PANELMATE
Creative HMI Solution

User Operation Manual

Panel21XXX

CNC Control Panel



上海亿耀电子有限公司
Shanghai Panelmate Electronics Co.,Ltd.

Publication List

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Panel21XXX	Shanghai Panelmate Electronics Co., LTD

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Approval	ZJC/Design engineer/Panelmate electronics	
Authorize	JJY/General manager/Panelmate electronics	

other

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Declaration Of Conformity

These restrictions are for system operation in a commercial environment from harmful interference in the operation of the system in a commercial environment. This device generates, uses and transmits radio frequency energy. If not properly installed and used correctly to the manual instructions, it may cause harmful interference to radio communications. However, even if the installation and use of the manual instructions are followed, there is no guarantee that there will be no interference. If this device will cause harmful interference with radio or television signal reception, the user can confirm by turning the device on and off. When the device produces harmful interference, the user can take the following measures to solve the interference problem:

1. Adjust the direction or position of the receiving antenna.
2. Increase the distance between this device and the receiver.
3. Plug the power connector of this device into a power socket with different circuit from the receiver.
4. For technical support, consult your dealer or an experienced radio technician.

Technical Support And Service

1. For the latest information and documentation of this product, please visit our official website www.panelmate.cn
2. If you need technical support, please contact your local distributor, sales representative customer service center. Before technical consultation, the user must collect the following product information:

- Product name and serial number
- Description of peripheral additional devices
- Description of the user software (operating system, version, application software, etc.)
- A complete description of the problem with the product
- The full content of each error message

Safety Instruction

1. Before installing, wiring, operating, and checking the product, it is necessary to carefully read this manual and related manuals introduced in the manual, and operate the product correctly with full attention to safety.
2. Please keep this user manual for future reference.
3. Please unplug the power cord from the socket before cleaning the device with a damp rag. Do not use liquid or decontamination sprays to clean the equipment.
4. For devices that use power cords, there must be an easily accessible power socket around the device.
5. Ensure that the device is placed on a reliable surface before installation. An unexpected fall may damage the device.
6. Before you connect the device to the power socket, make sure that the power socket voltage meets the requirements.
7. Please place the power cord in a position where people cannot easily trip, and do not cover any debris in the power line.
8. Please pay attention to all warnings and attention signs on the device.
9. If you do not use the device for a long time, please disconnect it from the power socket to avoid the device being damaged by excessive voltage fluctuations.
10. Do not allow any liquid to flow into the equipment , you must disconnect to avoid fire or short circuit.
11. Please do not turn on the device by yourself. To ensure your safety, disconnect all external power supplies used by the system before turning on the device. Turn on the device by a certified professional engineer with sufficient electrical knowledge.

In case of the following situations, please be repaired by professional personnel:

- The power cord or plug is damaged
- There is liquid flowing into the equipment
- The device does not work properly, or you cannot make it work properly through the user manual
- Equipment falls or is damaged
- The equipment has obvious appearance damage

Please do not store the device in an environment beyond our recommended temperature range, that is, not lower than -20 ° C or higher than 70 ° C, otherwise it may damage the device.

Disclaimer

All components are provid with specific hardware and software configurations are suitable for application software. Unauthorized modification and alteration of hardware or software configuration beyond the scope of the document is prohibited, otherwise Shanghai Panelmate Electronics Co., Ltd. shall not be liable for any resulting liability arising therefrom.

The following actions are not within the scope of responsibility of the Company:

- Failure to comply with the provisions of this document
- Improper use
- Operated by untrained personnel
- Unauthorized replacement of parts

Employee Qualifications and Responsibilities

All operations involving software and hardware should only be performed by qualified personnel with knowledge of control and automation engineering. Qualified personnel must understand the management of control teams and related networks.
All interventions must have knowledge of control planning, and qualified personnel must be familiar with existing standards and guidelines for automated environments.
The operator must ensure that:

- Products are used only as intended
- The product runs in good condition and works normally
- Products are operated, maintained and repaired only by qualified and authorized personnel
- Regularly receive guildance from personnel on safety and be familiar with the operating manual, especially the safety instructions contained in this document
- The operating manual is in good condition, complete and always available for reference at the product location

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Chapter 1 Overview

1.1 File Content

This document contains the information you need to use the product during the applicable phase of the product's life cycle, as follows:

- Specification and model
- Product size
- Adress definition
- Interface and connector definition
- Safety instruction

1.2 Safety Notes

For safety, the following icons are used in this document to provide you with more security information tips:

Icon	Description
	Warning: Indicates a potentially hazardous situation that, if not avoided, will result in death, serious injury, or significant property damage
	Danger: indicates an imminent hazardous situation that, if not avoided, will result in death, serious injury, or significant property damage
	Tip: Indicates important information

Chapter 2 Introduction

2.1 Product Overview

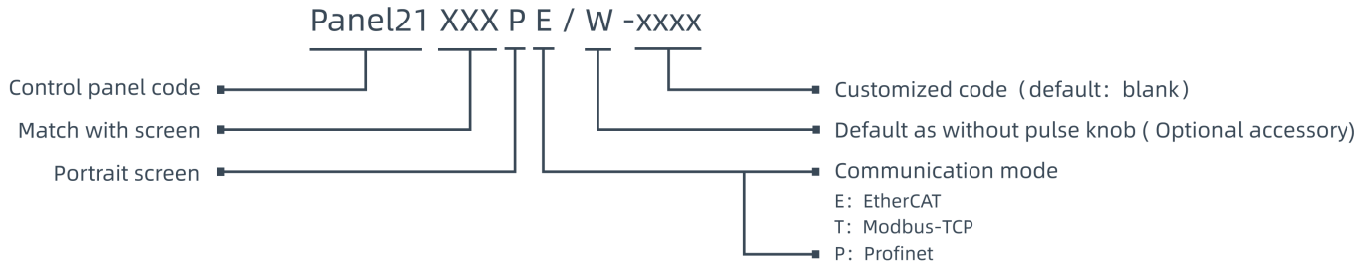
PANELMATE CNC control panel has a flexible custom key design and strong aluminum-magnesium alloy material, supporting customized button buttons and mask colors, tight alignment, saving wiring and volume. Panel size ADAPTS to the display size to form a modular integrated display panel. Communication protocols support EtherCAT communication, Modbus-TCP communication and Profinet communication, etc., perfect for CNC industry, injection molding equipment industry.

