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## CONNECTION MANUAL


### GSK 983Ma-H / GSK 983Ma-V Milling Machine CNC System



**GUANGZHOU**  
**CHINA**

**广州数控设备有限公司**  
**GSK CNC EQUIPMENT CO., LTD.**

 In this user manual we have tried to describe the matters concerning the operation of this CNC system to the greatest extent. However, it is impossible to give particular descriptions for all unnecessary or unallowable operations due to length limitation and products application conditions; Therefore, the items not presented herein should be regarded as “impossible” or “unallowable”.

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## Preface

Your Excellency,

We are honored by your purchase of this GSK 983Ma Milling CNC System made by GSK CNC Equipment Co., Ltd.

## Warning



Accident may occur by improper connection and operation ! This system can only be operated by authorized and qualified personnel.

Please read this manual and a manual from machine tool builder carefully before installation, programming and operation, and strictly observe the requirements. Otherwise, products and machine may be damaged, workpiece be scrapped or the user be injured.

## Safety Responsibility

### Manufacturer's Responsibility

- Be responsible for the danger which should be eliminated and/or controlled on design and configuration of the provided CNC systems and accessories.
- Be responsible for the safety of the provided CNC systems and accessories.
- Be responsible for the provided information and advice for the users.

### User's Responsibility

- Be trained with the safety operation of CNC system and familiar with the safety operation procedures.
- Be responsible for the dangers caused by adding, changing or altering to the original CNC systems and the accessories.
- Be responsible for the failure to observe the provisions for operation, adjustment, maintenance, installation and storage in the manual.

**This manual is reserved by end user.**

**We are full of heartfelt gratitude to you for supporting us in the use of GSK's products.**

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## Precautions

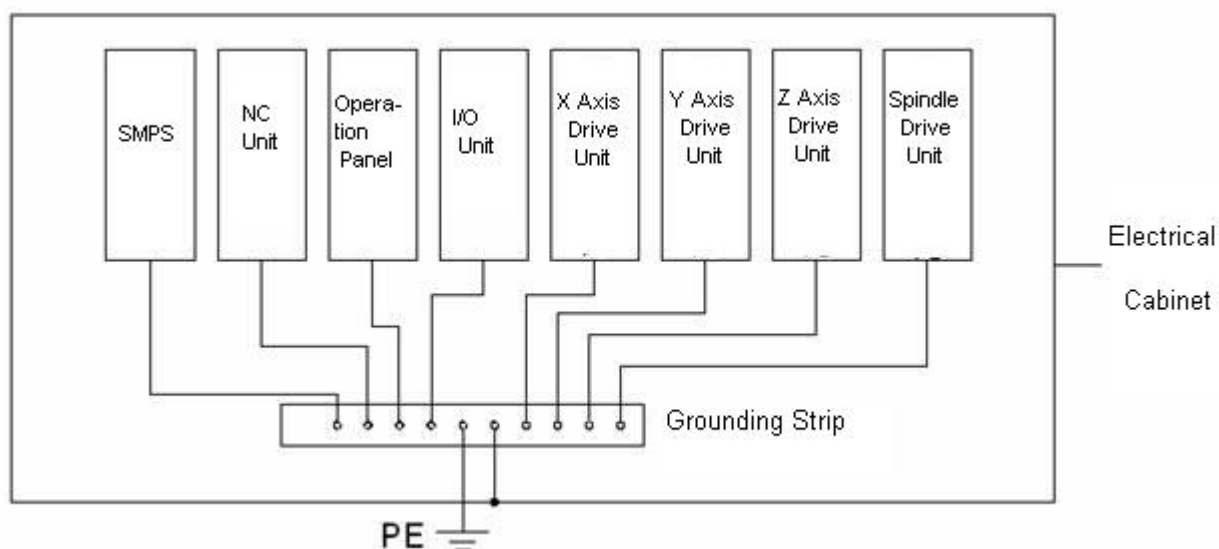
**1. The system-matched power box is exclusive for GSK983Ma. Do NOT supply this power to other devices (such as brake and magnetic valve); otherwise, serious danger may occur!**

### 2. Requirements for electrical cabinet

The electrical cabinet adopts full-enclosed structure and dustproof design. The temperature difference between outside and inside of the cabinet should be less than 10°C; or, a heat-exchange system should be installed. The ambient temperature should not exceed 45°C. Prevent the entry of dust, coolant and organic solution.

### 3. Grounding

The cabinet should be protectively grounded, and the continuity should meet the requirement of GB5226.1-2002. Well grounding is the essential condition for a stable operation. The grounding wires of different parts cannot be connected with each other in series; rather, the protective grounding terminals should be connected to grounding strip with yellow-green wires independently. The grounding strip mentioned here is installed in the cabinet and the thickness is not less than 3mm ; its grounding resistance should be less than 0.1Ω.



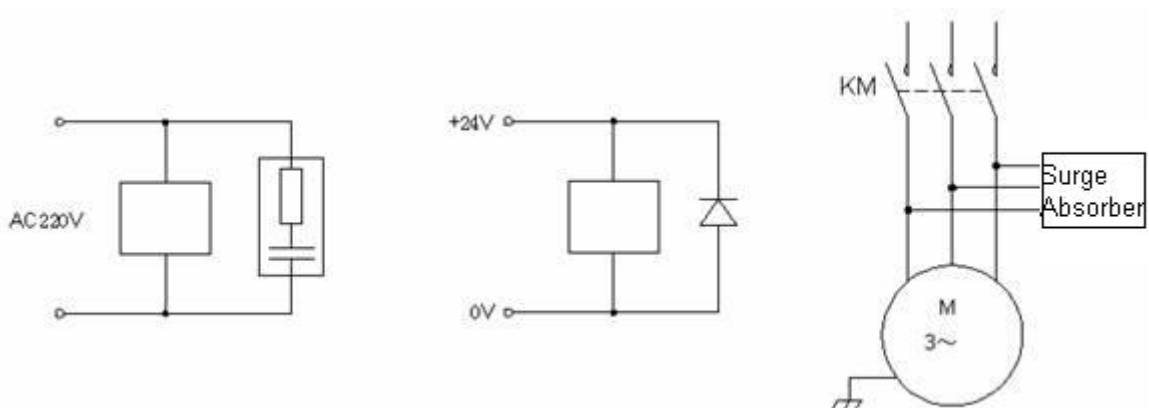
**4. The system power should be supplied through isolation transformer.**

## 5. Wiring

The joints between wires and the system or drive unit should be tight and firm. The low-current type wires such as signal wires and control wires should be laid far away from heavy current and electromagnetic interference, and be arranged in an uncurled manner as far as possible, because winding annularly could easily cause the acquisition of interference signal.

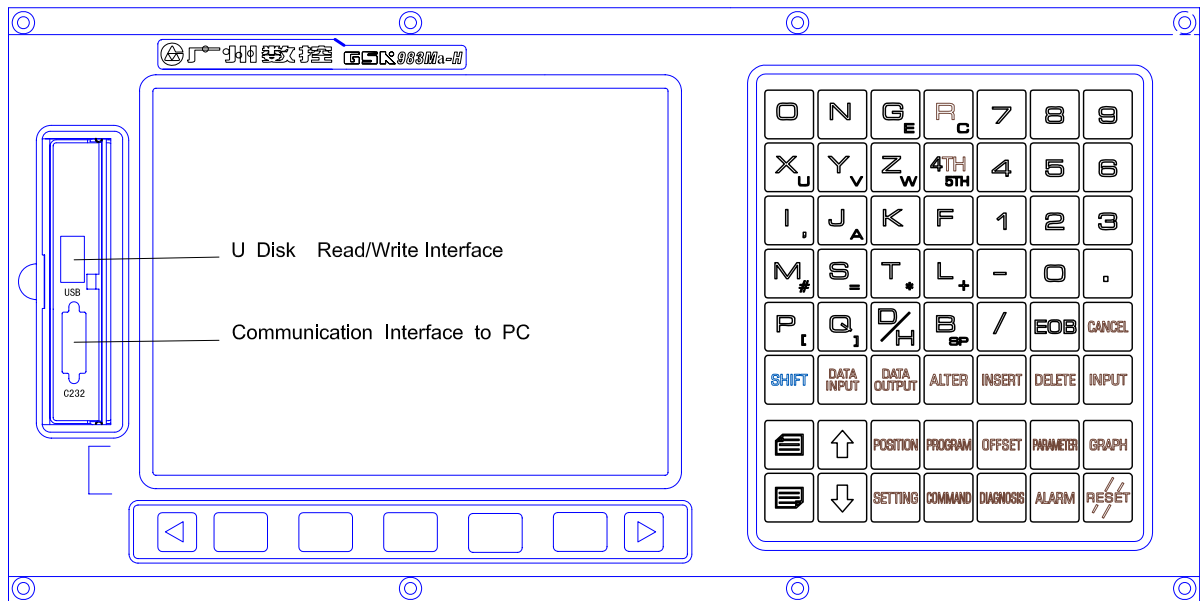
## 6. Interference suppression

Connect the RC circuits at the two ends of AC coil in parallel. The RC circuits should be closed to inductive load as far as possible. Connect FWD at the ends of DC coil reversely in parallel. Connect the surge absorber at the winding head of AC motor.

