN14：4th axis，pin15 D female, connect with 4th drive unit
8. CN15：spindle, pin 25 D female, connect with spindle drive unit
9. CN21：encoder, pin15 D male, connect with spindle encoder
10. CN31：MPG, pin26 D male, connect with MPG
11. CN51：communication, pin9 D female, connect PC RS232 interface
12. CN61：input, pin44 D male, connect with machine input
13. CN62：output, pin44 D female, connect with machine output

■ GH1000MC installation

1.2.1 GH1000MC external dimensions

See Appendix III, IV.

■ Preconditions of the cabinet installation

- The dust, cooling liquid and organic resolution should be effectively prevented from entering the cabinet;
- The designed distance between the CNC back cover and the cabinet should be not less than 20cm, the inside and outside temperature difference of the cabinet should be not more than 10℃ when the cabinet inside temperature rises;
- Fans can be fixed in the cabinet to ventilate it;
- The panel should be installed in a place where the cooling can't splash;
- The external electrical interference should be taken into consideration in cabinet design to prevent it from interfering the CNC system.

■ Measures against interference

In order to insure the CNC stable working, the anti-interference technology such as space electromagnetic radiation shielding, impact current absorbing, power mixed wave filtering are employed in CNC design. And the following measures are necessary during CNC connection:

- Make CNC far from the interference devices (inverter, AC contactor, static generator, high-voltage generator and powered sectional devices etc.);
- To supply the CNC via an isolation transformer, the machine with the CNC system should be grounded, the CNC and drive unit should be connected with independent grounding wires at the grounding point;
- To inhibit interference: connect parallel RC circuit at both ends of AC winding (Fig. 1-3), RC circuit should approach to inductive loading as close as possible; reversely connect parallel freewheeling diode at both ends of DC winding (Fig. 1-4); connect parallel surge absorber at

the ends of AC motor winding (Fig. 1-5);

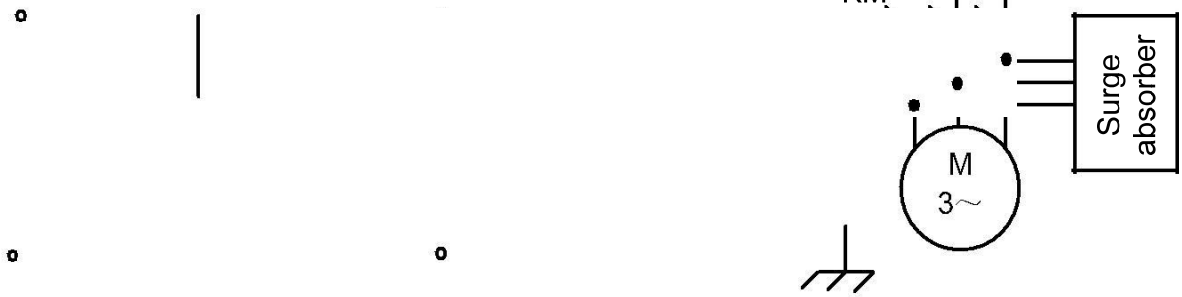


Fig. 1-3 Fig. 1-3 Fig. 1-3

4. The CNC leadout cables use the twisted shield cable or shield cable, the cable shield tier is grounded by an terminal at CNC side, signal cable should be as short as possible;
5. To reduce the mutual interference among the CNC signal cables, and among the strong current, the wiring should follow the following:

Table 1-1 The Wiring requirement

Group	Cable type	Wiring requirement
A	AC power cable	Tie up A group cables with a clearance at least 10cm from that of B, C groups, or shield A group cables from electromagnetism
	AC coil	
	AC contactor	
B	DC coil(24VDC)	Tie up B and A group cables separately or shield B group cables; and the further B group cables are from that of C group, the better it is
	DC relay(24VDC)	
	Cables between CNC and strong-power cabinet	
	Cables between CNC and machine	
C	Cables between CNC and servo drive unit	Tie up C and A group cables separately, or shield C group cables; and the cable distance between C group and B group is at least 10cm and they are twisted pair cables.
	Position feedback cable	
	Position encoder cable	
	Handwheel（MPG）cable	
	Other cables for shield	

Chapter 2 Interface Signal and Connection

2.1 Connection with the Drive Unit

2.1.1 Definition of the Drive Interface

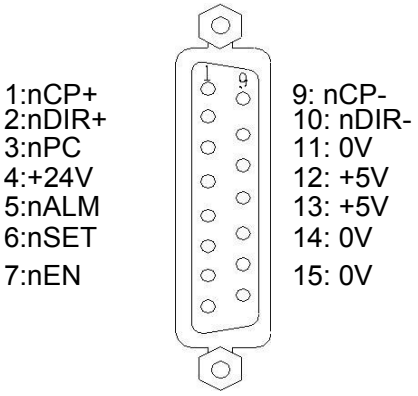


Fig. 2-1 Interfaces of CN11, CN12, CN13 and CN14 (female socket of 15-cord in D type)

SIGNAL	REMARK
nCP+, nCP-	Command pulse signal
nDIR+, nDIR-	Command direction signal
nPC	Zero signal
nALM	Drive unit alarm signal
nEN	Axis enable signal
nSET	Pulse forbid signal

2.1.2 Command Pulse Signal and Command Direction Signal

nCP+ and nCP- are command pulse signals, -nDIR+ and nDIR- are command direction signals, and the signals of two groups are differential output（AM26LS31）, and the external is suggested to use AM26LS32 for receiving, and the internal circuit is shown as the following figure 2-2:

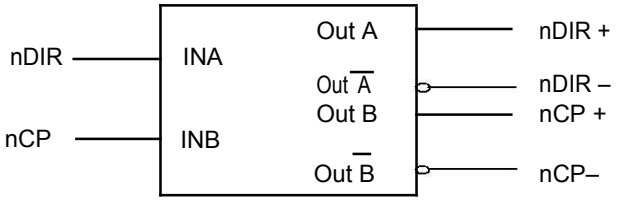


Fig. 2-2 The internal circuit of the command pulse signal and the command direction signal

2.1.3 Drive Unit Alarm Signal nALM

Whether the drive unit alarm level is low or high is set by Bit0, Bit1, Bit2, Bit3 and Bit4 of CNC parameter No.009. About the internal circuit, refer to figure 2-3:

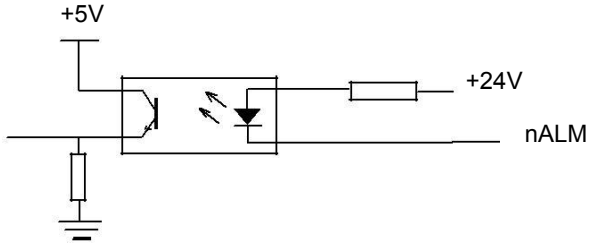


Fig. 2-3 The internal circuit of the drive unit alarm signal

Based on the input circuit of the type, the drive unit should be adopted the following methods (shown as fig.2-4) to provide the signals:

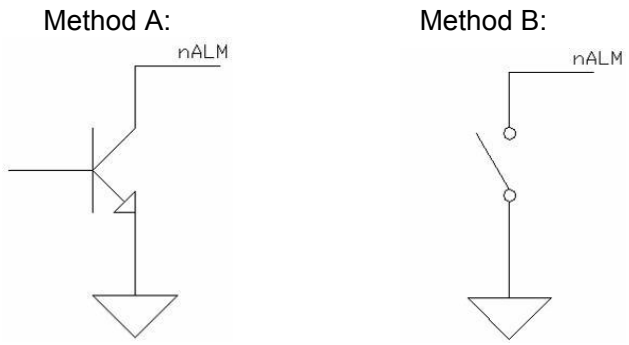


Fig. 2-4 Method of the drive unit providing signals

2.1.4 Axis Enable Signal nEN

When CNC works normally, nEN signal output is valid (nEN signal is connected with 0V); when the drive unit alarms, CNC switches off nEN signal output (nEN signal is disconnected with 0V). The internal interface circuit is shown as the following figure 2-5:

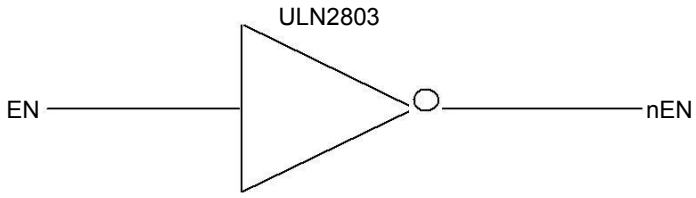


Fig. 2-5 Axis enable signal internal interface circuit

2.1.5 Pulse Forbid Signal nSET

The nSET signal is to control the servo input forbid, to improve anti-interference between CNC and the drive unit, and the signal is high impedance state when CNC outputs the pulse signal, and it is the low level when the pulse signal isn't output. The internal interface circuit is shown as the following figure 2-6:

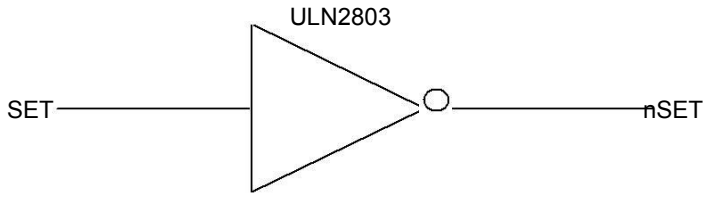


Fig. 2-6 Pulse forbid signal circuit

2.1.6 Zero Signal nPC

During the machine zero return, one-turn signal of the motor encoder or the proximity switch signal is taken as the zero signal. The internal connection circuit is shown as the following figure 2-7:

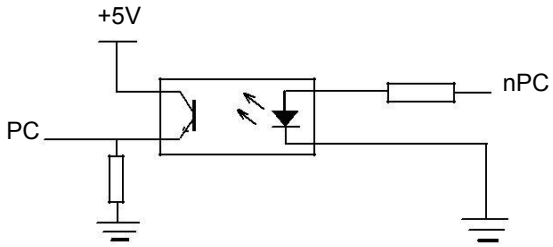


Fig. 2-7 Zero signal circuit

Note: The nPC signal is adopted +24V level.

■ The user should provide the wave of PC signal, which is shown as the following figure 2-8:

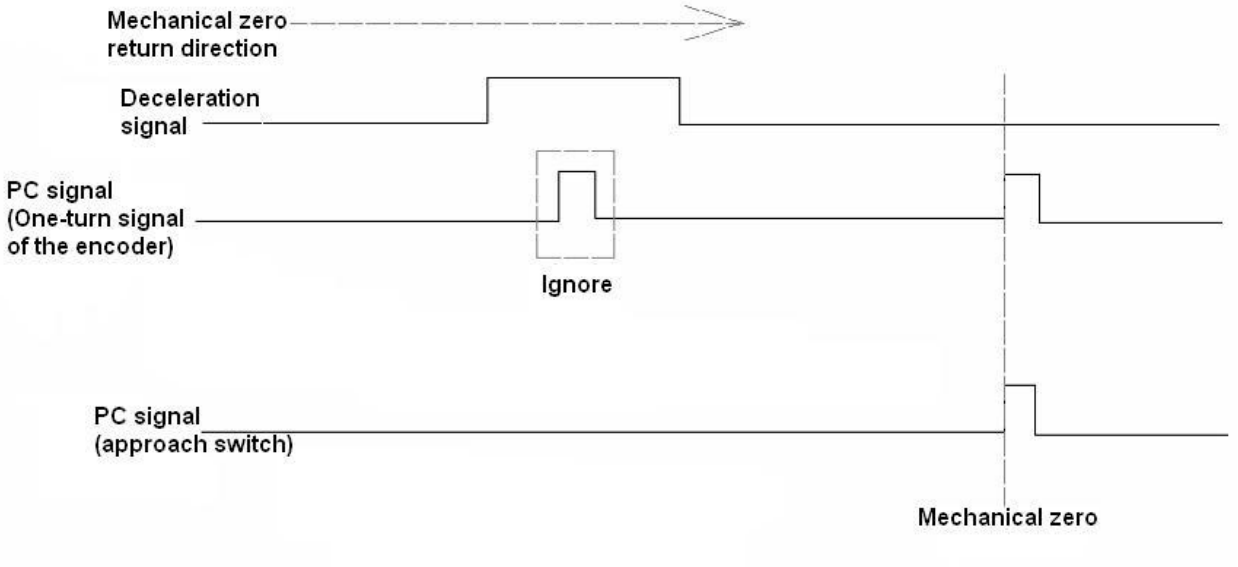


Fig. 2-8 PC signal waveform

Note: During the machine zero return, CNC can judge the location of the reference position through detecting PC signal after the deceleration switch is OFF, and the rising edge or the falling edge all are valid.

b) The wiring of NPN Hall element taken as both DEC signal and zero signal is shown in Fig. 2-9:

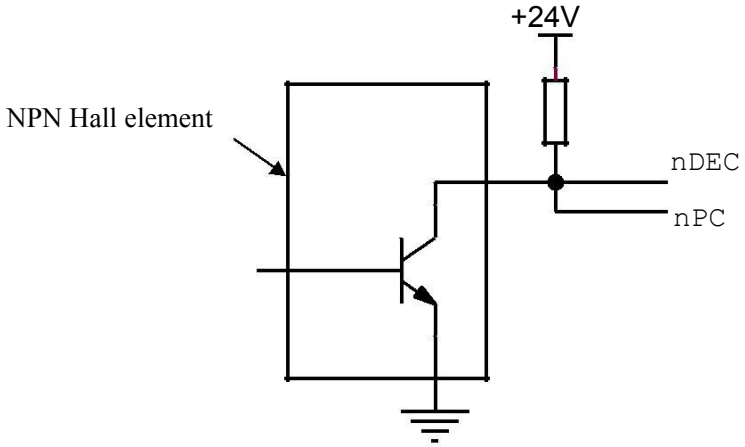


Fig. 2-9 Wiring by a NPN Hall element

c) The wiring of PNP Hall elements taken as both DEC signal and zero signal is shown in Fig. 2-10:

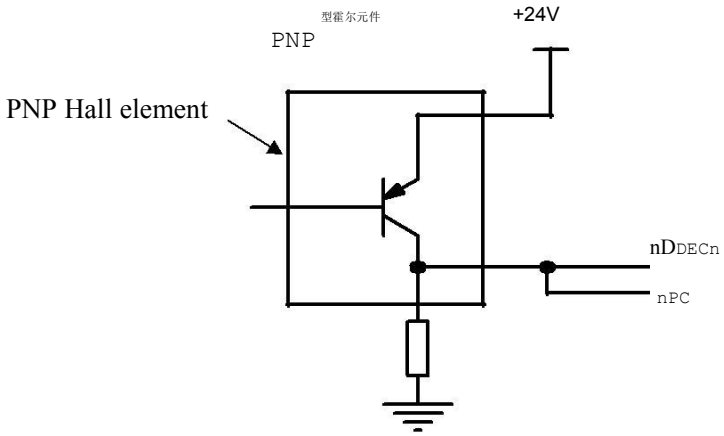
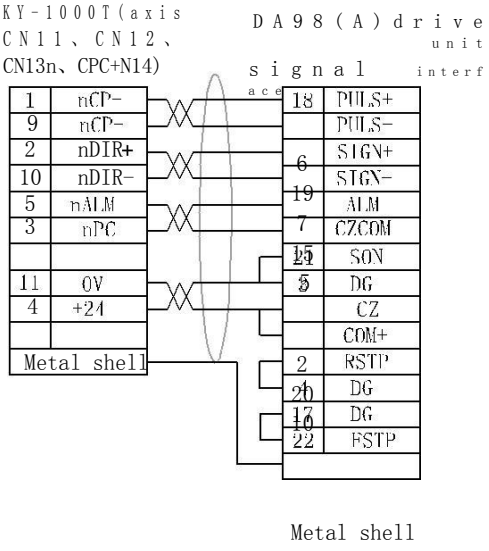


Fig. 2-10 Wiring by a PNP Hall element

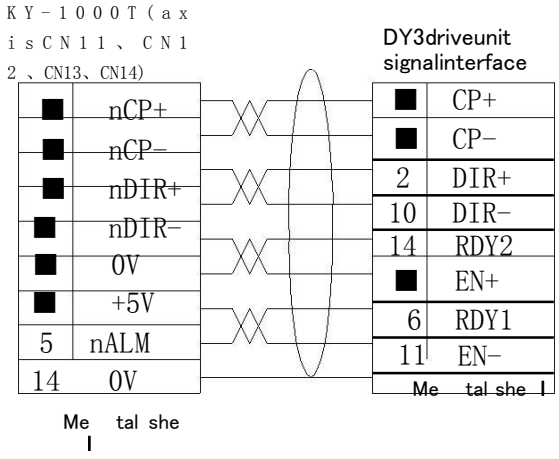
■ Connection to a drive unit

GH1000MC is connected with our drive unit shown in Fig. 2-11:

GH1000MC is connected with DA98(A)drive unit



Connection of GH1000MC and DY3 driver



Connection of GH1000MC and DF3 driver

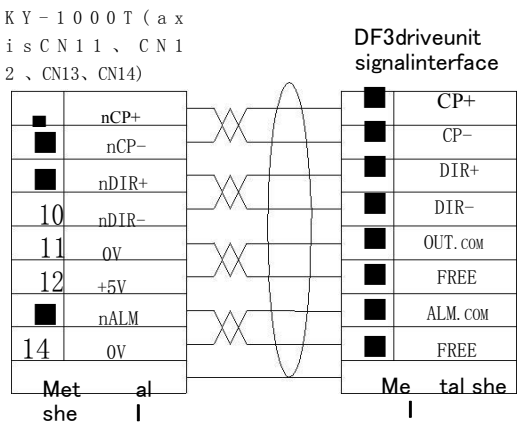
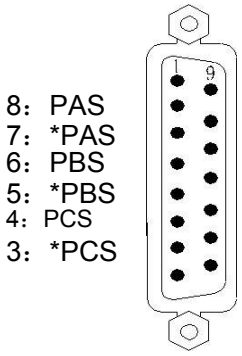


Fig. 2-11 Connection of GH1000MC and drive unit

2.2 Connection of the Spindle Encoder

2.2.1 Definition of the Spindle Encoder Interface



NAME	REMARK
*PAS/PAS	Encoder phase A pulse
*PBS/PBS	Encoder phase B pulse
*PCS/PCS	Encoder phase C pulse

Fig. 2-12 CN21 encoder interface (male socket of 15-cord in D type)

2.2.2 Signal Explanation

*PCS/PCS, *PBS/PBS and *PAS/PAS are respectively the differential input signals of the encoder phases C, B and A, and it adopts 26LS32 for receiving; *PAS/PAS and *PBS/PBS are orthogonal square waves of difference 90°, and the highest signal frequency is<1MHz; the encoder resolution is set by parameters (range 100～5000).

The internal connection diagram is shown as the following figure 2-13 (n in figure= A, B, C):

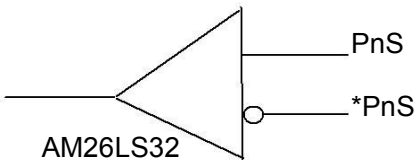


Fig. 2-13 Encoder signal circuit

2.2.3 Connection of the Spindle Encoder Interface

The connection of GH1000MC and the spindle encoder is shown as the following figure 2-14, and the connection is used with the twisted wire. (The encoder of ZLF-12-102.4BM-C05D from Changchun First Optical, Co., Ltd is taken as the example):

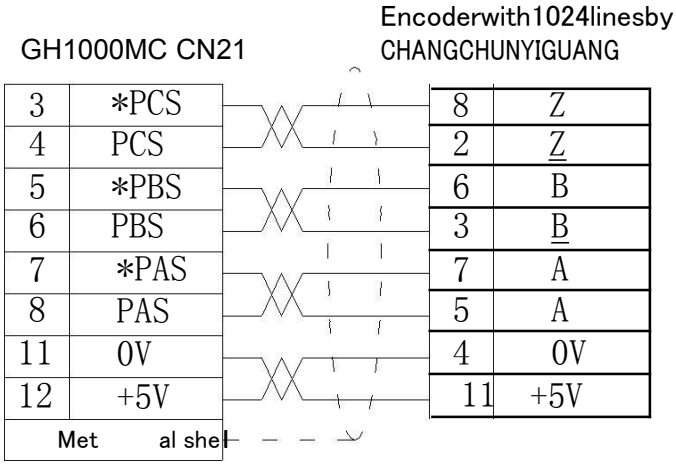


Fig. 2-14 Connection of GH1000MC and the encoder

2.3 Connection with MPG

2.3.1 MPG Interface Definition

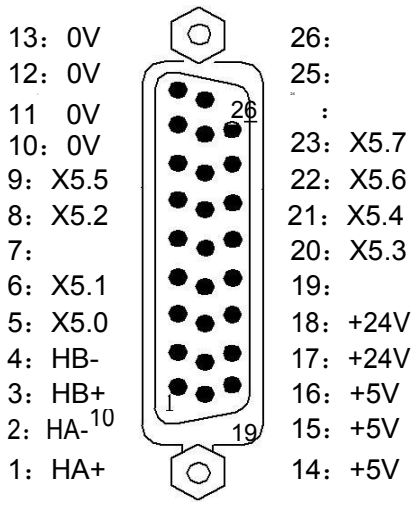


Fig. 2-15 CN31 MPG interface (male socket of 26-cord in type D)

Signal	Explanation
HA+、HA-	MPG A phase signal
HB+、HB-	MPG B phase signal
X5.0	X MPG axis selection
X5.1	Y MPG axis selection
X5.2	Z MPG axis selection
X5.3	4th MPG axis selection
X5.4	5th MPG axis selection
X5.5	increment×1
X5.6	increment×10
X5.7	increment×100
+24V	DC power supply
VCC、GND	

2.3.2 Signal Explanation

HA and HB are separately the input signals of MPG phases A and B. The internal connection diagram is shown as the following figure 2-16:

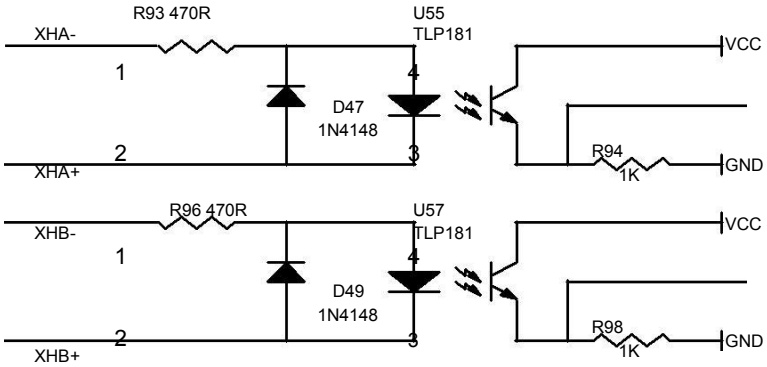
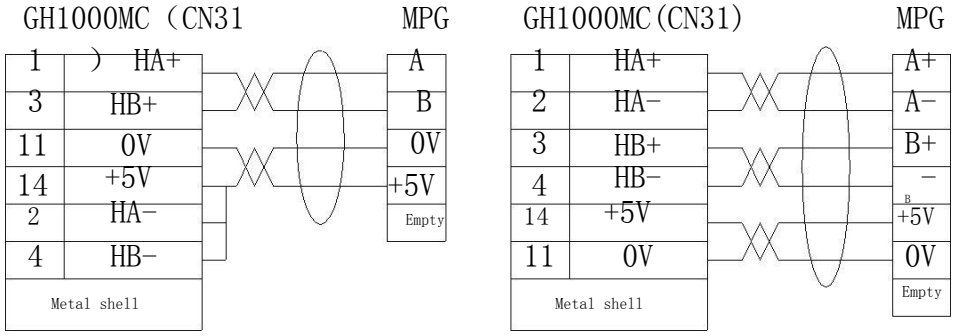


Fig. 2-16 MPG signal circuit

Connection of GH1000MC and MPG is shown as the following figure:2-17:



Single-terminal input differential input

Fig. 2-17 GH1000MC is connected with MPG

2.4 Spindle Interface

2.4.1 Spindle Interface Definition

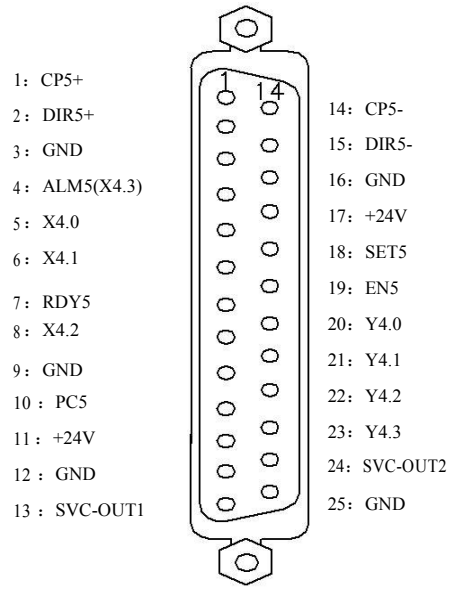


Fig. 2-18 CN15 spindle interface (female socket of 25-cord in type D)

CP5+,CP5-	Spindle pulse signal
DIR5+,DIR5-	Spindle direction signal
ALM5	The 5th axis/spindle abnormal alarm signal
RDY5	Spindle ready signal
PC5	Spindle zero signal
SVC-OUT1	Analog voltage output 1
SVC-OUT2	Analog voltage output 2
SET5	Spindle setting signal
EN5	Spindle enable signal
X4.0~X4.3	PLC address, only low level is valid
Y4.0~Y4.3	PLC address

3:GND
4:ALM5(X4.3)
5:X4.0
6:X4.1

Note 1: Conduction between PC5 and 0V is valid, and it is different with the other feeding axes（PC of CN11～CN14 axis interfaces is conductive with＋24V, and it is valid.）.