2.2 Product Features

- Aluminum-magnesium alloy panel, sheet metal rear cover
- Front panel/Rear: IP65 / IP20
- Support EtherCAT 、Modbus-TCP、Profinet and other protocol
- Max. supported 98 keys & 98 LEDs,no need any I/O modules
- The panel can be equipped with time control function
- The modular design provides flexibility and can be customized according to customer requirements, including special bus requirements
- Complete panel planning and wiring layout for easy maintenance and time saving

2.3 Name Rule

Product naming rules:



2.4 Product Specification

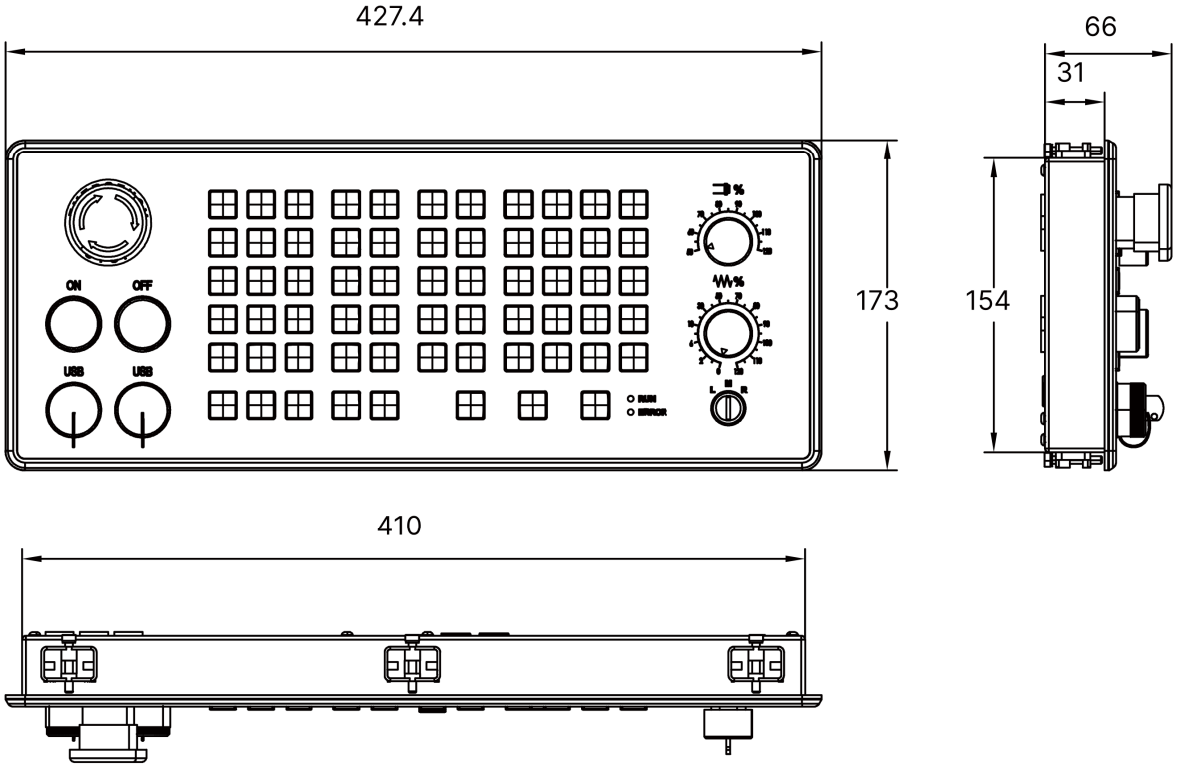
Panel21XXX series CNC control panel is a customized product. The table is for reference only.

Description	Panel21XXX CNC Control Panel	
Routine	Material	Front : aluminum-magnesium alloy ; Rear : sheet metal
	Mounting	Embedded
Power	Input Voltage	DC 24V
	Power	120W
Physical	Dimension(WxHxD)	For details, see Chapter 2 2.5 Product Size
	Open Size(WxH)	For details, see Chapter 2 2.5 Product Size
Key	Multiplier switch	2
	Key	Max 98
	Indicator light	All keys
	Emergency stop	Support（2NC）
	Front USB 2.0	Support（For Panel21190E/W version only）
	Key switch	Support（3 position）
	Switch key	1 x Power On，1 x Power Off （For Panel21190E/W version only）
	2 x EtherCAT RJ45（IN and OUT）	
	2 x 16pin connector（12DI + 12DO）	
Interface	1 x 4pin power supply	
	1 x 6pin emergency stop	

Interface	1 x 6pin encoder	
	1 x DB26 for MPG	
Environment	Operating Temperature	-10~55℃
	Storage Temperature	-20~70℃
	Relative Humidity	5~95%(Non condensation)
	Shock	Operating 10G peak acceleration(11 ms duration), follow IEC 60068-2-27
	Vibration	Operating Random Vibration Test 5~500Hz,1Grms@with HDD;2Grms@with SSD, follow IEC 60068-2-64
	EMC	CE/FCC Class A
	IP Rating	Front：IP65 ; Rear：IP20

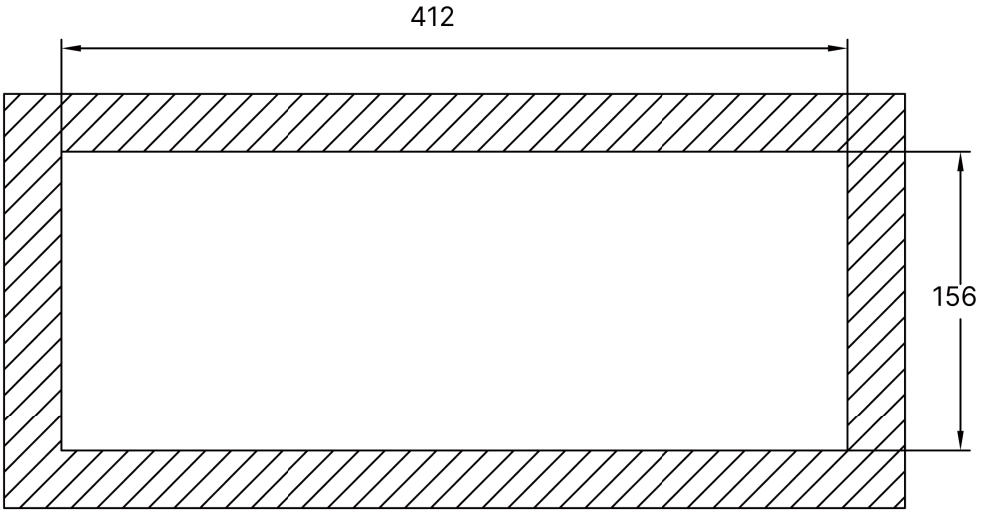
2.5 Product Size

For customized products, see the drawings provided by engineers.
The following is the standard product size information for Model Panel21190E:



Opening size:

Installation depth：32mm



2.6 Coloring

This is a standard product Panel21190E ,The coloring of mask is shown in Figure 2-6-1.
Support custom coloring.

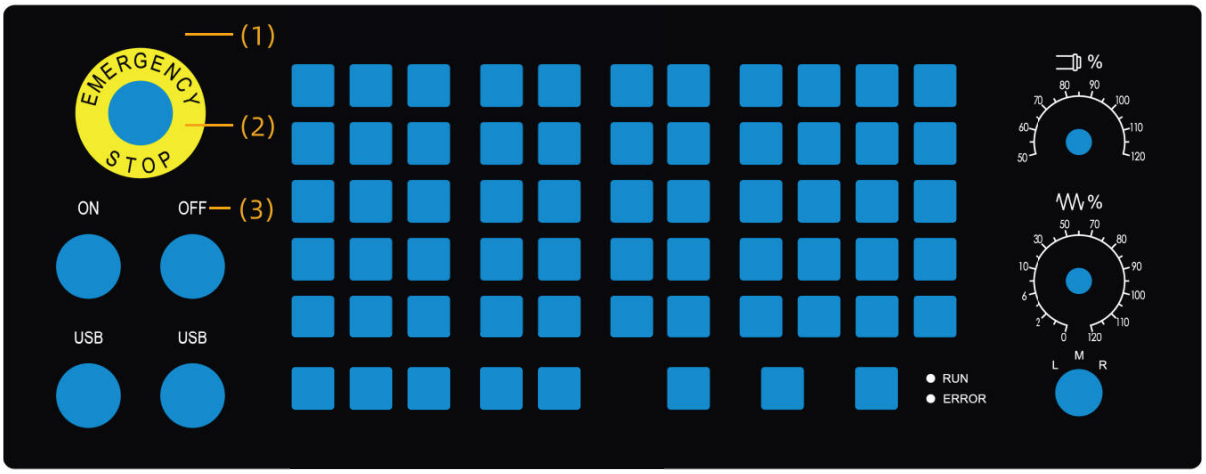


Figure 2-6-1

Object	Color
Basic color of the control panel (1)	Pantone Black C
Emergency / Alarm clear (2)	Pantone 136C
All Symbol（3）	Pantone White

2.7 Accessory parts

Standard insert label printed，Figure 2-7-1.

