TL-CP2E+ Integrated Control Processor
Operation Manual

Rev. 1.1

This document was prepared and written by the Technical Documentation Team of Union Control Co., Ltd.

Table of contents

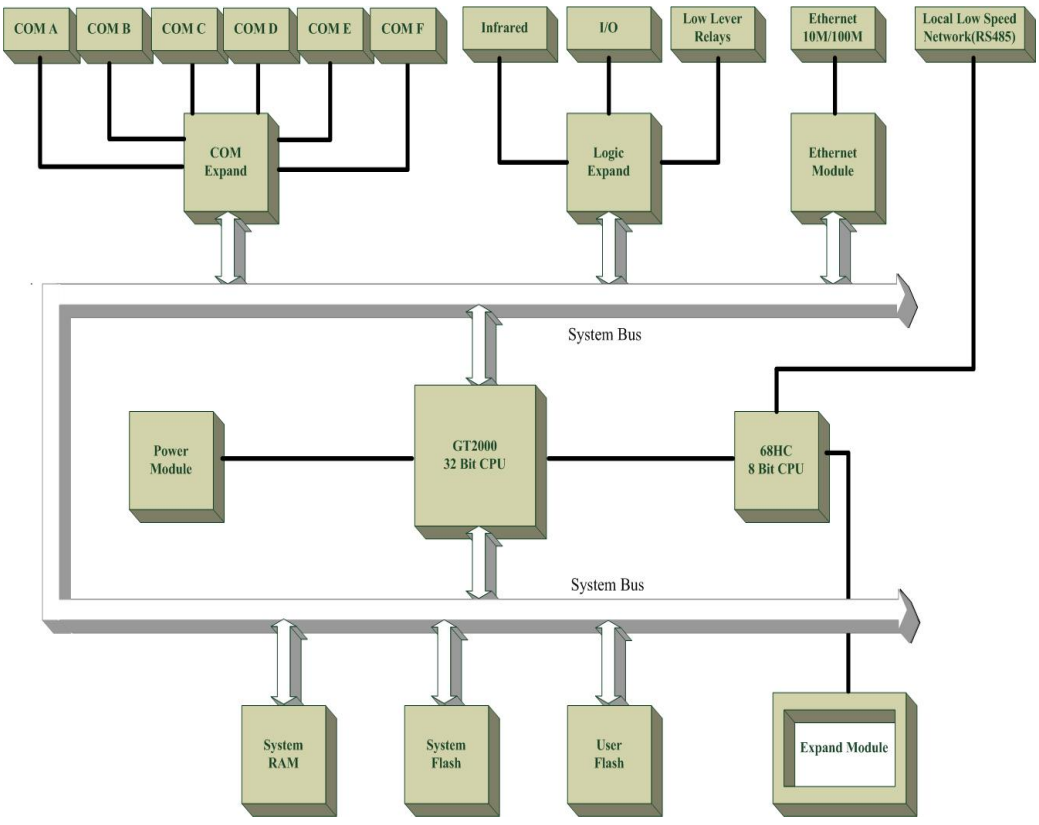
1 General

1.1 System outline

TL-CP2E+ is a multifunctional and multipurpose Integrated Control Processor designed for connection to and control over other devices. To perform the functions, it is necessary to program the integrated control processor using integrated development software “Logic Master” in WINDOWS environment. Control program can be compiled on site as required so as to control and manage other devices via its ports, e.g. Ethernet port, multifunctional COM port, local low-speed RS-485 network port, IR/one-way serial port, relay port and I/O port. The ports can be set to conform to the parameters of the devices under control, e.g. communication protocol and baud rate. TL-CP2E+ integrated control processor may also be applied to other control systems to expand or replace them.

The integrated control processor is provided with an embedded LINUX operating system in which secondary development control programs compiled for the unit run. Similar to the operating systems for tradition PC, the embedded LINUX operating system receives commands from control program and manages the I/O operations of all ports. The operating system is saved in FLASH and requires no intervention of user or deletion. Under most circumstances, operators need not to manage the operating system as it has been appropriately set at factory.

1.2 Hardware composition



As shown in the diagram, the TL-CP2E+ integrated control processor comprises a series of high performance chips and IC's. The core of the system is a robust embedded 32-bit CPU and an auxiliary 8-bit CPU. The system expands its multifunctional interfaces through high-speed bus. As the network interface is directly connected to the CPU bus, the system offers the capacity of processing all types of network information at high speed and supports 10M/100M network communication. The TL-CP2E+ integrated control processor applies to the network cascade connection of several devices and fulfills the requirements for large-scale and complicated control or total distributed control.