Note 3: The internal circuit of the signals of PC5 is shown as the following figure:

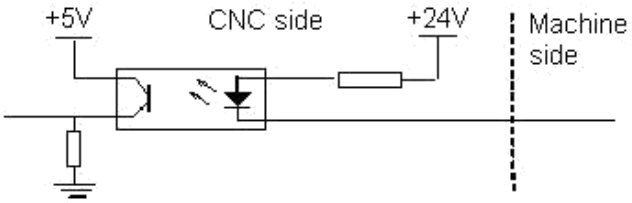


Fig. 2-19 Circuit of PC5

2.4.2 Common Transducer Connection

The analog spindle interface SVC port can output 0~10V voltage, the signal internal circuit is shown as the following figure 2-20:

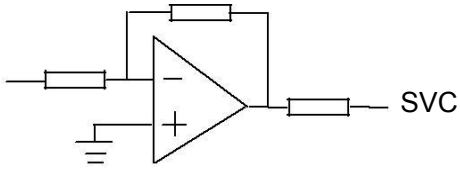


Fig. 2-20 SVC signal circuit

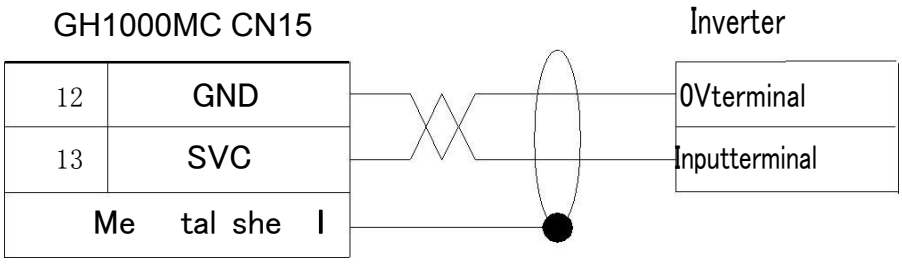
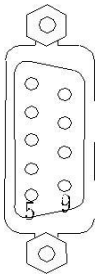


Fig. 2-21 Connection of GH1000MC and the transducer

2.5 Connection of GH1000MC and PC Serial Port

2.5.1 Communication Interface Definition



1:
2: RXD
3: TXD
4:
5: GND
6:485+
7:485-
8:
9:GND

SIGNAL	REMAKR
RXD	Receiving the data
TXD	Sending the data
GND	Signal ground
485+	Absolute value 485+
485-	Absolute value 485-

Fig.2-22 CN51communication interface（9 holes）

2.5.2 Communication Interface Connection

GH1000MC can communicate with CN51 interface and PC (the communication software is optional). GH1000MC and PC connection is shown as the following figure 2-23A:

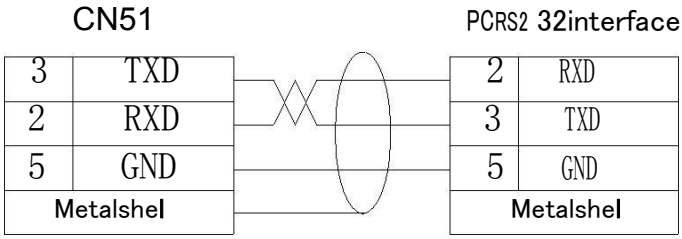


Fig. 2-23A GH1000MC is connected with PC

The communication between a GH1000MC system to another GH1000MC system can be done by CN51 shown in Fig. 2-23B:

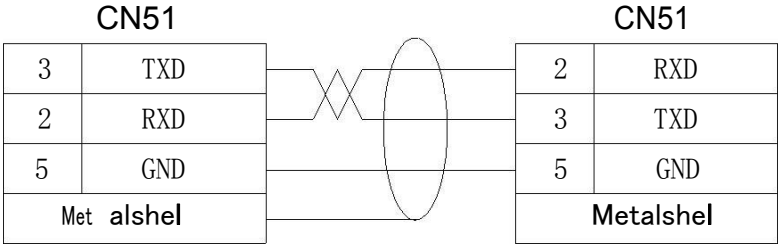


Fig. 2-23B Communication between a GH1000MC system and another GH1000MC system

■ Power interface connection

The power box interface has been done for its delivery from factory, and the user only need to connect it to a 220V AC power in using.

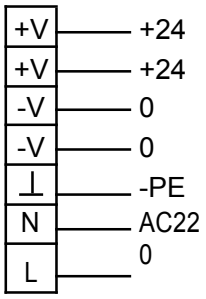


Fig. 2-24 system power interface CN1

2.7 I/O Interface Definition:

NOTE!

The meaning of the fixed address I/O function which doesn't mark in GH1000MC CNC system is defined by PLC program (ladder diagram). When GH1000MC CNC system is equipped with the machine tool , I/O function is set by the machine tool manufacturer; and about the details, please refer to the user manual from the machine tool manufacturer.

The fixed address I/O function which doesn't mark in the chapter is mainly for standard PLC program of GH1000MC. Please pay special attention to that the described content also applies to GH1000MC system without especial explanation.

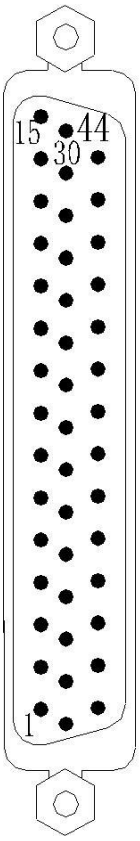


Fig. 2-25 CN61 input interface

PIN NO.	ADDRESS	FUNCTION	REMARK
21～24	0V	Power supply interface	Power supply 0V terminal
18～20 25～28	Suspend	Suspend	Suspend
1	X0.0	DECX	X axis deceleration signal
2	X0.1	SP1	External pause signal
3	X0.2	ST1	Y axis deceleration signal
4	X0.3	DECX(DEC1)	Z axis deceleration signal
5	X0.4	PRES1	4th axis deceleration signal
6	X0.5	ESP	Emergency stop signal
7	X0.6	ESP1	Over travel release input signal
8	X0.7	T11	Start working door switch X4
9	X1.0	T21	Tool location signal 2 of channel 1
10	X1.1	T31	Tool location signal 3 of channel 1
11	X1.2	T41	Tool location signal 4 of channel 1
12	X1.3	DECZ(DEC2)	Z axis deceleration signal
13	X1.4	TCP1	Tool post locked signal of channel 1
14	X1.5	SAGT1	Protection door detection signal of channel 1
15	X1.6	DIQP1	External chuck control signal of channel 1
16	X1.7	DITW1	External tailstock control signal of channel 1
29	X2.0	SAGT2	Protection door detection signal of channel 2
30	X2.1	SP2	Pause signal of channel 2
31	X2.2	ST2	Cycle start signal of channel 2
32	X2.3	DECY(DEC3)	Y axis deceleration signal
33	X2.4	DEC4	The 4^{th} axis deceleration signal
34	X2.5	DEC5	The 5^{th} axis deceleration signal
35	X2.6	ESP2	External emergency stop signal of channel 2
36	X2.7	T12	Tool location signal 1 of channel 2
37	X3.0	T22	Tool location signal 2 of channel 2
38	X3.1	T32	Tool location signal 3 of channel 2
39	X3.2	T42	Tool location signal 4 of channel 2
40	X3.3	TCP2	Tool post locked signal of channel 2
41	X3.4	PRES2	Pressure detection of channel 2
42	X3.5	SKIP	G31 skip signal
43	X3.6	DIQP2	External chuck control signal of channel 2
44	X3.7	DITW2	External tailstock control signal of channel 2

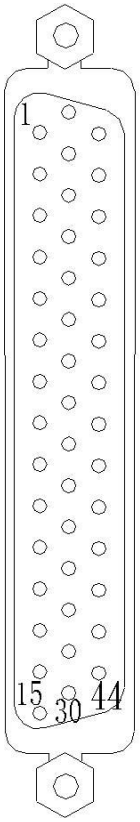


Fig. 2-26 CN62 output interface

PIN NO.	ADDRESS	FUNCTION	REMARK
17～19, 26～28	0V	Power supply interface	Power supply 0V terminal
20～25	+24V	Power supply interface	Power supply ＋24V terminal
1	Y0.0	COOL1	Channel cooling signal
2	Y0.1	LUBR1	Lubricating output signal of channel 1
3	Y0.2	SCLP	Spindle clamped output signal of channel 1
4	Y0.3	SFR1	Spindle CW rotation signal of channel 1
5	Y0.4	SRV1	Spindle CCW rotation signal of channel 1
6	Y0.5	DOTWJ1	Channel 1 tailstock advance
7	Y0.6	DOTWS1	Channel 1 tailstock retraction
8	Y0.7	SPZD1	Spindle brake signal of channel 1
9	Y1.0	S11/M411	Spindle mechanical gear signal 1 of channel 1
10	Y1.1	S21/M421	Spindle mechanical gear signal 2 of channel 1
11	Y1.2	S31/M431	Spindle mechanical gear signal 3 of channel 1
12	Y1.3	S41/M441	Spindle mechanical gear signal 4 of channel 1
13	Y1.4	DOQPJ1	Channel 1 chuck clamped
14	Y1.5	DOQPS1	Channel 1 chuck released
15	Y1.6	TL1+	Channel 1 tool post CW rotation
16	Y1.7	TL1-	Channel 1 tool post CCW rotation
29	Y2.0	COOL2	Channel 2 cooling signal
30	Y2.1	LUBR2	Channel 2 lubrication output signal
31	Y2.2	SVF	Channel 1 spindle servo OFF
32	Y2.3	SFR2	Channel 2 spindle CW rotation signal
33	Y2.4	SRV2	Channel 2 spindle CCW rotation signal
34	Y2.5	DOTWJ2	Channel 2 tailstock advance
35	Y2.6	DOTWS2	Channel 2 tailstock retraction
36	Y2.7	SPZD2	Channel 2 spindle brake signal
37	Y3.0	S12/M412	Channel 2 spindle mechanical gear signal 1
38	Y3.1	S22/M422	Channel 2 spindle mechanical gear signal 2
39	Y3.2	S32/M432	Channel 2 spindle mechanical gear signal 3
40	Y3.3	S42/M442	Channel 2 spindle mechanical gear signal 4
41	Y3.4	DOQPJ2	Channel 2 chuck clamped
42	Y3.5	DOQPS2	Channel 2 chuck released
43	Y3.6	TL2+	Channel 2 tool post CW rotation
44	Y3.7	TL2-	Channel 2 tool post CCW rotation

Note 1: Some input and output interfaces can define many functions, which is represented by "/" in the above list. Note 2: When the output function is valid, the output signal internal is conducted with 0V. When the output function is invalid, the output signal is high impedance cut off.

Note 3: When the input signal is conducted with +24V, the input is valid. When the input signal and +24V are cut off, the input is invalid.

Note 4: +24V and 0V and the terminals with the same name of the power supply box equipped by GH1000MC are equivalent.

2.7.1 Input Signals

The input signals are ones from the machine tool to the CNC, and the input is valid when the input signal is connected with +24V; the input is invalid when the input signal is disconnected with +24V. The input signals should satisfy the following conditions when it is on the machine side:

Contact capacity: DC30V, above 16mA.

The leakage current among the contacts in the open circuit: below 1mA.

Voltage drop of the contacts in the access: below 2V (current 8.5mA, including the voltage drop of the cable).

The external input of the input signals has two methods: One is input with the contact switch, the signals are from the buttons and the limit switch from the machine side and the contacts of the relay, the connection is shown as the figure 2-27:

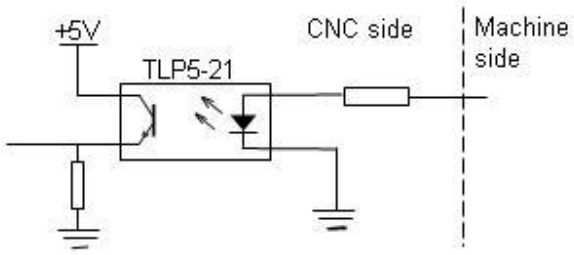


Fig. 2-27

The other is input without the contact switch (transistor), and the connection is shown as the figures 2-28A and 2-28B.

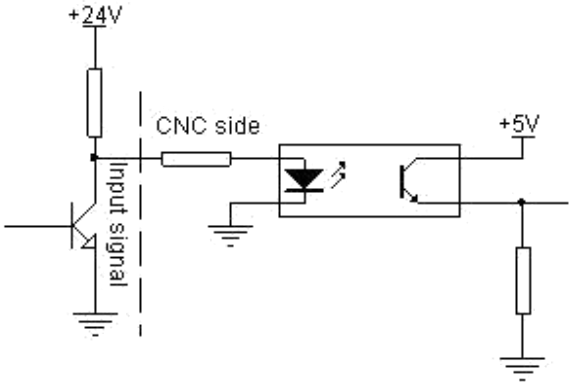


Fig. 2-28A Connection of NPN type

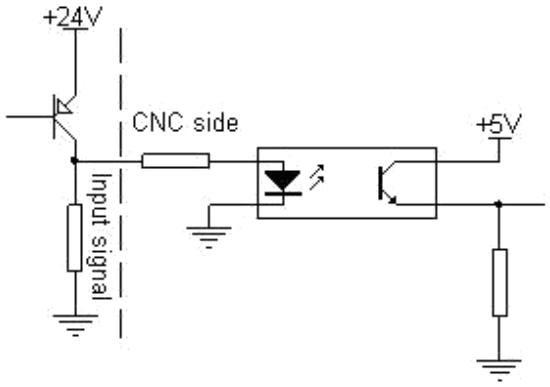


Fig. 2-28B Connection of PNP type

The input interfaces of GH1000MC standard PLC definition function includes the signals XDEC,YDEC,ZDEC,GHP,ST,SP and PRGH etc.

2.7.2 Output Signals

The output signals are used for driving the relay and the indicator on the machine side; when the output signals are connected with 0V, the output function is valid; when 0V is cut off, the output function is invalid. The digital of totally 36 routes is output in I/O interface, and they are all with the same structure, which is shown as figure 2-29:

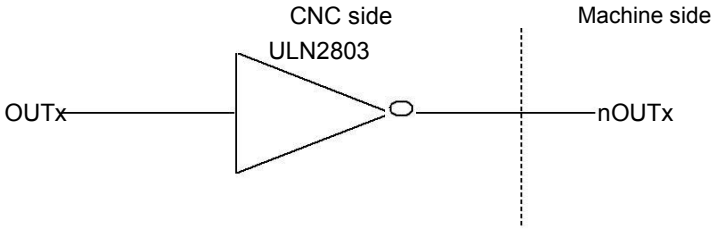


Fig. 2-29 Figure of digital output module circuit structure

The logic signal OUTx is output by the main board via the connecter and sent into the input port of the phase inverter (ULN2803), nOUTx has two output status: 0V output or high resistance. The typical application is shown as below:

■ Drive LED

Output the drive LED with ULN2803, and one resistance should be serial connected to limit the current via LED (normally it is 10Ma), which is shown as the following figure 2-30:

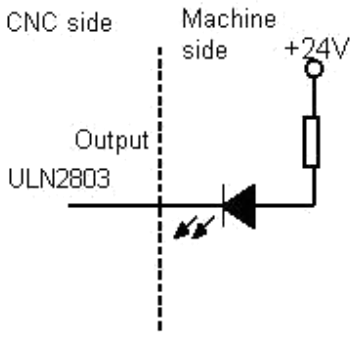


Fig. 2-30

■ Drive indicator in lamp filament type

Output the drive indicator in lamp filament type with ULN2803, one preheat resistance should be connected externally to reduce the electric shock during conducting, and the preheat resistance value should NOT make the indicator lamp ON, which is shown as the figure 2-31.

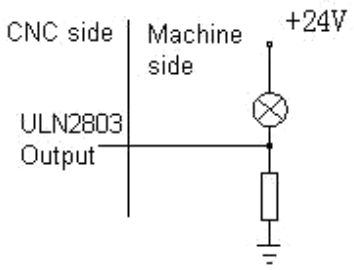


Fig. 2-31

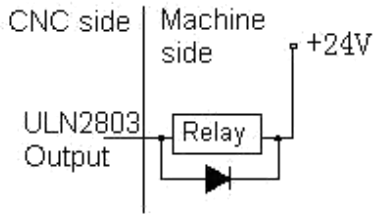


Fig.2-32

■ Drive inductive load (such as the relay)

Output the drive inductive load of ULN2803 type, connect the fly-wheel diode around the coil to protect the output circuit and reduce the interference, which is shown as the above figure 2-32.

The meaning of the signals output from I/O interface is defined by PLC program, and the output signals defined by standard PLC program include S1~S4(M41~M44), M3~M5, M8, M32 etc.

2.8 I/O Function and Connection

NOTE!

The I/O function meaning of GH1000MC CNC system is defined by PLC program (ladder diagram). When GH1000MC CNC system is equipped with the machine tool , I/O function is set by the machine tool manufacturer, and about the details, please refer to the user manual from the machine tool manufacturer.

The I/O function in the chapter is mainly for standard PLC program of GH1000MC. Please pay special attention to that the described content also applies to GH1000MC system without especial explanation.

■ Emergency Stop and Stroke limit

一. Relative signals

GHP: emergency stop signal, alarm issued if the system is not connected with +24V

LMIX：X overtravel limit check input

LMIY：Y overtravel limit check input

LMIZ：Z overtravel limit check input

■ **Diagnosis data**

0	0	0
Interface pin		

ESP							
CN61.6							

ℓ **Signal diagnosis**

Signal	GHP	LMIX	LMIY	LMIZ
Diagnosis address	X0.5	X3.0	X3.1	X3.2
Interface pin	CN61.6	CN61.37	CN61.38	CN61.39

ℓ **Control parameter**

Bit parameter

0	2	1

					GHP		

GHP =0: Check GHP signal

=1: Do not check GHP signal

ℓ **PLC bit parameter**

K	1	0

LMIT	**LMIS**						

LMIT =1：Travel limit check function of each axis is valid.

=0：Travel limit check function of each axis is invalid

LMI =1：The system alarms for overtravel when the travel limit check signal is not connected with +24V.

=0：The system alarms for overtravel when the travel limit check signal is connected with +24V

■ **Signal connection**

The circuit of the emergency stop signal（KSP）is shown as the following figure 2-33:

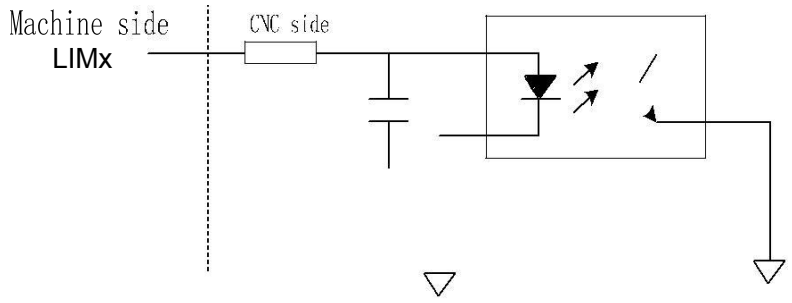


Fig. 2-33

■ **Machine external connection**

1. The limit switch is serial connected with the system emergency stop, the connection method is shown as the following figure 2-34A:

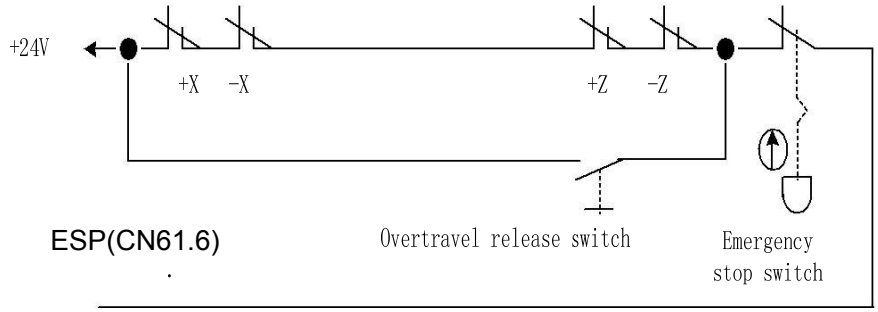


Fig. 2-34A Serial connection between the limit switch and the system emergency stop

■ The limit switch is independently connected with the external emergency stop of each channel, and the connection method is shown as the following figure 2-34B:

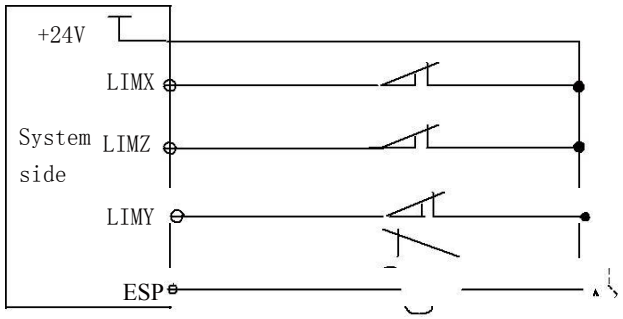


Fig. 2-34B Serial connection between the limit switch
and the external emergency stop of each channel

⎵. Control logic

■ The limit switch is serial connected with the system emergency stop

When overtravel occurs or the emergency stop button is pressed, “emergency stop” alarm occurs in the CNC system. If the overtravel occurs, press the overtravel release button without releasing, and press resetting key to cancel the alarm, and it moves in the opposite direction, then the overtravel alarm can be released. When the emergency stop alarm occurs, CNC stops pulse output. Except for the above mentioned CNC function, the other functions can be defined by PLC program when the emergency stop alarm occurs.

■ The limit switch is independently connected with the external emergency stop

1)There is only 1 overtravel contact.Whether positive or negative overtravel alarm is determined by movement direction of axis

2).If the overtravel alarm occurs, it moves in the opposite direction, then the overtravel alarm can be released by pressing reset key

■ Machine zero return

■ Relative signal

DECX：X deceleration signal；

DECY：Y deceleration signal；

DECZ：Z deceleration signal；

DEC4：4th deceleration signal；

DEC5：5th deceleration signal；

⎵. Diagnosis data

0	0	0
Interface pin		

			DEC5	DEC4	DECZ	DECY	DECX
			CN61.34	CN61.33	CN61.12	CN61.32	CN61.4

■ Control parameter

K	2	2

DEC4T	DECY	DECZ	DECX				

DEC4T=0: **4TH decelerates as DEC signal is LOW level**

=1: **4TH decelerates as DEC signal is HIGH level Y**

DECY=0: **decelerates as DEC signal is LOW level**

=1: **Ydecelerates as DEC signal is HIGH level**

DECZ=0: **Z decelerates as DEC signal is LOW level Z**

=1: **decelerates as DEC signal is HIGH level X**

DECX=0: **decelerates as DEC signal is LOW level X**

=1: **decelerates as DEC signal is HIGH level**

0	0	6

				ZPLS			ZMOD

ZMOD =1: machine zero return block before

=0: machine zero return block after

ZPLS =1: machine zero return mode selection,have one-urn single

=0: machine zero return mode selection,have not one-turn single

0	1	2

							ISOT

ISOT =1: Manual rapid traverse active prior to machine zero return after power on

=0: Manual rapid traverse inactive prior to machine zero return after power on

0	2	6

			MZR5	MZR4	MZRY	MZRZ	MZRX

MZRx =1: The direction of machine zero return is negative

=0: The direction of machine zero return is positive

ℓ Data parameter

0	8	0	ZRNFL

ZRNFL =Low rate of axes reference return

0	7	0	ZRNFHX

ZRNFH =High-speed of X axes reference return

0	7	1	ZRNFHY

ZRNFY =High-speed of Y axes reference return

0	7	2	ZRNFHZ

ZRNFHZ =High-speed of Z axes reference return

0	7	3	ZRNFH4

ZRNFH4 =High-speed of 4TH axes reference return

0	7	4	ZRNFH5

ZRNFH5 =High-speed of 5TH axes reference return

■ **Signal connection**

The interior wiring circuit of deceleration signal is shown as follows:

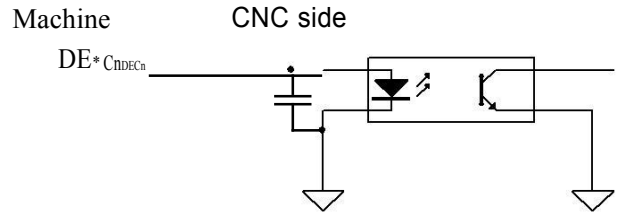
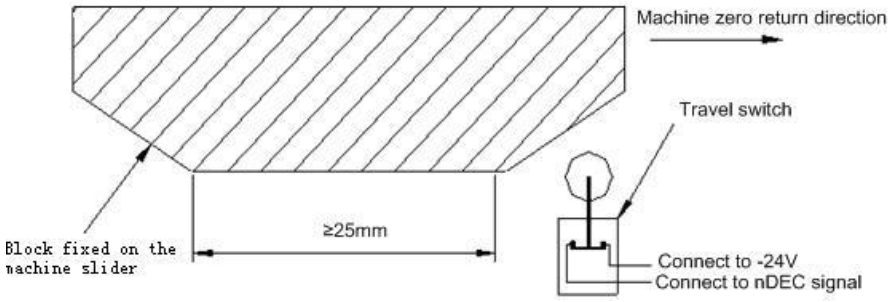


Fig.2-35

ℓ **Machine zero return type B by regarding servo motor one-rotation signal as zero signal**

①Its sketch map is shown as follows:



② The circuit of deceleration signal

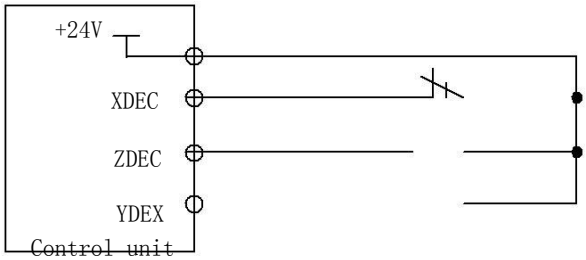
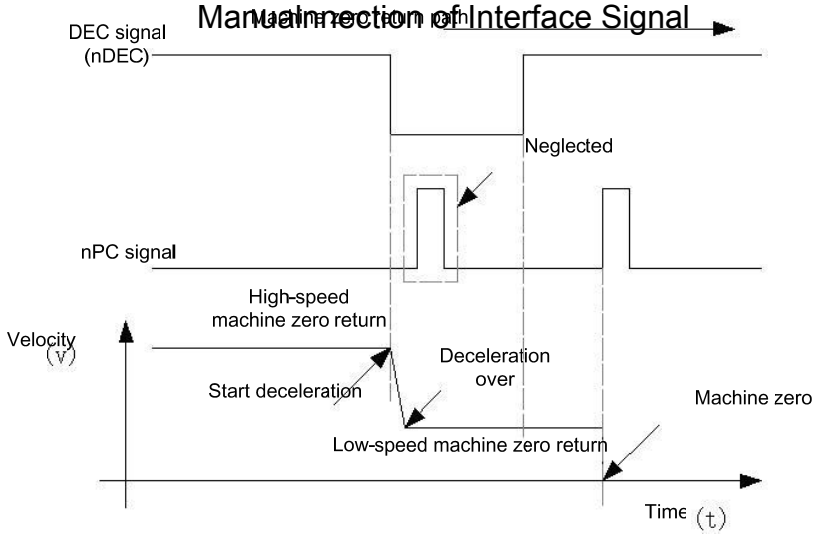


Fig. 2-40

③ Sequence of machine zero return(Take X axis as an example)

When BIT4 of the K022 is set to 0, the deceleration signal low level is active.