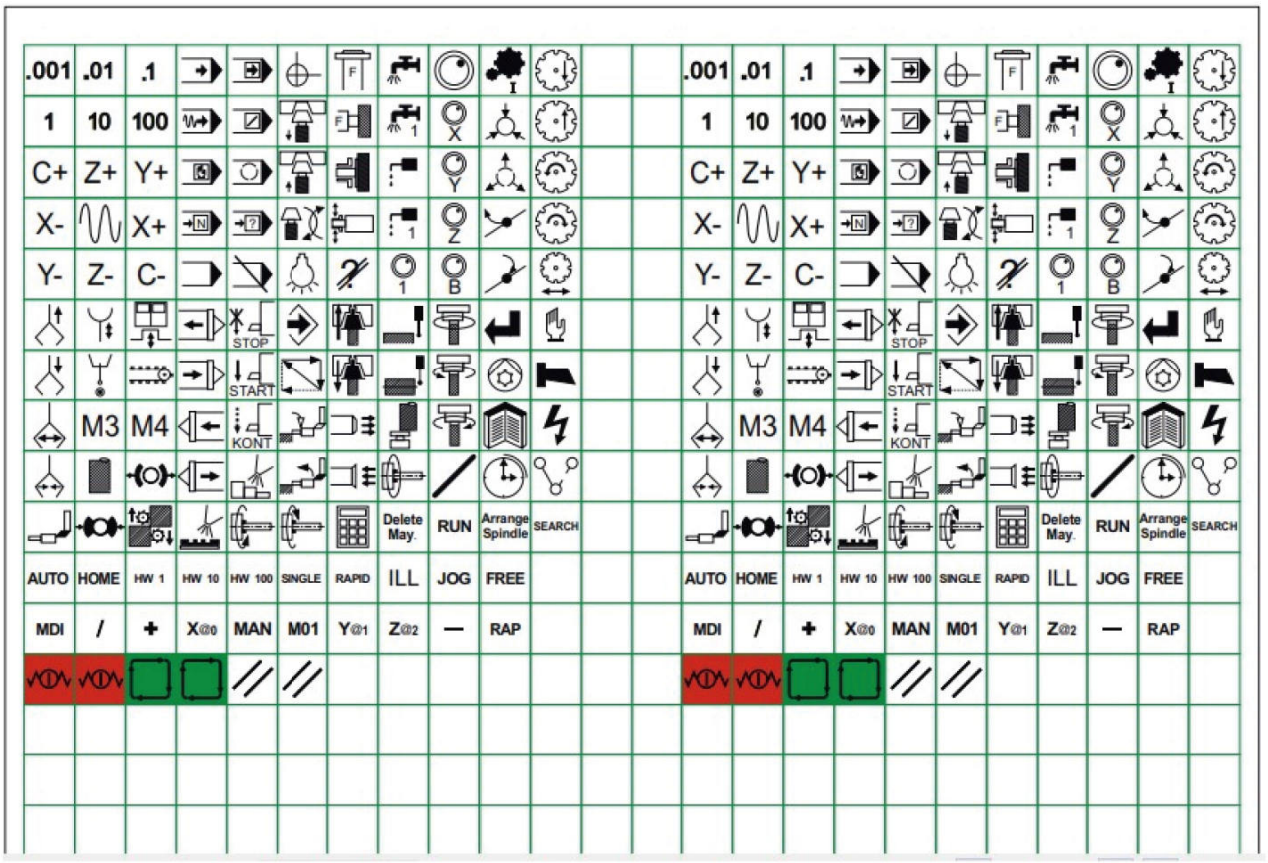
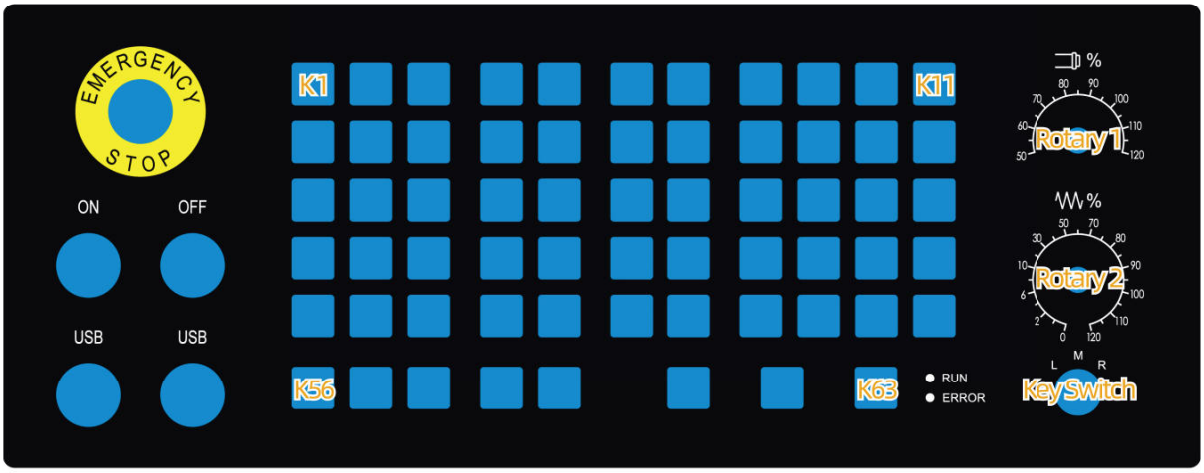


Figure 2-7-1

Chapter 3 Address Definition



3.1 Adress overview

- This panel design base on model version, there is separated model for key board and control unit.
- The control unit is based on EtherCAT interface.
- Power supply with 24V (19V~29V) for complete control panel and panel PC.
- PET overlay stick on the surface of Aluminium frontplate.