1.3 Characteristics and functions

The TL-CP2E+ is a cost-efficient integrated control processor. It may serve as a self-sustaining system or be used in conjunction with other systems. It is designed for applications in network control environment in industrial, commercial or civil network control systems. The TL-CP2E+ Integrated Control Processor offers multiple methods of connection, including standard Ethernet TCP/IP and UDP/IP operating modes. Its characteristics of high speed, low power consumption, large-capacity storage and high liability extremely apply to the following applications: command center, control center, meeting room, building control, e-classroom, media management center, video meeting environment, remote education, home automation, etc.

The TL-CP2E+ Integrated Control Processor uses a 32-bit GT2000 CPU whose superior display and drive capability, real-time, preemptive, multitask, multithreading program structure give solid support to complicated control programs.

1.4 Specifications

Specifications of TL-CP2E+ Integrated Control Processor

Items	Description
CPU	32 Bit GT2000 Processor 400MIPS
CPU, auxiliary	8 Bit Freescale 68HC908AP32
Memory	192MB (128MB Flash, 64MB SDRAM)
NET	1 - Dedicated local low-speed RS-485 network (UCnet)
INFRARED–SERIAL	8 - IR or one-way RS-232 serial port
I/O	4 - Programmable digital I/O
RELAY OUTPUT	4 - Isolated low voltage relay (normally open)
LAN	1 - RJ45 10/100M Ethernet interface
COM(A, B, C, D)	4 - DB9 programmable two-way serial communication port (RS-232)
COM(E, F)	2 - 7PIN programmable serial communication port (RS-232/422/485)
24VDC	1 - External power input

RST	1 - Reset button
Power supply	24 VDC, 2A
Ambient temperature Relatively Humidity (RH)	5℃ to 45℃ 10% to 90%
Dimensions and weight	Height: 4.3cm Width: 19 Inch(standard rack) Depth: 18.9 cm Weight: approximately 1.6 kg

1.5 Port description

The TL-CP2E+ Integrated Control Processor is as shown in the following diagram. It is black in color and texts are printed on both rear and front sides of the device.

LED indicators and Rest button are located on the front panel and other external connections on the rear side.

Front view of TL-CP2E+ integrated control processor:

Rear view of TL-CP2E+ integrated control processor:

The functions of the LED indicators and RST buttons are as follows:

- PWR (Power)

The LED indicator illuminates when the device is connected to an external 24VDC power supply.

- RST

The system is automatically reset to factory settings and its IP address 192.168.0.111 when the button is kept pressed for approximately 5sec at the same time when power on. Once it is successfully reset, the IN and OUT indicators on the front panel flash five times concurrently.

- IN

The LED indicator illuminates when the I/O port is inputting signals.

- OUT

The LED indicator illuminates when the RY or IR port is outputting signals.

- COM

The LED indicator illuminates when any programmable serial port transit data.

- NET

The LED indicator illuminates when the dedicated RS-485 network is transit data.

- 10M

The LED indicator illuminates when the unit is connected to a 10M network.

- 100M

The LED indicator illuminates when the unit is connected to a 100M network.

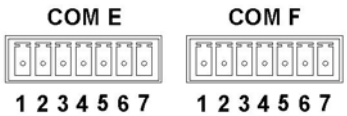
The functions of the ports are as follows:

- COM (A – D)

Four DB9 programmable two-way serial ports for common output or input are provided to support RS-232 communication protocol. Max transmission rate reaches 115200bps. IT supports seven standard baud rates between 2,400 and 115,200bps. (Refer to “Logic Master” development program).

Not all the defining of the 9-pin ports is standard. As for RS-232 mode, the configurations of the pins 2 (RXD), 3(TXD), 5(GND), 7(RTS) and 8(CTS) comply with standard assignments of RS-232.

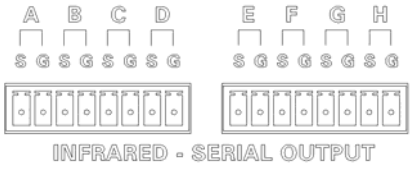
- COM (E – F)



Two programmable two-way complex 7-pin serial ports are provided to support RS-232, RS-422 or RS-485 communication protocol. Max transmission rate reaches 115200bps. IT supports seven standard baud rates between 2,400 and 115,200bps. (Refer to “Logic Master” development program).

