

RIO-BASIC Main Module

Basic Installation Instruction V1.0

Dear users, please go through the instructions in detail before the installation. Also, please preserve the manual properly and hand it to the actual operator of the machine.

CNC controllers are precision electronic devices. For the safety of both operators and the machine, please ensure all the tests, installations and adjustments are operated by professional electrical engineering personnel. For the description with “DANGER”, “WARNING” and “CAUTION” in the manual, please read them in detail. If there are any concerns, please contact our branches in various regions. Our professionals are glad to be at your service.

1. Safety Precautions :

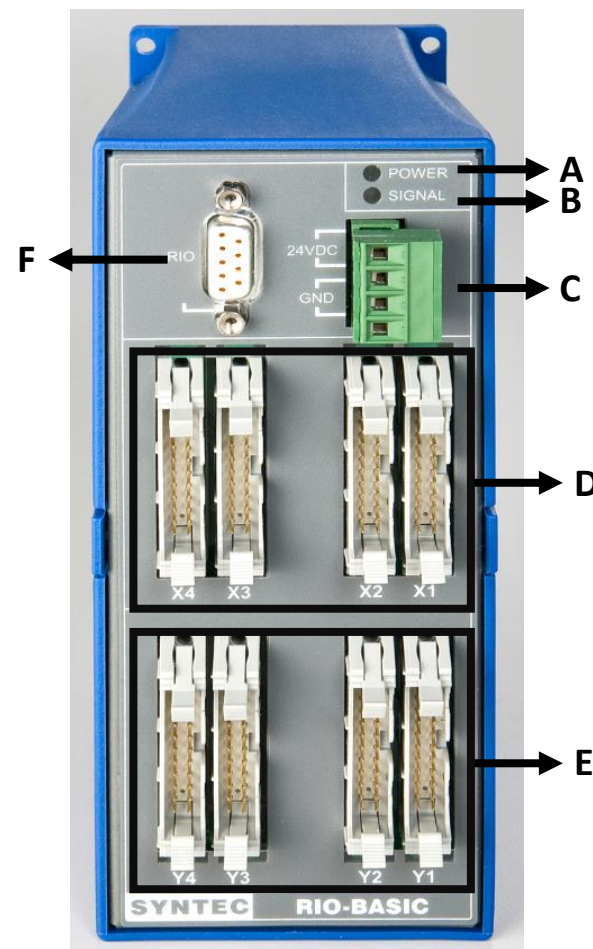
Please pay extra attention to the instructions below while operating the product.	
	<ul style="list-style-type: none"> The controller series are designed to control the motor of the machine tool and manage the IO control. Do not touch the internal circuits or components while the controller is powered up. The internal circuit board of the controller is composed of CMOS ICs, which are vulnerable to static electricity. Do not touch the circuit board with your hand before taking precautionary measures.
	<ul style="list-style-type: none"> Please cut off all the external loads when powering up the controller for the first time. The built-in testing PLC program may start the motor immediately after powered up, which might be dangerous for the staffs around. The controller is a precision instrument. Please prevent non-maintenance staff or non-professional electronic control personnel from disassembling the device.
	<ul style="list-style-type: none"> The CNC controller adopts microcomputer design. Please install the controller in a safe area and keep the surrounding clean. Please keep iron shavings, wires, water, corrosive gas and liquids from the controller to avoid malfunctioning. Storage temperature range: -20°C~60°C Storage relative humidity range: 0% to 90% and without condensation. Operating temperature range: -10°C~55°C Please reserve a space of more than 50mm in width for ventilation and heat dissipation.

Please pay extra attention to the instructions below while operating the product.	
	<ul style="list-style-type: none"> The grounding of the controller and the machine tool system is necessary for leakage protection and prevention of lightning strikes. Please make sure the controller and machine tool system are grounded properly before the installation. The controller should be installed with a power system operated below 24±20%. If the operating environment provides an unstable voltage source, please apply a voltage stabilizer to ensure proper functioning of the controller. Please turn off the power before plugging/unplugging the cables or modifying the wirings to prevent electric shocks and damage of the controller. Please ensure all the terminals are in the correct positions during wiring to prevent the controller from damage caused by wiring mistakes.