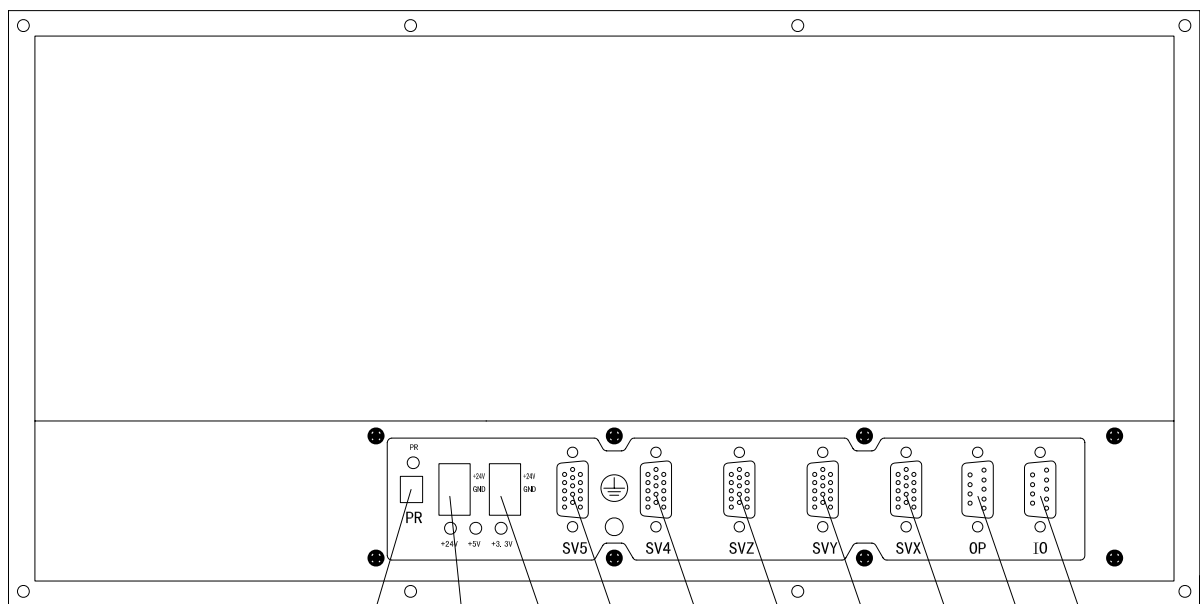


# 1. NC Unit Interfaces

## Front View

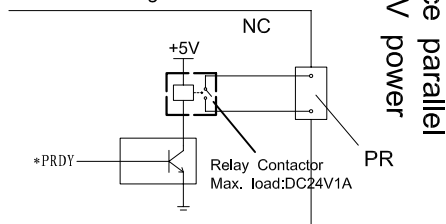


## Back View

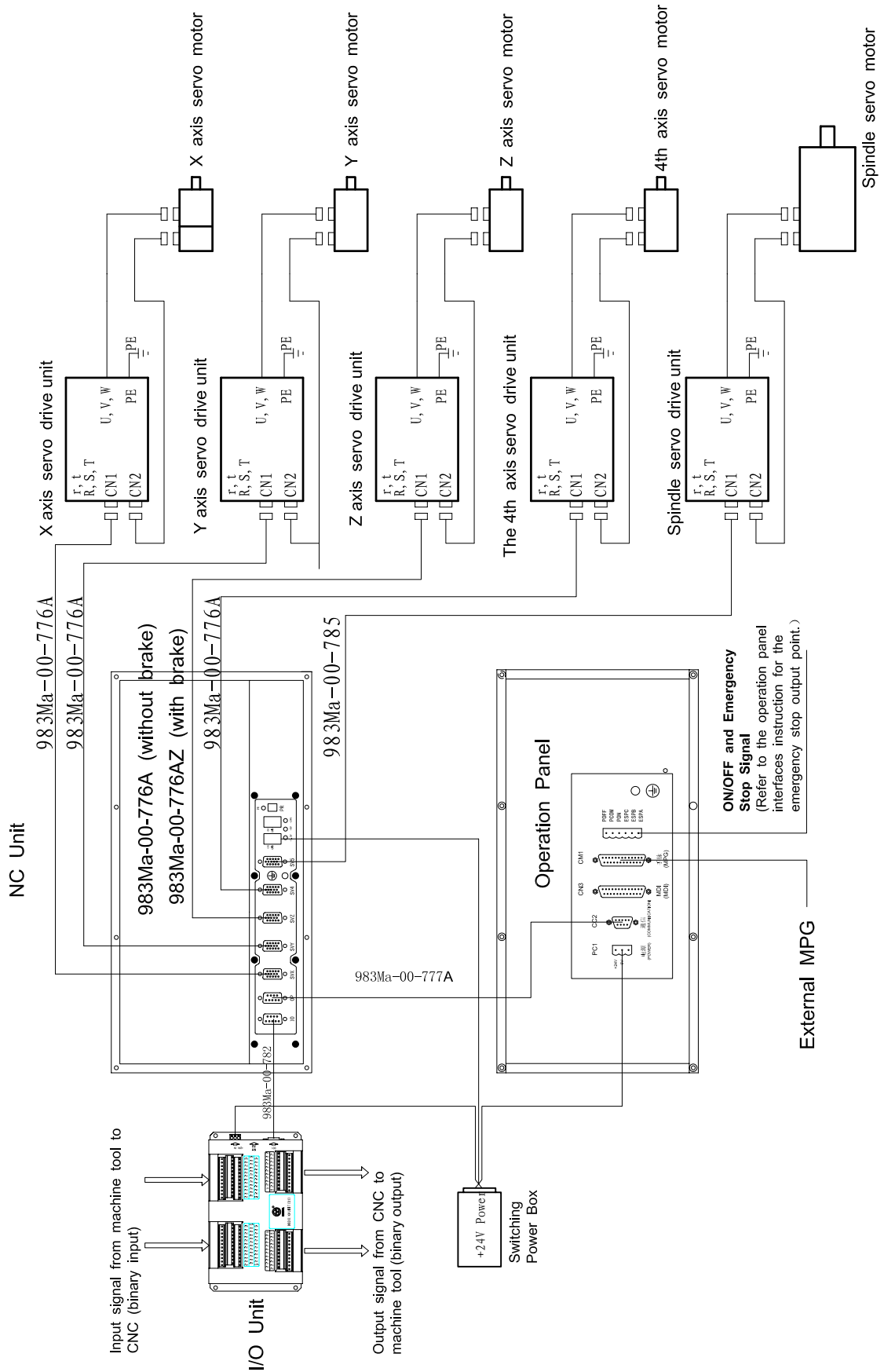


PR signal is used for the power-on control of main power of servo drive unit.

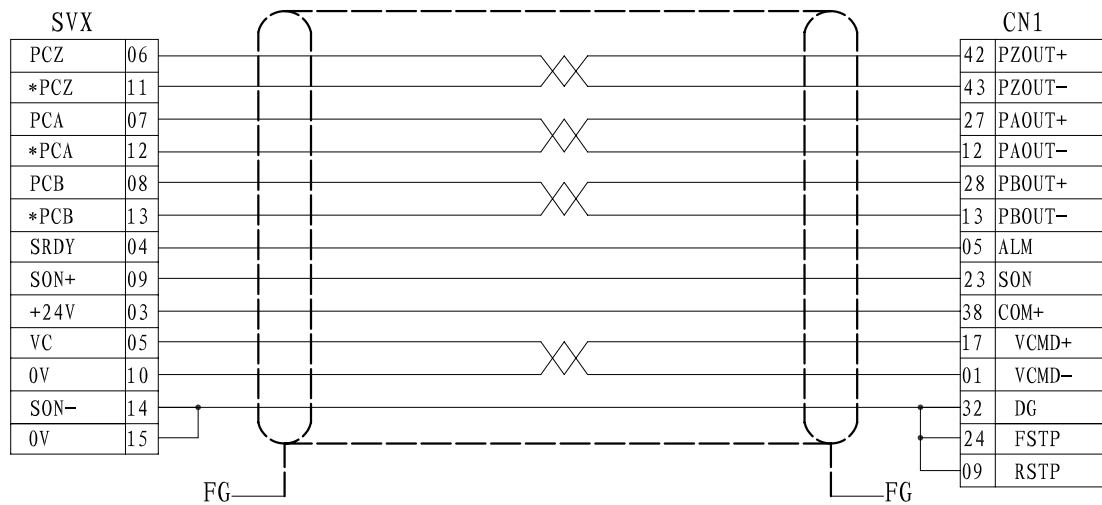
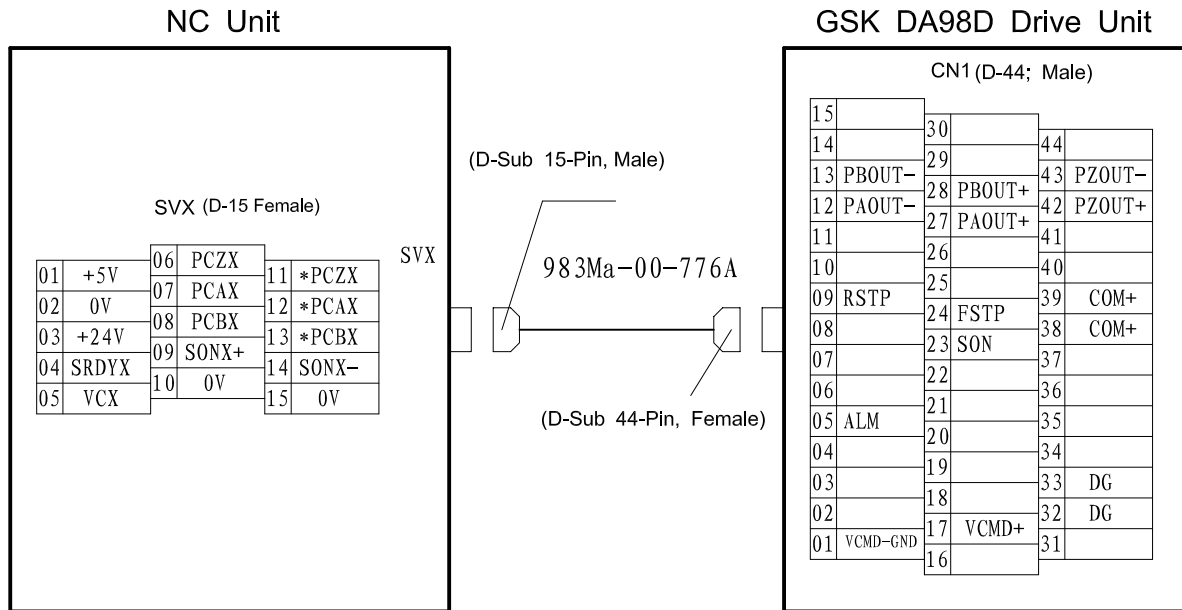
Basic circuit of PR signal in the NC



## 2. Interconnect Block Diagram



### 3. Connection between NC Unit and DA98D Drive Unit (without Brake)

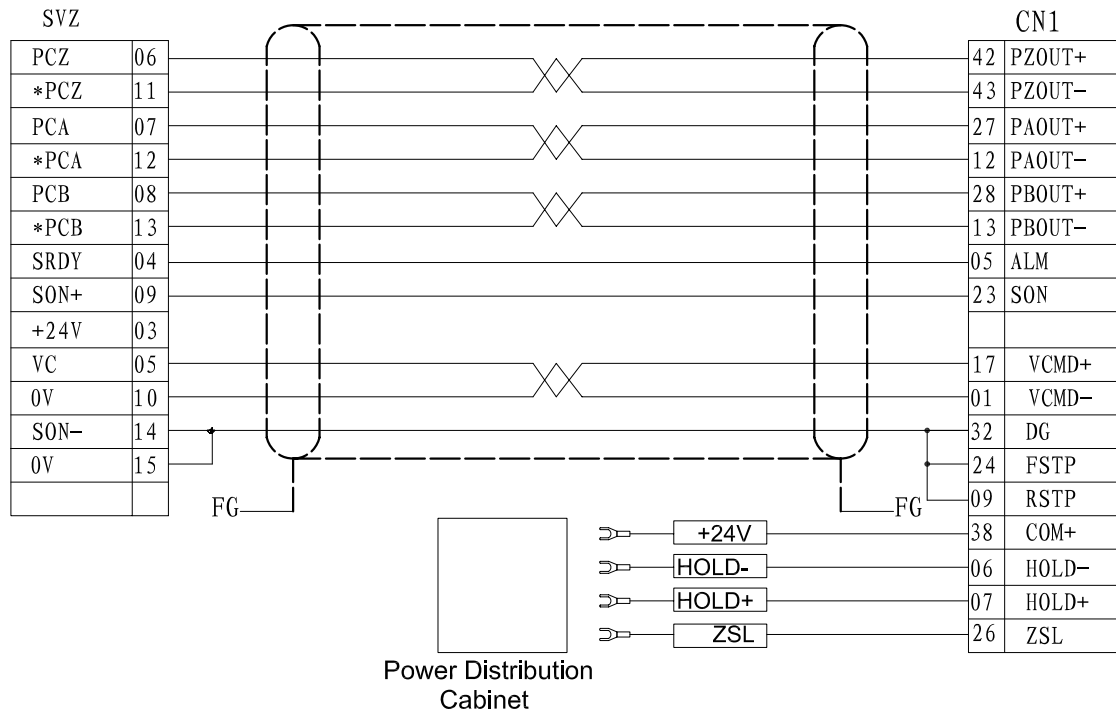
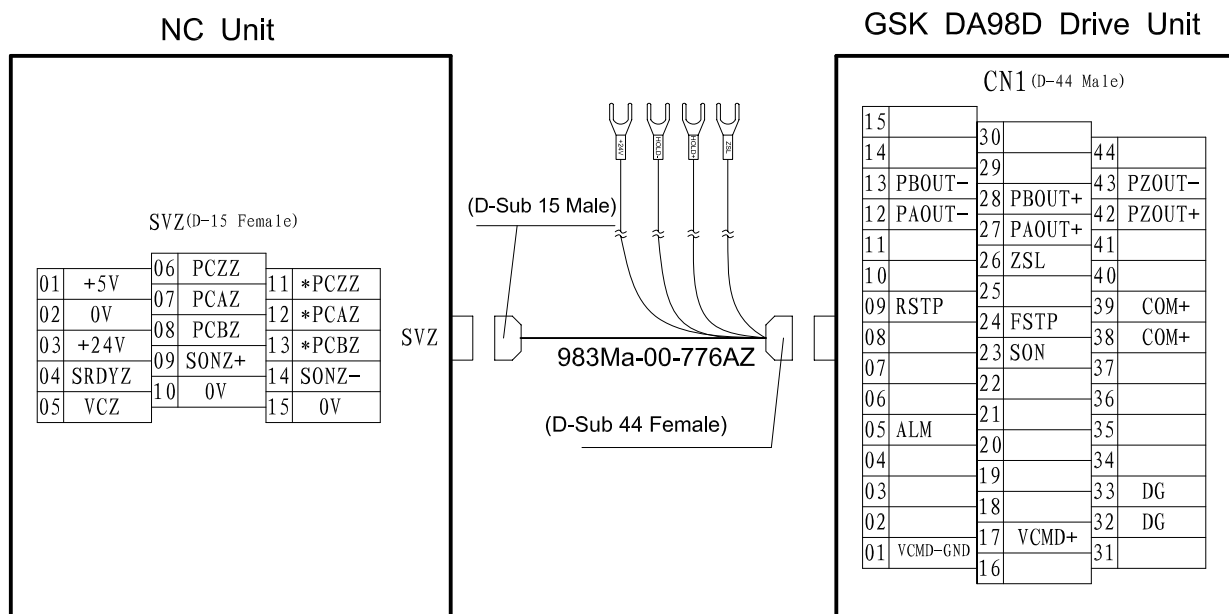


- PCA \*PCA: Encoder feedback A phase differential signal (pulse signal, drive unit→NC)
- PCB \*PCB: Encoder feedback B phase differential signal (pulse signal, drive unit→NC)
- PCZ \*PCZ: Encoder feedback Z phase differential signal (pulse signal, drive unit→NC)
- SON+/-: Enable signal (binary signal, NC→drive unit)
- ALM: Alarm signal (binary signal, drive unit→NC)
- VC: Speed control voltage (direct current, NC→drive unit)

Note 1: When the Z axis is connected without brake, the connection of X, Y, Z and 4th axis are the same. The Z axis connection with brake is shown in the following page.