Not all the configurations of the 7-pin outputs are standard. As for RS-232 mode, the configurations of the pins 5(GND), 6(RXD) and 7(TXD) comply with standard assignments of RS-232. For RS-422 mode, the assignments of the pins are as follows: 1(RXD+), 2(TXD+), 3(RXD-), 4(TXD-) and 5(GND). For RS-485 mode, pins 1(RXD+) and 2(TXD+) shall be shorted as D+ and 3(RXD-) and 4(TXD-) shall be shorted as D- while Pin 5 is still GND.

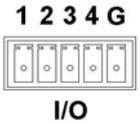
- IR – serial input



Each one of the eight ports may serve as an IR output or one-way RS-232 output. S is signal Positive and G is GND. The carrier frequency of IR output is up to 1.2MHz and data transmission rate 115K/s. The amplitude of the output via the one-way RS-232 port is the level of TTL, i.e. 0 to +5V. This is likely inapplicable to control some devices.

Both the data format and transmission rate of the one-way RS-232 can be set in development programs. 7-bit and 8-bit data lengths, five check modes, i.e. N, O, E, M and S and seven standard transmission rates between 2,400 and 115,200bps are supported. (Refer to “Logic Master” development program).

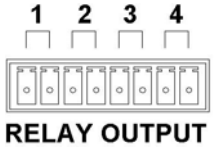
- I/O



The port provides a programmable 4 channel dry contact input interface and is normally used for detect the signal of the alarm.

- RY

Low-voltage relay output

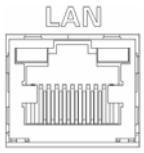


The four low-voltage relay ports are normally open contacts. Each group is independent and isolated, and can bear a load up to 1A 30VAC/DC.

- Power supply

The power input port is used to connect an external 24VDC power supply. When an external 24VDC power supply is input, the NET port also outputs 24VDC power. (The device is applicable to 9-24VDC wide power input.)

- LAN



10/100M Ethernet port and RJ45 terminal are supplied as standard to offer configuration, uploading, network communication and network control and other functions.

A standard cross network communication cable is supplied. The pins of the LAN port are assigned as follows:

PIN	SIGNALS
1	TD+
2	TD-
3	RD+
4	Connected to pin 5
5	Connected to pin 4
6	RD-
7	Connected to pin 8
8	Connected to pin7
1	TD+

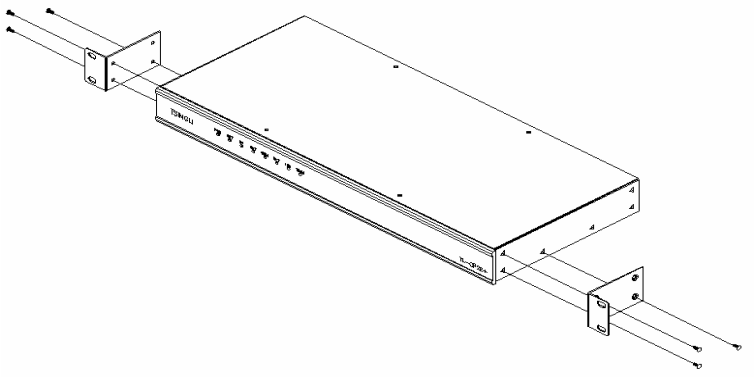
The connecting terminals for the NET port, IR serial output port, I/O port and low-voltage relay output port are supplied by the manufacturer.

2 Installation

2.1 Rack mounting

Rubber feet are supplied with the unit in order to place it stably on table top when not mounting it in rack. The unit can also be mounted on a standard rack with the supplied rack mounting bracket.

For rack mounting, the two mounting brackets must be at first installed as shown below. The installation of the rack mounting brackets requires no tools except a standard screw driver.



2.2 Ethernet network

In addition to uploading control program, Ethernet network can be used to cascade several TL-CP2E+ units and control a third party device.

ISC Ethernet communication module is used for programming and linking two or more TL-CP2E+ integrated control processors in a development program. The ISC Ethernet communication module has the function of linking several TL-CP2E+ integrated control processors by means of network communication.