2. Features :

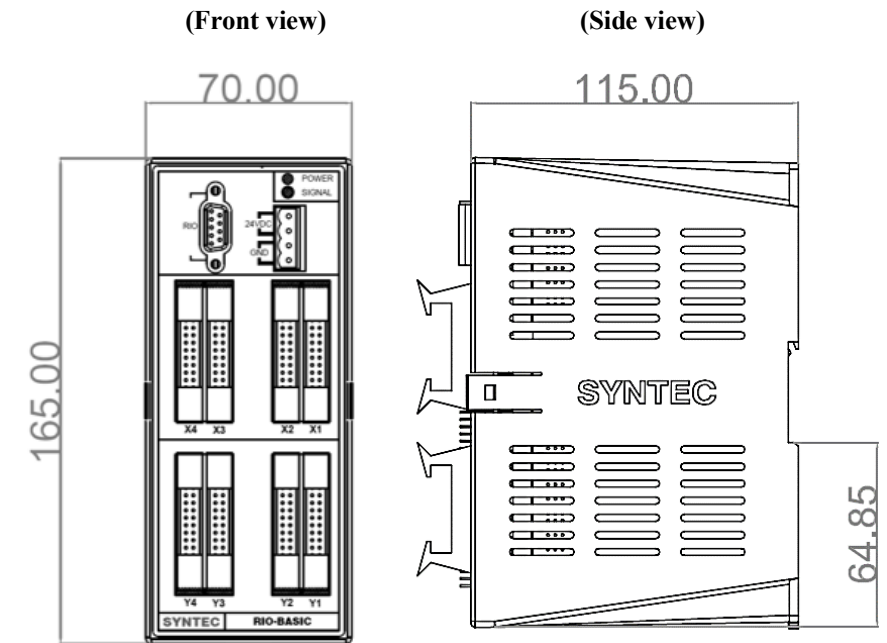
- Able to match the most feasible input/output points setting.
- Maximum 64 I input points; 64 O output points
- Only one series of cables is needed to connect the controller.
- The modular design can save wiring space and cost.

3. Interface Description :

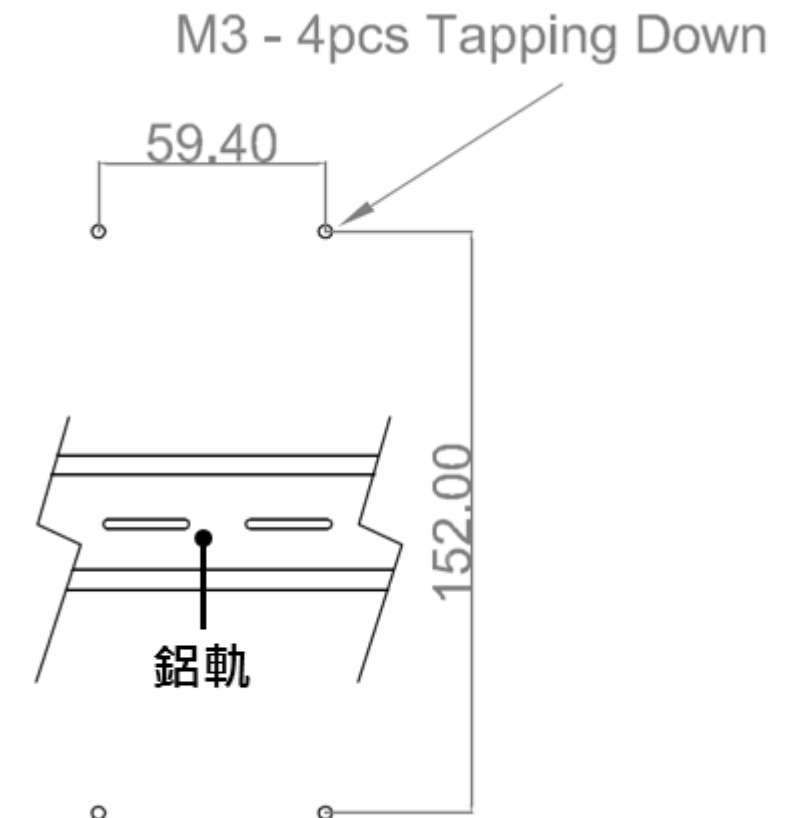


A	Power Indicator Light	Indicate the power state
B	Signal Indicator Light	Indicate the signal state
C	DC 24V INPUT	Power input DC 24V · 1A
D	Input Terminal (X1~X4)	External input expansion connector
E	Output Terminal (Y1~Y4)	External output expansion connector
F	RIO PORT	IO series interface connector

4. Structure Specifications : (Unit : mm)



5. Mounting Hole Specifications: (Unit : mm)



6. Interface definition :

Please notice the voltage value and the polarities.