Note 2: In this connection method, the motor rotation direction is complied with the Cartesian coordinate system (i.e. it is CCW rotation when viewed from the motor axis end; the feed direction is positive). If you want to reverse the direction, set the DA98D parameter PA46 to 3 (0 is default setting).

## 4. Connection between NC Unit and DA98D Drive Unit (Z Axis with Brake)

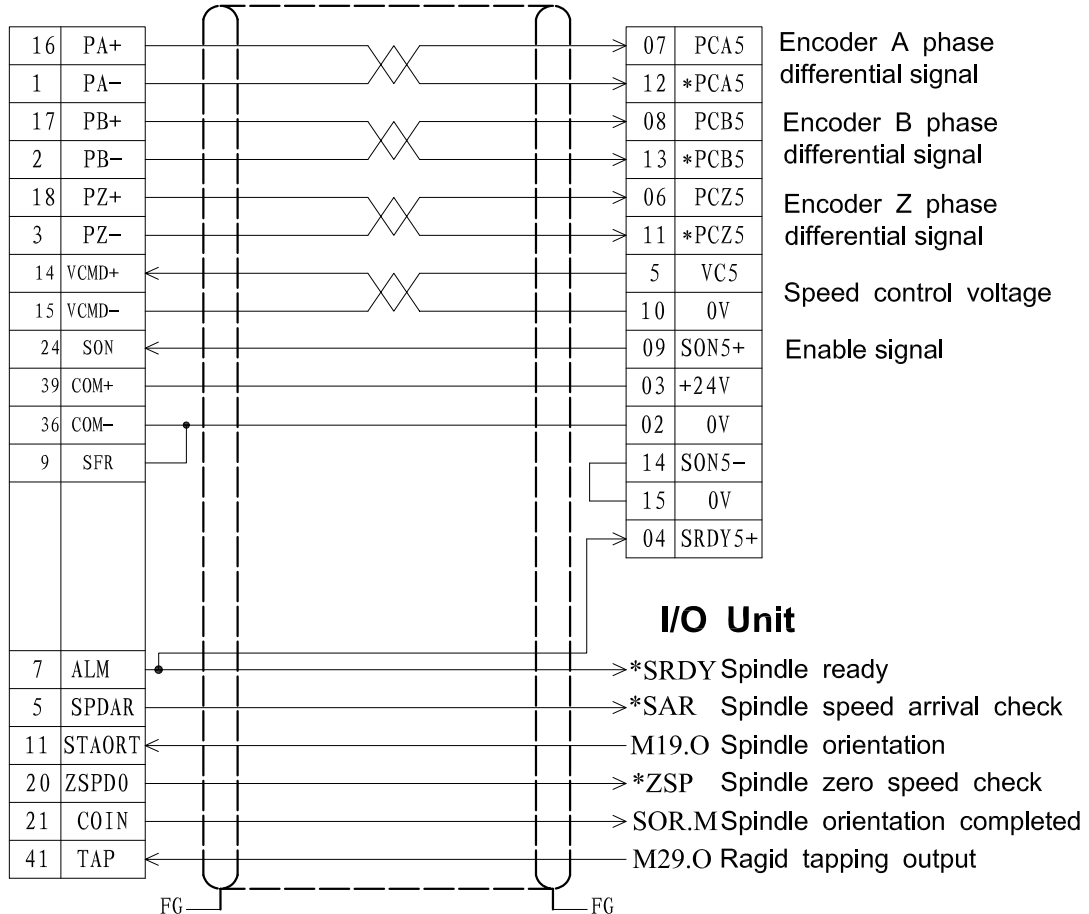


## 5. Connection between NC Unit and Spindle Servo Drive Unit

Spindle Servo Drive Unit:  
DAP01 or DAP03 CN1

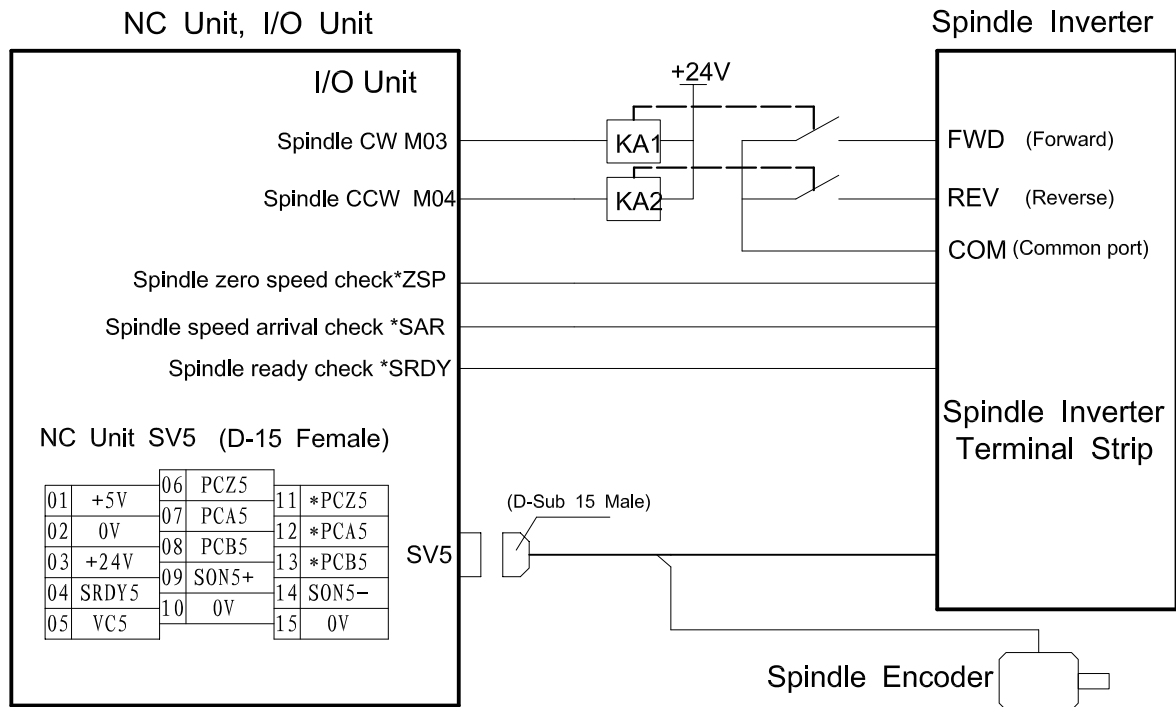
983Ma-00-785

NC Unit SV5



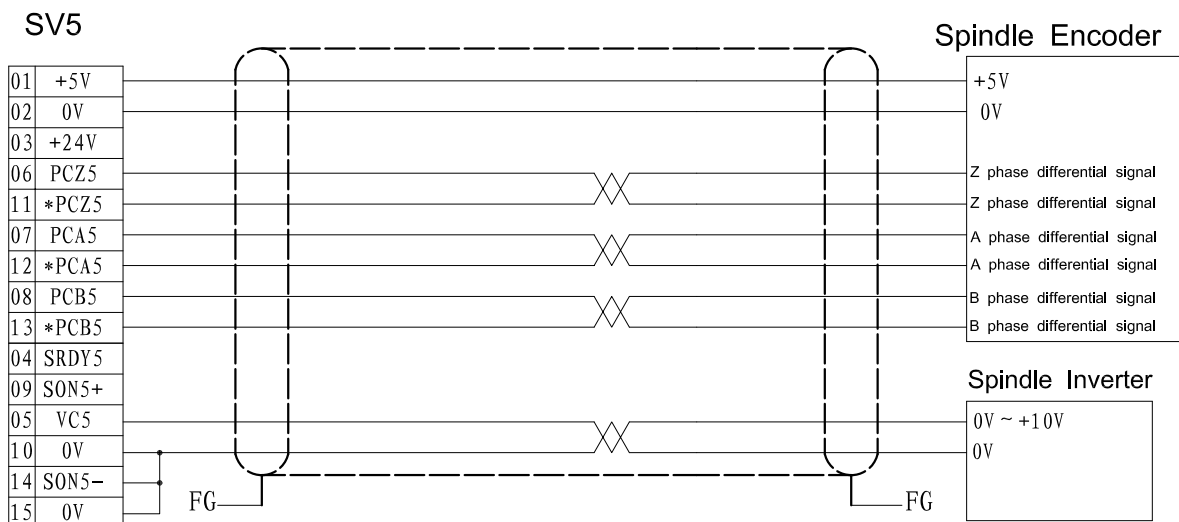
Note: The corresponding positions of I/O points in I/O unit are described in PLC User Manual of the same version.

## 6. Connection between NC Unit and Spindle Inverter



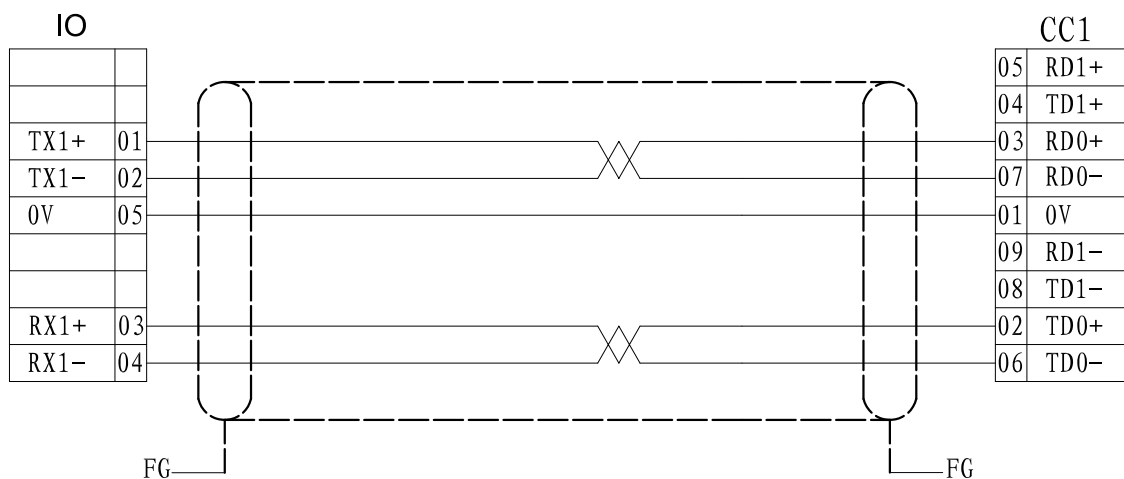
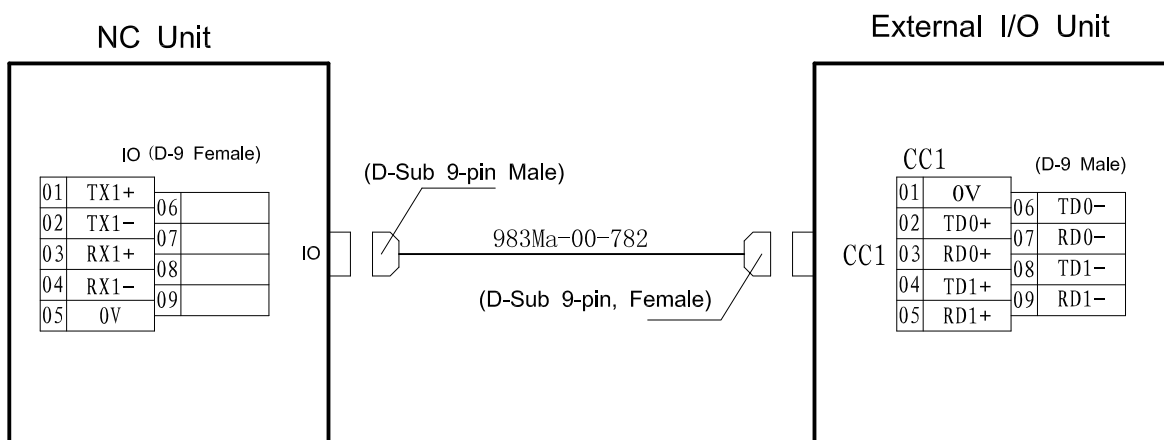
Note 1: The corresponding positions of M03, M04's I/O points in I/O unit are described in *PLC User Manual* of the same version.