XML File Name

This panel should be based on the XML file name:
ES101407_ 98 key.1enc.12di - 98 led.12do (es101407 - 0001 - 0001) . xml

Address Summary

KEY Inputs ------address for 98 keys

EXT Inputs ------address for rotaries front side, rotaries of hand held box and key switch

DIG Inputs ------address for 12DI back side independent

ENC Inputs ------address for ENCODER (DB26 connector)

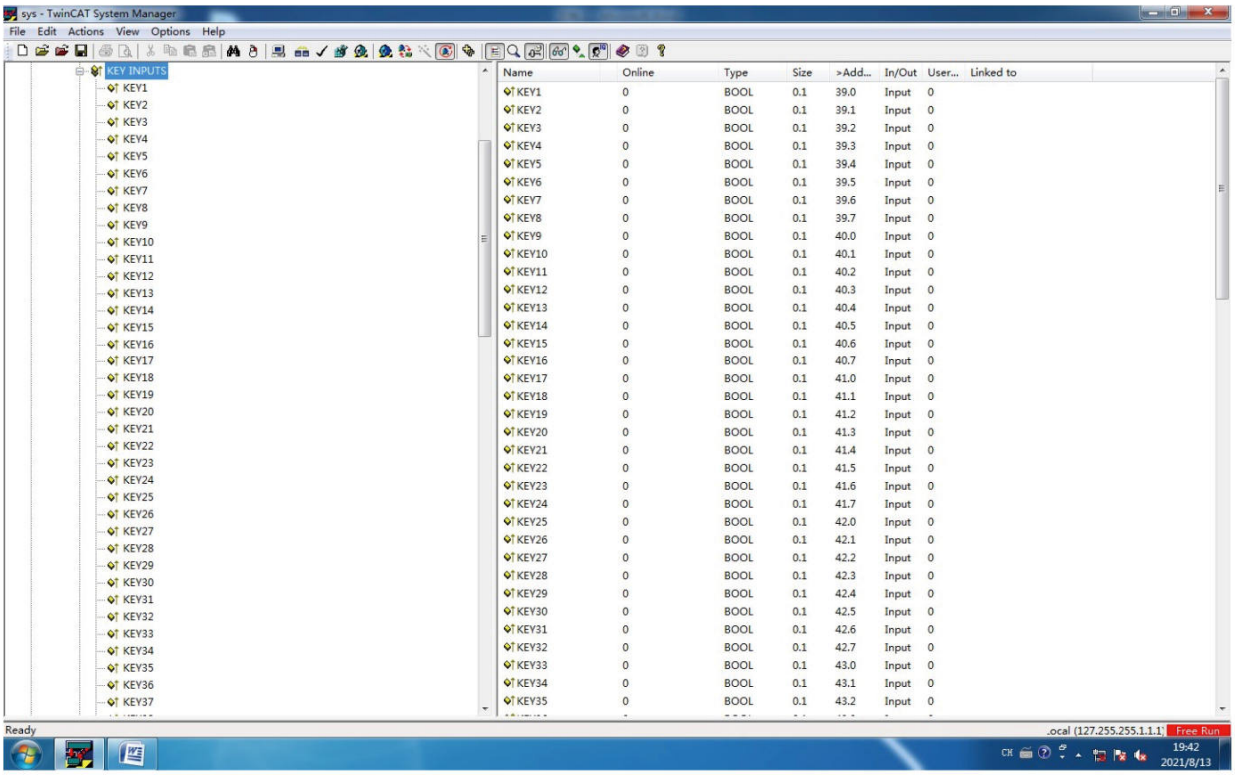
LED Outputs ------address for 98 LEDs

DIG Outputs ------address for 12DO back side independent

ENC Outputs ------control parameters for ENCODER

3.2 Address Detail

3.2.1 Key Inputs

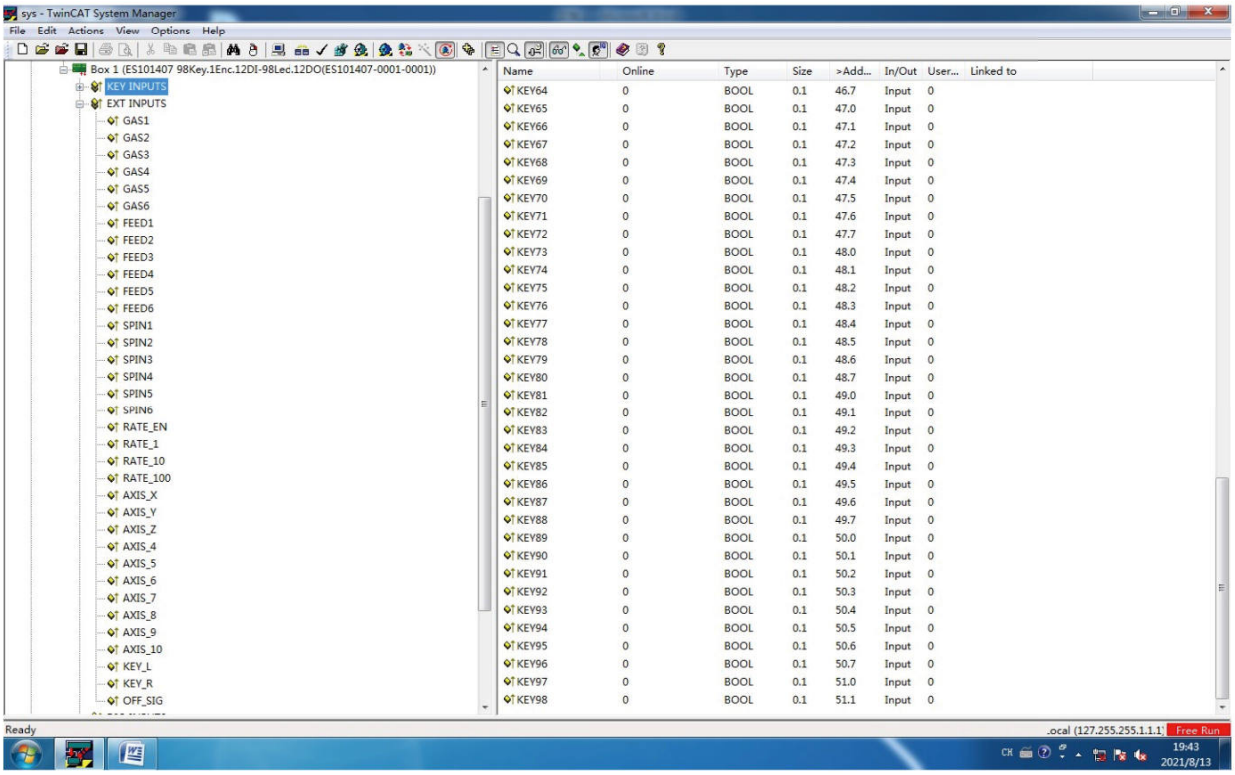


Address for keys (refer to overlay):

KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress
K1	KEY1	K8	KEY8	K15	KEY15	K22	KEY22	K29	KEY29
K2	KEY2	K9	KEY9	K16	KEY16	K23	KEY23	K30	KEY30
K3	KEY3	K10	KEY10	K17	KEY17	K24	KEY24	K31	KEY31
K4	KEY4	K11	KEY11	K18	KEY18	K25	KEY25	K32	KEY32
K5	KEY5	K12	KEY12	K19	KEY19	K26	KEY26	K33	KEY33
K6	KEY6	K13	KEY13	K20	KEY20	K27	KEY27	K34	KEY34
K7	KEY7	K14	KEY14	K21	KEY21	K28	KEY28	K35	KEY35

KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress
K35	KEY35	K42	KEY42	K49	KEY49	K56	KEY56	K63	KEY63
K36	KEY36	K43	KEY43	K50	KEY50	K57	KEY57	-	-
K37	KEY37	K44	KEY44	K51	KEY51	K58	KEY58	-	-
K38	KEY38	K45	KEY45	K52	KEY52	K59	KEY59	-	-
K39	KEY39	K46	KEY46	K53	KEY53	K60	KEY60	-	-
K40	KEY40	K47	KEY47	K54	KEY54	K61	KEY61	-	-
K41	KEY41	K48	KEY48	K55	KEY55	K62	KEY62	-	-