● X1 Port Definition

X1	PIN	SIGNAL	PIN	SIGNAL
	20	INPUT8	19	INPUT0
	18	INPUT9	17	INPUT1
	16	INPUT10	15	INPUT2
	14	INPUT11	13	INPUT3
	12	INPUT12	11	INPUT4
	10	INPUT13	9	INPUT5
	8	INPUT14	7	INPUT6
	6	INPUT15	5	INPUT7
	4	GND	3	GND
	2	NC	1	NC

● X2 Port Definition

X2	PIN	SIGNAL	PIN	SIGNAL
	20	INPUT24	19	INPUT16
	18	INPUT25	17	INPUT17
	16	INPUT26	15	INPUT18
	14	INPUT27	13	INPUT19
	12	INPUT28	11	INPUT20
	10	INPUT29	9	INPUT21
	8	INPUT30	7	INPUT22
	6	INPUT31	5	INPUT23
	4	GND	3	GND
	2	NC	1	NC

● X3 Port Definition

X3	PIN	SIGNAL	PIN	SIGNAL
	20	INPUT40	19	INPUT32
	18	INPUT41	17	INPUT33
	16	INPUT42	15	INPUT34
	14	INPUT43	13	INPUT35
	12	INPUT44	11	INPUT36
	10	INPUT45	9	INPUT37
	8	INPUT46	7	INPUT38
	6	INPUT47	5	INPUT39
	4	GND	3	GND
	2	NC	1	NC

● X4 Port Definition

X4	PIN	SIGNAL	PIN	SIGNAL
	20	INPUT56	19	INPUT48
	18	INPUT57	17	INPUT49
	16	INPUT58	15	INPUT50
	14	INPUT59	13	INPUT51
	12	INPUT60	11	INPUT52
	10	INPUT61	9	INPUT53
	8	INPUT62	7	INPUT54
	6	INPUT63	5	INPUT55
	4	GND	3	GND
	2	NC	1	NC

● 24V INPUT Port Definition

24V 電源輸入	PIN	SIGNAL
1	1	24V
	2	24V
	3	GND
4	4	GND

● RIO Port Definition

RIO	PIN	SIGNAL	PIN	SIGNAL
	1	RIO1-RX+	6	NC
	2	RIO1-RX-	7	NC
	3	RIO1-TX+	8	NC
	4	RIO1-TX-	9	NC
	5	NC		

● Y1 Port Definition

Y1	PIN	SIGNAL	PIN	SIGNAL
	20	OUTPUT8	19	OUTPUT0
	18	OUTPUT9	17	OUTPUT1
	16	OUTPUT10	15	OUTPUT2
	14	OUTPUT11	13	OUTPUT3
	12	OUTPUT12	11	OUTPUT4
	10	OUTPUT13	9	OUTPUT5
	8	OUTPUT14	7	OUTPUT6
	6	OUTPUT15	5	OUTPUT7
	4	GND	3	GND
	2	24V	1	24V

● Y2 Port Definition

Y2	PIN	SIGNAL	PIN	SIGNAL
	20	OUTPUT24	19	OUTPUT16
	18	OUTPUT25	17	OUTPUT17
	16	OUTPUT26	15	OUTPUT18
	14	OUTPUT27	13	OUTPUT19
	12	OUTPUT28	11	OUTPUT20
	10	OUTPUT29	9	OUTPUT21
	8	OUTPUT30	7	OUTPUT22
	6	OUTPUT31	5	OUTPUT23
	4	GND	3	GND
	2	24V	1	24V