Note 2: When the spindle speed arrival check signal \*SAR is not used, it should be shorted to 0V (valid when input point is at low level) or be shorted to 24V (valid when input point is at high level).



Connection with pindle Encoder(983Ma-00-775 )

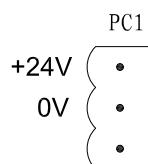
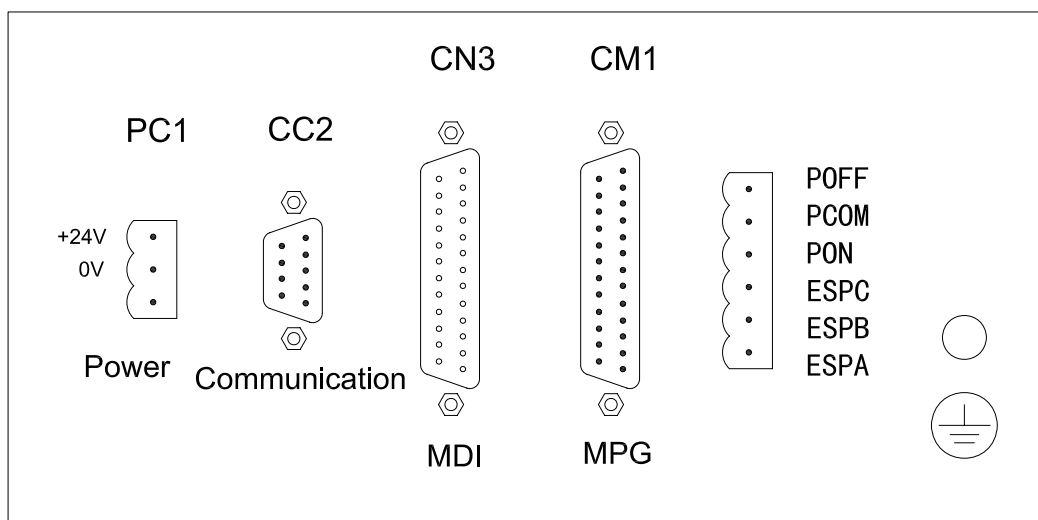
## 7. Connection between NC Unit and I/O Unit



TX1+,TX1-: RS422 differential signal transmission

RX1+,RX1-:RS422 differential signal receiveal

## 8. Machine Tool Panel Interfaces



CC2 (D-9 Male)

01	0V	06	TD-
02	TD+	07	RD-
03	RD+	08	HA-
04	HA+	09	HB-
05	HB+		

Communication

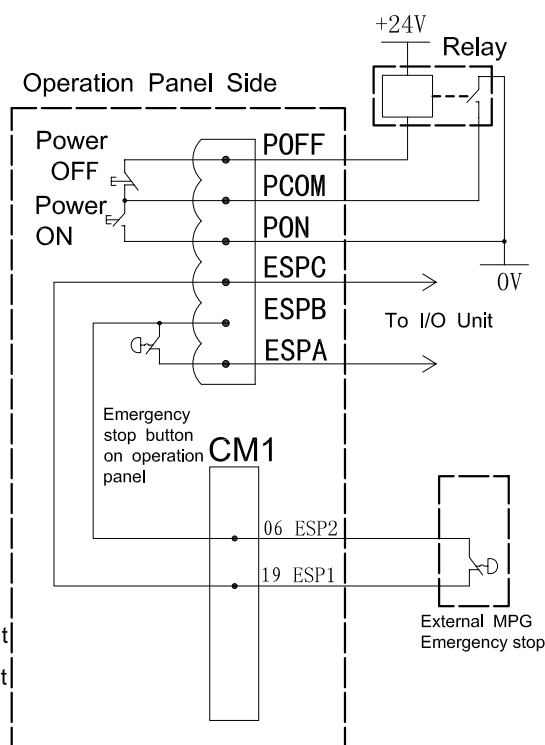
CN3(D-25 Female) Unused

CM1 (D-25 Male)

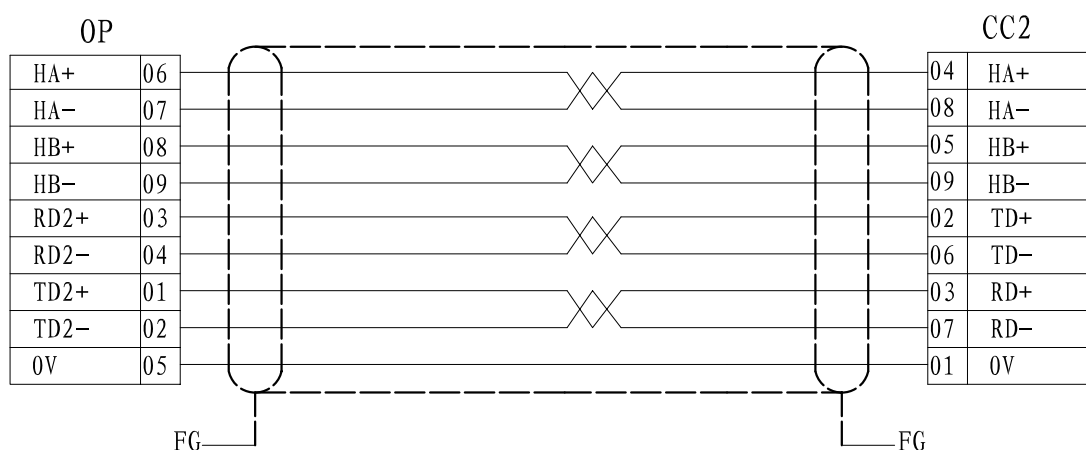
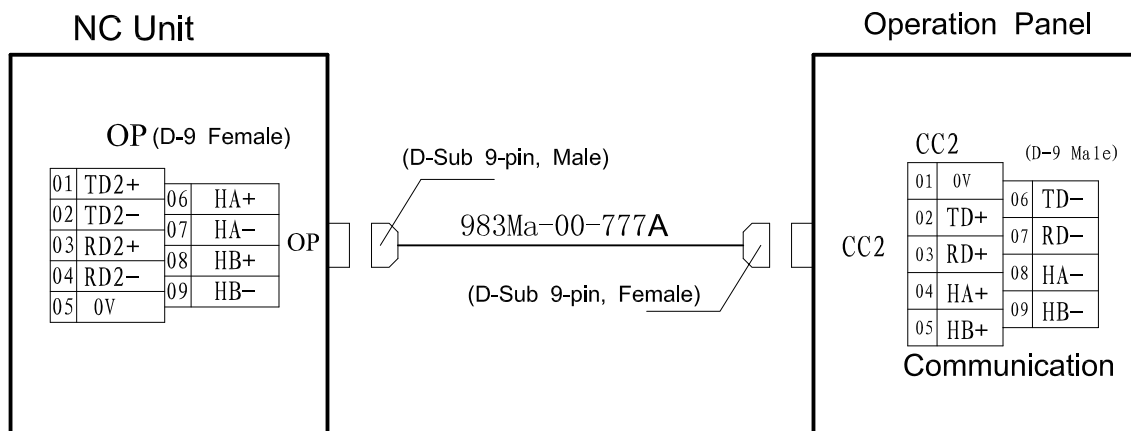
01	HX	14	HY
02	HZ	15	H4
03	H5	16	× 1
04	× 10	17	× 100
05	+L (24V)	18	-L (0V)
06	ESP2	19	ESP1
07		20	0V
08	HA+	21	HA-
09	HB+	22	HB-
10	0V	23	
11	0V	24	
12	+5V	25	
13	+5V		

MPG

- POFF (Power off)
- PCOM (Power switch common port)
- PON (Power on)
- ESPC (Emergency stop chain leading-out terminal 2)
- ESPB (Emergency stop button on operation panel leading-out terminal 2)
- ESPA (Emergency stop button on operation panel leading-out terminal 1)



## 9. Connection between NC Unit and Operation Panel



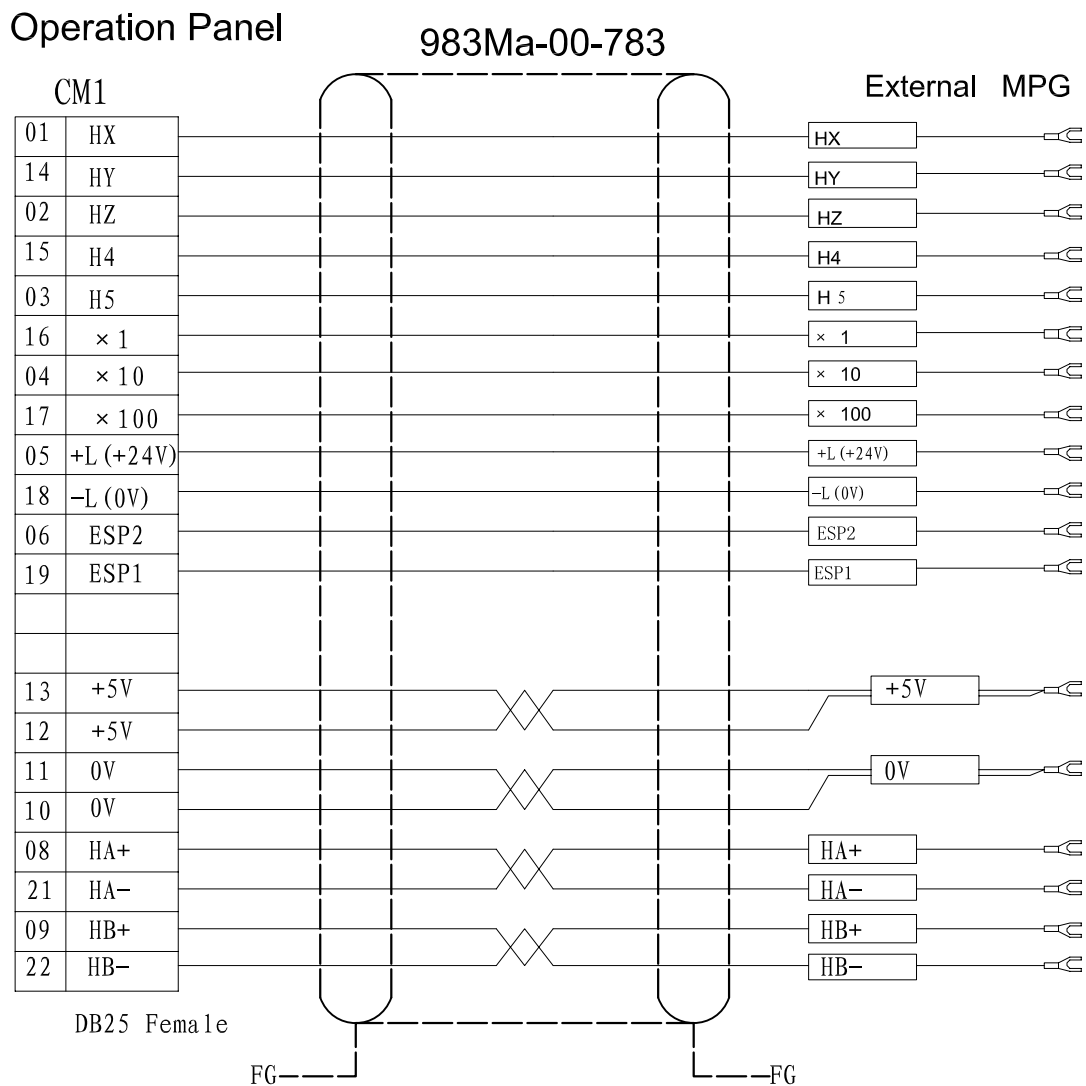
RD2+ RD2-: RS422 differential receival terminal