In a development program, the programming with TCP/IP SERVER or TCP/IP CLIENT module may be used to control a third part device and perform the interaction, analysis, creation of any open protocol TCP/IP network data package.

Refer to “Logic Master” programming software for specific functions.

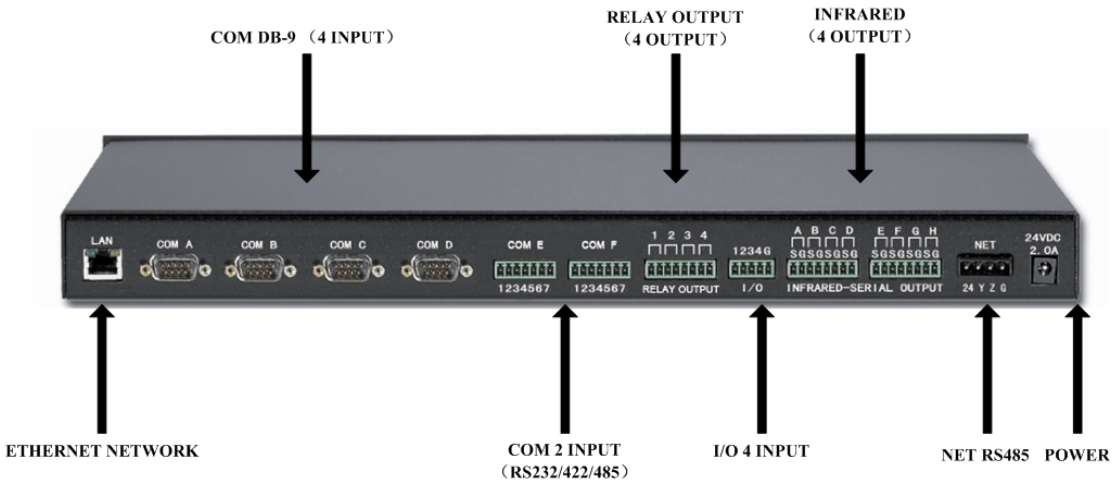
2.3 Low-speed NET network

The NET connecting port is used to expand UCnet RS-485 network device, e.g. TL-PCI8 Power Supply Controller. When the TL-CP2E+ integrated control processor is connected to an external 24VDC power supply. The NET port outputs 24VDC power supply and be used to supply power to other RS-485 network devices.

A four-wire NET network must be correctly connected. Otherwise the port is subject to damage. Make sure to power down the device before connecting the NET port and clearly identify 24, Y, Z and G that correspond to 24VDC positive, data positive, data negative and 24VDC negative respectively. If the port cascades NET network devices, twisted pair wire shall be used to transmit Y and Z signals to reduce interference.

2.4 Hardware interface

Connect the device as shown in the figure below.