3.2.2 Exit Inputs



Grid NO.	Set value （ Rotary 1）						Set value （ Rotary 2）					
	SPIN1	SPIN2	SPIN3	SPIN4	SPIN5	SPIN6	FEED1	FEED2	FEED3	FEED4	FEED5	FEED6
0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	1	1	0	0	0	0	1
2	1	0	0	0	1	0	1	0	0	0	1	0
3	0	0	0	0	1	1	0	0	0	0	1	1
4	0	1	0	0	1	0	0	1	0	0	1	0
5	1	1	0	0	1	1	1	1	0	0	1	1
6	1	1	0	0	0	0	1	1	0	0	0	0
7	0	1	0	0	0	1	0	1	0	0	0	1
8	0	1	0	1	0	0	0	1	0	1	0	0
9	1	1	0	1	0	1	1	1	0	1	0	1
10	1	1	0	1	1	0	1	1	0	1	1	0
11	0	1	0	1	1	1	0	1	0	1	1	1
12	0	0	0	1	1	0	0	0	0	1	1	0
13	1	0	0	1	1	1	1	0	0	1	1	1
14	1	0	0	1	0	0	1	0	0	0	0	0
15	-	-	-	-	-	-	0	0	0	0	0	1
16	-	-	-	-	-	-	0	0	1	0	0	0
17	-	-	-	-	-	-	1	0	1	0	0	1
18	-	-	-	-	-	-	1	0	1	1	1	0
19	-	-	-	-	-	-	0	0	1	1	1	1
20	-	-	-	-	-	-	0	0	1	1	1	0
21	-	-	-	-	-	-	1	0	1	1	1	1
22	-	-	-	-	-	-	1	0	1	0	0	0

Hand held box (refer to connector DB26):

RATE_EN	:	enable switch	AXIS_4	:	select axis No.4
RATE_1	:	1% for rate rotary	AXIS_5	:	select axis No.5
RATE_10	:	10% for rate rotary	AXIS_6	:	select axis No.6
RATE_100	:	100% for rate rotary	AXIS_7	:	select axis No.7
AXIS_X	:	select axis X	AXIS_8	:	select axis No.8
AXIS_Y	:	select axis Y	AXIS_9	:	select axis No.9
AXIS_Z	:	select axis Z	AXIS_10	:	select axis No.10

Key switch:

KEY_L : switch to location L

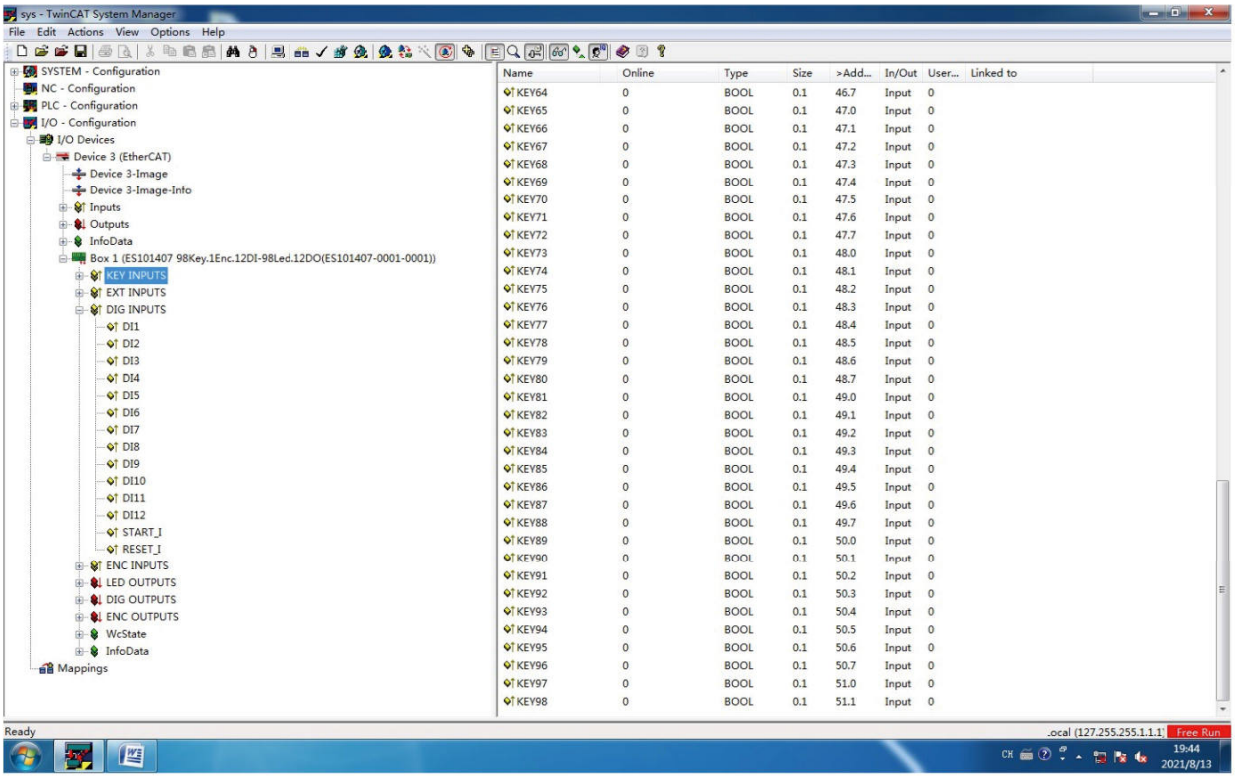
KEY_R : switch to location R

KEY_R : switch to location R

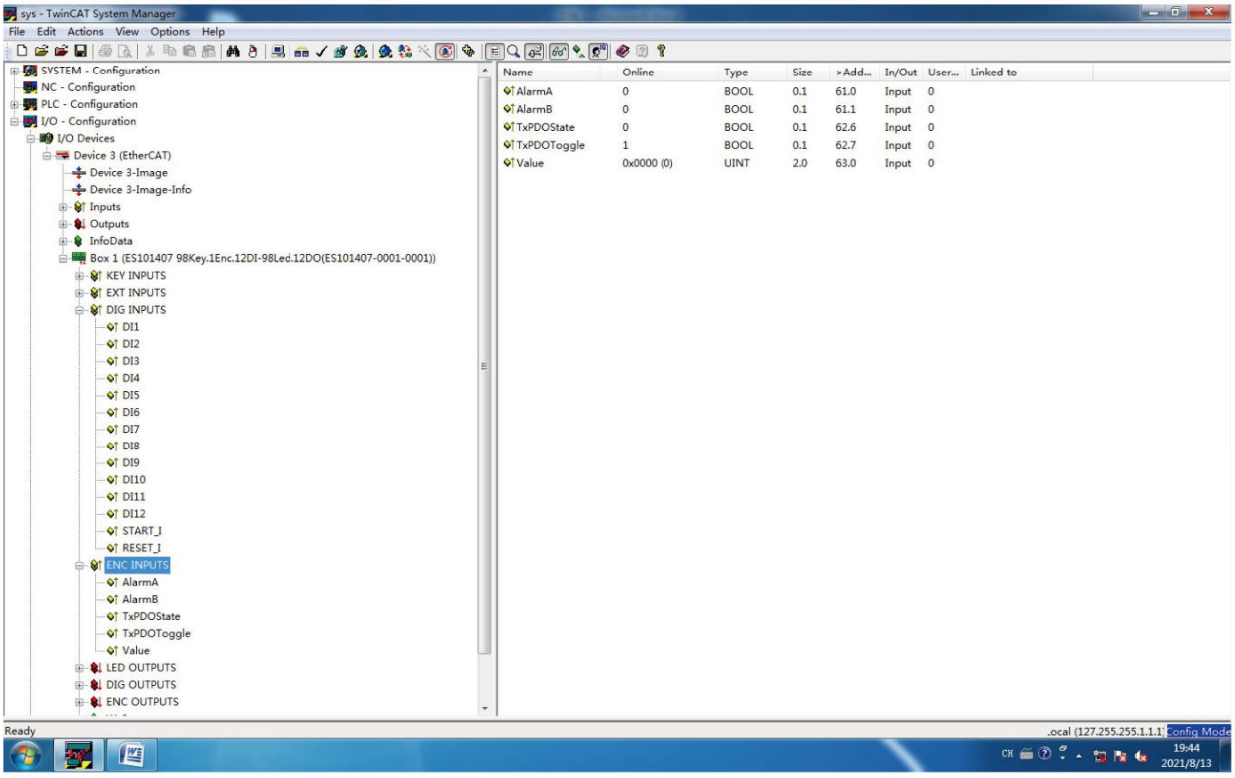
OFF_SIG : Off signal for power relay (only for special application)