TD2+ TD2-: RS422 differential sending terminal

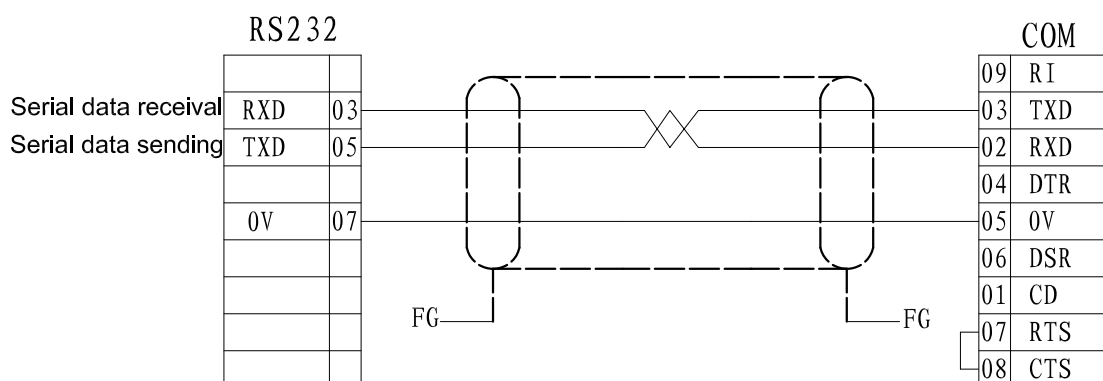
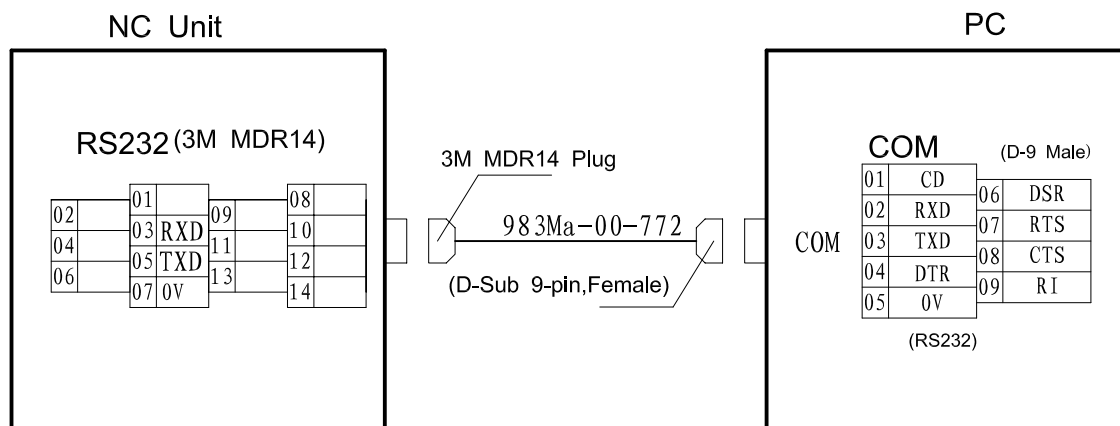
HA+ HA- : MPG A phase signal input

HB+ HB- : MPG B phase signal input

## 10. Connection between External MPG and Operation Panel

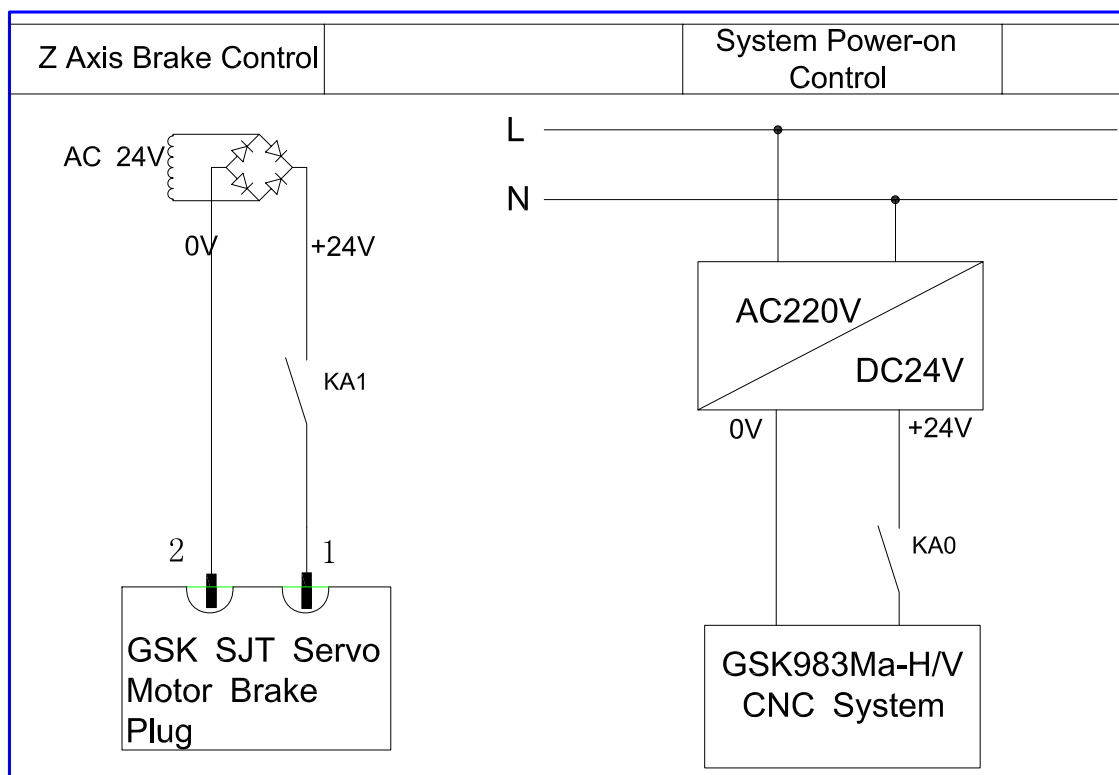
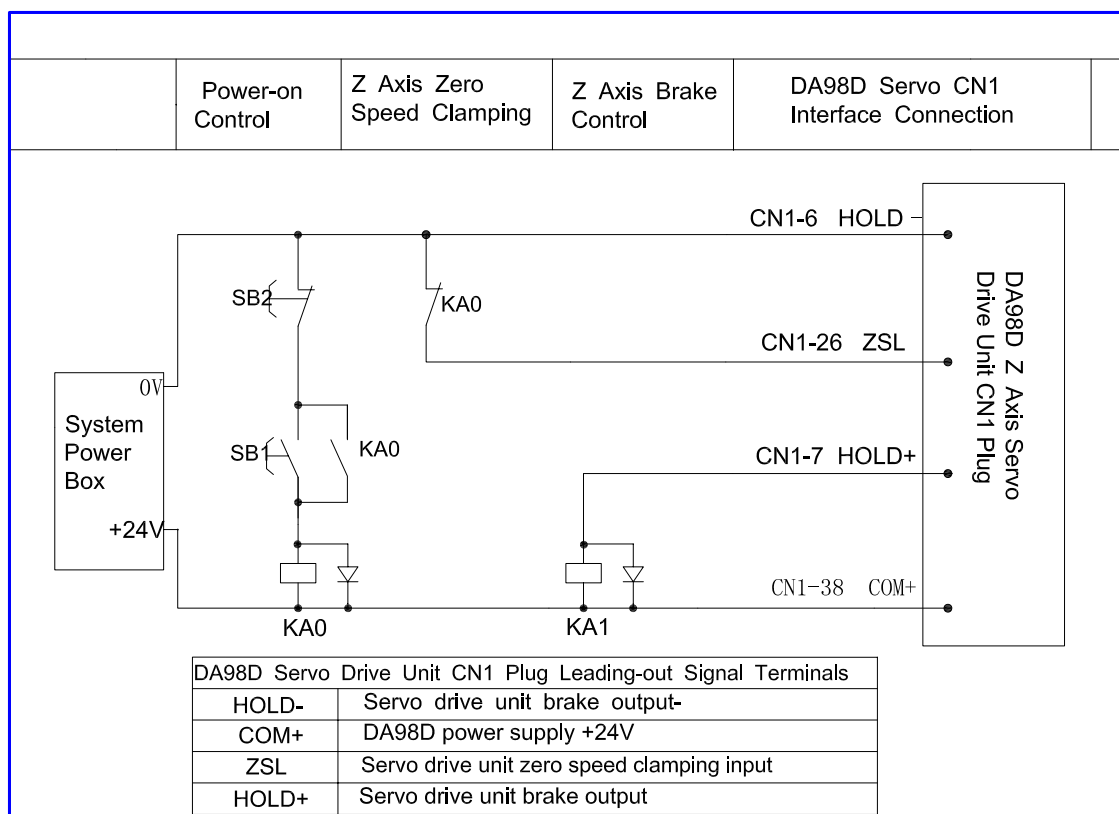


## 11. Connection between NC Unit and PC

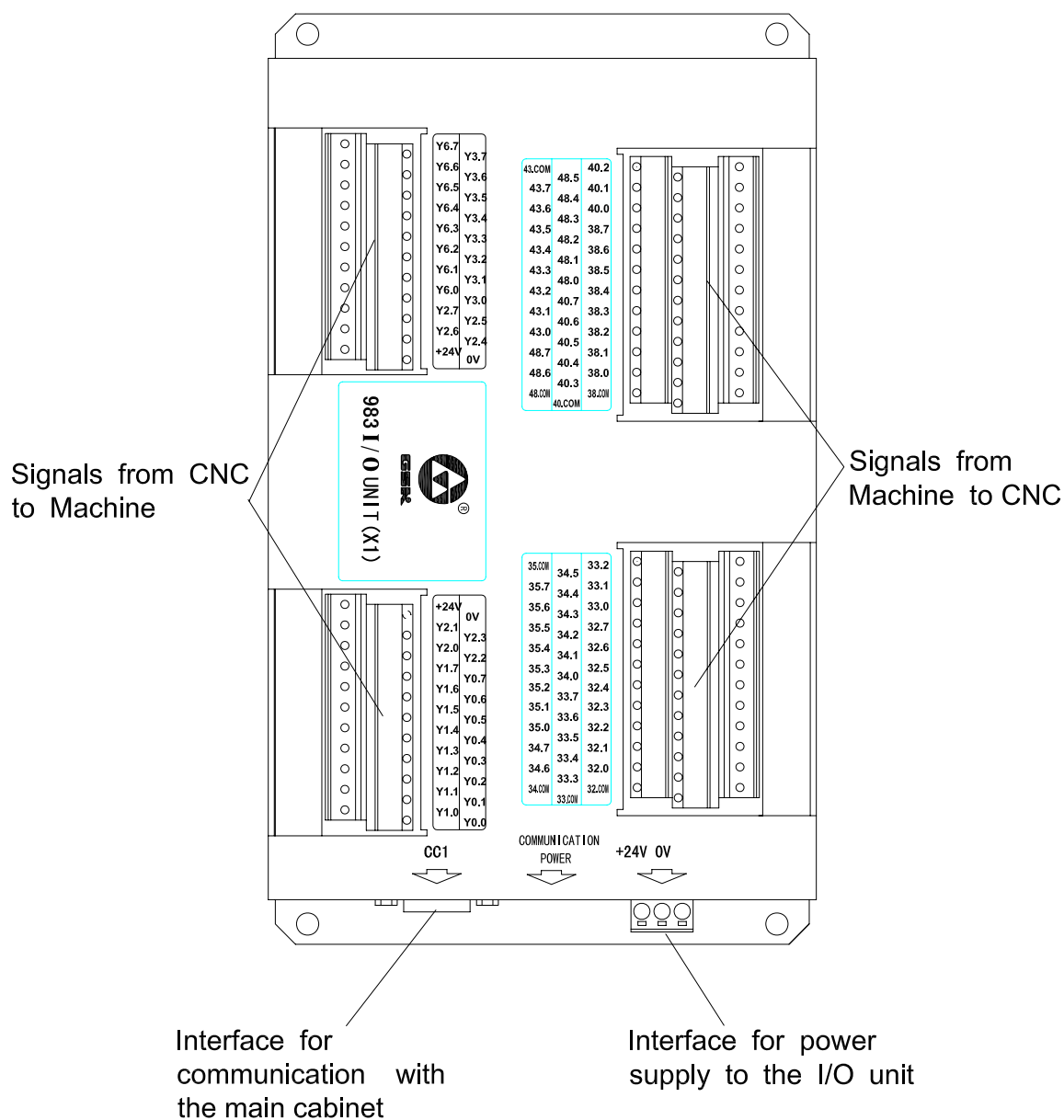


Note: The shell of NC and PC should be grounded firmly.