So the sequence of machine zero return is shown as follows:



Return process of machine zero Fig. 2-41-a

- Select Machine zero mode, press the manual positive or negative feed key(machine zero return direction set by bit parameter No.026), the corresponding axis moves to the machine zero by a rapid traverse speed(parameter No.70~No.74). As the axis press down the deceleration switch to cut off deceleration signal, the feeding slows down immediately, and it continues to run in a fixed low speed(parameter No.80).
- When the deceleration switch is released, the deceleration signal contact is closed again. And CNC begins to detect the encoder one-turn signal (PC), if this signal level skips, the motion will be halted. And the corresponding zero return indicator on the operator panel lights up for machine zero return completion.

When the BIT1 (ZMOD) of the bit parameter No.006 is set to 1, and the BIT4 of the K022 is set to 0, it chooses the machine zero return block before, and the deceleration signal low level is active.

So the sequence of machine zero return block before is shown as follows:

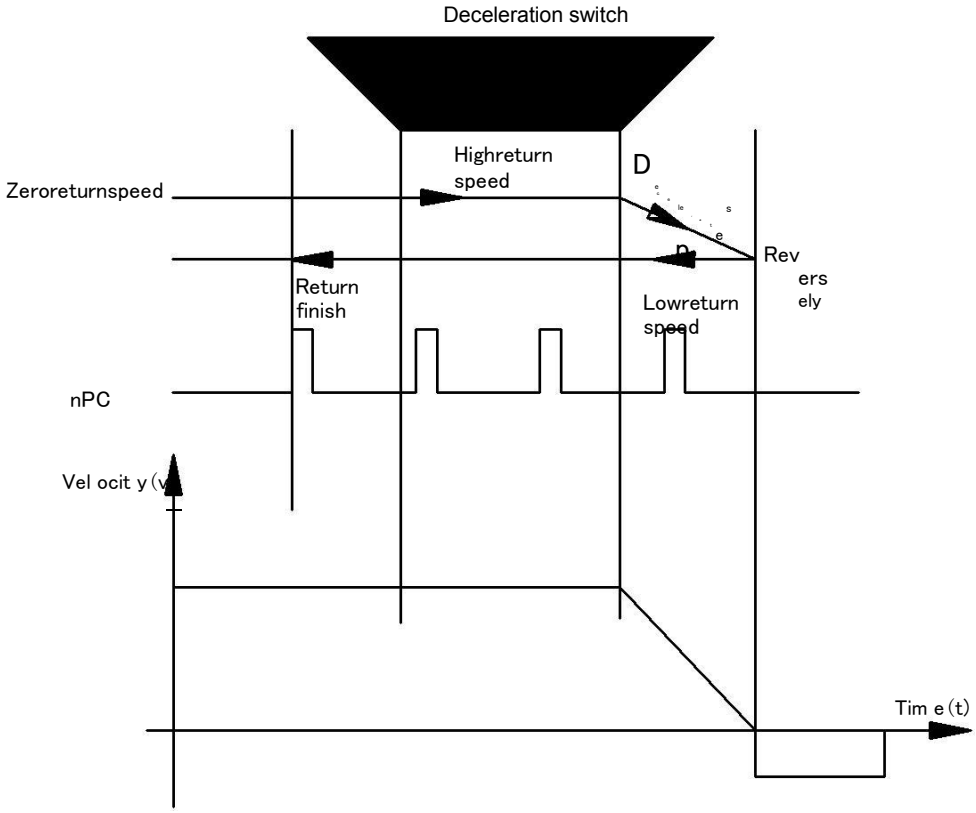


Fig. 2-41-b

Process of machine zero return block before

- Select Machine zero mode, press the manual positive or negative feed key (return direction set by bit parameter No.026), the corresponding axis moves to the machine zero by a rapid traverse speed(parameter No.70~No.74). As the axis press down the deceleration switch to cut off deceleration signal, the feeding keeps rapid rate and depart from the deceleration switch, when the DEC signal contact is closed, the feeding slows down to zero, then run reversely to return to machine zero in a low speed.
- In the reverse running, it presses down the deceleration switch to cut off the DEC signal contact and continues returning; as it departs from the deceleration switch, the deceleration signal contact is closed again. And CNC begins to detect the encoder one-turn signal (PC), if this signal level skips, the motion will be halted. And the corresponding axis zero return indicator on the operation panel lights up for zero return completion.

■ Spindle control

■ Relevant signal (by standard PLC program)

Type	Symbol	Interface	Address	Function	Remark
Input signal	SAR	CN15.6	X4.1	Spindle speed arrival signal	It is valid when 0V is input
	SALM	CN15.4	X4.3	Spindle abnormity alarm input	
Output signal	M03	CN62.4	Y0.3	Spindle rotation(CW)	
	M04	CN62.5	Y0.4	Spindle rotation(CCW)	
	M05	CN62.6	Y0.5	Spindle stop	
	SCLP	CN62.7	Y0.6	Spindle clamped	
	SPZD	CN62.8	Y0.7	Spindle brake	
	SVF	CN62.37	Y3.0	Spindle servo OFF	
Command format	M03			Spindle rotation(CW)	
	M04			Spindle rotation(CCW)	
	M05			Spindle stop	
	M20			Spindle clamped	They are valid in analog spindle
	M21			Spindle released	

■ Control parameter

Bit parameter

K	1	0							RSJG	

RSJG =1: CNC not turn off M03, M04, M08, M32 output signals when pressing 

key;

=0: CNC turns off M03, M04, M08, M32 output signals when pressing 

key.

0	2	0		SAR							

Bit6 1：The spindle SAR signal is checked before cutting;

0：The spindle SAR signal is not checked before cutting.

Data parameter

D	9	9	

Spindle zero speed output range(r/min)

■ **Signal connection**

M03,M04,M05,SCLP,SPZD,SVF signal output cricurt is shown as 2-45A:

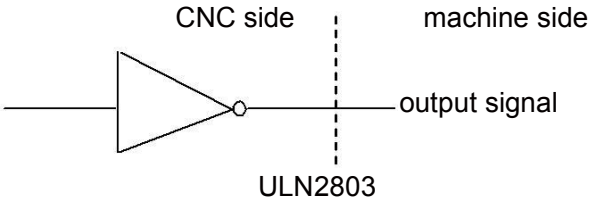


Fig. 2-45A

SAR、SALM signal input cricurt is shown as 2-45B:

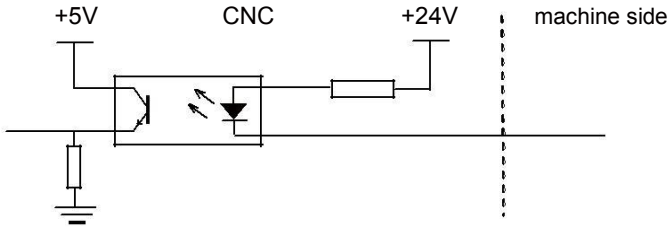


Fig. 2-45B

■ **Movement time sequence (standard PLC program definition)**

The movement time sequence of the spindle is shown as the following figure 2-46:

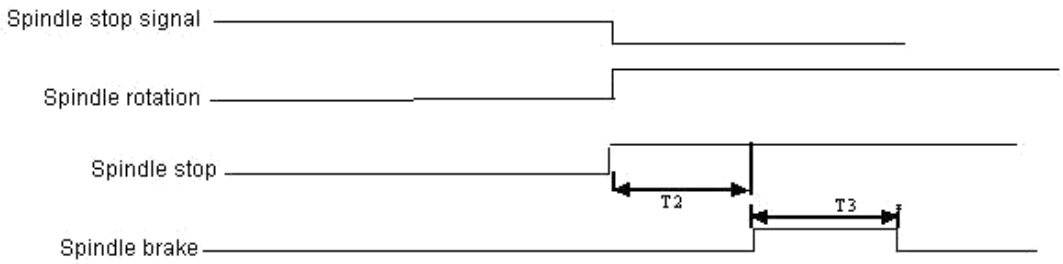


Fig. 2-46 Spindle CW and CCW rotation time sequence diagram

Note: T2 is the delay time from sending the signal of the spindle stop to sending the signal of the spindle brake; T3 is the spindle brake hold time.

■Function description（defined by standard PLC program）

1. After the CNC is turned on, when M05 output is valid, M03 or M04 is executed, M03 or M04 output is valid and remains, at the time, M05 output is closed; when M03 or M04 output is valid, M05 is executed, M03 or M04 is closed, M05 output is valid and remains;

② When M03（M04）output is valid, M04（M03）is executed, the alarm occurs.

Note 1: In the emergency stop, it turns off M03, M04, M08 signals, and outputs M05 signal;
Note 2: Whether M03, M04 is cancelled is set by BIT3 of the bit parameter No.009 when CNC is reset. If
Bit 1=0, CNC turns off M03, M04 at reset;
If Bit 1=1, M03, M04 is kept at reset.

■ Spindle switching volume control

■ Relevant signal(defined by standard PLC program)

S01～S04: The spindle speed switch value control signal, S01～S04 signal interfaces defined by the standard PLC program are the multiplex interfaces, S01～S04 and M41～M44 are the common interfaces.

ℓ Signal diagnosis

Signal	S4	S3	S2	S1
Diagnosis address	Y1.3	Y1.2	Y1.1	Y1.0
Interface pin	CN62.12	CN62.11	CN62.10	CN62.09

ℓ Control parameters

Bit parameter

0	**0**	**1**					**ACS**				

Bit4 =1: Analog voltage control of spindle speed
=0: Switching volume control of spindle speed

■ Control logic (defined by standard PLC program)

S1～S4 output are inactive at power on. If any code of them is executed, the corresponding S signal output is active and held on, and the other S signal outputs are cancelled. S1～S4 outputs are cancelled when executing S00 code, and only one of them is active at a time.

■ Spindle automatic gearing control

■ Relevant signal (defined by standard PLC program)

M41～M44：spindle automatic gear shifting output signals. It supports 4-gear spindle automatic gear shifting control when the system selects the spindle analog value control(0～10V analog voltage output)

M41I,M42I：spindle automatic gear shifting No.1, 2 gear in-position signals to support gear shifting in-position check function

ℓ Signal diagnosis

Signal	M42I	M41I	M44	M43	M42	M41
Diagnosis address	X1.6	X1.5	Y1.3	Y1.2	Y1.1	Y1.0
Interface pin	CN61.15	CN61.14	CN62.12	CN62.11	CN62.10	CN62.09

■ **Signal connection**

The circuit for M41~M44 is shown in Fig.2-47:

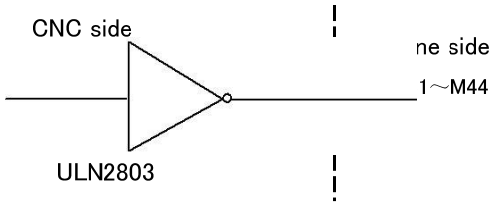


Fig. 2-47

ℓ **Control parameter**

Bit parameter

0	0	1				ACS				

Bit4 =1: Spindle analog volume control, set to 1 if using spindle automatic gearing

=0: Spindle switching volume control

K	1	5					SHT	AGIM	AGIN	AGER

AGER =1: Spindle automatic gearing active

=0: Spindle automatic gearing inactive

AGIN =1: Detect M41I, M42I signal when shifting to gear 1, 2

=0: Not detect M41I, M42I signal when shifting to gear 1, 2

AGIM =1: Active when M41I, M42I signals disconnecting to +24V

=0: Active when M41I, M42I signals connecting to +24V

SHT =1：spindle gear power-down executes the memory

=0：spindle gear power-down does not execute the memory

Data parameter

2	1	0	GRMAX1
2	1	1	GRMAX2
2	1	2	GRMAX3
2	1	3	GRMAX4

GRMAX1,GRMAX2, GRMAX3, GRMAX4: The respective max. speeds of spindle gear 1, 2, 3, 4 when analog voltage output is 10V. Spindle speeds for M41, M42, M43, M44 when spindle automatic gearing is active.

2	1	4	SFTREV

Output voltage of spindle gearing (0~10000, unit: mV)

■ **Function description (defined by standard PLC program)**

The spindle automatic gearing is active only under the spindle analog voltage control (BIT4 of the bit parameter No.001 set to 1) and the BIT0 of the K parameter No.15 is set to 1; if the spindle auto gearing is inactive, alarm will be issued when M41～M44 is being executed and only one of them is active at a time.

When spindle auto gearing is used to control automatic spindle mechanical gear switching, as CNC executes S□□□□ code, it calculates the analog voltage output to spindle servo or frequency inverter based on the parameter of the current gear by M4n (M41 ～ M44 to data parameters No.210~No.213 respectively) to make the actual speed to be consistent with the S code.

When CNC is powered on, the spindle gear memorizing is set by the BIT3 of K parameter No.15.

If the BIT4 of bit parameter No.001 is 0, the spindle gear is not memorized at repowering after power down, and the gear 1 will be defaulted, M41~M44 are not output. If BIT4 of bit parameter No.001 is 1, the spindle gear is memorized at repowering after power down.

No gearing is done if the specified gear is consistent with the current gear. If not, gearing will be performed, and the process defined by standard ladders is shown in the following:

①Execute any of M41, M42, M43, M44 codes, output analog voltage to spindle servo or frequency inverter according to a value set by data parameter No.214 (Unit: mV);

②After a delay (gearing time 1) by the data parameter DT000, turn off the original gear output signal and output the new gearing signal;

③If the gear is 1 or 2, and the BIT1(AGIN) of the K parameter No.15 is 1, it jumps to ④, or else it jumps to ⑤;

④Check the gear in-position input signal M41I, M42I, it jumps to ⑤ if the gear in-position is done; if not, the CNC waits the gear in-position signal;

⑤After a delay (gearing time 2) by the data parameter DT001, output spindle analog voltage by the current gear according to a value set by data parameter No.210~No.213 (gear 1~4) and finish the gearing.

Note: The output of M41 ～ M44 is held on when CNC is reset or i emergency stop, which is defined by standard PLC ladder.

■ External cycle start and feed hold

■ Relevant signal (defined by standard PLC program)

ST: External cycle start signal, whose function is the same with the CYCLE START key on the machine panel;

SP: External feed hold signal, whose function is the same with the FEED HOLD key on the machine panel

■ Signal diagnosis

Signal	SP	ST
Diagnosis address	X0.1	X1.4
Interface pin	CN61.2	CN61.13

■ Signal connection

The interior circuit of SP/ST signal is shown in Fig. 2-48:

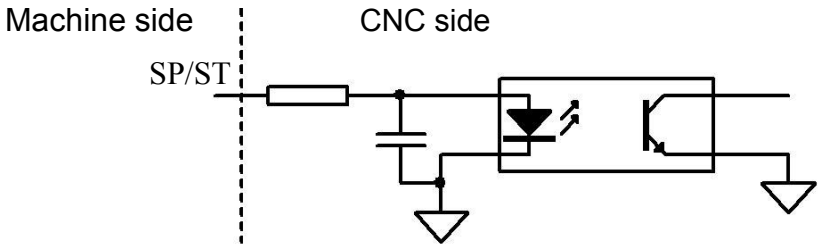


Fig. 2-48

■ Control parameter

Bit parameter

0	2	1								**MSP**	**MST**

MST =1: External cycle start signal (ST) inactive

=0: External cycle start signal (ST) active

MSP =1: External feed hold signal (SP) inactive

=0: External feed hold (SP) active, the External feed hold switch is needed, or “feed hold” is displayed by CNC.

ℓ External connection circuit

The external connection circuit of SP, ST signals is shown in Fig. 2-49:

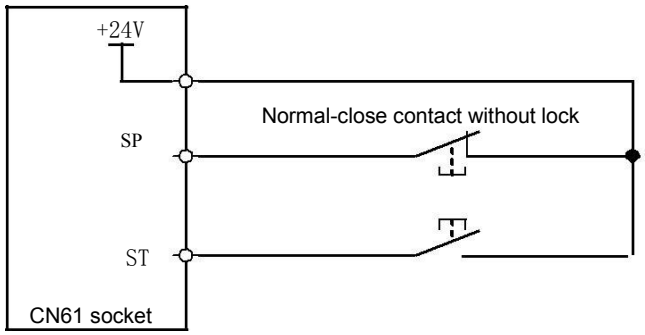


Fig. 2-49

■ Cooling Pump Control

■ Relevant signal (defined by standard PLC program)

Type	Symbol	Interface	Address	Function	Remark
Output signal	M08	CN62.1	Y0.0	Cooling control output	
Command format	M08			Cooing ON	
	M09			Cooling OFF	

■ Signal connection

Its internal circuit is shown in Fig. 2-50:

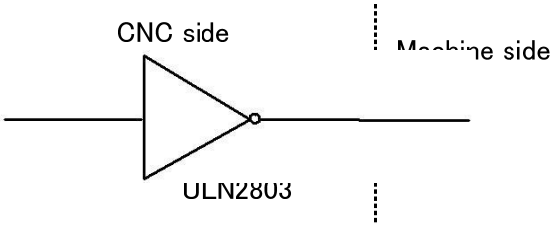


Fig. 2-50 M08 internal circuit

■ Function description (defined by standard PLC program)

M09 is active, i.e. M08 is inactive, after CNC power on. To execute M08, M08 output is active and cooling is turned on; to execute M09, M08 output is cancelled and cooling is turned off.

Note 1: M08 output is cancelled at CNC emergency stop.

Note 2: Whether M08 is cancelled is set by BIT3 of the bit parameter No.009 when CNC is reset.

When Bit1=0, M08 output is cancelled as CNC is reset;

When Bit1=1, M08 output is not cancelled as CNC is reset;

Note 3: There is no corresponding output signal for M09, and M08 output is cancelled if M09 is executed.

Note 4: The cooling can be controlled by the 

key on operation panel, see details in OPERATION.

2.8.9 Lubrication Control

ℓ Relative command signals (standard PLC program definition)

TYPE	CODE	INTERFACE	ADDRESS	FUNCTION	REMARK
Output signal	M32	CN62.2	Y0.1	lubrication control output	
Format	M32			Lubrication ON	
	M33			Lubrication OFF	

■ **Signal connection**

The internal circuit is shown as the following figure 2-51:

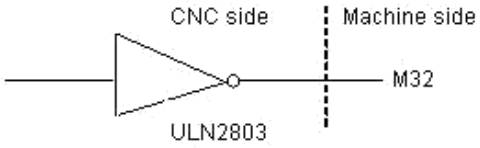


Fig. 2-51

ℓ **Control parameters**

PLC bit parameters

K	1	0								RSJG	

RSJG =1: When RESET key is pressed, the output signals M03, M04, M08 and M32 are NOT shut down

=0: When RESET key is pressed, the output signals M03, M04, M08 and M32 are shut down

K	1	6							M32A		

M32A =1: The lubrication is output at power-on when automatic lubrication is valid.

=0: The lubrication is NOT output at power-on when automatic lubrication is valid.

PLC data

D	T	0	5	3	

Automatic lubrication interval time (0~65535ms).

D	T	0	1	3	

Automatic lubrication output time (0~65535ms).

ℓ Function description

There are two types of lubrication function defined by GH1000MC standard PLC program: Manual lubrication and automatic lubrication, and they are set by parameters: DT13 =0: Manual lubrication

>0: Automatic lubrication, the lubrication time is set by DT13 and the lubrication interval time is set by DT53.

■ Manual lubrication function

For lubrication turnover output, press the machine operation panel 

key, the lubrication is output, and press it again, the lubrication output is cancelled. During executing M32, the lubrication is output, and M33 is executed, the lubrication output is cancelled.

When DT13>1, the lubrication is output in fixed time, press the machine operation panel 

key, the lubrication is output, and after the time set by DT13, the lubrication output is cancelled; M32 is executed, the lubrication is output, and the lubrication output is cancelled in the time set by DT13. If the time set by DT13 is not up, execute M33 or press 

key once again, and then, the lubrication output is cancelled.

2. Automatic lubrication:

When K16.2 is set as 1, after power-on, the system starts lubricating in the time set by DT13, and then the output stops. And then, the lubrication is output, again after the time set by DT53 is up, the process is executed in cycle. During automatic lubricating, codes of M32 and M33 and the machine operation panel 

key are also valid, and the lubrication time is still set by DT13.

Note 1: During CNC emergency stop, the lubrication output is OFF.

Note 2: During CNC resetting, whether cancel the lubrication output is set by Bit1 of K10:

When Bit1＝0, close lubrication output by CNC resetting;

When Bit1＝1, the lubrication output state remains unchanged during CNC resetting.

2.8.10 Safety door detection

ℓ **Relevant signal**

SAGT: Safety door detection input signal

ℓ **Signal diagnosis**

Signal	SAGT
Diagnosis address	X0.0
Interface pin	CN61.1

ℓ **Control parameter**

State parameter

K	**1**	**4**						**SPB4**	**PB4**		

PB4 =0: Safety door detection inactive

=1: Safety door detection active

SPB4 =0: For safety door closing as SAGT is cut off with +24V

=1: For safety door closing as SAGT is connected with +24V

■ **Function description (defined by standard PLC program)**

①When PB4＝1, SPB4＝0, CNC confirms that the safety door is closed as SAGT is disconnected to +24V;

②When PB4＝1, SPB4＝1, CNC confirms that the safety door is closed as SAGT is cut off with +24V;

③The protection door detection function is valid in Auto mode; however, when the protection door is open, the alarm of “the protection door is open” occurs in all modes, but it doesn’t affect the operation;

④In Auto mode, during the automatic cycle start, if CNC has detected the protection door open, the alarm is issued;

⑤During automatic running, if CNC has detected the protection door is open, the axis feeding dwells, and the cooling output is closed. If SGSP is set as 0, the spindle output is also closed meanwhile; otherwise, the spindle output isn’t closed.