3.2.3 DIG Inputs

Related to the 12xDI connector. START_I and RESET_I for start and reset push button.



3.2.4 ENC Inputs



ENCODER for hand held box:

AlarmA : wrong connect of A signal wire

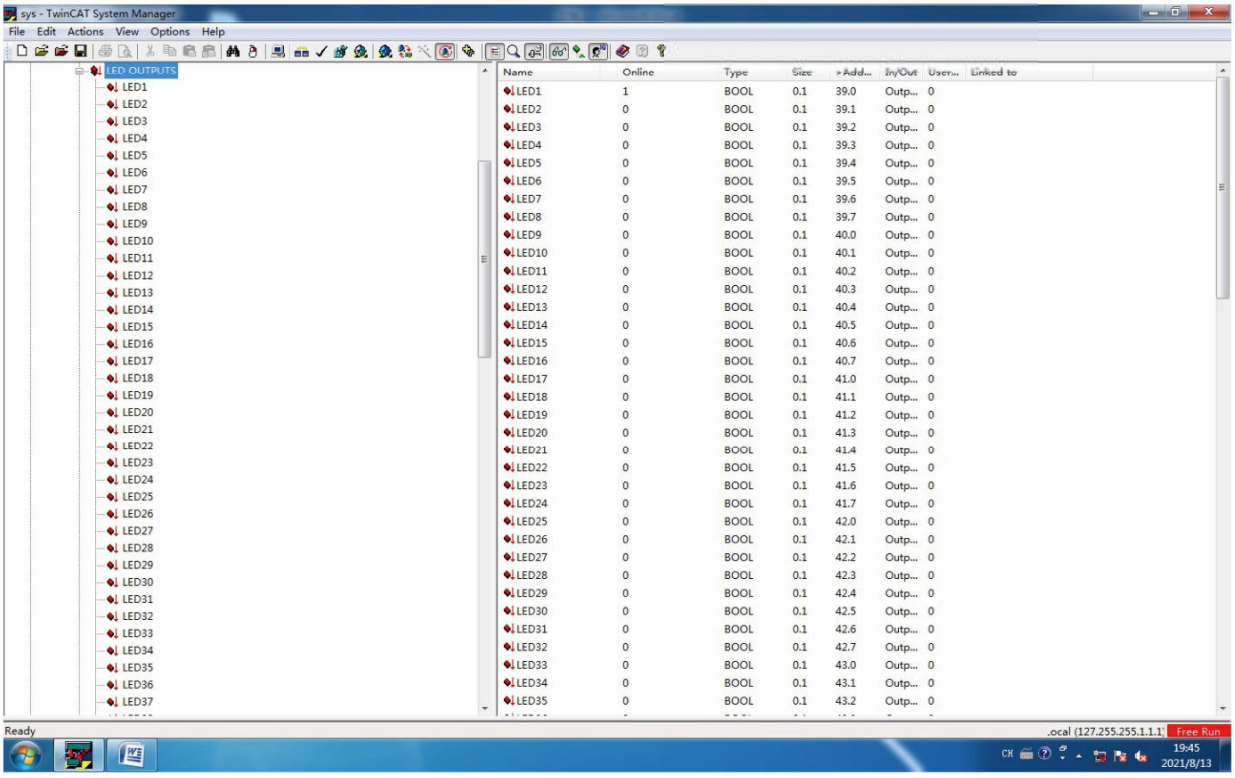
AlarmB : wrong connect of B signal wire

TxPDOState : Link to TC internal state refer to EL5101

TxPDOToggle : Link to TC internal state refer to EL5101

Value : Encoder pulse count value

3.2.5 LED Outputs



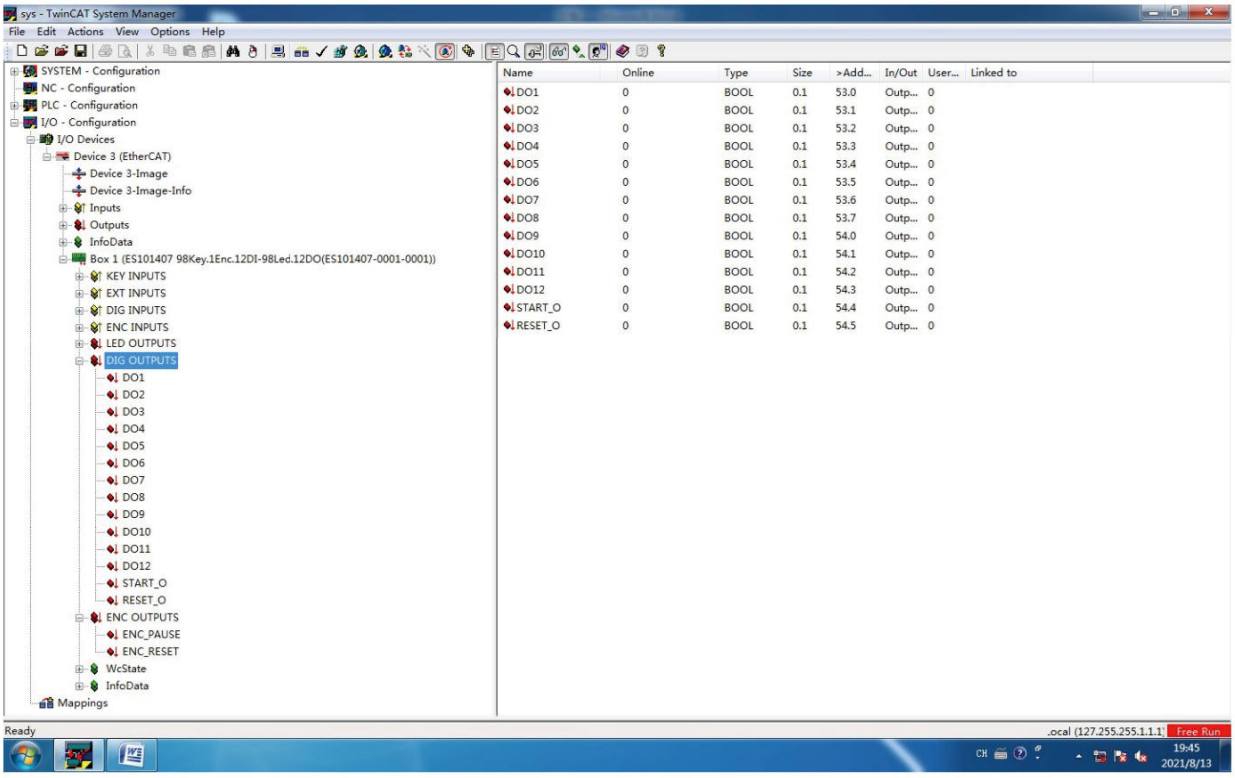
Address for LED (refer to overlay):

KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress
K1	LED1	K8	LED8	K15	LED15	K22	LED22	K29	LED29
K2	LED2	K9	LED9	K16	LED16	K23	LED23	K30	LED30
K3	LED3	K10	LED10	K17	LED17	K24	LED24	K31	LED31
K4	LED4	K11	LED11	K18	LED18	K25	LED25	K32	LED32
K5	LED5	K12	LED12	K19	LED19	K26	LED26	K33	LED33
K6	LED6	K13	LED13	K20	LED20	K27	LED27	K34	LED34
K7	LED7	K14	LED14	K21	LED21	K28	LED28	K35	LED35

KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress	KEY NO.	Adress
K35	LED35	K42	LED42	K49	LED49	K56	LED56	K63	LED63
K36	LED36	K43	LED43	K50	LED50	K57	LED57	-	-
K37	LED37	K44	LED44	K51	LED51	K58	LED58	-	-
K38	LED38	K45	LED45	K52	LED52	K59	LED59	-	-
K39	LED39	K46	LED46	K53	LED53	K60	LED60	-	-
K40	LED40	K47	LED47	K54	LED54	K61	LED61	-	-
K41	LED41	K48	LED48	K55	LED55	K62	LED62	-	-

3.2.6 DIG Outputs

Related to the 12xDO connector backside. START_O and RESET_O for light of start and reset push button.

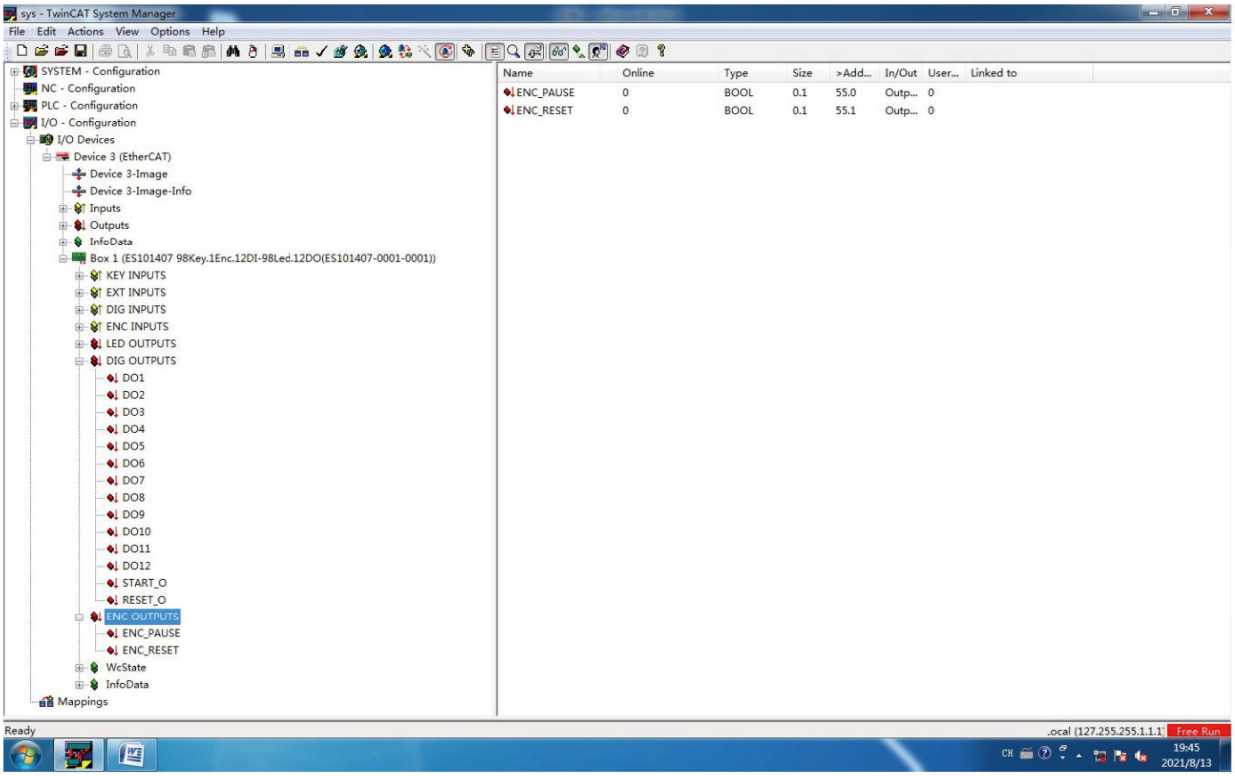


3.2.7 ENC Outputs

ENCODER for hand held box:

ENC_PAUSE : stop count value for encoder

ENC_RESET : reset value to 0 for encoder



Chapter 4 Connectors for control panel

4.1 Interfaces and connectors

The following is an example of the labels on the 19-inch key control panel of the Panel21190E, Figure 4-1-1. For the interface labels of customized products, see the label diagram on the back of the product.

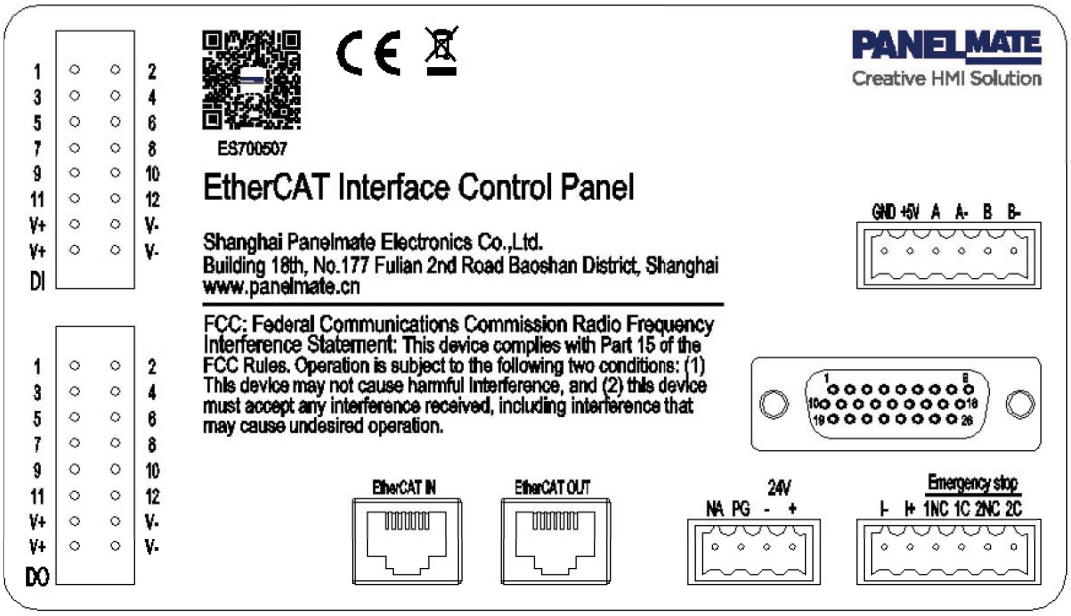


Figure 4-1-1

The control panel with following interfaces and connectors:

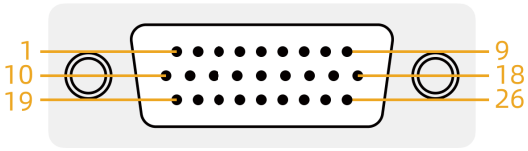
Power supply	1 x 4Pin connector (24V DC power supply)
Emergency Stop	1 x 6Pin connector
Encoder	1 x 6Pin connector
Hand held box	1 × DB26
12 x DI	1 × 16Pin connector
12 x DO	1 × 16Pin connector
EtherCAT In	1 x RJ45(link to front equipment's EtherCAT Out)
EtherCAT Out	1 × RJ45((link to front equipment's EtherCAT In))

Warning:

Connectors may not be plugged or unplugged when power is ON. Connectors may only be connected or disconnected when power is OFF.

4.2 Connector definition

4.2.1 DB26 for hand held box



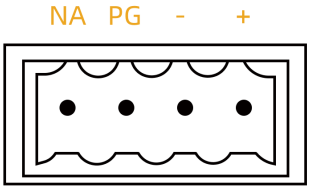
DB9

DB26	Connector type specification	EtherCAT variable
P1	Pulse wheel：0V	Pulse number (Encoder type)
P2	Pulse wheel：+5V	
P3	Pulse wheel：A+	
P4	Pulse wheel：B+	
P5	Pulse wheel：B-	
P6	Shaft sorting：COM common pin	
P7	Shaft sorting：COM common pin	Shaft selected common foot
P8	Shaft sorting：X	AXIS_X
P9	Shaft sorting：Y	AXIS_Y
P10	Shaft sorting：Z	AXIS_Z
P11	Shaft sorting：4 axis	AXIS_4
P12	Shaft sorting：5 axis	AXIS_5
P13	Shaft sorting：6 axis	AXIS_6
P14	Shaft sorting：7 axis	AXIS_7
P15	Shaft sorting：8 axis	AXIS_8

P16	Shaft sorting：9 axis	AXIS_9
P17	Shaft sorting：10 axis	AXIS_10
P18	Magnification：COM common pin	Magnification common pin
P19	Magnification： x1	RATE_1
P20	Magnification： x1	RATE_10
P21	Magnification： x1	RATE_100
P22	Enable button signal (COM with magnification)	RATE_EN
P23	emergency stop	
P24	emergency stop	
P25	LED+	Connect to + 24V
P26	LED-	Connect to 0V

4.2.2 Power supply connector

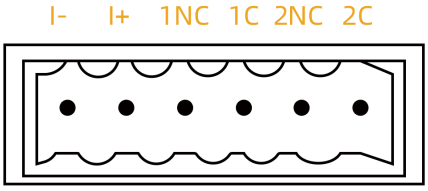
This panel support maximum 120W when all independent 12*DO worked. So the power supply capacity should bigger than 5A DC24V.



DC power input port

4.2.3 Emergency stop connector

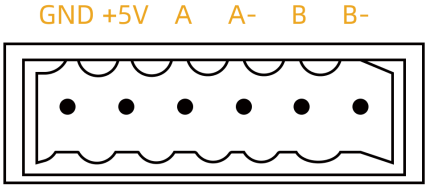
Emergency stop supports 2NC signal, the signal I- and I+ is only special for customer version.



Emergency Stop

4.2.4 Encoder connector

This connector is only for single encoder when equipment doesn't use hand held box and only use single encoder.



Encoder

Chapter 5 Safety Prevention And Maintenance

5.1 Safety Precautions

Please follow the following safety precautions.

5.1.1 General safety precautions

- When opening the Panel21XXX series, always follow the ESD precautions described in the following summary.
- Whenever you need to install, move or modify the Panel21XXX series, ensure that the power supply is turned off and the power cord is disconnected.
- Do not apply voltage levels that exceed the specified voltage range. Failure to do so may result in fire or electric shock.
- When the Panel21XXX series is running, an electric shock may occur once the Panel21XXX series is opened.
- Do not drop or insert any object into the external port of the Panel21XXX series.
- Once a large amount of dust, water or liquid enters the Panel21XXX series products, the power should be turned off immediately, unplug the power cord, and then contact Panelmate.
- The following activities are prohibited:
  Do not drop the device onto hard ground.
  Do not hit buttons/knob switches, etc., or exert excessive force on them.
  Do not use sharp objects to touch any part of the panel.
  Do not use Panel21XXX series products in places where the ambient temperature exceeds the rated temperature.

5.1.2 ESD Preventive Measures

Warning:
Failure to take ESD precautions during installation of the Panel21XXX series products may result in permanent damage to the products and serious injury to users.

Electrostatic discharge (ESD) may cause serious damage to the electrical components of this product. Dry climates are more likely to produce ESD. Therefore, once this product is opened and any electrical parts need to be handled, the following anti-static precautions must be strictly followed:

- Wear an ESD wrist strap: Wear a simple ESD wrist strap to prevent ESD damage to electrical components.
- Self-grounding: Any grounding conductive material should be touched before handling any electrical parts. During handling of electrical parts, any conductive substance that is grounded should always be touched.

- Use an ESD mat: When you configure electrical components or perform related operations, place them on an ESD mat.This reduces the possibility of ESD damage.
- Only touch the edge of the electrical parts: In the case of handling electrical parts, hold the electrical parts by holding the edge.

5.1.3 The scope of the product is not applicable

The product is not suitable for operation in the following areas:

- reas with aggressive environments, e.g. aggressive gases or chemicals

5.2 Maintenance and Cleaning

Please maintain and clean the product as follows.

5.2.1 Maintenance and Cleaning

Please read the following details before cleaning any parts or components of the product. Do not spray or spray the liquid directly on any other parts.

- No need to clean the inside to avoid liquids from getting inside.
- Be careful not to damage the internal small , removable parts.
- Please turn off the power before cleaning.
- Do not drop any object or allow any liquid to enter the product through the opening.
- When cleaning, be careful of any allergic reactions your body may have to solvents or chemicals.
- Avoid eating, drinking and smoking near work areas.

5.2.2 Cleaning Tool

Only specially designed products can be used to clean certain parts. In such cases, such products are clearly noted in the cleaning instructions. Here is a list of items that can be used for cleaning:

- Cloth - Although paper towels or tissue paper can be used, soft, clean cloths are recommended.
- Water or external alcohol - Cloths with water or external alcohol should be used.
- Use solvents - It is recommended not to use solvents as they may cause damage to plastic parts.
- Vacuum cleaners - Using vacuum cleaners designed for computers is one of the best cleaning methods. Dust and dirt can restrict airflow and cause corrosion of the circuit.
- Cotton swabs with external alcohol or water are an excellent tool for wiping hard-to-reach product areas.
- Foam swabs - If possible, it is best to use foam swabs and other non-lint labels for cleaning.

Chapter 6 FAQ

6.1 Technical Support And Service

Please visit the official website of Shanghai Yiyao Electronics www.panelmate.cn and wechat official account “亿耀电子” to download the documents and related driver software, or contact the company directly for support and service.

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