## 12. Connection Method for Z Axis Brake and System Power-on Control ( Match with GSK DA98D)



## 13. General of External I/O Unit (X1) Interfaces

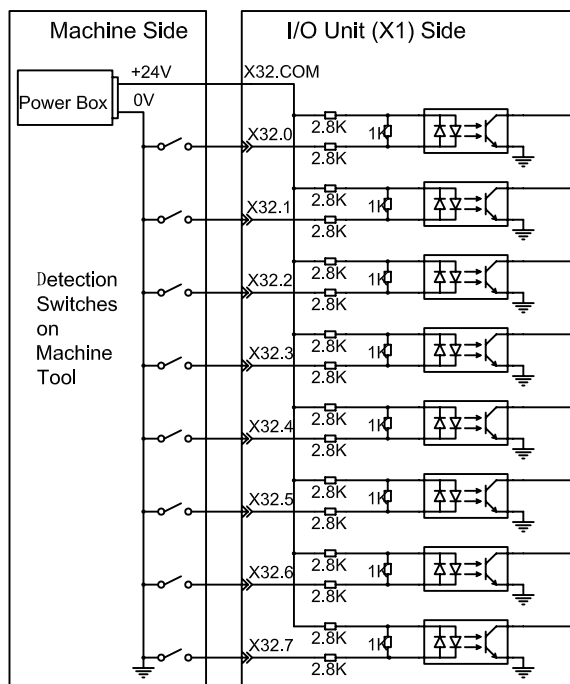


## 14. Connectivity Diagrams for I/O Unit (X1) Input/Output Signals

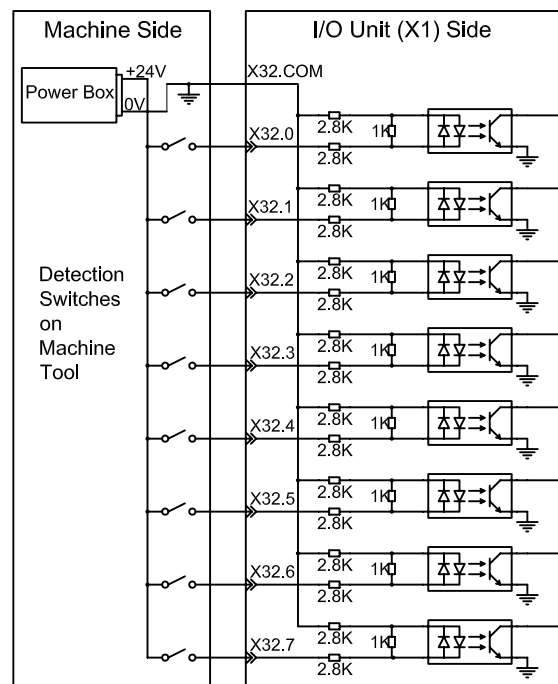
### 1. Input Signal

The COM ports of each address group determine whether the addresses are valid at high or low level:  
 When the COM port is connected to 24V, the input points are valid at low level (0V);  
 When the COM port is connected to 0V, the input points are valid at high level (24V).

Connection when low level is valid



Connection when high level is valid

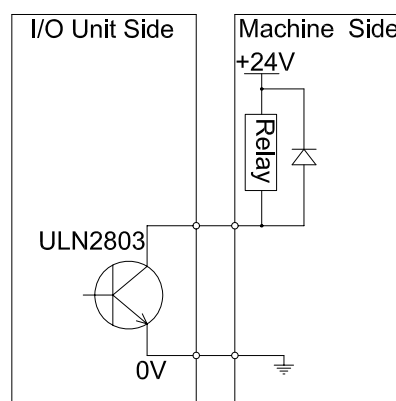


Note: There are 64 input points in 8 different groups. The figure above is taken X32.0-X32.7 for example; other groups are alike.

### 2. Output Signal

There are 40 points for ULN2803 output. The maximum passing current of each point is 200mA.

Connectivity Diagram of Output Point



## 15. I/O Points Definition (X1)

Terminal No.	PLC Address	Signal Name	Signal Function	I/O
<b>X32.COM</b>		<b>X32 common port</b>	High/low level selection for group X32	
<b>X32.0</b>	<b>X32.0</b>	<b>*+LX (fixed)</b>	X axis “+” direction limit (short it to 0V when unused)	I
<b>X32.1</b>	<b>X32.1</b>	<b>*-LX (fixed)</b>	X axis “-” direction limit (short it to 0V when unused)	I
X32.2	X32.2			I
X32.3	X32.3			I
X32.4	X32.4			I
<b>X32.5</b>	<b>X32.5</b>	<b>*DECX (fixed)</b>	X axis zero-point return deceleration switch	I
X32.6	X32.6			I
X32.7	X32.7			I
<b>X33.COM</b>		<b>X33 common port</b>	High/low level selection for group X33	
<b>X33.0</b>	<b>X33.0</b>	<b>*+LY (fixed)</b>	Y axis “+” direction limit (short it to 0V when unused)	I
<b>X33.1</b>	<b>X33.1</b>	<b>*-LY (fixed)</b>	Y axis “-” direction limit (short it to 0V when unused)	I
X33.2	X33.2			I
X33.3	X33.3			I
X33.4	X33.4			I
<b>X33.5</b>	<b>X33.5</b>	<b>*DECY (fixed)</b>	X axis zero-point return deceleration	I
X33.6	X33.6			I
X33.7	X33.7			I
<b>X34.COM</b>		<b>X34 common port</b>	High/low level selection for group X34	
<b>X34.0</b>	<b>X34.0</b>	<b>*+LZ (fixed)</b>	Z axis “+” direction limit (short it to 0V when unused)	I
<b>X34.1</b>	<b>X34.1</b>	<b>*-LZ (fixed)</b>	Z axis “-” direction limit (short it to 0V when unused)	I
X34.2	X34.2			I
X34.3	X34.3			I
X34.4	X34.4			I
<b>X34.5</b>	<b>X34.5</b>	<b>*DECZ (fixed)</b>	X axis zero-point return deceleration	I
X34.6	X34.6			I
X34.7	X34.7			I
<b>X38.COM</b>		<b>X38 common port</b>	High/low level selection for group X38	
X38.0	X38.0			I
X38.1	X38.1			I
X38.2	X38.2			I
X38.3	X38.3			I
<b>X38.4</b>	<b>X38.4</b>	<b>*ESP (fixed)</b>	Emergency stop (input)	I

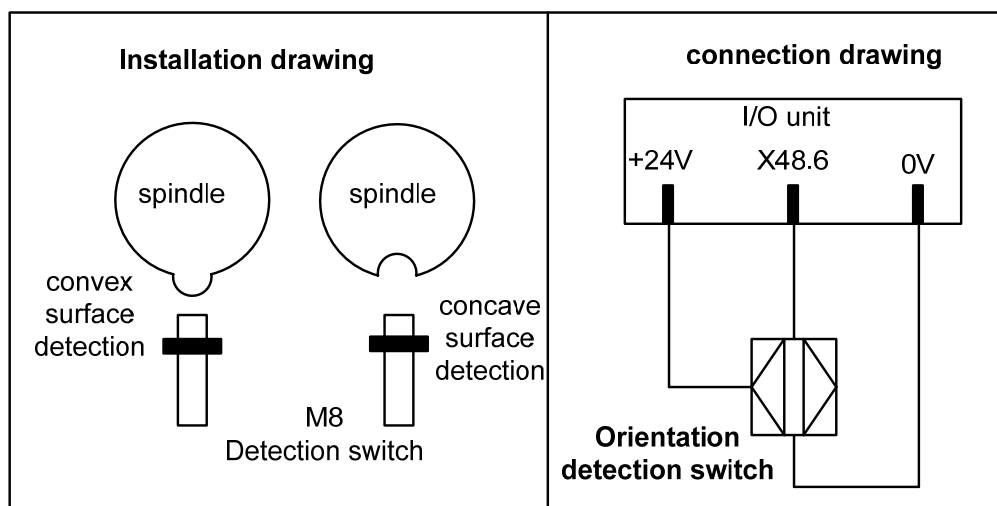
X38.5	X38.5			I
X38.6	X38.6			I
X38.7	X38.7			I
<b>X48.COM</b>		<b>X48 common port</b>	High/low level selection for group X48	
X48.0	X48.0	<b>*+L5 (fixed)</b>	5th axis “+” direction limit	I
X48.1	X48.1	<b>*-L5 (fixed)</b>	5th axis “-” direction limit	I
X48.2	X48.2			I
X48.3	X48.3			I
X48.4	X48.4			I
X48.5	X48.5	<b>*DEC5 (fixed)</b>	*5th axis zero-point return deceleration	I
X48.6	X48.6			I
X48.7	X48.7			I
<b>X43.COM</b>		<b>X43 common port</b>	High/low level selection for group X48	
X43.0	X43.0			I
X43.1	X43.1			I
X43.2	X43.2			I
X43.3	X43.3			I
X43.4	X43.4			I
X43.5	X43.5			I
<b>X43.6</b>	<b>X43.6</b>	<b>SKIP.M</b>	Block skip signal input	I
X43.7	X43.7			I
<b>X35.COM</b>		<b>X35 common port</b>	High/low level selection for group X35	
<b>X35.0</b>	<b>X35.0</b>	<b>*+L4 (fixed)</b>	4th axis “+” direction limit	I
<b>X35.1</b>	<b>X35.1</b>	<b>*-L4 (fixed)</b>	4th axis “-” direction limit	I
X35.2	X35.2			I
X35.3	X35.3			I
X35.4	X35.4			I
<b>X35.5</b>	<b>X35.5</b>	<b>*DEC4 (fixed)</b>	4th axis zero-point return deceleration	I
X35.6	X35.6			I
X35.7	X35.7			I
<b>X40.COM</b>		<b>X40 common port</b>	High/low level selection for group X40	
X40.0	X40.0			I
X40.1	X40.1			I
X40.2	X40.2			I
<b>X40.3</b>	<b>X40.3</b>			I
<b>X40.4</b>	<b>X40.4</b>			I
X40.5	X40.5			I
X40.6	X40.6			I
X40.7	X40.7			I
Y0.0	Y0.0			O
Y0.1	Y0.1			O
Y0.2	Y0.2			O

Y0.3	Y0.3			O
Y0.4	Y0.4			O
Y0.5	Y0.5			O
Y0.6	Y0.6			O
Y0.7	Y0.7			O
Y1.0	Y1.0			O
Y1.1	Y1.1			O
Y1.2	Y1.2			O
Y1.3	Y1.3			O
Y1.4	Y1.4			O
Y1.5	Y1.5			O
Y1.6	Y1.6			O
Y1.7	Y1.7			O
Y2.0	Y2.0			O
Y2.1	Y2.1			O
Y2.2	Y2.2			O
Y2.3	Y2.3			O
0V			24V power ground	
+24V			24V power output	O
Y3.0	Y3.0			O
Y3.1	Y3.1			O
Y3.2	Y3.2			O
Y3.3	Y3.3			O
Y3.4	Y3.4			O
Y3.5	Y3.5			O
Y3.6	Y3.6			O
Y3.7	Y3.7			O
Y6.0	Y6.0			O
Y6.1	Y6.1			O
Y6.2	Y6.2			O
Y6.3	Y6.3			O
Y6.4	Y6.4			O
Y6.5	Y6.5			O
Y6.6	Y6.6			O
Y6.7	Y6.7			O
Y2.4	Y2.4			O
Y2.5	Y2.5			O
Y2.6	Y2.6			O
Y2.7	Y2.7			O
0V			24V power ground	
+24V			24V power output	O

**Note:** The already defined I/O point cannot be changed or re-defined by customer. Other points' function can be determined during PLC programming.