■ CNC macro variables

■ **Relevant signal**

Macro output signal: standard PLC defines 5 macro output interfaces #1100～#1105；

Macro input signal: standard PLC defines 16 macro output interfaces #1000～#1015

■ **Signal diagnosis**

Macro variable number	#1105	#1104	#1103	#1102	#1101	#1100
Diagnosis address	Y3.7	Y3.6	Y3.5	Y3.4	Y3.3	Y3.2

Macro variable number	#1007	#1006	#1005	#1004	#1003	#1002	#1001	#1000
Diagnosis address	X0.7	X0.6	X0.5	X0.4	X0.3	X0.2	X0.1	X0.0

Macro variable number	#1015	#1014	#1013	#1012	#1011	#1010	#1009	#1008
Diagnosis address	X1.7	X1.6	X1.5	X1.4	X1.3	X1.2	X1.1	X1.0

■ **Function description (defined by standard PLC program)**

U00～U05 signal output may be changed if macro variable ＃1100～＃1105 are assigned. If they are assigned for “1”, it outputs 0V, if they are assigned for “0”, it turns off their output signals.

Detect the values of the macro variables ＃1000～＃1015 in channel 1, the input status of the input interfaces X0.0~X0.7 and X1.0~X1.7 can be got.

■ Tri-colour indicator

Relevant signals and function definitions:

Y2.2 (CN62.31): yellow indicator,normal (non-running, non-alarming)

Y2.3 (CN62.32): green indicator,running

Y2.4 (CN62.33): red indicator,alarming

2.8.13 External MPG

ℓ Related signals

CN31(MPG)	PLC address	Address character	Function	Remark
5	X5.0	EHDX	X MPG	Applied to PSG-100-05E/L, ZSSY2080 MPG
6	X5.1	EHDY	Y MPG	
8	X5.2	EHDZ	Z MPG	
9	X5.3	EMP0	Increment ×1	
22	X5.4	EMP1	Increment ×10	
23	X5.5	EMP2	Increment ×100	
11, 12, 13	GND			
14,15	+5V			
17,18	+24V			

ℓ Related parameters

Bit parameter

0	0	1					MPG			

Bit3 =0：Step working mode.

=1：MPG working mode.

PLC bit parameter

K	1	6	SINC							

SINC =0：MPG, STEP mode ×1000-gear increment is valid.

=1：MPG, STEP mode×1000-gear increment is invalid.

■ Function description

When SINC is set to 1, MPG/STEP mode ×1000-gear selection is disabled. When x1000-gearis selected before modifying the parameter, the system automatically changes into ×100mm-gear

When the external MPG, its axis selection does not lock, that is, the axis selection of MPG is disabled, the system changes to the non-axis selection state.

2. When the external MPG axis selection and gear selection input are enabled, the axis selection on the panel and the gear selection keys are disabled; when the external MPG axis selection and gear selection input are disabled, the axis selection on the panel and the gear selection keys are enabled and self-locked.

CHAPTER 3 PARAMETERS

The CNC bit and data parameters are described in this chapter, various functions can be set by these parameters.

■ Parameter description (by sequence)

■ Bit parameter

The state parameter is expressed as follows:

Parameter No.			BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0	0	1	***	***	***	SPTY	SOHW	***	***	INI

Bit0 0: Metric input

■ Inch input

Bit3 0: Step mode

1: MPG mode

Bit4 0: Spindle switching volume control

1: Spindle analog voltage control

Default:0 0 0 1 1 0 0 0

0	0	3	***	***	SCRW	TLC	***	***	CIM	OIM

Bit0 0: Not convert the tool compensation value during the metric and inch system switch

1: Automatically convert the tool compensation value during the metric and inch system switch

Bit1 0: Not convert the workpiece coordinate value during the metric and inch system switch

1: Automatically convert workpiece coordinate value during the metric and inch system switch

Bit4 0: Select mode B of tool length compensation

1: Select mode A of tool length compensation

Bit5 0: Screw pitch error compensation function invalid

1: Screw pitch error compensation function valid

Default:0 0 11 0 0 11

0	0	4	SCW	***	***	***	***	***	***	***

Bit7 1: Inch system output

0: Metric system output

Default:0 0 0 0 0 0 0 0

0	0	5	***	***	***	M30	M02	***	***	***

Bit3 0: Cursor to beginning after M02 execution

■ Cursor not to beginning after M02 execution

Bit4 0: Cursor to beginning after M30 execution

■ Cursor not to beginning after M30 execution

Default:0 0 0 1 1 0 0 0

0	0	6	***	***	***	MAOB	ZPLS	***	***	ZMOD

Bit0 0： Reference return mode selection: in front of the block

1：Reference return mode selection: behind the block

Bit3 0：Zero type selection: non-one-revolution signal

1：Zero type selection: one-revolution signal

Bit4 0: Zero return mode when have not one-turn signal: A mode

1: Zero return mode when have not one-turn signal: B mode

Default:0 0 0 0 1 0 0 0

0	0	8	***	***	***	DIR5	DIR4	DIRZ	DIRY	DIRX

Bit0 0: Direction signal (DIR) is high level as X axis moves negatively

1: Direction signal (DIR) is high level as X axis moves positively

Bit1 0: Direction signal (DIR) is high level as Y axis moves negatively

1: Direction signal (DIR) is high level as Y axis moves positively

Bit2 0: Direction signal (DIR) is high level as Z axis moves negatively

1: Direction signal (DIR) is high level as Z axis moves positively

Bit3 0: Direction signal (DIR) is high level as 4th axis moves negatively

1: Direction signal (DIR) is high level as 4th axis moves positively

Bit4 0: Direction signal (DIR) is high level as 5th axis moves negatively

1: Direction signal (DIR) is high level as 5th axis moves positively

Default:0 0 0 1 1 1 0 1

0	0	9	SALM	***	***	5ALM	4ALM	ZALM	YALM	XALM

Bit0 0: X alarm signal signal is high level alarm

1: X alarm signal signal is low level alarm

Bit1 0: Y alarm signal is high level alarm

1: Y alarm signal is low level alarm

Bit2 0: Z alarm signal is high level alarm

1: Z alarm signal is low level alarm

Bit3 0: 4th alarm signal is high level alarm
1: 4th alarm signal is low level alarm
Bit4 0: 5th alarm signal is high level alarm
1: 5th alarm signal is low level alarm
Bit7 0: Spindle alarm signal is high level alarm
1: Spindle alarm signal is low level alarm
Default:0 0 0 0 0 0 0 0

0	1	1	RVCS	***	***	***	***	***	***	***

Bit7 0: Backlash compensation mode:fixed frequency
■ Backlash compensation mode:acc and dec
Default:0 0 0 0 0 0 0 0

0	1	2	***	***	***	***	***	***	***	ISOT

Bit0 0: Prior to machine zero return after power on, manual rapid traverse active
■ Prior to machine zero return after power on, manual rapid traverse inactive
Default:0 0 0 0 0 0 0 0

0	1	3	HPF	RHPG	***	***	***	***	***	HNGD

Bit0 0：Coordinates increase in all axis MPG (CCW) rotation
1：Coordinates decrease in all axis MPG (CW) rotation
Bit6 0： Not use electronic MPG drive function
1：Use electronic MPG drive function
Bit7 0： MPG rotate displacement run completely
1：MPG rotate displacement run incompletely
Default:1 0 0 0 0 0 0 1

0	1	4	***	***	***	***	***	***	RFO	LRP

Bit0 0： Positioning(G00) interpolation track:non-linear
1： Positioning(G00) interpolation track:linear

Bit1 0： Not stop while rapid feeding when rapid feed override is Fo

1： Stop while rapid feeding when rapid feed override is Fo

Default:0 0 0 0 0 0 0 0

0	1	5

JAX	***	***	***	DLF	ZRN	AZR	SJZ

Bit0 1: Memory mechanical zero is memorized

0: Memory mechanical zero is not memorized

Bit1 1: G28 instruction alarms when the reference point is not set up

0: G28 instruction uses the block when the reference point is not set up

Bit2 1: Instructions except G28 alarms when the reference point is not set up

■ Instructions except G28 do not alarm when the reference point is not set up

Bit3 1: After the reference point, the point is returned to for manual speed

0: After the reference point, the point is returned to for quick speed.

Bit7 1: Not choose multi axis when manual back to zero

0: Choose multi axis when manual back to zero

Default:0 0 0 0 0 1 0 0

0	1	6

WLOE	HLOE	CLLE	CBLS	CBOL	FLLS	FBLS	FBOL

Bit0 0: Rapid run mode:front acceleration and deceleration

1: Rapid run mode:rear acceleration and deceleration

Bit1 0: Rapid run front acceleration and deceleration :linear type

■ Rapid run front acceleration and deceleration :S type

Bit2 0: Rapid run rear acceleration and deceleration :linear type

■ Rapid run rear acceleration and deceleration:exponential type

Bit3 0: Cutting feed mode in none-preread:front acceleration and deceleration

■ Cutting feed mode in none-preread:rear acceleration and deceleration

Bit4 0: Cutting feed mode front acceleration and deceleration in none-preread way:linear type

1: Cutting feed mode front acceleration and deceleration in none-preread way:S type

Bit5 0: Cutting feed mode rear acceleration and deceleration in none-preread way:linear type

1: Cutting feed mode rear acceleration and deceleration in none-preread way:exponential type

Bit6 0: Manual(JOG) run:linear acceleration and deceleration

1: Manual(JOG) run:exponential acceleration and deceleration

Bit7 0: Manual run:linear acceleration and deceleration

1: Manual run:exponential acceleration and deceleration

Default:1 0 0 0 1 1 0 1

0	1	7

***	***	***	PIIS	PPCK	ASL	PLAC	STL

Bit0 0: select non-prereading working type
1: select prereading working type
Bit1 0: Interpolation rear acceleration and deceleration in preread way:linear type
1: Interpolation rear acceleration and deceleration in preread way:exponential type
Bit2 0：Auto corner deceleration function in preread way:angle control
1：Auto corner deceleration function in preread way:speed difference control
Bit3 0：Not carry on detection of in place in preread way
1：Carry on detection of in place in preread way
Bit4 0：Overlapping interpolation ineffective in acceleration/deceleration blocks before forecasting
1：Overlapping interpolation effective in acceleration/deceleration blocks before forecasting
Default:1 1 0 0 0 0 0 1

0	1	8

***	***	***	***	CANT	***	CLV	CCV

Bit0 0: Macro program public variable #100~#199,not clear after reseting
1: Macro program public variable #100~#199,clear after reseting
Bit1 0: Macro program local variable #1~#50,not clear after reseting
1: Macro program local variable #1~#50, clear after reseting
Bit3 0：Single workpiece machinning time not clear automatically
1：Single workpiece machinning time clear automatically
Default:0 0 0 0 0 0 0 0

0	1	9

G39	ODI	CCA	CCN	SUP	CNI	***	***

Bit2 0: Not carry on radius compensation intervene check
1: Carry on radius compensation intervene check
Bit3 0: Tool start and tool retract's form are A type in tool radius compensation
1: Tool start and tool retract's form are B type in tool radius compensation
Bit4 0：Not cancle tool radius compensation when G28,G30 instruction move to middle point
1: Cancle tool radius compensation when G28,G30 instruction move to middle point
Bit5 0：Cancle tool compensation standard action when G28,G30 instruction move to middle point
1: Cancle tool radius verticality when G28,G30 instruction move to middle point
Bit6 0：Tool radius compensation value is set by radius value
1: Tool radius compensation value is set by diameter value
Bit7 0：Corner circular arc function is invalid in radius compensation
1: Corner circular arc function is valid in radius compensation
Default:1 1 0 1 0 1 0 0

0	2	0

SPFD	SAR	***	VAL5	VAL4	VALY	VALZ	VALX

Bit7 1：In cutting feed, do not permit the spindle stopping rotation
0：In cutting feed, permit the spindle stops rotation

Bit6 1: Detect spindle SAR signal prior to cutting
■ Not detect spindle SAR signal prior to cutting

Bit4 1：Not flip 5th axis movement key direction
0：Flip 5th axis movement key direction

Bit3 1：Not flip 4th axis movement key direction
0：Flip 4th axis movement key direction

Bit2 1：Not flip Y axis movement key direction
0：Flip Y axis movement key direction

Bit1 1：Not flip Z axis movement key direction
0：Flip Z axis movement key direction

Bit0 1：Not flip X axis movement key direction
0：Flip X axis movement key direction

Default:0 0 0 0 0 0 0 0

0	2	1

***	***	***	***	***	MESP	MSP	MST

Bit0 1: External cycle start signal inactive；
0: External cycle start signal active.

Bit0 1: External pause signal inactive；
0: External pause signal active.

Bit2 1: Do not detect emergency signal；
0: Detect emergency signal.

Default:0 0 0 0 0 0 1 1

0	2	2

AD2	***				BFA	LZR	UOUT2

Bit0 0: Inside the off-limits areas of 2nd travel limit
1: Outside the off-limits areas of 2nd travel limit

Bit1 0: Soft limit is invalid before returning machine zero
1: Soft limit is valid before returning machine zero

Bit2 0: Alarm before over-distance when give out over-distance instruction
1: Alarm after over-distance when give out over-distance instruction

Bit7 0: Not alarm when instruct more than 2 same adress in a block 1:
Alarm when instruct more than 2 same adress in a block
Default:1 0 0 0 0 0 0 1

0	2	5	NAT	RRW	***	***	***	WARP	PETP	SPOS

Bit0 0: RELATIVE POS displayed in POS&PRG page
1: DIS TO GO displayed in POS&PRG page
Bit1 0: Not switch to program interface by pressing edit key
1: Switch to program interface by pressing edit key
Bit2 0: Not switch to alarm interface when alarm occurs
1: Switch to alarm interface when alarm occurs
Bit2 0: Cursor return to the beginning of program in edit mode when reset
1: Cursor return to the beginning of program in all mode when reset
Bit7 0: Function ATAN, ASIN range is -90.0～90.0;
1: Function ATAN, ASIN range is 90.0～270.0
Default:0 0 0 0 0 0 1 0

0	2	6	***	***	***	ZMI5	ZMI4	ZMIY	ZMIZ	ZMIX

Bit0 0: Set the direction of the X axis returning to the reference point: positive direction
1: Set the direction of the X axis returning to the reference point: nagative direction
Bit1 0: Set the direction of the Z axis returning to the reference point: positive direction
1: Set the direction of the Z axis returning to the reference point: nagative direction
Bit2 0: Set the direction of the Y axis returning to the reference point: positive direction
1: Set the direction of the Y axis returning to the reference point: nagative direction
Bit2 0: Set the direction of the 4th axis returning to the reference point: positive direction
1: Set the direction of the 4th axis returning to the reference point: nagative direction
Bit4 0: Set the direction of the 5th axis returning to the reference point: positive direction
1: Set the direction of the 5th axis returning to the reference point: nagative direction
Default:0 0 0 0 0 0 0 0

0	2	9	***	***	NE9	NE8	***	***	***	***

Bit4 0: Not ban editing subprogram of No. 8000~8999
1: Ban editing subprogram of No. 8000~8999
Bit5 0: Not ban editing subprogram of No. 9000~9999
1: Ban editing subprogram of No. 9000~9999
Default:0 0 1 1 0 0 0 0

0	3	0	***	***	***	***	***	***	PRPD	PLA

Bit1 1: Axis rapid traverse rate of PLC by input value
■ Axis rapid traverse rate of PLC by parameter value
Bit0 1: PLC axis control active
■ PLC axis control inactive
Default:0 0 0 0 0 0 0 0

0	3	3	***	***	RG90	***	***	AXSZ	AXSY	AXSX

Bit0 0: X axis is set to be linear axis
1: X axis is set to be rotate axis
Bit1 0: Y axis is set to be linear axis
1: Y axis is set to be rotate axis
Bit2 0: Z axis is set to be linear axis
1: Z axis is set to be rotate axis
Bit5 0: Scale division instruction:specified by G90/G91
1: Scale division instruction:absolute instruction
Default:0 0 0 0 0 0 0 0

0	3	4	SATP	***	RCS4	***	***	***	ROS4	ROT4

Bit0 0: Set 4th axis to be the linear axis
1: Set 4th asix to be the rotary axis
Bit1 0: Set 4th to be the rotary axis(B type)
1: Set 4th to be the rotary axis(A type)
Bit5 0 : 4th Cs axis function is valid
1: 4th Cs axis function is invalid
Bit0 0: 3 axis linkage system
1: 4 axis linkage system
Default:0 0 0 0 0 0 0 0

0	3	5	***	***	***	***	***	RRL4	RAB4	ROA4

Bit2 1：When 4th is the rotary axis, the relative coordinate cycle function is valid

0：When 4th is the rotary axis, the relative coordinate cycle function is invalid

Bit1 1：4th rotates according to the symbol when it is the rotary axis

0：4th rotates contiguously when it is the rotary axis

Bit0 1：The absolute coordinate cycle function is valid when 4th is the rotary axis

0：The absolute coordinate cycle function is invalid when 4th is the rotary axis

Default:0 0 0 0 0 0 0 0

0	3	6	***	***	RCS5	***	***	***	ROS5	ROT5

Bit5 0：5th Cs function is valid；

1：5th Cs function is invalid

Bit1 0： sets 5th to be the rotary axis(A type)，

1： sets 5th to be the rotary axis(B type)，

Bit0 0: sets 5th to be the linear

■ sets 5th to be the rotary

Default:0 0 0 0 0 0 0 0

0	3	7	***	***	***	***	***	RRL5	RAB5	ROA5

Bit2 1：When 5th is the rotary axis, the relative coordinate cycle function is valid

0：When 5th is the rotary axis, the relative coordinate cycle function is invalid

Bit1 1：5th rotates according to the symbol when it is the rotary axis

0：5th rotates contiguously when it is the rotary axis

Bit0 1：The absolute coordinate cycle function is valid when 5th is the rotary axis

0：The absolute coordinate cycle function is invalid when 5th is the rotary axis

Default:0 0 0 0 0 0 0 0

0	4	2	***	***	***	***	RIN	***	***	SSC

Bit0 0：Not use constant surface cutting speed control function

1：Use constant surface cutting speed control function

Bit3 0：Rotation angle of G68 coordinate rotation:abslute instruction 1：

Rotation angle of G68 coordinate rotation:G90/G91 instruction

Default:0 0 0 0 1 0 0 0

0	4	3

XSC	***	***	SCLZ	SCLY	SCLX	***	SCL

Bit0 0: Not use zoom function
1: Use zoom function

Bit2 0: X axis zoom function is invalid
1: X axis zoom function is valid

Bit3 0: Y axis zoom function is invalid
1: Y axis zoom function is valid

Bit4 0: Z axis zoom function is invalid
1: Z axis zoom function is valid

Bit7 0: Mode of every zoom ratios:every axis uses P instruction
1: Mode of every zoom ratios:every axis uses IJK instruction

Default:1 0 0 1 1 1 0 1

0	4	4

QZA	***	RD2	RD1	MUNI	***	***	***

Bit3 0: G76,G87 displacement:Q instruction
1: G76,G87 displacement:I,J,K instruction

Bit4 0: Set tool retract direction of G76,G87:positive
1: Set tool retract direction of G76,G87:negative

Bit5 0: Set tool retract axis of G76,G87:X axis
1: Set tool retract axis of G76,G87:Y axis

Bit7 0: In deep-hole drilling(G73,G83),not alarm without instruction penetration value
1: In deep-hole drilling(G73,G83),alarm without instruction penetration value

Default:1 0 0 0 0 0 0 0

0	4	5

***	***	***	***	***	***	***	DWL

Bit0 0: Not clear F,H,D code when reset or emergency stop
1: Clear F,H,D code when reset or emergency stop

Default:0 0 0 0 0 0 0 0

0	4	6

C07	C06	C05	C04	C03	C02	C01	***

Bit1 0: Not clear 01 group G code when reset or emergency stop
1: Clear 01 group G code when reset or emergency stop

Bit2 0: Not clear 02 group G code when reset or emergency stop
1: Clear 02 group G code when reset or emergency stop

Bit3 0: Not clear 03 group G code when reset or emergency stop
1: Clear 03 group G code when reset or emergency stop

Bit4 0: Not clear 04 group G code when reset or emergency stop
1: Clear 04 group G code when reset or emergency stop
Bit5 0: Not clear 05 group G code when reset or emergency stop
1: Clear 05 group G code when reset or emergency stop
Bit6 0: Not clear 06 group G code when reset or emergency stop
1: Clear 06 group G code when reset or emergency stop
Bit7 0: Not clear 07 group G code when reset or emergency stop
1: Clear 07 group G code when reset or emergency stop
Default:1 0 0 0 0 0 0 0

0	4	7	C15	C14	C13	C12	C11	C10	C09	C08

Bit0 0: Not clear 08 group G code when reset or emergency stop
1: Clear 08 group G code when reset or emergency stop
Bit1 0: Not clear 092group G code when reset or emergency stop
1: Clear 09 group G code when reset or emergency stop
Bit2 0: Not clear 10 group G code when reset or emergency stop
1: Clear 10 group G code when reset or emergency stop
Bit3 0: Not clear 11 group G code when reset or emergency stop
1: Clear 11 group G code when reset or emergency stop
Bit4 0: Not clear 12 group G code when reset or emergency stop
1: Clear 12 group G code when reset or emergency stop
Bit5 0: Not clear 13 group G code when reset or emergency stop
1: Clear 13 group G code when reset or emergency stop
Bit6 0: Not clear 14 group G code when reset or emergency stop
1: Clear 14 group G code when reset or emergency stop
Bit7 0: Not clear 15 group G code when reset or emergency stop
1: Clear 15 group G code when reset or emergency stop
Default:0 0 0 0 0 0 0 1

0	4	8	***	***	G13	G91	G19	G18	G17	G01

Bit0 0: Set to G00 way when power on or in the state of clearing
1: Set to G01 way when power on or in the state of clearing
Bit1 0: Plane selection is not G17 when power on or in the state of clearing
1: Plane selection is G17 when power on or in the state of clearing
Bit2 0: Plane selection is not G18 when power on or in the state of clearing
1: Plane selection is G18 when power on or in the state of clearing
Bit3 0: Plane selection is not G19 when power on or in the state of clearing
1: Plane selection is G19 when power on or in the state of clearing
Bit4 0: Set to G90 way when power on or in the state of clearing
1: Set to G91 way when power on or in the state of clearing
Bit5 0: Set to G12 way when power on or in the state of clearing
1: Set to G13 way when power on or in the state of clearing
Default:0 0 1 0 0 0 1 0

0	4	9	***	***	***	***	WZ0	MCV	GOF	WOF

Bit0 0: Input tool wear offset value in MDI mode
1: Ban inputing tool wear offset value in MDI mode
Bit1 0: Input tool geometry offset value in MDI mode
1: Ban inputing tool geometry offset value in MDI mode
Bit2 0: Input macro program variable in MDI mode
1: Ban inputing macro program variable in MDI mode
Bit3 0: Input workpiece origin offset value in MDI mode
1: Ban inputing workpiece origin offset value in MDI mode

Default:0 0 0 0 0 0 0 0

0	5	0	DAL	***	***	***	MCL	MKP	MSL	SEQ

Bit0 0：Not insert number automatically
1：Insert number automatically
Bit0 0：Start line is 1st line when program status interface executes
1：Start line is cursor line when program status interface executes
Bit2 0：Not delete program after executive program at the interface
1：Delete program after executive program at the interface
Bit2 0：Not delete program when reset under the state interface
1：Delete program when reset under the state interface
Bit2 0：Absolute location display not considers tool length compensation
1：Absolute location display considers tool length compensation

Default:0 0 0 0 0 0 0 0

0	5	1	ITL	***	***	***	***	***	***	SCBM

Bit7 1 ： All axis interlocking signals are valid
0 ： All axis interlocking signals are invalid
Bit0 1: Travel detection before moving
0: Not travel detection before moving

Default:0 0 0 0 0 0 0 0

0 5 2	MDLY	SBM	***	SIM	***	MDL	***	***

Bit2 0：Single direction localization G code is not set to modal code
1：Single direction localization G code is set to modal code
Bit4 0：Do not make alarm if indexing instruction and other axes instructions are in the same block
1：Make alarm if indexing instruction and other axes instructions are in the same block
Bit6 0：Can not use "single block" in the macro program instruction
1：Can use "single block" in the macro program instruction
Bit7 0：Delay in the macro program instruction
1：Not delay in the macro program instruction
Default:0 0 0 0 0 0 0 0

0 5 3	ZCL	RLC	***	***	***	***	***	***

Bit6 0：Relative coordinate system not cancle after reseting
1：Relative coordinate system cancle after reseting
Bit7 0： Not cancle relative coordinate which is for returning reference point
1：Cancle relative coordinate which is for returning reference point
Default:0 0 0 0 0 0 0 0

0 5 4	***	***	***	***	***	***	HPC	NPC

Bit0 0：Feeding is invalid when it doesn't install position encoder
1：Feeding is valid when it doesn't install position encoder
Bit1 0：The system has not install position encoder
1：The system has installs position encoder
Default:0 0 0 0 0 0 1 0

0 5 5	***	***	***	***	***	CALT	ALS	CPCT

Bit0 0：Cutting feed does not control in place precision
1：Cutting feed controls in place precision
Bit1 0：Automatic corner ratio function is invalid
1：Automatic corner ratio function is valid
Bit2 0：Exponential acceleration and deceleration cutting feed accelerated speed does not clamp down
1：Exponential acceleration and deceleration cutting feed accelerated speed clamps down
Default:0 0 0 0 0 0 0 1

0 5 6	***	***	***	***	***	TDR	FDR	RDR

Bit0 0: Dry running is invalid during cutting feed
■ Dry running is valid during cutting feed