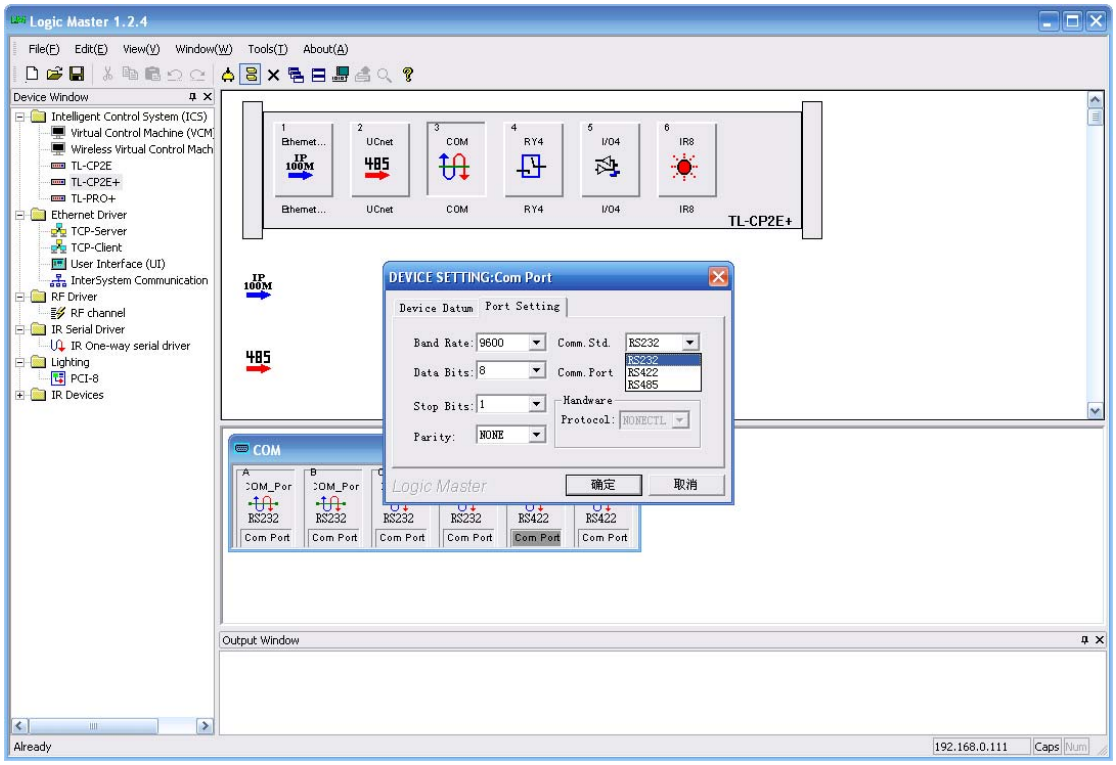
2.5 Power supply

The device is supplied with an external 24VDC 2.0A power supply. If this power supply unit is not used, it is likely to connect the 24VDC power supply input port with a power supply with the equivalent parameters supplied by a third party.

The device is applicable to 9-24VDC wide power input.

3 Programming

The “Logic Master” software is designed for the integrated control processor series. It is a graphic integrated development environment (software) based on WINDOWS platform. The “Logic Master” software offers a device view window and a logic view window which are used to set hardware related ports and parameters or all types of logic, time sequence, protocol and other functions. See the figure below.



3.1 Device

In the device view window, drag the TL-CP2E+ unit from the device list to the work area.

- Socket 1: Ethernet network device

Each TL-CP2E+ integrated control processor can be connected to at least 255 Ethernet network devices. Each network device is provided with a unique IP address. All these devices must be located in the same network section.

- Socket 2: NET network device

Each TL-CP2E+ integrated control processor can be connected to at least 252 RS-485 network devices. Each network device is provided with a unique NET ID which is indicated in form of hexadecimal number from 03H to FEH.

- Socket 3: 4(RS-232) + 2(RS-232/422/485) programmable serial communication ports

TL-CP2E+ provides four programmable RS-232 interfaces and two complex programmable RS-232/RS-422/RS-485 interfaces which has an inline driver each. Double click on the Device Setup. Then the Device Setup dialog box in which all types of parameters for the serial port, e.g. baud rate, data bit, stop bit and check mode can be set.

The codes of each programmable serial port can be filled in the parameter corresponding logic module or defined a string variable.

- Socket 4: 4 low-voltage relay port

When an input signal that represents the relay port channel is high, the relay will close and hold until the signal drops to low level. If the signal is not defined, the corresponding relay will open, normally open state is default.

- Socket 5: 4 I/O

TL-CP2E+ provides four programmable I/O input ports for input of digital quantity, e.g. the dry contact trigger signal for detection alarm.

When an I/O input port is grounded, the signal corresponding to the port channel will change to high state and keep in that high state until the I/O input port is disconnected from grounding wire.