## 16. Instructions for Installing Mechanical Position Detection Switch for Spindle Orientation

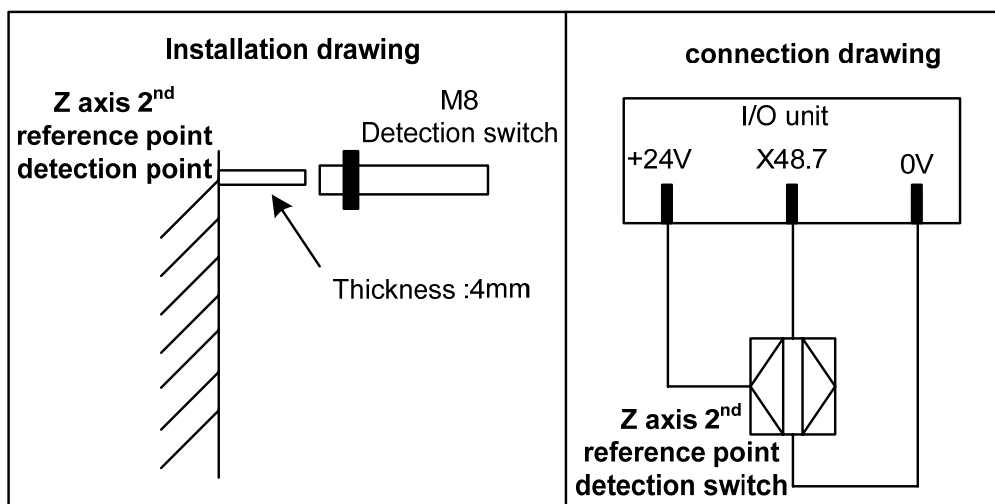
To further improve the accuracy and reliability of the spindle orientation, and to protect the tool magazine and tools, the 983M system adds mechanical position confirmation signal. During tool change, besides checking the orientation in-position signal of spindle servo drive unit, the system also checks the mechanical position confirmation signal for spindle orientation. X48.6 is the input point of the confirmation signal. A machine tool builder can install orientation in-position detection switch accordingly (proximity switch of size M8 is advised, its detection distance is above 1mm). Detection method (concave surface detection or convex surface detection) can be selected by the machine tool builder. The PC parameter No. 3004.7 selects the normally-open or normally-closed state of the detection switch (default PC parameter No. 3004.7=0; normally-open; convex surface detection). When PC parameter No. 3004.7=1, normally-closed switch and concave detection is applied.



**Note:** X48.6 is the input point of “spindle orientation mechanical position confirmation” signal, which is defined by PLC in Version Me1. 0A. Note that different PLC versions may lead to different input point positions, please refer to corresponding PLC version manual before connection.

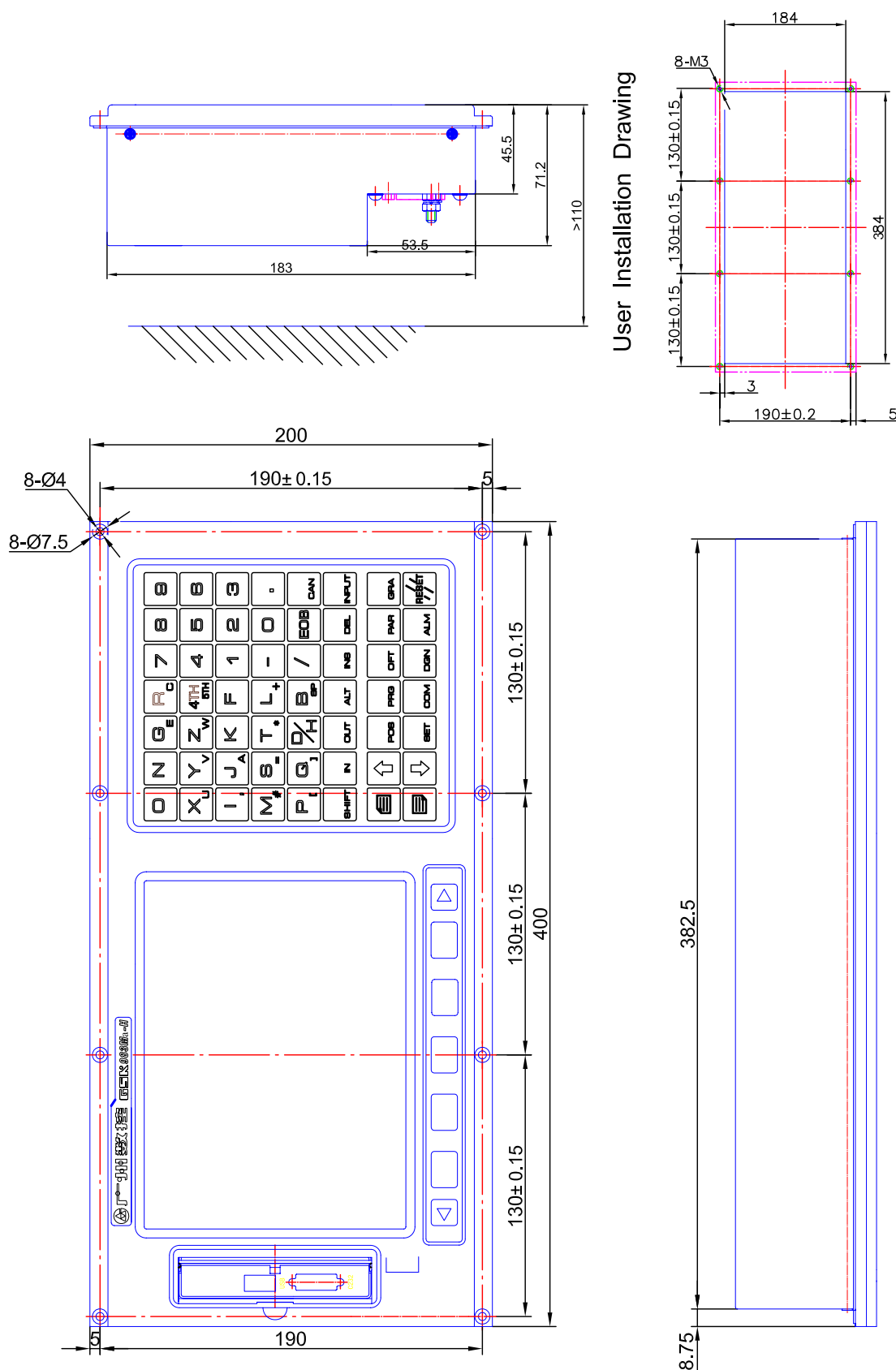
## 17. Instruction for installing mechanical position detection switch at Z axis 2<sup>nd</sup> reference point

To further improve the accuracy and reliability of the spindle orientation, and to protect the tool magazine and tools, the 983M system adds mechanical position confirmation signal for Z axis 2<sup>nd</sup> reference point. During tool change, besides detecting the Z axis 2<sup>nd</sup> reference point signal which is set based on the machine zero point, the system also detects the Z axis 2<sup>nd</sup> reference point mechanical position confirmation signal. X48.7 is the input point of Z axis tool gripping position signal (i.e. Z axis 2<sup>nd</sup> reference point mechanical position confirmation signal). The PC parameter No.3005.1 selects the normally-open or normally-closed state of the detection switch (default PC parameter No. 3004.7=0; normally-open;). When PC parameter No. 3005.1=1, normally-closed switch is applied.

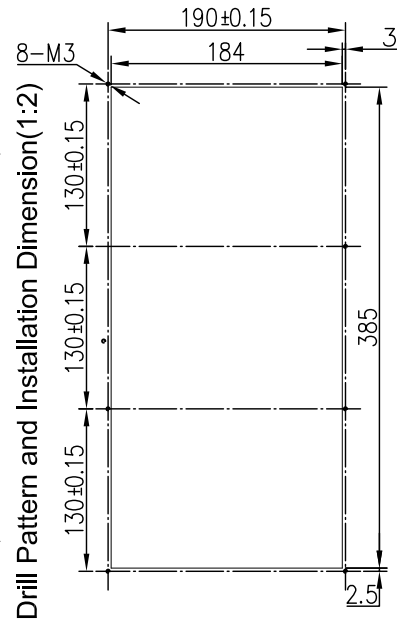
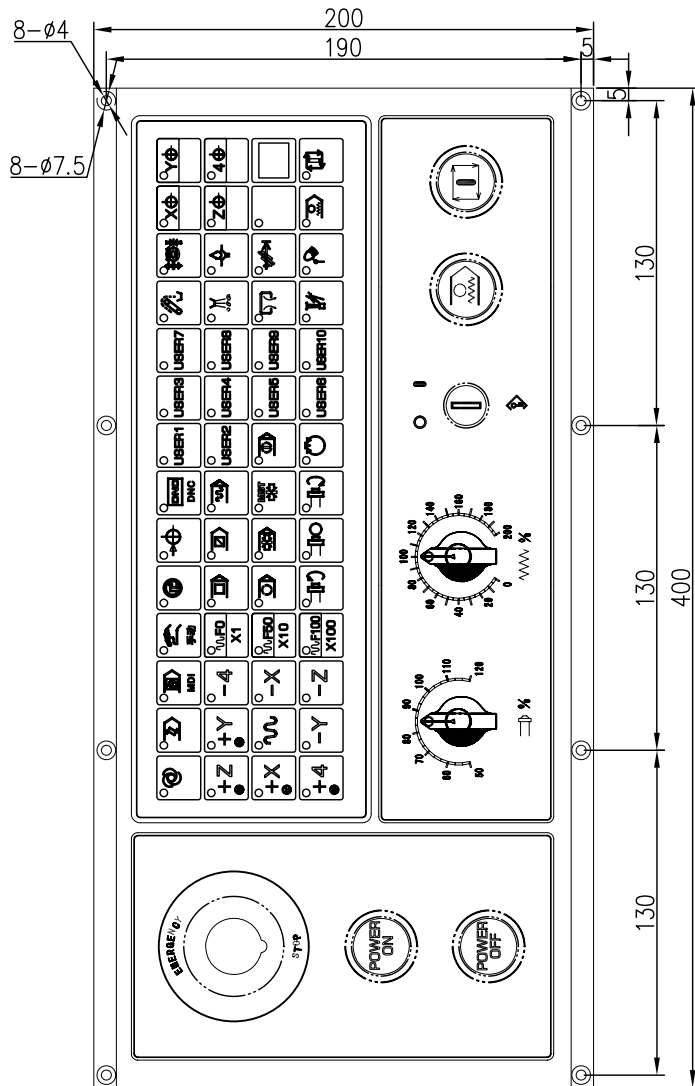


**Note:** X48.7 is the input point of “tool magazine tool gripping point Z axis mechanical position confirmation” signal, which is defined by PLC in Version Me1. 0A. Note that different PLC version may lead to different input point position, please refer to corresponding PLC version manual before connection.

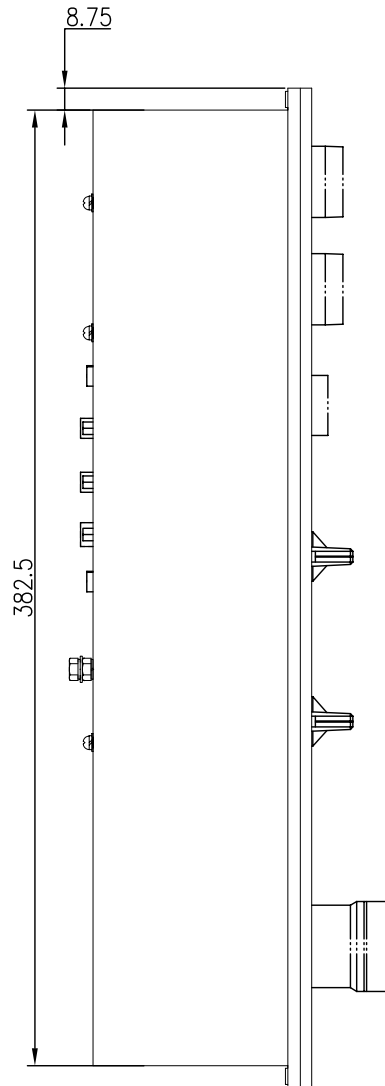
## Appendix Installation Dimension Drawings