Bit1 0: Dry running is invalid during rapid localization
■ Dry running is valid during rapid localization

Bit2 0: Dry running is invalid during the operation of tapping
■ Dry running is valid during the operation of tapping

Default:0 0 0 0 0 0 0 0

0 5 7	DWL	***	SOC	RSC	***	***	***	***

Bit7 1: G04 is pause in every turn of the feed mode
0: G04 is not pause in every turn of the feed mode

Bit5 1: After the G96 spindle speed clamps down spindle override
0: Before the G96 spindle speed clamps down spindle override

Bit4 1: G90 spindle speed when G0 positioning according to the current coordinate
0: G90 spindle speed when G0 positioning according to the Final coordinate

Default:0 0 00 0 0 0 0

0 5 8	OVU	DOV	TDR	***	ORI	***		SSOG

Bit7 1: Rigid tapping knife back rate is 10%
0: Rigid tapping knife back rate is 1%

Bit6 1: Rigid tapping knife back rate is valid
0: Rigid tapping knife back rate is invalid

Bit5 1: Rigid tapping knife, knife back use the same time constant
0: Rigid tapping knife, knife back dose not use the same time constant

Bit3 1: The spindle stop when flexible tapping at the beginning
0: The spindle does not stop when flexible tapping at the beginning

Bit1 1: Tapping into high speed deep hole tapping cycle
0: Not into high speed deep hole tapping cycle

Bit0 1: Tapping mode of spindle control for servo
0: Tapping mode of spindle control as follow

Default:0 0 0 0 0 0 0 0

0 5 9	LEDT	LOPT	OHPG	HISP	***	SOVD	FOVD	ROVD

Bit7 1: Use external editor lock

0: Not use external editor lock

Bit6 1: Use external operation panel lock

0: Not use external operation panel lock

Bit5 1: Use extenrnal MPG

0: Not use external MPG

Bit4 1: Use the external hand wheel/single-step interrupt function

0: Not use the external hand wheel/single-step interrupt function

Bit2 1: Use band switch on the main shaft speed adjustment

0: Use the operating panel on the speed adjustment of the main shaft

Bit1 1: Use band switch on the cutting feed rate adjustment

0:Use the operating panel on the cutting feed rate adjustment

Bit0 1: Use band switch on the fast running rate adjustment

0: Use the operating panel on the fast running rate adjustment

Default:0 0 0 0 0 0 0 0

2 1 5	***	***	***	AALM	LALM	EALM	SALM	FALM

Bit4 1: Ignore external user alarm

0：Not ignore external user alarm

Bit3 1：Ignore hard limit alarm

0: Not ignore hard limit alarm

Bit2 1：Ignore emergency stop alarm

0: Not ignore emergency stop alarm

Bit1 1: Ignore alarm of the spindle drive

0: Not ignore alarm of the spindle drive

Bit0 1：Ignore alarm of the feed shaft drive

0：Not ignore alarm of the feed shaft drive

Default:0 0 0 0 0 0 0 0

■ Data parameter

0	0	0	CMRX(X axis)multiplier coefficient
0	0	1	CMRY(Y axis) multiplier
0	0	2	coefficient CMRX(Z axis)multiplier coefficient
0	0	3	CMR4th(4th axis) multiplier coefficient
0	0	4	CMR5th(5th axis)multiplier coefficient

［Data range］ 1 ～65536

Default value 1

0	0	5	X axis frequency division coefficient(CMD)
0	0	6	Y axis frequency division coefficient(CMD)
0	0	7	Z axis frequency division coefficient(CMD)
0	0	8	4th axis frequency division coefficient(CMD)
0	0	9	5th axis frequency division coefficient(CMD)

［Data range］ 1 ～65536

Electronic gear ratio formula:

$$\frac{CMR}{CMD} = \frac{P}{\mathrm{L} \times 1000}$$

P: Feedback corresponding to the number of pulses when motor rotation

L: Movement of machine tools when motor rotation

Default value 1

0	1	0	X axis negative max. travel(1st travel limit)
0	1	2	Y axis negative max. travel(1st travel limit)
0	1	4	Z axis negative max. travel(1st travel limit)
0	1	6	4th axis negative max. travel(1st travel limit)
0	1	8	5th axis negative max. travel(1st travel limit)

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ -9999.9999～9999.9999

Default value -9999.9999

0	1	1	X axis positive max. travel(1st travel limit)
0	1	3	Y axis positive max. travel(1st travel limit)
0	1	5	Z axis positive max. travel(1st travel limit)
0	1	7	4th axis positive max. travel(1st travel limit)
0	1	9	5th axis positive max. travel(1st travel limit)

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ -9999.9999～9999.9999

Default value 9999.9999

0	2	0	X axis negative max. travel(2nd travel limit)
0	2	2	Y axis negative max. travel(2nd travel limit)
0	2	4	Z axis negative max. travel(2nd travel limit)
0	2	6	4th axis negative max. travel(2nd travel limit)
0	2	8	5th axis negative max. travel(2nd travel limit)

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ -9999.9999～9999.9999

Default value -9999.9999

0	2	1	X axis positive max. travel(2nd travel limit)
0	2	3	Y axis positive max. travel(2nd travel limit)
0	2	5	Z axis positive max. travel(2nd travel limit)
0	2	7	4th axis positive max. travel(2nd travel limit)
0	2	9	5th axis positive max. travel(2nd travel limit)

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ ～

-9999.9999 9999.9999

Default value 9999. 9999

0	3	0	Reverse gap compensation to determine the reverse accuracy (X0.000

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ 0.000.1~1

Default value 0.01

0	3	1	X axis backlash compensation.
0	3	2	Y axis backlash compensation
0	3	3	Z axis backlash compensation.
0	3	4	4th axis backlash compensation.
0	3	5	5th axis backlash compensation.

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ 0~0.5000

Default value 0

Note ： X is the diameter value.

0	3	6	
0	3	7	
0	3	8	
0	3	9	
0	4	0	

［Data unit］

［Data range］

Default value

Compensation step for X axis space with fixed frequency

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

0~99.9999

0.003

Compensation step for Z axis space with fixed frequency

Compensation step for Y axis space with fixed frequency

Compensation step for 4TH axis space with fixed frequency

0	4	1	**Time constant of the reverse gap to the lifting speed mode**

［Data unit］ ms

［Data range］ 0~400

Default value 20

0	5	0	**X coordinate value of 1st reference point in the machine coordinate system Y**
0	5	1	**coordinate value of 1st reference point in the machine coordinate system Z**
0	5	2	**coordinate value of 1st reference point in the machine coordinate system 4th**
0	5	3	**coordinate value of 1st reference point in the machine coordinate system 5th**
0	5	4	**coordinate value of 1st reference point in the machine coordinate system**

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ -9999.9999~9999.9999

Default value 0

0	6	0	**X coordinate value of 3rd reference point in the machine coordinate system Y**
0	6	1	**coordinate value of 3rd reference point in the machine coordinate system Z**
0	6	2	**coordinate value of 3rd reference point in the machine coordinate system 4th**
0	6	3	**coordinate value of 3rd reference point in the machine coordinate system 5th**
0	6	4	**coordinate value of 3rd reference point in the machine coordinate system**

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ -9999.9999~9999.9999

Default value 0

0	6	5
0	6	6
0	6	7
0	6	8
0	6	9

X coordinate value of 4th reference point in the machine coordinate system Y
coordinate value of 4th reference point in the machine coordinate system Z
coordinate value of 4th reference point in the machine coordinate system 4th
coordinate value of 4th reference point in the machine coordinate system 5th
coordinate value of 4th reference point in the machine coordinate system

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ -9999.9999~9999.9999

Default value 0

0	7	0
0	7	1
0	7	2
0	7	3
0	7	4

High speed of X axis returning to machine zero
High speed of Y axis returning to machine zero
High speed of Z axis returning to machine zero
High speed of 4th axis returning to machine zero
High speed of 5th axis returning to machine zero

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 10～9999

Default value 4000

0	7	5
0	7	6
0	7	7
0	7	8
0	7	9

X axis grid offset vlaue or reference point offset value Y
axis grid offset vlaue or reference point offset value Z
axis grid offset vlaue or reference point offset value 4th
axis grid offset vlaue or reference point offset value 5th
axis grid offset vlaue or reference point offset value

［Data unit］

Setting unit	Data unit
Metric input	mm/min
Inch input	inch/min
rotary axis	deg

［Data range］ 0～50

Default value 0

0 8 0 **Low speed of returning to machine zero(universal for all axis)**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 1~60

Default value 40

0 8 2 **Dry running speed**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0~9999

Default value 5000

0 8 3 **Cutting feed speed after powering on**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0~9999

Default value 300

0 8 5 **Fo speed of rapid running override for all axis(universal for all axis)**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0~1000

Default value 30

0 8 6 **Rapid localization and max. controlled speed in none-preread mode(universal for all axis)**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 300~30000

Default value 8000

0 8 7 **Rapid localization and min. controlled speed in none-preread mode(universal for all axis)**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0~300

Default value 0

0 8 8 **Max. controlled speed in preread mode(universal for all axis)**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 300~9999

Default value 6000

0 8 9 **Min. controlled speed in preread mode(universal for all axis)**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0~300

Default value 0

0 9 0	**X axis G0 rapid localization speed**
0 9 1	**Y axis G0 rapid localization speed**
0 9 2	**Z axis G0 rapid localization speed**
0 9 3	**4th axis G0 rapid localization speed**
0 9 4	**5th axis G0 rapid localization speed**

［Data unit］

Setting unit	Data unit
Metric input	mm/min
Inch input	inch/min

[Data range] 0～30000

Default value 5000

1 0 0	**Exponential acc/dec accelerated speed clamping constant**

［Data unit］ ms

［Data range］ 0~1000

Default value 50

1 0 2	**Max. clamping speed when MPG runs imcompletely**

［Data unit］

Setting unit	Data unit
Metric input	mm/min
Inch input	inch/min

[Data range] 0～3000

Default value 2000

1 0 3	**Accelerated speed clamping constant when MPG runs imcompletely**

[Data range] 0～1000

Default value 50

1 0 4 **MPG linear acc/dec time constant**

［Data unit］ ms

[Data range] 1～4000

Default value 120

1 0 5 **MPG exponential acc/dec time constant**

［Data unit］ ms

[Data range] 0～4000

Default value 80

1 0 8 **Maximum clamp speed of step feed**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

[Data range] 0～3000

Default value 1000

1 1 0 **Feedrate of manual continuous feed for axes (JOG)**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

[Data range] 0～9999

Default value 2000

1 1 1 **Linear acc/dec time constant when every axis manual feeds**

［Data unit］ ms

[Data range] 0～400

Default value 100

1	1	2	**Exponential acc/dec time constant when every axis manual feeds**

［Data unit］ ms

［Data range］ 0～400

Default value 120

1	1	3	**X axis manual rapid localization speed**
1	1	4	**Y axis manual rapid rapid localization speed Z**
1	1	5	**axis manual rapid rapid localization speed 4th**
1	1	6	**axis manual rapid rapid localization speed 5th**
1	1	7	**axis manual rapid rapid localization speed**

［Data unit］

Setting unit	Data unit
Metric input	mm/min
Inch input	inch/min

［Data range］ 0～30000

Default value 5000

1	2	0	**Front acceleration&deceleration linear time constant of X axis rapid traverse**
1	2	1	**Front acceleration&deceleration linear time constant of Y axis rapid traverse**
1	2	2	**Front acceleration&deceleration linear time constant of Z axis rapid traverse**
1	2	3	**Front acceleration&deceleration linear time constant of 4th axis rapid traverse**
1	2	4	**Front acceleration&deceleration linear time constant of 5th axis rapid traverse**

［Data unit］ ms

［Data range］ 3～400

Default value 100

1	2	5	**Front acceleration&deceleration S type time constant of X axis rapid traverse**
1	2	6	**Front acceleration&deceleration S type time constant of Y axis rapid traverse**
1	2	7	**Front acceleration&deceleration S type time constant of Z axis rapid traverse**
1	2	8	**Front acceleration&deceleration S type time constant of 4th axis rapid traverse**
1	2	9	**Front acceleration&deceleration S type time constant of 5th axis rapid traverse**

［Data unit］ ms

［Data range］ 3～400

Default value 100

1	3	0	**Rear acceleration&deceleration linear time constant of X axis rapid traverse**
1	3	1	**Rear acceleration&deceleration linear time constant of Y axis rapid traverse**
1	3	2	**Rear acceleration&deceleration linear time constant of Z axis rapid traverse**
1	3	3	**Rear acceleration&deceleration linear time constant of 4th axis rapid traverse**
1	3	4	**Rear acceleration&deceleration linear time constant of 5th axis rapid traverse**

［Data unit］ ms

［Data range］ 3～400

Default value 80

1	3	5	**Rear acceleration&deceleration S type time constant of X axis rapid traverse**
1	3	6	**Rear acceleration&deceleration S type time constant of Y axis rapid traverse**
1	3	7	**Rear acceleration&deceleration S type time constant of Z axis rapid traverse**
1	3	8	**Rear acceleration&deceleration S type time constant of 4th axis rapid traverse**
1	3	9	**Rear acceleration&deceleration S type time constant of 5th axis rapid traverse**

［Data unit］ ms

［Data range］ 3～400

Default value 60

1	4	0	**Max. number of merged program segment in none-preread mode**

［Data range］ 0～10

Default value 0

1	4	1	**Controlled precision of merged program segment in none-preread mode**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0.001～0.5

Default value 0.01

1	4	2

In place precision of cutting feed in none-preread mode

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0.001～0.5

Default value 0.03

1	4	4

Front acc.&dec. linear time constant of cutting feed in none-preread mode

［Data unit］ ms

［Data range］ 3～400

Default value 100

1	4	5

Front acc.&dec. s type time constant of cutting feed in none-preread mode

［Data unit］ ms

［Data range］ 3～400

Default value 100

1	4	6

Rear acc.&dec. linear time constant of cutting feed in none-preread mode

［Data unit］ ms

［Data range］ 3～400

Default value 80

1	4	7

Rear acc.&dec. exponential time constant of cutting feed in none-preread mode

［Data unit］ ms

［Data range］ 3～400

Default value 60

1 4 8 **Min. speed of exponential acc.&dec. in none-preread mode**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0～9999

Default value 10

1 5 0 **Max. number of merged program segment in preread mode**

［Data range］ 0～15

Default value 0

1 5 1 **Controlled precision of merged program segment in preread mode**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0.001～0.5

Default value 0.01

1 5 2 **In place precision of cutting feed in preread mode**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0.01～0.5

Default value 0.01

1 5 4 **Front acc.&dec. linear time constant of cutting feed in preread mode**

［Data unit］

Setting unit	Data unit
Metric input	mm/s/s
Inch input	inch/s/s

［Data range］ 0～2000

Default value 250

1	5	5

Front acc.&dec. s type time constant of cutting feed in preread mode

［Data unit］ ms

［Data range］ 3～400

Default value 100

1	5	6

Rear acc.&dec. linear time constant of cutting feed in preread mode

［Data unit］ ms

［Data range］ 3～400

Default value 80

1	5	7

Rear acc.&dec. exponential time constant of cutting feed in preread mode

［Data unit］ ms

［Data range］ 3～400

Default value 60

1	5	8

Min. speed of exponential acc.&dec. in preread mode

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0～400

Default value 10

1	6	0

2 program segment critical angle of automatic corner deceleration in preread mode

［Data unit］ angle

［Data range］ 1～45

Default value 5

1 6 1 **Min. feed speed of automatic corner deceleration in preread mode**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 10～1000

Default value 120

1 6 2 **Every axis allowable deviation for deceleration function in speed difference way in preread mode**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 60～1000

Default value 80

1 6 3 **Precision level of cutting machining in preread mode**

［Data range］ 0～8

Default value 2

1 6 5 **Length condition of forming spline in preread mode**

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ 0.5～5

Default value 3

166 **Angle condition of forming spline in preread mode**

［Data unit］ angle

［Data range］ 0～30

Default value 5

170 **Accelerated speed limit outside circular interpolation**

［Data unit］

Setting unit	Data unit
Metric machine	mm/s/s
Inch machine	inch/s/s

［Data range］ 100～5000

Default value 1000

171 **Low speed lower bound of accelerated speed-clamped outside circular interpolation**

［Data unit］

Setting unit	Data unit
Metric machine	mm/min
Inch machine	inch/min

［Data range］ 0～2000

Default value 200

172 **Controlled precision of circular interpolation**

［Data range］ 0～0.5

Default value 0.03

173 **Limit value of circular radius error**

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ 0.0001～1

Default value 0.01

1	8	0
1	8	1
1	8	2
1	8	3
1	8	4

Pitch error compensation No. of the X axis reference point
Pitch error compensation No. of the Y axis reference point
Pitch error compensation No. of the Z axis reference point
Pitch error compensation No. of the 4th axis reference point
Pitch error compensation No. of the 5th axis reference point

［Data range］ 0～255

Default value 0

1	8	5
1	8	6
1	8	7
1	8	8
1	8	9

Pitch error compensation points of the X axis
Pitch error compensation points of the Y axis
Pitch error compensation points of the Z axis
Pitch error compensation points of the 4th axis
Pitch error compensation points of the 5th axis

［Data range］ 0～256

Default value 256

1	9	0
1	9	1
1	9	2
1	9	3
1	9	4

Pitch error compensation interval of the X axis
Pitch error compensation interval of the Y axis
Pitch error compensation interval of the Z axis
Pitch error compensation interval of the 4th axis
Pitch error compensation interval of the 5th axis

［Data unit］

Setting unit	Data unit
Metric input	mm
Inch input	inch

［Data range］ 0～9999.9999

Default value 5

195	**Pitch error compensation override of the X axis**
196	**Pitch error compensation override of the Y axis**
197	**Pitch error compensation override of the Z axis**
198	**Pitch error compensation override of the 4th axis**
199	**Pitch error compensation override of the 5th axis**

［Data range］ 0～99.9999

Default value 0.001

200 **Spindle upper limit speed**

［Data unit］ r/min

［Data range］ 0～99999

Default value 6000

201 **Spindle encoder lines**

［Data unit］ line/r

[Data range] 100～5000

Default value 1024

202 **The Max. setting value of the frequency-converter**

［Data range］ 4000～65536

Default value 65535

203 **Spindle override lower limit**

［Data range］ 0～1

Default value 0

2 0 5	**Gain adjustment data for spindle analog output**
［Data range］	0.98～1.02
Default value	1

2 0 6	**Compensation value of offset voltage for spindle analog output**
［Data range］	-0.2～
Default value	0.2 0

2 0 8	**Spindle speed in the spindle orientation or JOG**
［Data unit］	r/min
［Data range］	0～9999
Default value	50

2 0 9	**Spindle upper limit speed in tapping cycle**
［Data unit］	r/min
［Data range］	0～5000
Default value	2000

2 1 0 2	**Spindle maximum speed to gear 1**
1 1 2	**Spindle maximum speed to gear 2**
1 2	**Spindle maximum speed to gear 3**
［Data unit］	r/min
［Data range］	0~99999
Default value	6000

2 1 4	Output voltage(mV) when spindle shifts gear

［Data unit］ mV

［Data range］ 0~10000

Default value 100

2 2 02	Tooth number of spindle side gear (the 1st gear)
2 12	Tooth number of spindle side gear (the 2nd gear)
2 2	Tooth number of spindle side gear (the 3rd gear)

［Data range］ 1~999

Default value 1

2 2 32	Tooth number of position encoder side gear (the 1st gear)
2 42	Tooth number of position encoder side gear (the 2nd gear)
2 5	Tooth number of position encoder side gear (the 3rdgear)

［Data range］ 1~999

Default value 1

2 3 02	Spindle instruction multiplication coefficient (CMR) in tapping(the 1st gear)
3 12	Spindle instruction multiplication coefficient (CMR) in tapping(the 2nd gear)
3 2	Spindle instruction multiplication coefficient (CMR) in tapping(the 3rd gear)

［Data range］ 1~999

Default value 512

2 3 32	Spindle instruction frequency division coefficient (CMD) in tapping(the 1st gear)
3 42 3	Spindle instruction frequency division coefficient (CMD) in tapping(the 2nd gear)
5	Spindle instruction frequency division coefficient (CMD) in tapping(the 3rd gear)

［Data range］ 1~999

Default value 215

2402
412
42

Spindle clearance in rigid tapping (the 1st gear)

Spindle clearance in rigid tapping (the 2nd gear)

Spindle clearance in rigid tapping (the 3rd gear)

［Data unit］

Setting unit	Data unit
Metric input	mm
Inch input	inch

［Data range］ 0~99.9999

Default value 0

2442
452
46

Maximum spindle speed in rigid tapping (the 1st gear)

Maximum spindle speed in rigid tapping (the 2nd gear)

Maximum spindle speed in rigid tapping (the 3rd gear)

［Data unit］［ r/min

Data range］ 0~9999

Default value 6000

2502
512
52

Linear acc./dec. time constants of spindle and tapping axis (the 1st gear)

Linear acc./dec. time constants of spindle and tapping axis (the 2nd gear)

Linear acc./dec. time constants of spindle and tapping axis (the 3rd gear)

［Data unit］［ ms

Data range］ 0~9999

Default value 200

2532
5425
5

Linear acc./dec. time constant of spindle and tapping axis in retraction(the 1st gear)

Linear acc./dec. time constant of spindle and tapping axis in retraction(the 2nd gear)

Linear acc./dec. time constant of spindle and tapping axis in retraction(the 3rd gear)

［Data unit］［ r/min

Data range］ 0~9999

Default value 200

260	External workpiece' origin offset amount along the X axis
261	External workpiece' origin offset amount along the Y axis
262	External workpiece' origin offset amount along the Z axis
263	External workpiece' origin offset amount along the 4th axis
264	External workpiece' origin offset amount along the 5th axis

［Data unit］

Setting unit	Data unit
Metric input	mm
Inch input	inch

［Data range］ -999.999~999.9999

Default value 0

265	Workpiece' origin offset amount along X axis in workpiece coordinate1 in G54
266	Workpiece' origin offset amount along Y axis in workpiece coordinate1 in G54
267	Workpiece' origin offset amount along Z axis in workpiece coordinate1 in G54
268	Workpiece' origin offset amount along 4th axis in workpiece coordinate1 in G54
269	Workpiece' origin offset amount along 5th axis in workpiece coordinate1 in G54
270	Workpiece' origin offset amount along X axis in workpiece coordinate1 in G55
271	Workpiece' origin offset amount along Y axis in workpiece coordinate1 in G55
272	Workpiece' origin offset amount along Z axis in workpiece coordinate1 in G55
273	Workpiece' origin offset amount along 4th axis in workpiece coordinate1 in G55
274	Workpiece' origin offset amount along 5th axis in workpiece coordinate1 in G55
275	Workpiece' origin offset amount along X axis in workpiece coordinate1 in G56
276	Workpiece' origin offset amount along Y axis in workpiece coordinate1 in G56
277	Workpiece' origin offset amount along Z axis in workpiece coordinate1 in G56
278	Workpiece' origin offset amount along 4th axis in workpiece coordinate1 in G56
279	Workpiece' origin offset amount along 5th axis in workpiece coordinate1 in G56
280	Workpiece' origin offset amount along X axis in workpiece coordinate1 in G57
281	Workpiece' origin offset amount along Y axis in workpiece coordinate1 in G57
282	Workpiece' origin offset amount along Z axis in workpiece coordinate1 in G57
283	Workpiece' origin offset amount along 4th axis in workpiece coordinate1 in G57
284	Workpiece' origin offset amount along 5th axis in workpiece coordinate1 in G57
285	Workpiece' origin offset amount along X axis in workpiece coordinate1 in G58
286	Workpiece' origin offset amount along Y axis in workpiece coordinate1 in G58
287	Workpiece' origin offset amount along Z axis in workpiece coordinate1 in G58
288	Workpiece' origin offset amount along 4th axis in workpiece coordinate1 in G58
289	Workpiece' origin offset amount along 5th axis in workpiece coordinate1 in G58

290	**Workpiece' origin offset amount along X axis in workpiece coordinate1 in G59**
291	**Workpiece' origin offset amount along Y axis in workpiece coordinate1 in G59**
292	**Workpiece' origin offset amount along Z axis in workpiece coordinate1 in G59**
293	**Workpiece' origin offset amount along 4th axis in workpiece coordinate1 in G59**
294	**Workpiece' origin offset amount along 5th axis in workpiece coordinate1 in G59**

［Data unit］

Setting unit	Data unit
Metric input	mm
Inch input	inch

［Data range］ -9999.999~999.9999

Default value 0

300 DNC mode select(0:U disk 1:Xon/Xoff 2:XModem)

［Data range］ 0～2

Default value 0

301 Baudrate of communication channel (DNC)

［Data unit］ bit/s

［Data range］ 2400,4800,9600,14400,19200,28800,38400,57600,115200

Default value 115200

302 Baudrate of communication channel (file transmission)

［Data unit］ bit/s

［Data range］ 2400,4800,9600,14400,19200,28800,38400,57600,115200

Default value 115200

303 Axes controlled by the CNC

［Data range］ 3～4

Default value 3

304 Current used ladder No.

［Data range］ 0～99

Default value 1

3	0	5

CNC language selection(0: CH 1: EN 2: RuS 3: ESP)