- Socket 6: 8 IR port

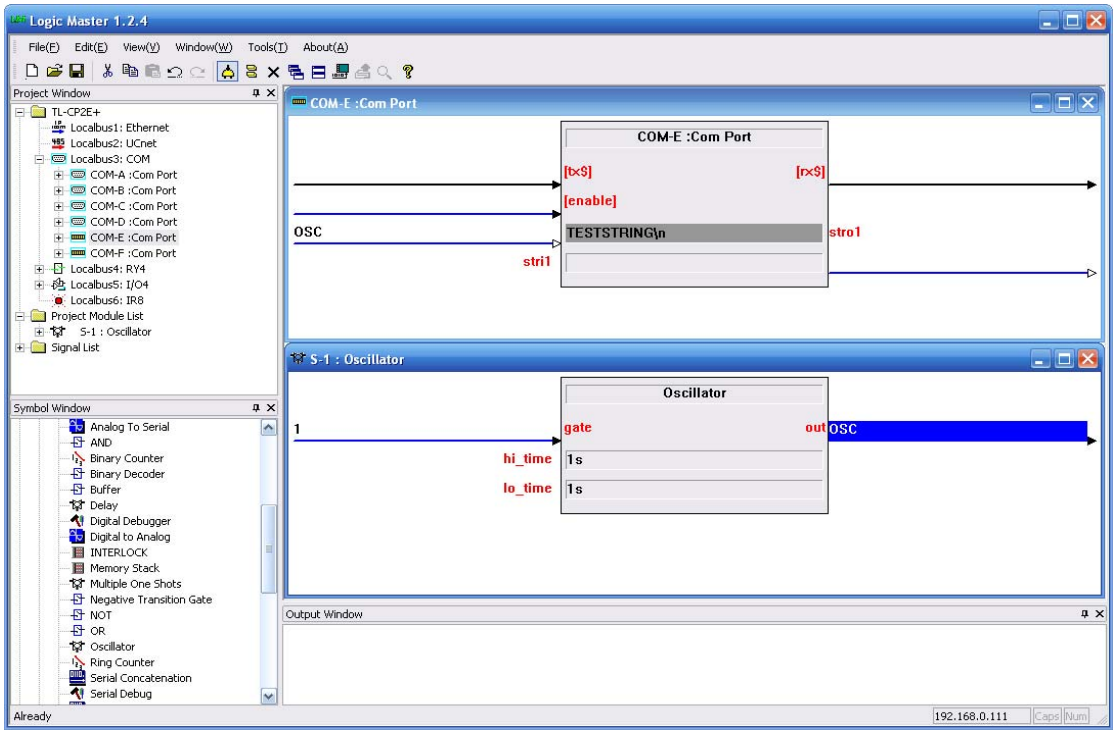
TL-CP2E+ provides 8 IR outputs A through H which each support a one-way RS-232 output. As an IR output, IR driver needs to be added by simply dragging the relevant IR driver file in the IR database in the development software. To add a RS-232 drive, it is only necessary to drag RS-232 one way serial driver. When the one way RS-232 operating mode is selected, hardware or software Handshake Protocol will not be supported.

The IR driver file beyond the IR database may be obtained by TSINGLI IR LEARNER (TL-LIR).

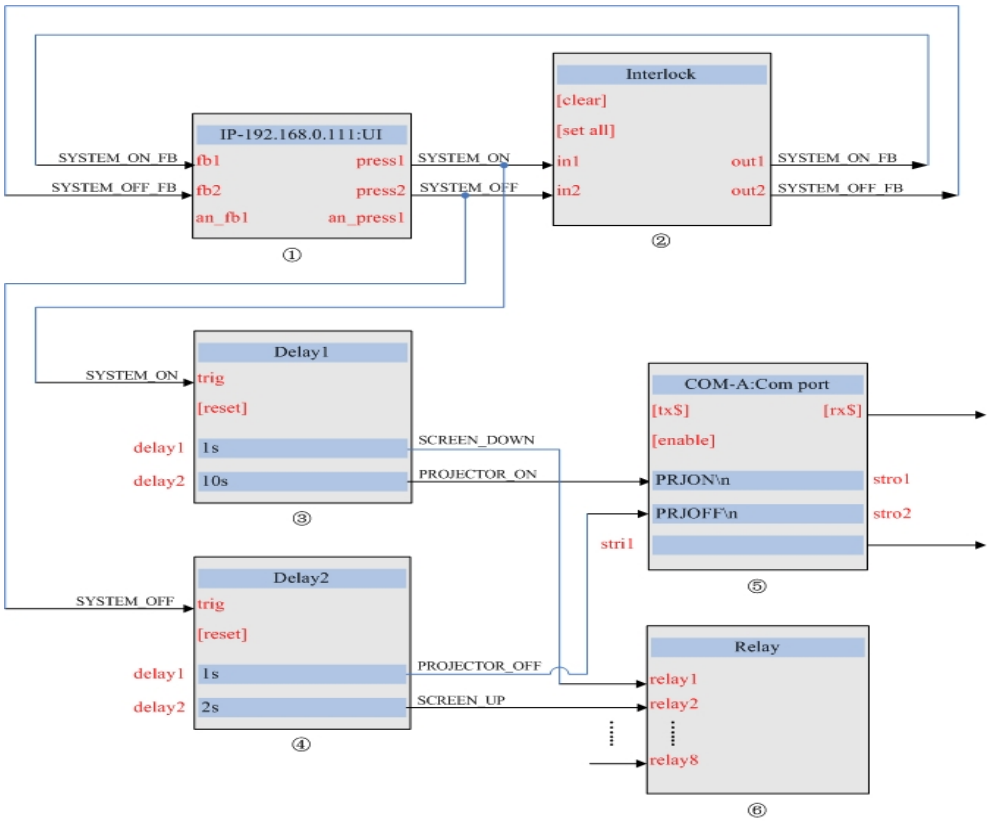
3.2 Modules

Generally, programming process is the interconnection of device module and logic module by selecting them depending on their functions. “Logic Master” Software provides adequate device modules and logic modules to satisfy the different requirements for all type of requirements.