● Y3 Port Definition

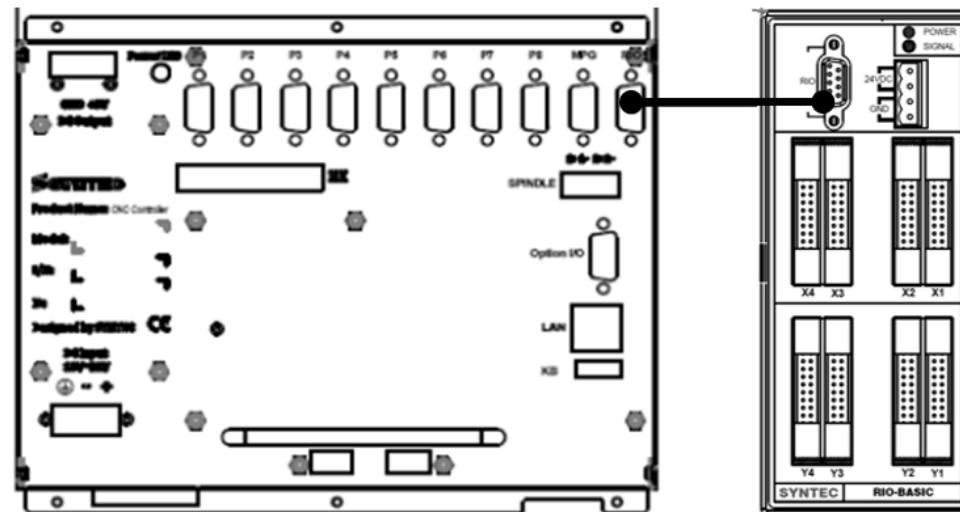
Y3	PIN	SIGNAL	PIN	SIGNAL
	20	OUTPUT40	19	OUTPUT32
	18	OUTPUT41	17	OUTPUT33
	16	OUTPUT42	15	OUTPUT34
	14	OUTPUT43	13	OUTPUT35
	12	OUTPUT44	11	OUTPUT36
	10	OUTPUT45	9	OUTPUT37
	8	OUTPUT46	7	OUTPUT38
	6	OUTPUT47	5	OUTPUT39
	4	GND	3	GND
	2	24V	1	24V

● Y4 Port Definition

Y4	PIN	SIGNAL	PIN	SIGNAL
	20	OUTPUT56	19	OUTPUT48
	18	OUTPUT57	17	OUTPUT49
	16	OUTPUT58	15	OUTPUT50
	14	OUTPUT59	13	OUTPUT51
	12	OUTPUT60	11	OUTPUT52
	10	OUTPUT61	9	OUTPUT53
	8	OUTPUT62	7	OUTPUT54
	6	OUTPUT63	5	OUTPUT55
	4	GND	3	GND
	2	24V	1	24V

※Note: The maximum output current of the Y Port single channel is 350mA.

7. Basic Wiring Diagram :



8. Wiring Notifications :

- When using a solenoid valve or other inductive loads, please apply an arc extinguisher or RC voltage dependent resistor RC to ensure the life of the contact points. Advantages of the arc extinguisher:
 - 1) Extend the life of electrical contacts.
 - 2) Reduce the sparks from the contact points.
 - 3) Prevent the inductive loads from interferences caused by back EMF.
 - 4) Restrain the impulse voltage.
- If the server line you are using is not a standard Syntec cable, please check all the terminals and make sure they are connected properly before running a test. The wrong wiring will lead to the controller output command error and cause malfunctioning.
- MPG terminal's +5V output capacity is 200mA and it is only for a single external hand wheel. Do not connect it with other loads or it might cause malfunction due to the lack of drive capacity.
- The external 24V power supply used in wiring should be certificated and protective to avoid the malfunction caused by wiring mistakes. (Recommendation standard : fulfill requirements of both EN60950 and UL1950)
- Please crimp or weld the wire connections while doing the wirings.
- In case of the use of Ethernet, to prevent the internet congestion and noise, the CAT5e or CAT6 cable are recommended.
- Do not use counterfeit terminal strips. Those terminal strips cannot provide overall protection for the system. The quality is also not guaranteed and prone to cause electrical control problems of the machine tools.
- Grounding Directions:
 - 1) The length of the grounding wire should follow the electrical equipment regulations. The shorter the better.
 - 2) The grounding wire of the controller should be separated from those with large current loading such as electric welders or high frequency motors.
 - 3) Please refer to the pictures below when the controller is grounded with multiple electrical control devices. Do not make it a loop.