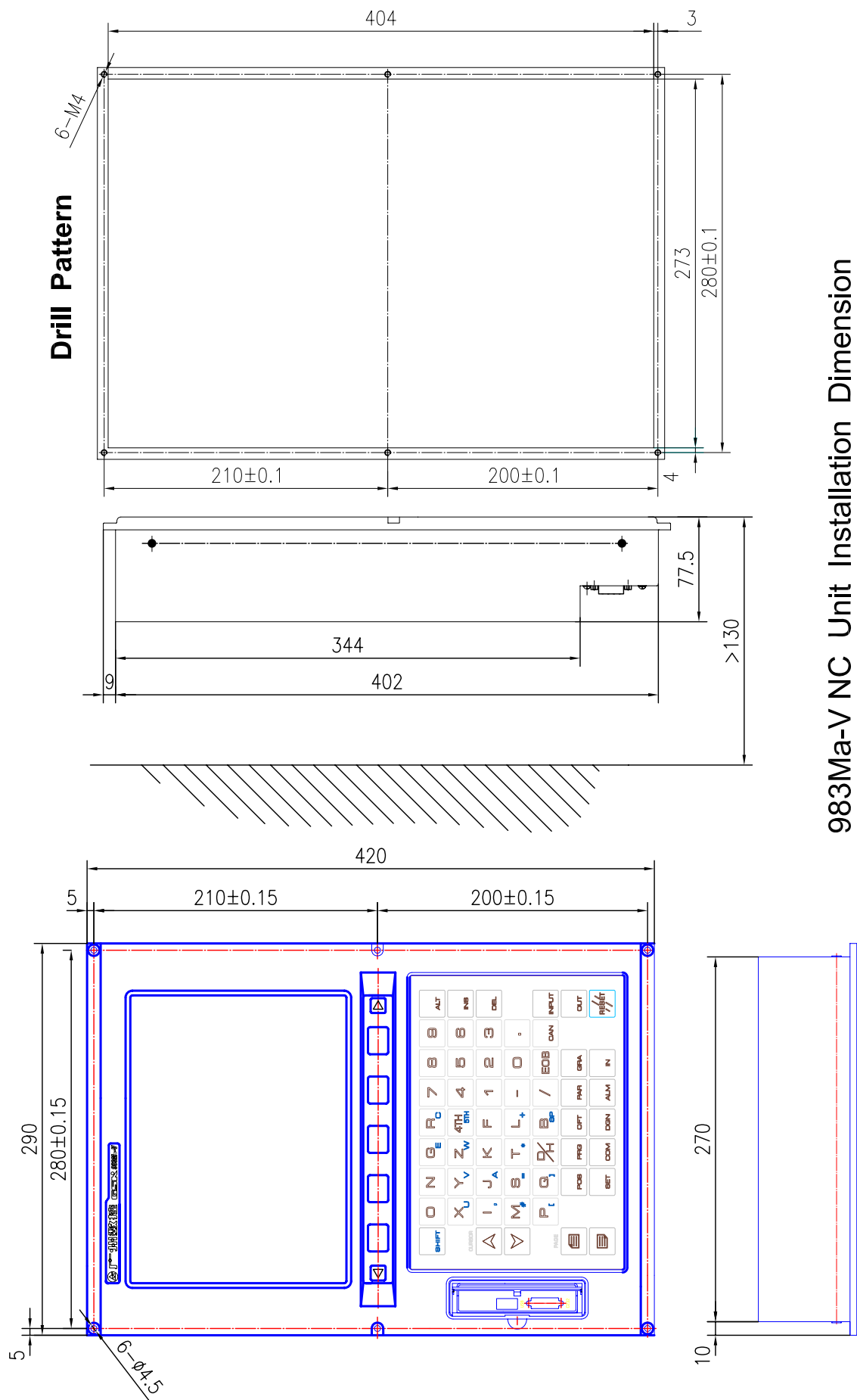
983Ma-H NC Unit Installation Dimension



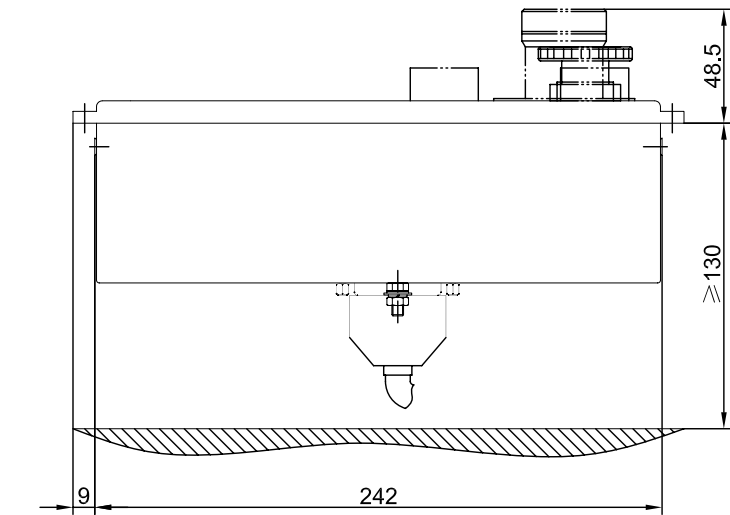
Note: There are several versions concerning the panel rear cover dimension, and the "Drill Pattern and Installation Dimension" is compatible with all versions; therefore, the drill pattern should be strictly followed.



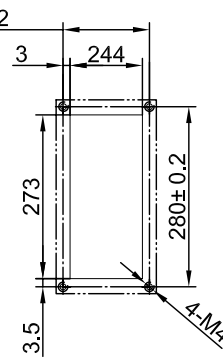
## 983Ma-H Operation Panel Installation Dimension



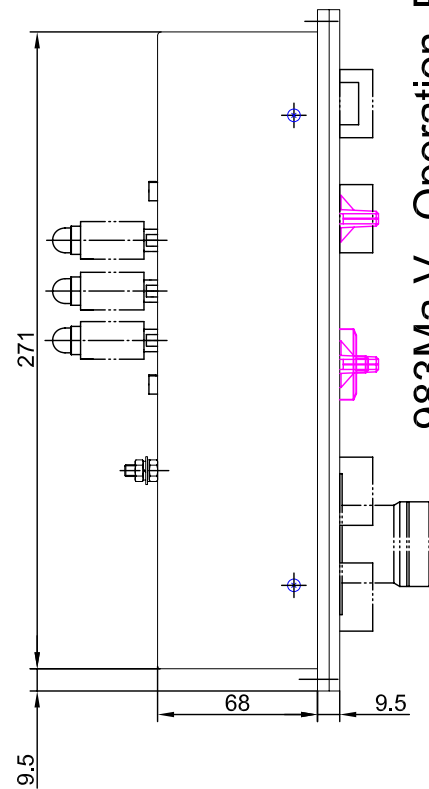
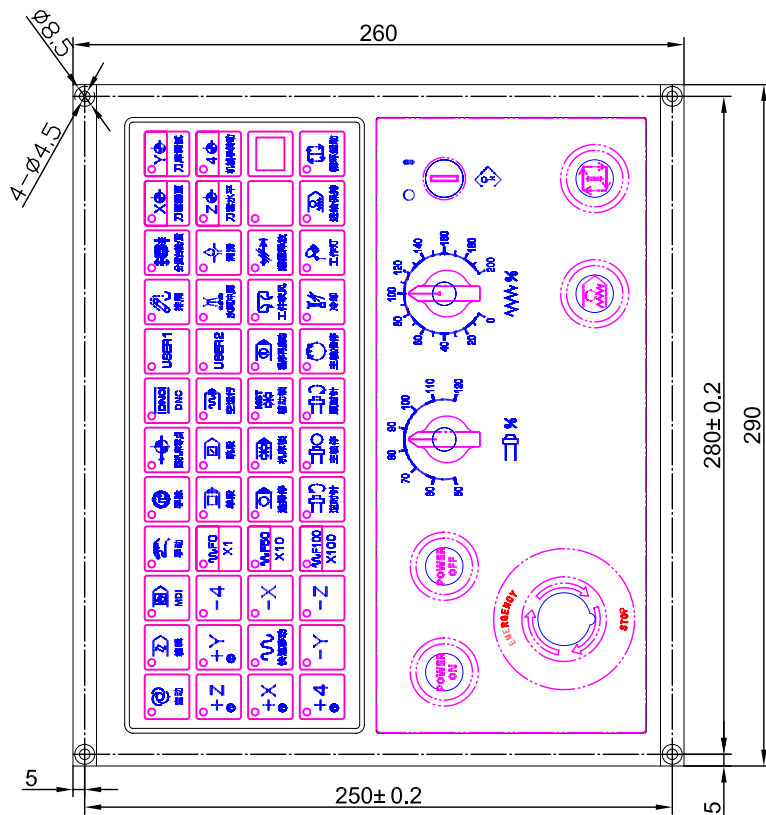
983Ma-V NC Unit Installation Dimension



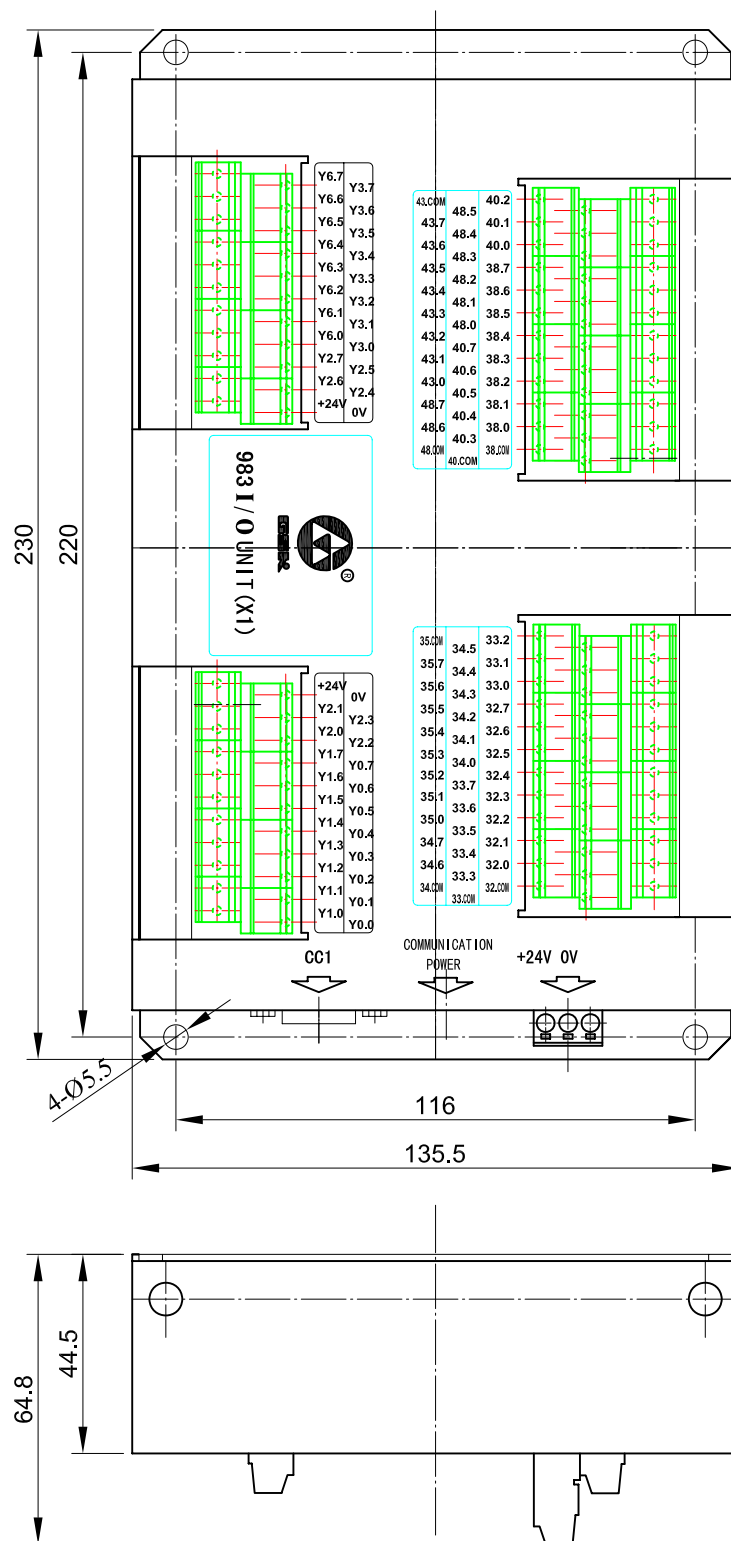
Drill Pattern and Installation Dimension



Note: There are several versions concerning the panel rear cover dimension, and the "Drill Pattern and Installation Dimension" is compatible with all versions; therefore, the drill pattern should be strictly followed.



983Ma-V Operation Panel Installation Dimension



983Ma-H/V External I/O Unit Installation Dimension

# GSK983Ma-H/V Milling CNC System Connection Manual Version Upgrading Records

No.	Date	Version	Contents
1	2010-4-7	First version	