If you are good at using this software, you will find that one function can be fulfilled in many ways. The “Logic Master” offer you a flexible platform for representation of creativeness. Refer to help documents of the “Logic Master” software for more information.



3.3 Program example



The above diagram shows a simple testing program compiled with the “Logic Master” software. Refer to help documents of the “Logic Master” software for more information.

3.4 Communication establishment

Communication with the TL-CP2E+ integrated control processor must be established before unloading a program. At first, connect a PC to the TL-CP2E+ integrated control processor with the cross network cable. Then select the “Tools/Communication Setting” menu and set the factory default IP communication address: 192.168.0.111. The PING command in the PC may be used to check that the communication network is established. It is also possible to directly connect it to a LAN through a HUB with the “straight through” network cable.

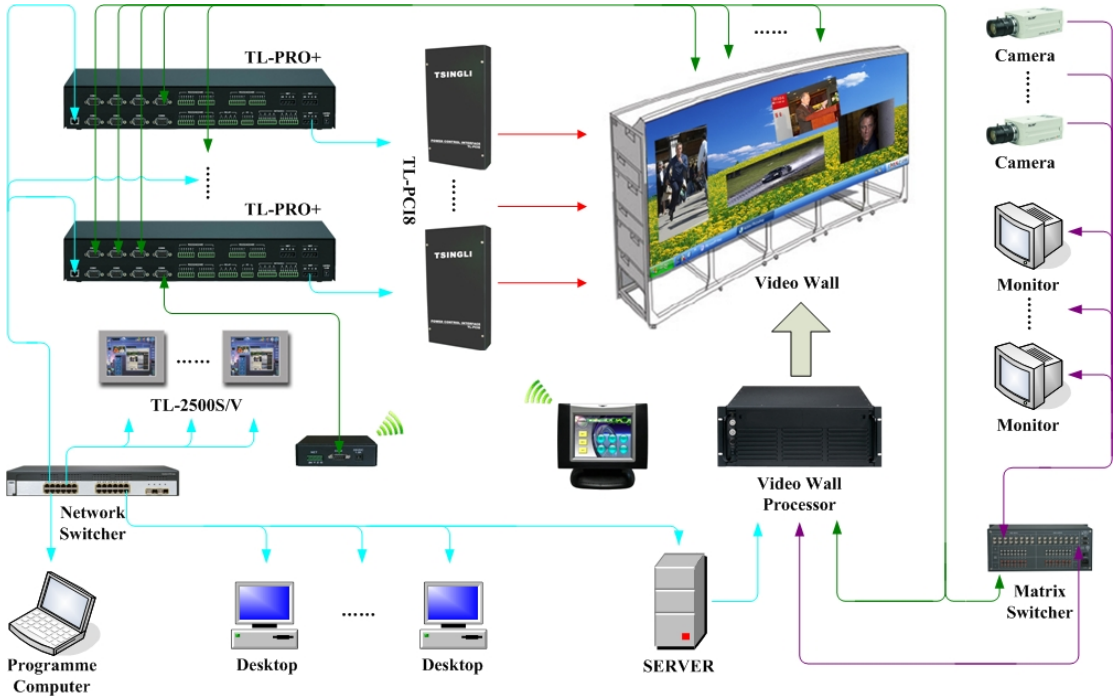
When the IP address of the current device is unknown, restart the processor and press the RST button on the front panel and hold it for approximately 5 seconds. The IN and OUT LED indicators will flash for 5 times and the system will automatically restore the factory settings when the settings are successfully recovered. The IP address is 192.168.0.111 by default.