［Data range］ 0～3

Default value 0

3	1	3

Program name of the 4th axis(3:A 4:B 5:C)

［Data range］ 3～5

Default value 3

3	1	6

Incremental amount for automatic sequence number insertion

［Data range］ 0～1000

Default value 10

3	1	7

Tool offset heading number input by MDI disabled

［Data range］ 0～9999

Default value 10

3	1	8

Tool offset numbers input by MDI disabled

［Data range］ 0～9999

Default value 10

3	2	1

Output time of reset signal

［Data unit］ ms

［Data range］ 50~400

Default value 200

3	2	2

Bits allowable for M codes

［Data range］ 1～2

Default value 2

3	2	3

Bits allowable for S codes

［Data range］ 1～6

Default value 5

3 2 4

Bits allowable for T codes

［Data range］ 1～6

Default value 4

3 2 7

Axis as counting for surface speed control

［Data range］

Setting value	meaning
0	X axis
1	Y axis
2	Z axis
3	4th axis
4	5th axis

Default value 0

3 2 8

Spindle minimum speed for constant surface speed control (G96)

［Data unit］ r/min

［Data range］ 0~9999

Default value 100

3 3 0

Limit with vector ignored when moving along outside corner in tool radius compensation C

［Data unit］

Setting unit	Data unit
Metric intput	mm
Inch intput	inch

［Data range］ 0～9999.9999

Default value 0

3 3 1

Maximum value of tool wear compensation

［Data unit］

Setting unit	Data unit
Metric intput	mm
Inch intput	inch

［Data range］ 0～999.9999

Default value 400

3	3	2

Maximum error value of tool radius compensation C

［Data unit］

Setting unit	Data unit
Metric intput	mm
Inch intput	inch

［Data range］ 0.0001～0.01

Default value 0.001

3	3	3

Helical infeed radius coefficient in groove cycle

［Data range］ 0.01～3

Default value 1.5

3	3	4

Retraction amount of high-speed peck drilling cycle G73

［Data unit］

Setting unit	Data unit
Metric intput	mm
Inch intput	inch

［Data range］ 0～999.9999

Default value 2

3	3	5

Reserved space amount of canned cycle G83

［Data unit］

Setting unit	Data unit
Metric intput	mm
Inch intput	inch

［Data range］ 0～999.9999

Default value 2

3	3	6

Minimum dwell time at the hole bottom

［Data unit］ ms

［Data range］ 0~1000

Default value 250

337	Maximum dwell time at the hole bottom
［Data unit］	ms
［Data range］	1000~9999
Default value	9999

338	Override for retraction in rigid tapping
［Data range］	0.8～1.2
Default value	1

339	Retraction or spacing amount in peck tapping cycle
［Data unit］	

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］	0～100
Default value	0

342	Rotational angle with no rotational angle specified in G68 coordinate rotation
［Data unit］	angle
［Data range］	0~9999.9999
Default value	0

344	Scaling with no scaling specified
［Data range］	0.0001～9999.9999
Default value	1

345	Scaling override of the X axis
［Data range］	0.0001～9999.9999
Default value	1

3	4	6

Scaling override of the Y axis

［Data range］ 0.0001～9999.9999

Default value 1

3	4	7

Scaling override of the Z axis

［Data range］ 0.0001～9999.9999

Default value 1

3	5	0

Dwell time unidirectional positioning

［Data unit］ s

［Data range］ 0~10

Default value 0

3	5	1
3	5	2
3	5	3
3	5	4
3	5	5

External workpiece' origin offset amount along the X axis

External workpiece' origin offset amount along the Y axis

External workpiece' origin offset amount along the Z axis

External workpiece' origin offset amount along the 4th axis

External workpiece' origin offset amount along the 5th axis

［Data unit］

Setting unit	Data unit
Metric machine	mm
Inch machine	inch

［Data range］ -99.999~99.9999

Default value 0

3	6	0

Number of machined workpiece

［Data range］ 0～9999

Default value 0

3	6	1

Total workpiece to be machined

［Data range］ 0～9999

Default value 0

Chapter 4 Machine Debugging Methods and Modes

The trial run methods and steps at initial power on for this GH1000MC-V are described in this chapter. The corresponding operation can be performed after the debugging by the following steps.

■ Emergency Stop and Limit

GH1000MC-V system has a software limit function. It is suggested that hardware limit should be employed by fixing the stroke limit switches in the positive or negative axis. The connection is as follows (taking example of 2 axes):

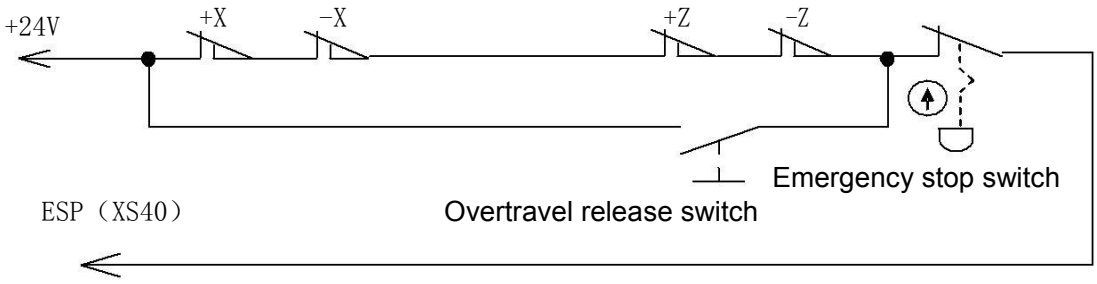


Fig. 4-1

So the BIT2 (MGHP) of bit parameter No.21 should be set to 0.

The diagnostic message DGN000.7 monitors the emergency stop input signal.

In Manual or MPG mode, slowly move the axes to testify the validity of stroke limit switch, correctness of alarm display, validity of overtravel release button. When the overtravel occurs or Emergency Stop button is pressed, “emergency stop” alarm will be issued by CNC system. The alarm can be cancelled by pressing down the OVERTRAVEL key for reverse moving.

■ Drive Unit Setting

BIT4, BIT3, BIT2, BIT1, BIT0 (5ALM, 4ALM, YALM, ZALM, XALM separately corresponds to 5th, 4th, Y, Z, X) of bit parameter No.009 for SZGHTECH drive unit are all set to 1 according to the alarm logic level of the drive unit.

If the machine moving direction is not consistent with the move code, modify BIT4, BIT3, BIT2, BIT1 and BIT0 (DIR5, DIR4, DIRY, DIRZ, DIRX separately corresponds to 5th, 4th, Y, Z, X) of bit parameter No.008.

The manual move direction can be set by BIT4,BIT3,BIT2,BIT1, BIT0 (5VAL, 4VAL, YVAL, ZVAL, XVAL separately corresponds to 5th, 4th, Y, Z, X movement key) of bit parameter No.175.

■ Gear Ratio Adjustment

№000～№009 can be modified for electronic gear ratio adjustment to meet the various mechanical transmission ratios when the machine travel distance is not consistent with the displacement distance displayed by the CNC.

Formula:

$$\frac{CMR}{CMD} = \frac{\delta * 360}{\alpha * L} * \frac{Z_M}{Z_D}$$

CMR: Code multiplier coefficient (data parameter No.000,No.001,No.002,No.003,No.004)

CMD: Code frequency division coefficient (data parameter No.005,No.006,No.007,No.008,No.009)

α : Pulse volume, motor rotation angle for a pulse

L: Screw lead

δ: Current min. input code unit of CNC

ZM : gear teeth number of lead screw

ZD: gear teeth number of motor

Example: if gear teeth number of lead is 50, gear teeth number of motor is 30, pulse volumer =0.075 degree,screw lead is 4mm.α

gear ratio is:

$$\frac{CMR}{CMD} = \frac{\delta \times 360}{\alpha \times L} \times \frac{Z_M}{Z_D} = \frac{0.001 \times 360}{0.075 \times 4} \times \frac{50}{30} = \frac{2}{1}$$

■ Acceleration & Deceleration Characteristic Adjustment

Adjust the relative CNC parameters according to the factors such as the drive unit, motor characteristics and machine load:

Data parameter No.090~No.094,No.113~No.117: rapid traverse rate of each axis;

Data parameter No.120~No.139: ACC&DEC time constant of each axis rapid traverse rate;

Data parameter No.111~No.112: ACC&DEC time constant in manual feeding for every axis;

Data parameter No.154: Front acc.&dec. linear time constant of cutting feed in preread mode(mm/s/s);

Data parameter No.102~No.105: ACC&DEC time constant and MPG spped;

Data parameter No.108: Maximum clamp speed of step feed;

Data parameter No.110: Feedrate of manual continuous feed for axes (JOG);

The larger the ACC&DEC time constant is, the slower the ACC&DEC is, the smaller the machine movement impact and the lower the machining efficiency is, and vice versa.

If ACC&DEC time constants are equal, the higher the ACC&DEC start/end speed is, the faster the ACC&DEC is, the bigger the machine movement impact and the higher the machining efficiency is, and vice versa.

The principle for ACC&DEC characteristic adjustment is to properly reduce the ACC&DEC time constant and increase the ACC&DEC start/end speed to improve the machining efficiency on the condition that there is no alarm, motor out-of-step and obvious machine impact. If the ACC&DEC time constant is set too small, and the start/end speed is set too large, it is easily to cause faults such as drive unit alarm, motor out-of-step or machine vibration.

■ Machine zero adjustment

Related signal

DECX：X axis deceleration signal；

DECY：Y axis deceleration signal；

DECZ：Z axis deceleration signal；

DEC4：4TH axis deceleration signal；

DEC5：5TH axis deceleration signal；

DGN DATA

0	0				DEC5	DEC4	DECZ	DECY	DECX
0					CN61.34	CN61.33	CN61.12	CN61.32	CN61.4

Interface pin

Control PAR

	DEC4T	DECY	DECZ	DECX				
K	2	2						

DEC4T=0：4th decelerates signal is low level；=1：4th decelerates signal is high level。

DECY=0：Y decelerates signal is low level；=1：Y decelerates signal is high level。

DECZ=0：Z decelerates signal is low level；=1：Z decelerates signal is high level。

DECX=0：X decelerates signal is low level；=1：X decelerates signal is high level。

0	0	6					ZPLS			ZMOD

ZMOD =1: Zero return mode selection: in front of the block.
=0: Zero return mode selection: behind the block.

ZPLS =1: Zero type selection: one-revolution signal
=0: Zero type selection: non-one-revolution signal

0	1	2								ISOT

ISOT=1：After electric power, the machine can move quickly and effectively；=0：After the power, the machine to the zero point, the manual is invalid。

					ZMI5	ZMI4	ZMIZ	ZMIY	
0	2	6				ZMIX			

MZRX=1：Set the direction of the axis returning to the reference point: nagative direction；=0：Set the direction of the axis returning to the reference point: positive direction

Data PAR

0	8	0	ZRNFL

ZRNFL：Low rate back to zero。

0	7	0	ZRNFHX

ZRNFHX：X high rate back to zero。

0	7	1	ZRNFHY

ZRNFHY：Y high rate back to zero。

0	7	2	ZRNFHZ

ZRNFHZ：Z high rate back to zero。

0	7	3	ZRNFH4

ZRNFH4：4th high rate back to zero。

0	7	4	ZRNFH5

ZRNFH5：5th high rate back to zero。

Adjust the relevant parameters based on the active level of the connection signal, zero return type and direction applied:

BIT4, BIT5, BIT6，BIT7 of the K parameter No.022: valid level of deceleration signal as machine zero return

BIT0(ZMOD) of the bit parameter No.006: Zero return mode selection:(0:behind the block 1:in front of the block)

BIT3(ZPLS) of the bit parameter No.006: Zero type selection: (0:no 1:yes) have one-revolution signal

Data parameter No.080: low deceleration speeds of each axis in machine zero return.

Data parameter No.070~No.074：high speed of each axis in machine zero return.

BIT0, BIT1, BIT2, BIT3, BIT4(ZMIX, ZMIY, ZMIZ, ZMI4, ZMI5) of the bit parameter No.026: each axis zero return direction: negative or positive.

Only the stroke limit switch validity is confirmed, can the machine zero return be performed.

The machine zero is usually fixed at the max. travel point, and the effective stroke of the zero return touch block should be more than 25mm to ensure a sufficient deceleration distance for accurate zero return. The more rapid the machine zero return is, the longer the zero return touch block should be. Or the moving carriage will rush over the block and it may affect the zero return precision because of the insufficient deceleration distance.

Usually there are 2 types of machine zero return connection:

① The connection to AC servo motor: using a travel switch and servo motor one-turn signal separately

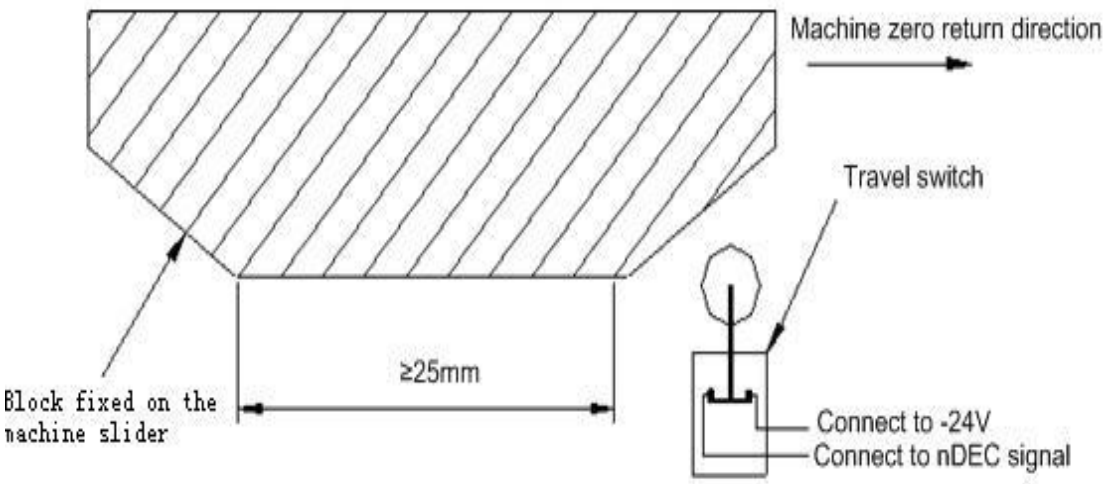


Fig. 4-2

By this connection, when the deceleration switch is released in machine zero return, the one-turn signal of encoder should be avoided to be at a critical point after the travel switch is released. In order to improve the zero return precision, and it should ensure the motor reaches the one-turn signal of encoder after it rotates half circle.

The parameter setting is as follows:

Bit parameter No.006 BIT0(ZMOD) =0

Bit parameter No.006 BIT3(ZPLS) =1

Data parameter No.080=200

Bit parameter No.026 BIT0(ZMIX) , BIT1(ZMIY) , BIT2(ZMIZ), BIT3(ZMI4) , BIT4(ZMI5) =0

② The connection to stepper motor: schematic diagram of using a proximity switch taken as both deceleration signal and zero signal

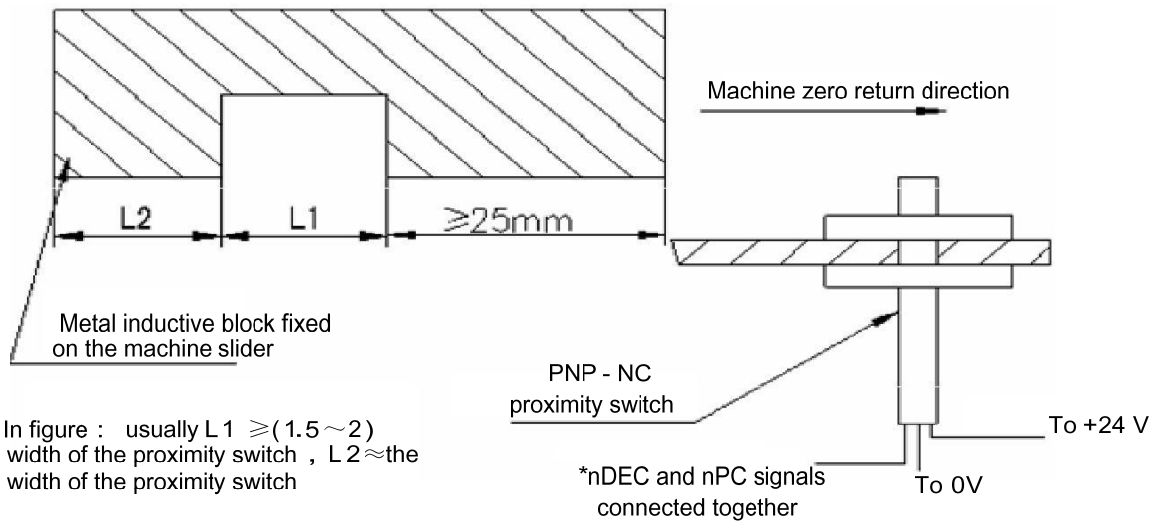


Fig. 4-3

When matching the stepper motor, the parameter settings are as follows:

Bit parameter No.006 BIT5(ZMOD) =0

Bit parameter No.006 BIT3(ZPLS) =0

Data parameter No.080=200

Data parameter No.026 BIT0(ZMIX), BIT1(ZMIY), BIT2(ZMIZ), BIT3(ZMI4), BIT4(ZMI5) =0

■ Spindle adjustment

■ Spindle encoder

Encoder with the pulses 100~5000p/r is needed to be installed on the machine for flexible tapping. The pulses are set by data parameter No.201. The transmission ratio(spindle gear teeth/ encoder gear teeth) between encoder and spindle is 1/255～255. The spindle gear teeth are set by CNC data parameter No.220, and the encoder gear teeth are set by data parameter No.223. Synchronous belt transmission should be applied for it (no sliding transmission).

■ Switch volume control of spindle speed

When the machine is controlled by a multi-speed motor, the motor speed codes are S01～S04. The relevant parameters are as follows:

State parameter No.001 Bit4=0: select spindle speed switch control.

■ Analog voltage control of spindle speed

This function can be obtained by the parameter setting of CNC. By interface outputting 0V～10V analog voltage to control frequency inverter, the stepless shift can be obtained. And the related parameters needed to be adjusted are:

Bit parameter No.001 Bit4=1: for spindle speed analog voltage control;

Data parameter No.026: offset value(mv) as spindle speed code voltage is 10V;

Data parameter No.210～ No.212: max. spindle speed of each gear;

Basic parameters are needed to adjust the inverter:

CW or CCW code mode selection:by common terminal VF;

Frequency setting mode selection:by common terminal FR;

The concrete is referred to the user manual about inverter.

When the speed by programming is not consistent with that detected by the encoder, it can be adjusted to be consistent with the actual one by adjusting the data parameter No.210～No.212.

Speed adjustment method: select the corresponding spindle gear, determine the data parameter is 9999 as for this system gear, set the spindle override for 100%. Input spindle run command in MDI mode to run the spindle: M03/M04 S9999, view the spindle speed shown on the right bottom of the screen, then input the speed value displayed into the corresponding system parameter.

When entering S9999 code, the voltage should be 10V, S0 for 0V. If there is a voltage error, adjust bit parameter No.0206 to correct the voltage offset value (corrected by manufacturer, usually not needed).

For the max. speed of current gear, w the analog voltage output by CNC is not 10V, the CNC output analog voltage is set 10V by adjusting the data parameter No.206;

If the machine is not fixed with an encoder, the spindle speed can be detected by a speed sensing instrument, input S9999 in MDI mode to set the speed value displayed by the instrument into the data parameter No.210～No.212.

■ Backlash Offset

The backlash offset is input by actual measured offset The unit is mm or inch.It can be measured by a dial indicator,micrometer or a laser detector.Because the backlash offset can improve the machining precision only by accurate compensation, it is not recommended to measure it in MPG or Step mode, but the following method is suggested:

- Program editing (taking example of Z)

O0001；

N10 G01 Z10 F800 G91；

N20 Z15 ；

N30 Z1 ；

N40 Z-1 ；

N50 M30 。

- Set the backlash error offset to 0 before measuring;
- Run the program by single blocks, search the measuring benchmarkA after 2 positioning operations, record the current data, move 1mm in the same direction, then move 1mm to point B reversely, read the current data.

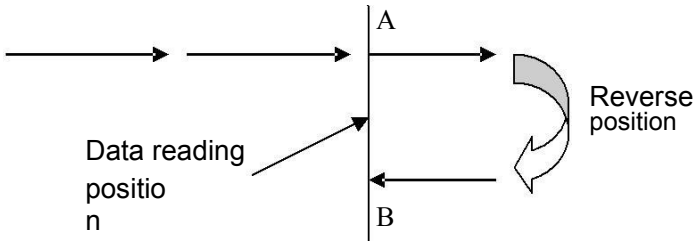


Fig. 4-4 Schematic map of backlash measuring method

- Backlash error offset value= | data of point A –data of point B |; then input its outcome to the CNC data parameter No.031~No.035.

Data A: dial-indicator data at point A

Data B: dial-indicator data at point B

Note 1: The backlash offset mode can be set by Bit7 of CNC parameter No.011; the Step size of backlash offset frequency can be set by data parameter No.036~No.040.

Note 2: Check the machine backlash every 3 months.

■ Step/MPG Adjustment

The key on the panel can be used to select the Step mode or MPG mode, which is set by the BIT3 of bit parameter No.001.

Bit3 =1: MPG mode is active, Step mode inactive;

=0: Step mode is active, MPG mode inactive;

■ Other Adjustment

0	2	1								MSP	MST

MST =0: External Cycle Start(ST) signal valid;

=1: External Cycle Start(ST) signal invalid.

MSP =0: External Stop(SP) signal valid.It is must connected with an external stop switch, or “HALT”will be shown by CNC

=1: External Dwell(SP) signal invalid.

CHAPTER 5 DIAGNOSIS MESSAGE

Diagnosis messages for GH1000MC system are described in this chapter.

■ CNC diagnosis

The part is used to check the CNC interface signals and internal running and it can't be modified.

■ I/O status and data diagnosis message

0 0 0 Pin	ESP	***	***	DEC5	DEC4	DECZ	DECY	DECX
	CN61.6			CN61.34	CN61.33	CN61.12	CN61.32	CN61.4
PLC fixed address	X0.5			X2.5	X2.4	X1.3	X2.3	X0.3

DECX, DECY, DECZ, DEC4, DEC5：machine zero return signal of X, Y, Z, 4th, 5th

ESP: emergency stop signal

0 0 1	***	***	***	***	***	***	***	SKIP
Pin								CN61.42
PLC fixed address								X3.5

SKIP：skip signal

■ CNC motion state and data diagnosis message

0 0 4	***	***	***	EN5	EN4	ENZ	ENY	ENX

EN5～ENX：enabling signal

0 0 5	***	***	***	SET5	SET4	SETZ	SETY	SETX

SET5～SETX： pulse prohibit signal

0 0 6	***	***	***	DRO5	DRO4	DROZ	DROY	DROX

DRO5～DROX：X, Y, Z, 4th, 5th motion direction output

0 0 9	***	***	***	5ALM	4ALM	ZALM	YALM	XALM

5ALM～XALM： X, Y, Z, 4th, 5th axis alarm signal

0	9	0	X output pulse quantity
0	9	1	Z output pulse quantity
0	9	2	Y output pulse quantity
0	9	3	4TH output pulse quantity
0	9	4	5TH output pulse quantity
1	4	0	MPG count value
1	4	4	Spindle encoder count value

■ Diagnosis keys

DGN.010～DGN.016 are the diagnosis messages of edit keypad keys; When pressing a key in the operation panel, the corresponding bit displays “1”, and “0” after releasing this key. If it displays reversely, it means there is a fault in the keypad circuit.

0 1 0	9	8	7	P/Q	G	N	O	RST
Key	9	8	7	P Q	G *	N #	O ␣	// RESET //

0 1 1	6	5	4	W	U	Z	X	PGU
Key	6	5	4	U W	Z :	Y &	X	

0 1 2	3	2	1	R	K	J	I	PGD
Key	3	2	1	R V	K C	J B	I A	

0 1 3	-	0	.	T	S	M	RIGHT	CRU
Key	−+ >	0	. / <	T	S]	M [	⇨	⇧

0 1 4	ALT	INS	EOB	F/E	D/L	H	LEFT	CRD
Key	ALTER	INSERT	EOB	F E	D L	H =	⇦	⇩

0 1 5	PLC	DGN	PAR	SET	ALM	OFT	PRG	POS
Key	PLC	DIAGNOSE	PARAMETER	SETTING	ALARM	OFFSET	PROGRAM	POSITION

0 1 6	IN	OUT	CHG	CAN	DEL	***	***	***
Key	DATA INPUT	DATA OUTPUT	CHANGE	CANCEL	DELETE			

5.1.4 Others

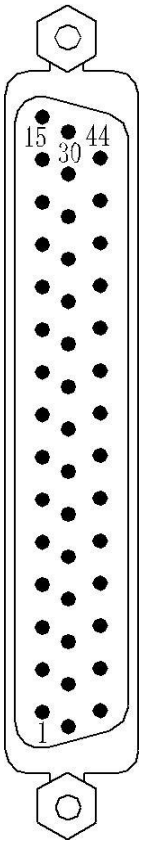
1	4	5
1	4	6

PLC execution time(ms)
Execution all time (h)

■ PLC state

This part of diagnosis is used to detect the signal state of machine→PLC(X), PLC→machine(Y), CNC→PLC (F), PLC→CNC (G) and alarm address A, and internal relay (R, K) states.

■ X address (machine→PLC , defined by standard PLC ladders)

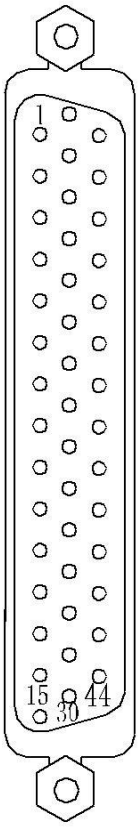


(CN61)

PIN	Address	Function	Explain
21 ～ 24	0V	Power on	Power 0V
18 ～ 20 25 ～ 28	Floating	Floating	Floating
1	X0.0	SAGT	Guard door check signal
2	X0.1	SP	external pause
3	X0.2	THAN	External manual clamp/loose tool
4	X0.3	DECX	X deceleration signal
5	X0.4		Retention
6	X0.5	GHP	emergency stop signal
7	X0.6	LIMU	Release overtravel input signal
8	X0.7	PRGH	Pressure detecion input signal
9	X1.0	TOPE	Spindle tool loose in-position signal
10	X1.1	TCLO	Spindle tool clamp in-posotion signal
11	X1.2	TZER	Tool magazine return zero key signal
12	X1.3	DECZ	Z deceleration signal
13	X1.4	ST	External cycle start
14	X1.5	M41I	Spindle auto gear shift 1-gear in-position
15	X1.6	M42I	Spindle auto gear shift 2-gear in-position
16			
29	X2.0	TFRX	Tool magazine forward in-position signal
30	X2.1	TBAX	Tool magazine backward in-position signal
31	X2.2	TCUX	Tool magazine count switch signal
32	X2.3	DEXY	X deceleration signal
33	X2.4	DEC4	4TH deceleration signal
34	X2.5	TZEX	Tool magazine return zero in-position signa
35	X2.6	TRSW	Current tool pan tool detection switch signa
36	X2.7	TMSW	Spindle tool detection switch signal
37	X3.0	LMIX	X overtravel input

38	X3.1	LMIY	Y overtravel input
39	X3.2	LMIZ	Z overtravel input
40	X3.3	TCW	Tool CW key signla
41	X3.4	TCCW	Tool CCW key signal
42	X3.5	SKIP	G31 skip signal
43	X3.6	TFRX	Tool magazine forward key signal
44	X3.7	TBAX	Tool magazine backward key signal

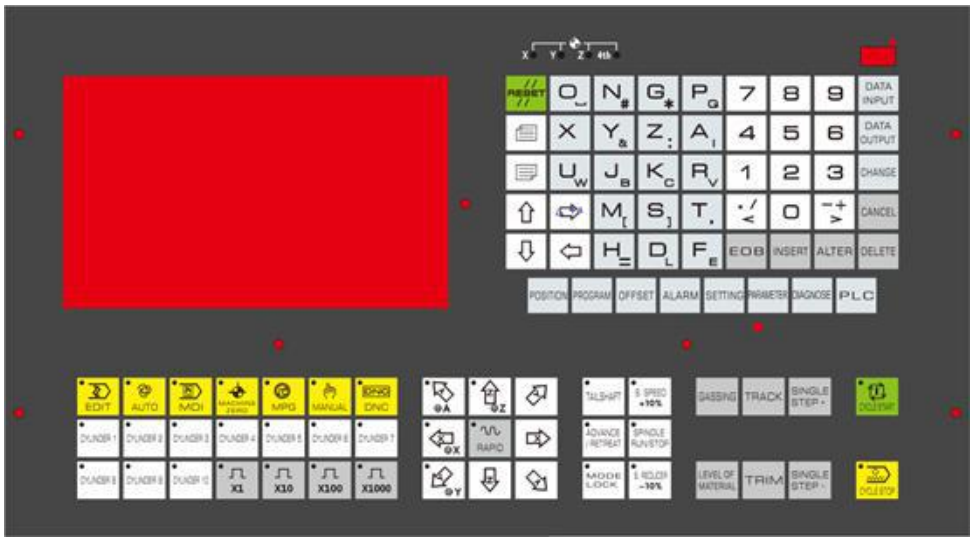
■ Y address (PLC→machine, defined by standard PLC ladders)



(CN62)

PIN	Address	function	Explain
17 ～ 19 26 ～ 28	0V	Power on	Power 0V
20 ～ 25	+24V	Power on	Power＋ 24V
1	Y0.0	COOL	cooling output
2	Y0.1	M32	lubricating output
3	Y0.2	TCLA	1/0 Tool loose/clamp
4	Y0.3	M03	Spindle rotation CW
5	Y0.4	M04	Spindle rotation CCW
6	Y0.5	M05	Spindle stop
7	Y0.6	SCLP	Spindle clamped
8	Y0.7	SPZD	Spindle brake
9	Y1.0	S1/M41	Spindle mechanical 1-gear
10	Y1.1	S2/M42	Spindle mechanical 2-gear
11	Y1.2	S3/M43	Spindle mechanical 3-gear
12	Y1.3	S4/M44	Spindle mechanical 4-gear
13	Y1.4		Spindle tool loose indicator
14	Y1.5		Retention
15	Y1.6		Retention
16	Y1.7		Retention
29	Y2.0	TLP	Retention
30	Y2.1		Retention
31	Y2.2	CLPY	Three-color yellow-lamp
32	Y2.3	CLPG	Three-color green-lamp
33	Y2.4	CLPR	Three-color red-lamp
34	Y2.5		Retention
35	Y2.6		Retention
36	Y2.7		Retention
37	Y3.0	STAO	Spindle oriented output signal
38	Y3.1	TCCY	Tool magazine totation CW
39	Y3.2	TCWY	Tool magazine totation CCW
40	Y3.3	TFRY	Tool magazine forward
41	Y3.4	TBAY	Tool magazine backward
42	Y3.5	TBAL	Tool magazine backward indicator
43	Y3.6		Retention
44	Y3.7		Retention

■ Machine panel



GH1000MC machine panel

5.2.4 F address(CNC→PLC)

F000	OP	SA	STL	SPL	***	***	***	

OP: Auto run signal
SA: Servo ready signal
STL: Cycle start indicator signal
SPL: Feed hold indicator signal

F001	MA	***	TAP	ENB	DEN	***	RST	AL

MA: CNC ready signal
TAP: Tapping signal
ENB: Spindle enable signal
DEN: Designation end signal
RST: Reset signal
AL: Alarm signal

F002	MDRN	CUT	MSTOP	SRNMV	THRD		RPDO	

MDRN: Dry run detection signal
CUT: Cutting feed signal
MSTOP: Select stop detection signal
SRNMV: Program start signal
THRD: Threading signal
RPDO: Rapid feed signal

F003	***	MEDT	MMEM	MRMT	MMDI	MJ	MH	MINC

MEDT: Memory edit selection detection signal
MMEM: Auto run selection detection signal
MRMT: DNC run selection detection signal
MMDI: MDI selection detection signal
MJ: JOG selection detection signal
MH: MPG selection detection signal
MINC: Increment feed detection signal

F004	***	MPST	MREF	MAFL	MSBK	MABSM	MMLK	MBDT

MPST: Program beginning return detection signal
MREF: Manual reference return detection signal
MAFL: MST lock detection signal
MSBK: Single block detection signal
MABSM: Manaul absolute detection signal
MMLK: All machine axes lock detection signal
MBDT: Optional block skip detection signal

F007	***	***	***	***	TF	SF	***	MF

TF: Tool function strobe signal
SF: Spindle speed strobe signal
MF: MST function strobe signal

F009	DM00	DM01	DM02	DM30	***	***	***	RCT

DM00: M01 decoding signal
DM01: M02 decoding signal
DM02: M03 decoding signal
DM30: M04 decoding signal
RCT: executing changing tool

F010	MB07	MB06	MB05	MB04	MB03	MB02	MB01	MB00

MB07: Miscellaneous function code M07
MB06: Miscellaneous function code M06
MB05: Miscellaneous function code M05
MB04: Miscellaneous function code M04
MB03: Miscellaneous function code M03
MB02: Miscellaneous function code M02
MB01: Miscellaneous function code M01
MB00: Miscellaneous function code M00

F014							DRUN	PDBG

PDBG: PLC enter debug mode
DRUN: No switching signal

F015				EN5T	EN4T	ENZ		

EN5T: 5TH axis selection
EN4T: 4TH axis selection
ENY: Z axis selection

F018	. AR07	AR06 .	AR05	AR04	AR03	AR02	AR01	AR00

AR07:Actual speed of spindle AR07
AR06:Actual speed of spindle AR06
AR05:Actual speed of spindle AR05
AR04:Actual speed of spindle AR04
AR03:Actual speed of spindle AR03
AR02:Actual speed of spindle AR02
AR01:Actual speed of spindle AR01
AR00:Actual speed of spindle AR00

F019	AR15	AR14	AR13	AR12	AR11	AR10	AR09	AR08

AR15:Actual speed of spindle AR15
AR14:Actual speed of spindle AR14
AR13:Actual speed of spindle AR13
AR12:Actual speed of spindle AR12
AR11:Actual speed of spindle AR11
AR10:Actual speed of spindle AR10
AR09:Actual speed of spindle AR09
AR08:Actual speed of spindle AR08

F020							BCLP	BUCLP

BCLP: 4TH axis indexing table clamp signal
BUCLP: 4TH axis indexing table release signal

F022	SB07	SB06	SB05	SB04	SB03	SB02	SB01	SB00

SB07: Spindle speed code signal SB07
SB06: Spindle speed code signal SB06
SB05: Spindle speed code signal SB05
SB04: Spindle speed code signal SB04
SB03: Spindle speed code signal SB03
SB02: Spindle speed code signal SB02
SB01: Spindle speed code signal SB01
SB00: Spindle speed code signal SB00

F026	TB07	TB06	TB05	TB04	TB03	TB02	TB01	TB00

TB07: Tool code signal TB07
TB06: Tool code signal TB06
TB05: Tool code signal TB05
TB04: Tool code signal TB04
TB03: Tool code signal TB03
TB02: Tool code signal TB02
TB01: Tool code signal TB01
TB00: Tool code signal TB00

F030	R08O	R07O	R06O	R05O	R04O	R03O	R02O	R01O

R08O: S12 bit code signal R08O
R07O: S12 bit code signal R07O
R06O: S12 bit code signal R06O
R05O: S12 bit code signal R05O
R04O: S12 bit code signal R04O
R03O: S12 bit code signal R03O
R02O: S12 bit code signal R02O
R01O: S12 bit code signal R01O

F031	***	***	***	***	R12O	R11O	R10O	R09O

R12O: S12 bit code signal R12O
R11O: S12 bit code signal R11O
R10O: S12 bit code signal R10O
R09O: S12 bit code signal R09O

F032	X1000	X100	10	X1			RGSPM	RGSPP

X1000: Step X1000 soft key.
X100: Step X100 soft ke.
X10: Step X10 soft ke.
X1: Step X1 soft ke.
RGSPM: The reversal in rigid tapping
RGSPP: Rigid tapping spindle is in turn

F033	MTAP	DTAP						RTAP

MTAP: G63 tapping mode signal
DTAP: During rigid tapping signal
RTAP: Rigid tapping mode signal

F034	SSTOP	SCW	Z-	Z+	Y-	Y+	X-	X+

SSTOP：Spindle stop softkey

SCW：Rotating softkey

Z-: Z- softkey Z+：Z+ softkey

Y-: Y- softkey Y+: Y+ softkey

X-：X- softkey X+：X+ softkey

F035	SCCW	MSTOP	AFLO	BDTO	SBKO	MLKO	DRNO	QFAST

SCCW：Spindle rotate(CCW) softkey

MSTOP：Choose to stop softkey

AFLO：The auxiliary function lock key

BDTO：Hop key program

SBKO：Single program softkey

MLKO：Machine lock key

DRNO：Dry run softkey

QFAST：Fast moving softkey

F036	S-	S+	FAST-	FAST+			FEED-	FEED+

S-：Spindle override decrease soft key

S+：Spindle override increase soft key

FAST-：Rapid override decrease soft key

FAST+：Rapid override decrease soft key

FEED-：Feed override decrease soft key

FEED+：Feed override increase soft key

F037				ZP5	ZP4	ZP3	ZP2	ZP1

ZP5：Reference point return end signal ZP5

ZP4：Reference point return end signal ZP4

ZP3：Reference point return end signal ZP3

ZP2：Reference point return end signal ZP2

ZP1：Reference point return end signal ZP1

F038				MV5	MV4	MV3	MV2	MV1

MV5：Axis move signal MV5

MV4：Axis move signal MV4

MV3：Axis move signal MV3

MV2：Axis move signal MV2

MV1：Axis move signal MV1

F039					MVD5	MVD4	MVD3	MVD2	MVD1

MVD5: Axis move direction signal MVD5

MVD4: Axis move direction signal MVD4

MVD3: Axis move direction signal MVD3

MVD2: Axis move direction signal MVD2

MVD1: Axis move direction signal MVD1

F040					ZRF5	ZRF4	ZRF3	ZRF2	ZRF1

ZRF5: Reference point creation signal ZRF5

ZRF4: Reference point creation signal ZRF4

ZRF3: Reference point creation signal ZRF3

ZRF2: Reference point creation signal ZRF2

ZRF1: Reference point creation signal ZRF1

F041					ZP15	ZP14	ZP13	ZP12	ZP11

ZP15: 5TH axis 1st reference point return end signal

ZP14: 4TH axis 1st reference point return end signal

ZP13: Y axis 1st reference point return end signal

ZP12: Z axis 1st reference point return end signal

ZP11: X axis 1st reference point return end signal

F042					PRO5	PRO4	PRO3	PRO2	PRO1

PRO5: Program zero return end signal PRO5

PRO4: Program zero return end signal PRO4

PRO3: Program zero return end signal PRO3

PRO2: Program zero return end signal PRO2

PRO1: Program zero return end signal PRO1

F043								MSPHD

MSPHD: Spindle jog detection signal

F044				SIMSPL			FSCSL	

SIMSPL: Analog spindle valid

FSCSL: Cs contour control switch end signal

F047	Total tool number

F048		MST	MSP		MESP			

MST: Shield external cycle start signal

MSP: Shield external pause signal

MGHP: Shield external emergency stop sign

F051					VAL5	VAL4	VAL3	VAL2	VAL1

VAL5：5TH axis direction selection

VAL4：4TH axis direction selection

VALY：Y axis direction selection

VALZ：Z axis direction selection

VALX：X axis direction selection

F054	UO07	UO06	UO05	UO04	UO03	UO02	UO01	UO00

UO07: Macro output signal UO07

UO06: Macro output signal UO06

UO05: Macro output signal UO05

UO04: Macro output signal UO04

UO03: Macro output signal UO03

UO02: Macro output signal UO02

UO01: Macro output signal UO01

UO00: Macro output signal UO00

F0055	UO15	UO14	UO13	UO12	UO11	UO10	UO09	UO08

UO15: Macro output signal UO15

UO14: Macro output signal UO14

UO13: Macro output signal UO13

UO12: Macro output signal UO12

UO11: Macro output signal UO11

UO10: Macro output signal UO10

UO09: Macro output signal UO09

UO08: Macro output signal UO08

F057				ZP25	ZP24	ZP23	ZP22	ZP21

ZP25：5TH axis 2nd reference point return end signal

ZP24：4TH axis 2nd reference point return end signal

ZP23：Z axis 2nd reference point return end signal

ZP22：Y axis 2nd reference point return end signal

ZP21：X axis 2nd reference point return end signal

F058					ZP35	ZP34	ZP33	ZP32	ZP31

ZP35: 5TH axis 3rd reference point return end signal

ZP34: 4TH axis 3rd reference point return end signal

ZP33: Y axis 3rd reference point return end signal

ZP32: Z axis 3rd reference point return end signal

ZP31: X axis 3rd reference point return end signal

F059					ZP45	ZP44	ZP43	ZP42	ZP41

ZP45: 5TH axis 4th reference point return end signal

ZP44: 4TH axis 4th reference point return end signal

ZP43: Y axis 4th reference point return end signal

ZP42: Z axis 4th reference point return end signal

ZP41: X axis 4th reference point return end signal

F061								ESEND

GHEND: Required parts to arrive signal

F008							SCHK	

SCHK: Checking grammar signal

F016					ZP4	ZP3	ZP2	ZP1

ZP1: X axis return zero point end signal
ZP2: Y axis return zero point end signal
ZP3: Z axis return zero point end signal
ZP4: 4TH axis return zero point end signal

F022	SB07	SB06	SB05	SB04	SB03	SB02	SB01	SB00

SB07: Spindle spped code signal SB07
SB06: Spindle spped code signal SB06
SB05: Spindle spped code signal SB05
SB04: Spindle spped code signal SB04
SB03: Spindle spped code signal SB03
SB02: Spindle spped code signal SB02
SB01: Spindle spped code signal SB01
SB00: Spindle spped code signal SB00

5.2.5 G address(PLC→CNC)

G004					FIN			

FIN: MST function end signal

G005	LEDT	AFL		LAXIS				

LEDT: Edit lock signal
AFL: MST lock signal
LAXIS: All axis interlock sianal

G006		SKIPP		OVC		ABSM	MSTOP	SRN

SRN: Program restart signal
ABSM: Manual absolute signal
OVC: Feedrate override cancel signal
SKIPP: Skip signal
MSTOP: Selective stop signal

G007						ST		

ST: Cycle start signal

G008			SP	ESP				

ESP: Emergency stop signal
SP: Feed hold signal

G009						M12	M32	COOL

M12: 0:/1 Spindle tool clamp/loose signal
M32: Lubricating signal
COOL: Cooling signal

G0010	JV07	JV06	JV05	JV04	JV03	JV02	JV01	JV00

JV00: JOG override signal JV00
JV01: JOG override signal JV01
JV02: JOG override signal JV02
JV03: JOG override signal JV03
JV04: JOG override signal JV04
JV05: JOG override signal JV05
JV06: JOG override signal JV06
JV07: JOG override signal JV07

G0011	JV15	JV14	JV13	JV12	JV11	JV10	JV09	JV08

JV08: JOG override signal JV08
JV09: JOG override signal JV09
JV10: JOG override signal JV10
JV11: JOG override signal JV11
JV12: JOG override signal JV12
JV13: JOG override signal JV13
JV14: JOG override signal JV14
JV15: JOG override signal JV15

G0012	FV07	FV06	FV05	FV04	FV03	FV02	FV01	FV00

FV00: Feedrate override signal FV00
FV01: Feedrate override signal FV01
FV02: Feedrate override signal FV02
FV03: Feedrate override signal FV03
FV04: Feedrate override signal FV04
FV05: Feedrate override signal FV05
FV06: Feedrate override signal FV06
FV07: Feedrate override signal FV07

G0014	RV8	RV7	RV6	RV5	RV4	RV3	RV2	RV1

RV1: Rapid feedrate override signal RV1
RV2: Rapid feedrate override signal RV2
RV3: Rapid feedrate override signal RV3
RV4: Rapid feedrate override signal RV4
RV5: Rapid feedrate override signal RV5
RV6: Rapid feedrate override signal RV6
RV7: Rapid feedrate override signal RV7
RV8: Rapid feedrate override signal RV8

G016					SAR				

SAR：Spindle speed arrival signal

G017						DECA	DECY	DECZ	DECX

DECA: 4TH axis back to zero deceleration signal
DECY: Y axis back to zero deceleration signal
DECZ: Z axis back to zero deceleration signal
DECX: X axis back to zero deceleration signal

G018						H4TH	HY	HZ	HX

H4TH: 4TH axis MPG feed selection signal
HY: Y axis MPG feed selection signal
HZ: Z axis MPG feed selection signal
HX: X axis MPG feed selection signal

G019	RT		MP2	MP1				

RT: Manual rapid feed selection signal
MP2: MPG override signal MP2
MP1: MPG override signal MP1

G021	SOV7	SOV6	SOV5	SOV4	SOV3	SOV2	SOV1	SOV0

SOV7: Spindle override signal SOV7
SOV6: Spindle override signal SOV6
SOV5: Spindle override signal SOV5
SOV4: Spindle override signal SOV4
SOV3: Spindle override signal SOV3
SOV2: Spindle override signal SOV2
SOV1: Spindle override signal SOV1
SOV0: Spindle override signal SOV0

G022	R08I	R07I	R06I	R05I	R04I	R03I	R02I	R01I

R01I: Spindle motor speed code signal R01I
R02I: Spindle motor speed code signal R02I
R03I: Spindle motor speed code signal R03I
R04I: Spindle motor speed code signal R04I
R05I: Spindle motor speed code signal R05I
R06I: Spindle motor speed code signal R06I
R07I: Spindle motor speed code signal R07I
R08I: Spindle motor speed code signal R08I

G023	SIND	SGN			R12I	R11I	R10I	R09I

R09I: Spindle motor speed code signal R09I
R10I: Spindle motor speed code signal R10I
R11I: Spindle motor speed code signal R11I
R12I: Spindle motor speed code signal R12I
SGN: Spindle motor code polarity selection signal
SIND: Spindle motor speed code selection signal

G024	MRDYA							

MRDYA：Machine ready signal

G025			SRVB	SFRB				

SRVB：Spindle rotate(CCW) signal
SFRB: Spindle rotate(CW) signal

G026	CON							

CON：Cs contour control switch signal

G027					+J4	+J3	+J2	+J1

+J4:Feed axis and direction selection signal +J4
+J3:Feed axis and direction selection signal +J3
+J2:Feed axis and direction selection signal +J2
+J1: Feed axis and direction selection signal +J1

G028						-J4	-J3	-J2	-J1

-J4:Feed axis and direction selection signal -J4
-J3:Feed axis and direction selection signal -J3
-J2:Feed axis and direction selection signal -J2
-J1: Feed axis and direction selection signal -J1

G030						+L4	+L3	+L2	+L1

+L4: Axis overtravel signal +L4
+L3: Axis overtravel signal +L3
+L2: Axis overtravel signal +L2
+L1: Axis overtravel signal +L1

G031						-L4	-L3	-L2	-L1

-L4: Axis overtravel signal -L4
-L3: Axis overtravel signal -L3
-L2: Axis overtravel signal -L2
-L1: Axis overtravel signal -L1

G036	BEUCL	BECLP						SPD

BEUCL: Indexing table release signal
BECLP: Indexing table clamp signal
SPD: Spindle point function signal

G037	NT07	NT06	NT05	NT04	NT03	NT02	NT01	NT00

NT07: Current tool No. NT07
NT06: Current tool No. NT06
NT05: Current tool No. NT05
NT04: Current tool No. NT04
NT03: Current tool No. NT03
NT02: Current tool No. NT02
NT01: Current tool No. NT01
NT00: Current tool No. NT00

G043	ZRN		DNC1			MD4	MD2	MD1

ZRN: Cueernt work mode selection 4

DNC1: DNC run selction signal

MD4: Cueernt work mode selection 3

MD2: Cueernt work mode selection 2

MD1: Cueernt work mode selection 1

G044	HDT						MLK	BDT

HDT: Manual change tool by sequence signal

MLK: Machine locked signal (PLC → CNC)

BDT: Program skip signal(PLC → CNC)

G046	DRN				KEY1		SBK	

DRN: Dry run signal

KEY1: Storage protect signal

SBK: Signal program senment signal(PLC → CNC)

G048							GR2	GR1

GR2: Gear selection signal2

GR1: Gear selection signal1

G053	CD2	SMZ						

CDZ: Chamfer signal

SMZ: Error check signal

G054	UI07	UI06	UI05	UI04	UI03	UI02	UI01	UI00

UI07: Macro input signal UI07

UI06: Macro input signal UI06

UI05: Macro input signal UI05

UI04: Macro input signal UI04

UI03: Macro input signal UI03

UI02: Macro input signal UI02

UI01: Macro input signal UI01

UI00: Macro input signal UI00

■ Address A (message display requiery signal, defined by standard PLC ladders)

A0002.0	1216	Alarm of safe door not closed
A0002.1	1217	Alarm of chuck low pressure
A0002.3		Chuck released unallowed in spindle running
A0002.4	1220	Clamping in-position signal inactive alarm in spindle running
A0002.5	1221	Spindle start unallowed if chuck clamping in-position signal inactive
A0002.6	1222	Spindle start unallowed for chuck releasing
A0004.0	1232	Illegal M code
A0004.1	1233	Spindle jog disabled in non-analog spindle mode
A0004.2	1234	M03, M04 designation error
A0004.4	1236	Spindle gear change time is too long
A0004.5	1237	Spindle speed/position control switch time is too long
A0005.1	1241	Alarm for the abnormal spindle servo or frequency converter for abnormality
A0007.1	1257	Safety door has been opened
A0007.3	1259	Alarm for the tool pot unclocked

CHAPTER 6 MEMORIZING PITCH ERROR COMPENSATION

■ Function description

There are more or less precision errors in the pitch of machine axes lead screw, and it will definitely affect the parts machining precision. This GH1000MC CNC system has the memorizing pitch error offset function that it can accurately compensate the pitch error of the lead screw.

■ Specification

1. The set offset amount is concerned with the offset origin, offset intervals etc.;
2. Pitch error offset value is get by searching the table about machine coordinates and pitch error compensation origin;
3. Points to be compensated: 256 points for each axis
4. Axis compensated: X, Y, Z ,4th,5th axis
5. Compensation range: 0～±99 x least input increment
6. Compensation range interval: 1～9999.9999;
7. Compensation amount of compensation pointN(N=0,1,2,3,…255) is determined by the mechanical error between point N and point N-1;
8. The setting is the same as the CNC parameters input, see **Volume Ⅱ Operation.**

■ Parameter setting

■ Pitch compensation

Bit parameter

0	0	3

		SCRW					

Bit5=1: Pitch error offset active;
Bit5=0: Pitch error offset inactive;

■ Pitch error compensation origin

A position which the pitch error offset starts from in the offset list, which is determined from the machine zero, is called pitch error offset origin (reference point). This position may be set from 0 to 255 in each axis by data parameter No.180~No.184, depending on the mechanical requirement.

Data parameter

1	**8**	**0**	X axis pitch error compensation origin position No.
1	**8**	**1**	Y axis pitch error compensation origin position No.
1	**8**	**2**	Z axis pitch error compensation origin position No.
1	**8**	**3**	4^{th} axis pitch error compensation origin position No.
1	**8**	**4**	5^{th} axis pitch error compensation origin position No.

■ Offset interval

Pitch offset interval: No.190~No.194；

Input unit: Metric machine:mm; Inch machine:inch

Setting range: 1～9999.9999

State parameter

1	**9**	**0**
1	**9**	**1**
1	**9**	**2**
1	**9**	**3**
1	**9**	**4**

Pitch error compensation interval of X axis
Pitch error compensation interval of Y axis
Pitch error compensation interval of Z axis
Pitch error compensation interval of 4th axis Pitch error compensation interval of 5th axis

■ Offset value

Every axes pitch offset values is set according to the parameter No. in the following table. The offset value is input by mm(metric machine) or inch(inch machine), which is not irrelevant to diameter or radius programming.

Offset No.	X	Z	Y
000	…	…	…
001	5	-2	3
002	-3	4	-1
…	…	…	…
255	…	…	…

■ Notes of offset setting

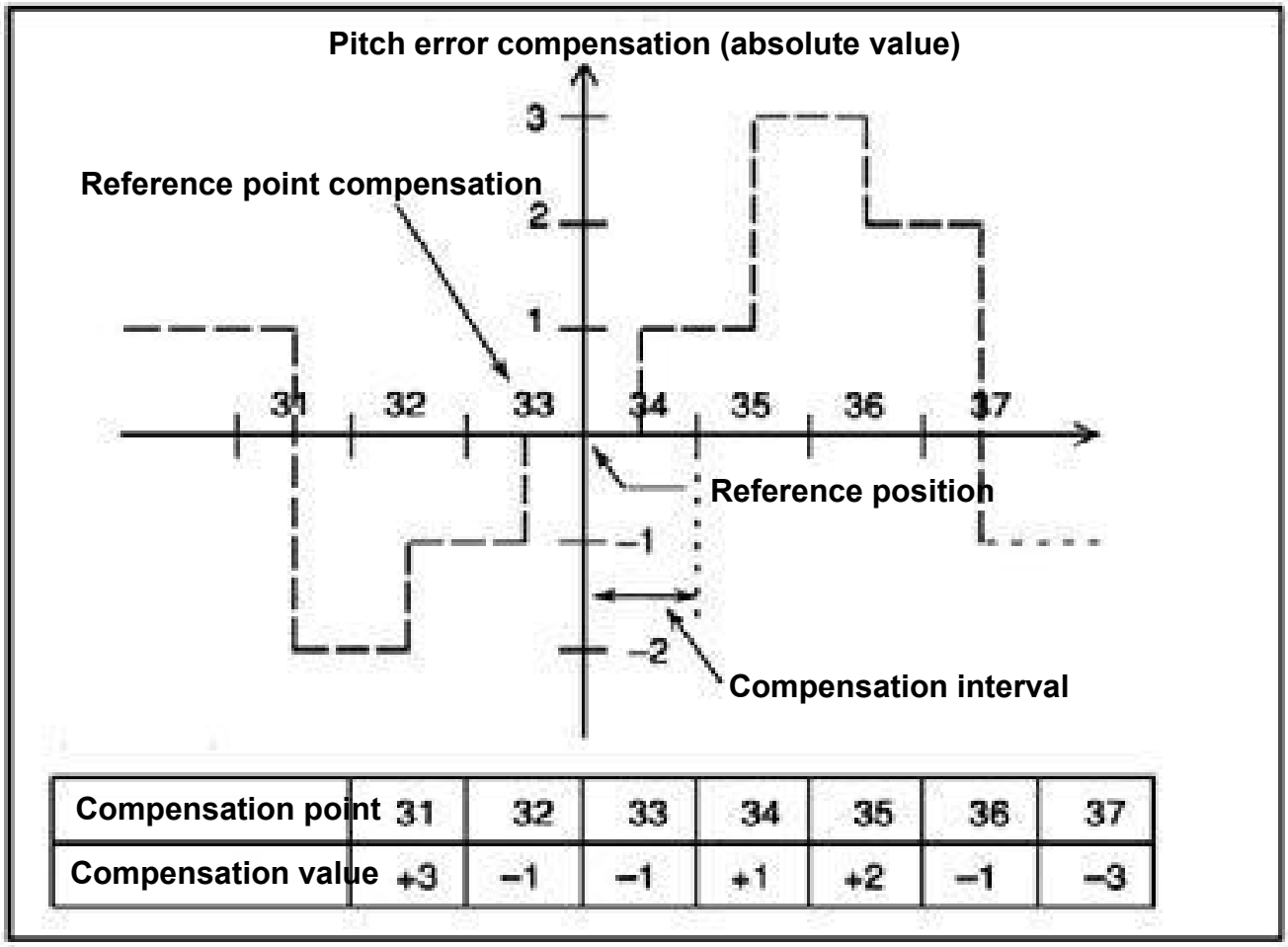
①The setting and alteration of pitch offset can only be done at the authority of password level 2.

②After the parameter of pitch offset is set, only the machine zero is returned could the offset be done.

■ Setting examples of offset parameters

①Data parameter No.180(pitch error origin) =33, Data parameter No.185 (offset interval)=10.000mm

When the pitch error origin is set to 33:



Compensation point	31	32	33	34	35	36	37
Compensation value	+3	−1	−1	+1	+2	−1	−3

Appendix

Appendix I List of alarm

1、CNC Alarm

NO.	Content	Remark
0000	Please power off!	
0001	Fail opening file	
0002	Edited data exceeding limit	
0003	Copy or rename program No. existing .	
0004	No searched address	
0005	No data behind address	
0006	illegal minus	
0007	illegal decimal point	
0008	File too capacity not be loaded .	
0009	Input illegal address	
0010	Incorrect G codes	
0011	No feedrate instruction	
0012	Insufficient disc .	
0013	Too many Files	
0014	Not command G95, spindle not support	
0015	Command too axes	
0016	Cur pitch error comp. point too many!	
0017	No right to alert!	
0018	Not permit to alert	
0019	Cann't use scale!	
0020	Exceed radius tolerance	
0021	Command illegal plane axis	
0022	R and IJK is 0 in arc	
0023	IJK and R specified simultaneously in arc	
0024	Screw interpolation chamfer is 0	
0025	G12 cann't specify with other G code	
0026	Format not supported by system .	
0027	Offset can't share a block with G92 .	
0028	illegal plane selection	

0029	illegal offset value	
0030	illegal comp. No.	
0031	illegal P commanded in G10	
0032	illegal comp. value in G10	
0033	No intersection in C	
0034	Cann't start or cancel tool comp. in arc	
0035	Not cancel C offset before M99	
0036	Not command G31	
0037	Not change plane in C	
0038	interference in arc block	
0039	Tool nose position error in C	
0040	Workpiece coordinate changed in comp. C	
0041	interference in C	
0042	Over 10 non-traverse instructions in comp. C	
0043	Unauthorized	
0044	No permitting G27~G30 in canned cycle	
0045	Address Q not found (G73/G83)	
0046	illegal reference point return instruction	
0047	Executing machine zero return before it	
0048	Z plane should be higher than R	
0049	Z plane should be lower than R	
0050	Should traverse pos before chang fixed cycle	
0051	Mistaken traverse after chamfer	
0052	Mirror disabled in grooving cycle	
0053	Over address instruction	
0054	DNC carry setting error	
0055	Mistaken traversing value in chamfer or R	
0056	M99 can't share a block with macro	
0057	Save failed .	
0058	Not found end point	
0059	Not found program No.	
0060	Not found sequence No.	
0061	X axis not in reference point	

0062	Y axis not in reference point	
0063	Z axis not in reference point	
0064	4TH axis not at reference point	
0065	5TH axis not at reference point	
0066	Cancel fixed cycle before executing G10	
0067	Setting format not supported by G10.	
0068	PARA SWITCH hasn't turned on	
0069	Need close "U" disk interface as cnc runing	
0070	Memory capacity insufficiency	
0071	Not found data	
0072	Over program quantities	
0073	Program number used	
0074	illegal program number	
0075	Protection	
0076	Address P no defined	
0077	Mistaken subprogram embedding	
0078	Not found sequence number	
0079	System expired .	
0080	Improper input data	
0082	Command H in G37	
0083	illegal axis instruction in G37	
0084	Key overtime or short circuit	
0085	Communication error	
0087	X axis reference point return unfinished	
0088	Z axis reference point return unfinished	
0089	Y axis reference point return unfinished	
0090	4TH axis reference point return unfinished	
0091	5TH axis reference point return unfinished	
0092	Axis not in reference point	
0094	Not permit P type (coordinates)	
0095	Not permit P type (EXT OFS CHG)	
0096	Not permit P type (WRK OFS CHG)	
0097	Not permit P type(automatically execute)	

0098	Found G28 in sequence return	
0099	Not permit executing MDI after searching	
0100	Valid parameter write	
0101	Power-off memory data confused	
0110	Data overflow .	
0111	PC data overflow	
0112	Divided by zero	
0113	Mistaken instruction	
0114	Mistaken G39 format	
0115	illegal variable	
0116	Write protection variable	
0118	Mistaken big brackets embed	
0119	M00~M02,M06,M98,M99,M30 can't at the same block with other block	
0122	Fourfold macro mold-calling	
0123	Not use macro instruction in DNC	
0124	Program illegal completion	
0125	Mistaken macro program format	
0126	illegal cycle number	
0127	NC & macro instruction in the same block	
0128	Sequence number of illegal macro instruction	
0129	illegal independent variable address	
0130	illegal axis operation	
0131	Over external alarm information	
0132	Not found alarm number	
0133	System not support axis instruction	
0134	Axis more than 3 can not use rigid tapping	
0135	illegal angle instruction	
0136	illegal axis instruction	
0139	Can't change PLC control axis	
0142	illegal proportional rate	
0143	Scaling motion data overflow	
0144	illegal plane selection	
0148	illegal data setting	

0149	Format error in G10L3	
0150	illegal tool group No.	
0151	Not found tool group No.	
0152	Tool data not memorize	
0153	Not cancle C before changing tool	
0154	Tool in unused tool life	
0155	Illegal T code in M06	
0156	Not found P/L instruction	
0157	Over tool group	
0158	illegal tool life data	
0159	Tool data setting unfinished	
0160	Arc only use R prg in polar coordinates mode	
0161	Not execute the instr in polar coordinates	
0162	Have used G70~G76 instructions in MDI mode	
0163	Not execute the instruction in rotation mode	
0164	Not execute the instruction in scaling mode	
0165	Specify the instruction in sole block	
0166	Axis not specified in reference point return	
0167	Coordinates in intermediate point too big	
0168	Min. dwell time should smaller than max.4	
0170	Not cancel comp. in entering or Esc subprg	
0172	P not int or less than 0 in calling subprg	
0173	Subprogram calling times less than 9999	
0175	G17 executed only in canned cycle	
0176	Spindle rotate speed not set	
0177	Not support spindle oriented function	
0178	Spindle rotate speed not set before canned cycle	
0181	illegal M code	
0182	illegal S code	
0183	illegal T code	
0184	Selected tool exceeding limit	
0185	L too small	
0186	L too large	

0187	Tool radius too large	
0188	U too large	
0189	U smaller than tool radius	
0190	V too small or V has not defined	
0191	W too small or W has not defined	
0192	Q too small or Q has not defined	
0193	I has not define or I is zero	
0194	J has not define or J is zero	
0195	D has not define or D is zero	
0198	Illegal axis selection	
0199	Macro instruction not defined	
0200	illegal S mode instruction	
0201	Not found feedrate in rigid tapping	
0202	Position LSI overflow	
0203	Program error in rigid tapping	
0204	Illegal axis operation	
0205	Rigid mode DI signal closed	
0206	Not change plane (rigid tapping)	
0207	Tapping data error	
0208	Cann't exe. the instruction in G10 .	
0212	illegal plane selection	
0224	Reference point return	
0231	illegal format in G10 L50 or L51	
0232	Commanded spiral interpolation axes too many	
0233	Device busy	
0235	Error completion	
0236	Program restart parameter error	
0237	No decimal point	
0238	Address repetition error	
0239	Parameter 0	
0240	No permitting G41/G42 in MDI	
0241	MPG abnormal	

0251	Emergency stop alarm
0260	Name of axis is repeated.Please alter parameters NO.225~227
0451	X axis driver alarm.
0452	Z axis driver alarm.
0453	Y axis driver alarm.
0454	4TH axis driver alarm.
0455	5TH axis driver alarm.
0456	Spindle driver alarm.
0500	Software limit overtravel:-X
0501	Software limit overtravel:+X
0502	Software limit overtravel:-Y
0503	Software limit overtravel:+Y
0504	Software limit overtravel:-Z
0505	Software limit overtravel:+Z
0506	Software limit overtravel:-4Th
0507	Software limit overtravel:+4Th
0508	Software limit overtravel:-5Th
0509	Software limit overtravel:+5Th
0510	Hardware limit overtravel:-X
0511	Hardware limit overtravel:+X
0512	Hardware limit overtravel:-Y
0513	Hardware limit overtravel:+Y
0514	Hardware limit overtravel:-Z
0515	Hardware limit overtravel:+Z
0516	Hardware limit overtravel:-4TH
0517	Hardware limit overtravel:+4TH
0518	Hardware limit overtravel:-5TH

0519	Hardware limit overtravel:+5TH
0740	Rigid tapping alarm: overproof
0741	Rigid tapping alarm: overproof
0742	Rigid tapping alarm:LSI overflow
0751	Check the first spindle alarm(AL-XX)
0754	Abnormal torque alarm
1001	Address of relay or coil not set
1002	Input code inexistence
1003	COM/COME used by mistake .
1004	ladder exceeding max. linage or step .
1005	Error in END1/END2.
1006	illegal output in NET.
1007	Hardware failure or system interrupt error causes PLC to communicate
1008	Not connected correctly.
1009	Network horizon not connected .
1010	Network missing for power-off in edit ladder .
1011	Address data not input correctly .
1012	Symbol undefined or data exceeding limit .
1013	Defined illegal characters .
1014	CTR adress is repeated .
1015	JMP/LBL deal error exceeding its capacity .
1016	Network struct is incomplete .
1017	Network struct isn't supported .
1019	TMR address repeat .
1020	No parameter in function instruction .
1021	PLC execution timeout, the system automatically stops PLC.
1022	Function instruction name lost .
1023	Functional address or constant overflow .
1024	Unnecessary relay or coil exist .
1025	Function instruction not correctly output .
1026	Line number of network connection overflow .
1027	One symbol name defined in another place.
1028	Ladder format error .

1029	Ladder being used lost .	
1030	Incorrect vertical line in NET .	
1031	Data full, reducing COD instr. data capacity .	
1032	First grade of ladder too big .	
1033	SFT instruction exceeding max. capacity.	
1034	DIFU/DIFD used mistakenly.	
1035	Current opened ladder convert failed	
1036	PLC emergency stop alarm	
1037	Opened and data para setting ladder isn't same	
1039	Instruction or network not within range	
1040	CALL/SP/SPE used mistakenly .	
1041	Horizonal line parallels to node net.	
1042	PLC parameter file not loaded	

Appendix II Operation list

Type	Function	Operation	Opera-tion mode	Display window	Password level	Program switch	Para-meter switch	Remark
Clear	X relative coordinate clear			Relative coordinate				Volume II Section 1.3.1

Type	Function	Operation	Opera-tion mode	Display window	Password level	Program switch	Para-meter switch	Remark
	Y relative coordinate clear	Y & , CANCEL		Relative coordinate				
	Z relative coordinate clear	Z : , CANCEL		Relative coordinate				
	Machining numbers clear	CANCEL + N #		relative coordinate or absolute coordinate				Volume Ⅱ Section 1.3.1
	Cutting time clear	CANCEL + M [		relative coordinate or absolute coordinate				Volume Ⅱ Section 1.3.1
Data setting	state parameter	parameter value, DATA INPUT	MDI mode	state parameter	2-level, 3-level,		ON	Volume Ⅱ Section 10.1.3
	Data parameter	parameter value, DATA INPUT	MDI mode	data parameter	2-level, 3-level,		ON	
	X pitch parameter input	X ,compensation value, DATA INPUT	MDI mode	pitch compensation parameter	2-level		ON	Volume Ⅱ Section 10.1.3
	Y pitch parameter input	Y & ,compensation value, DATA INPUT	MDI mode	pitch compensation parameter	2-level		ON	Volume Ⅱ Section 10.1.3
	Z pitch parameter input	Z : ,compensation value, DATA INPUT	MDI mode	pitch compensation parameter	2-level		ON	Volume Ⅱ Section 10.1.3
	Macro variable	macro variable value, DATA INPUT		Macro variable	2-level, 3-level, 4-level			Volume Ⅱ Section 1.3.3
	Tool offset	compensation value, DATA INPUT		tool offset	2-level, 3-level, 4-level			Volume Ⅱ Section 7.4.2
Search	Search downward from the cursor's current position	character, ⇩	EDIT mode	program content	2-level, 3-level, 4-level	ON		Volume Ⅱ Section 6.1.3
	Search upward from the cursor's current position	character, ⇧	EDIT mode	program content	2-level, 3-level, 4-level	ON		Volume Ⅱ Section 6.1.3

Type	Function	Operation	Opera-tion mode	Display window	Password level	Program switch	Para-meter switch	Remark
	Search downward from the current program	, ⇩	EDIT mode or AUTO mode	program content program contents or program state	2-level,3-level, 4-level			Volume Ⅱ Section 6.4.1
	Search upward from the current program	, ⇧			2-level,3-level, 4-level			Volume Ⅱ Section 6.4.1
	Search specified program	,program name, ⇩			2-level,3-level, 4-level			Volume Ⅱ Section 6.4.2
	Search bit parameters, data parameters or pitch compensation parameters	P, parameter No., DATA INPUT		Corresponding page of data				Volume Ⅱ Section 10.1.3
	PLC state, PLC data search	P,address No., DATA INPUT		PLC state PLC data				Volume Ⅱ Section 1.3.7
Delete	character deletion at the cursor	DELETE	EDIT mode	program content	2-level,3-level, 4-level	ON		Volume Ⅱ Section 6.1.6
		CANCEL	EDIT mode	program content	2-level,3-level, 4-level	ON		
	Single block deletion	Move the cursor to the head line, DELETE	EDIT mode	program content	2-level,3-level, 4-level	ON		Block No. in block, Volume Ⅱ Section 6.1.7
	Blocks deletion	CHANGE , sequence No. , DELETE	EDIT mode	program content	2-level,3-level, 4-level	ON		Volume Ⅱ Section 6.1.8
	Segment deletion	CHANGE ,character, DELETE	EDIT mode	program content	2-level,3-level, 4-level	ON		Volume Ⅱ Section 6.1.9
	Single program deletion	,program name, DELETE	EDIT mode	program content	2-level,3-level, 4-level	ON		Volume Ⅱ Section 6.3.1
	All programs deletion	, − + 999, DELETE	EDIT mode	program content	2-level,3-level, 4-level	ON		Volume Ⅱ Section 6.3.2

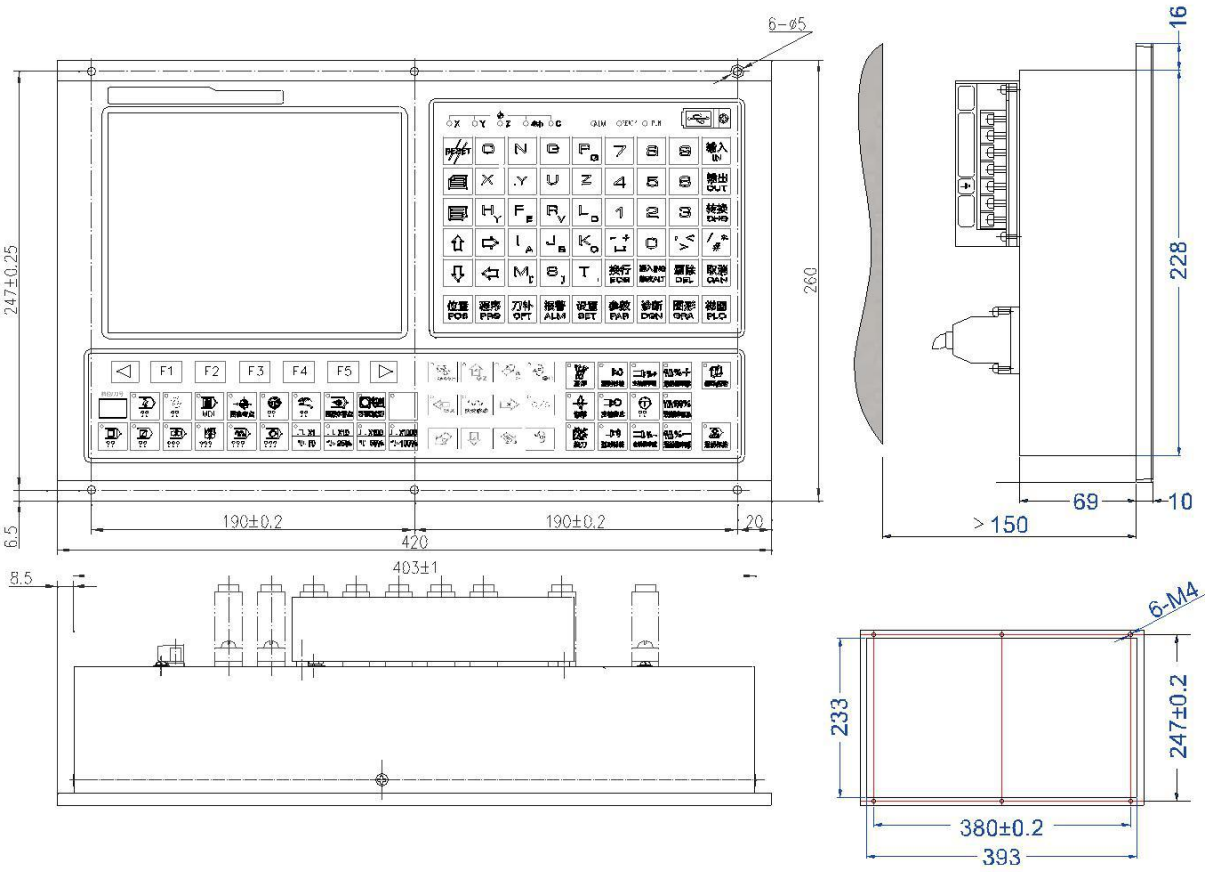
Type	Function	Operation	Opera -tion mode	Display window	Password level	Program switch	Para -meter switch	Remark
Rename	Program rename	,program name, ALTER	EDIT mode	program content	2-level,3-level, 4-level	ON		
Copy	Program copy	,program name,	EDIT mode	program content	2-level,3-level, 4-level	ON		
Switch setting	Parameter switch ON	DL		Switch setting	2-level,3-level			Volume Ⅱ Section10.1.1
	Program switch ON	DL		Switch setting	2-level,3-level, 4-level			
	Automatic sequence No. ON	DL		Switch setting				
	Parameter switch OFF	UW		Switch setting	2-level,3-level			
	Program switch OFF	UW		Switch setting	2-level,3-level, 4-level			
	Automatic sequence No. OFF	UW		Switch setting				

Note 1: “,” in “Operation” indicates that the two operations are successive, “+” indicates that the two operations are executed at the same time.

Example: “ , CANCEL ” indicates that we firstly press and then press CANCEL; “ CANCEL + # ” indicates these two keys are pressed simultaneously.

Note 2: The blanks in Operation Mode, Display Window, Password Level, Program Switch and Parameter Switch column indicate that the corresponding switches are not related to their items correspondingly.

Appendix III GH1000MC contour dimension



Appendix IV Additional panel dimensions