3.5 Compiling and uploading

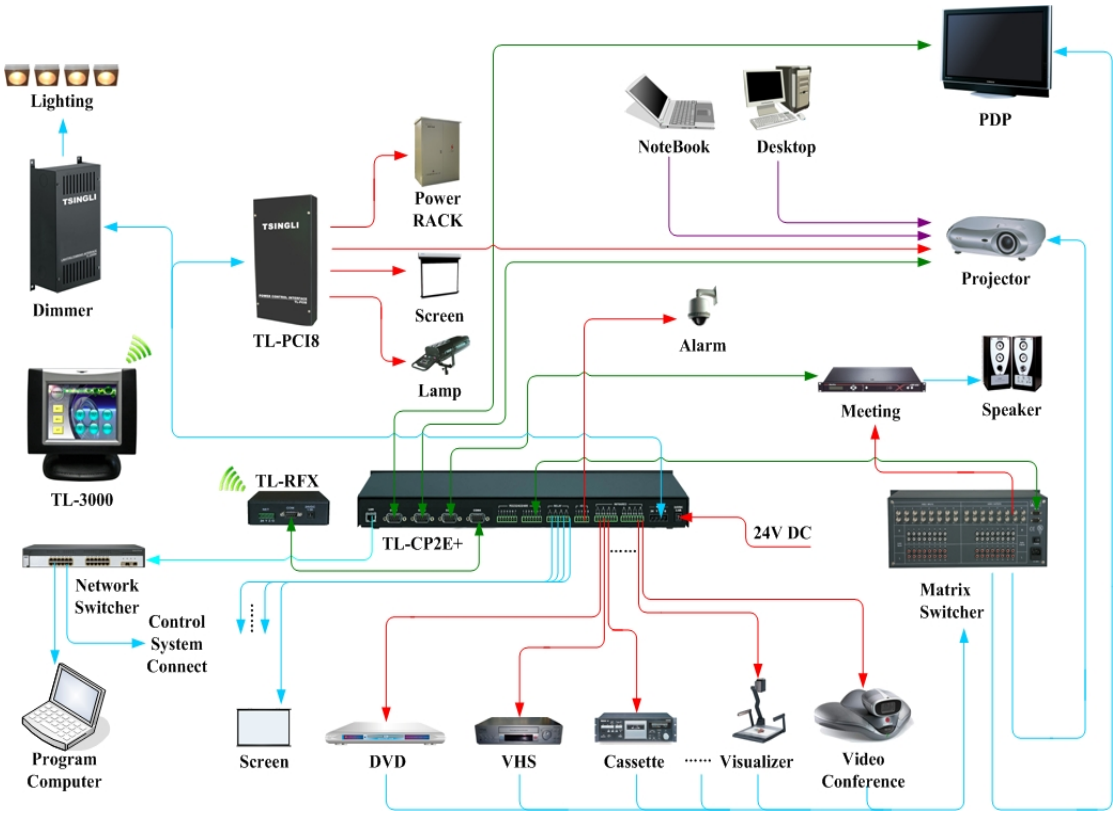
Control engineering programs must be compiled before uploading. The compilation of programs can be completed simply by pressing the “Tools/Compile” menu or F12 hot key. Caution: The program with severe errors cannot be compiled or uploaded. The compiling process is indicated by a progress bar. After compiling, the system will ask you whether to upload the program or not. Select “YES” to upload the program. The uploading process is also indicated by a progress bar. The uploaded program will be automatically stored in TL-CP2E+ and will not be lost after each power off. The uploaded program will automatically run.

4 Application example

4.1 Control center



4.2 Meeting room



5 Troubleshooting

5.1 Troubleshooting checklist

Symptom	Possible cause	Solution
The power indicator does not illuminate.	Loose power supply.	Make sure that the DC power supply is correct and securely connected.
	Incorrect power supply	Make sure that the external power supply is correct.
Cannot establish communication.	Communication cable not connected	Make sure that the supplied cross network cable is secured connected.
Compiled program can not upload	The program is not saved.	Check and save the program.
	Erroneous program	Check and rectify the program.

Note: Contact your dealer for other troubles.

5.2 Correspondence

For further assistance, please email to public@unioncontrol.com or directly call us. Our service hotline is +86-10-62243207 62265816 62265186.

Our website: www.unioncontrol.com

6 Warranty

Union Control Co., Ltd. warrants the Products to be free of defects in materials and workmanship for a period of three (3) years from the date of shipment except the components stated below. We pledge to repair or replace defective disk drive or mechanical components requiring adjustment, power supply unit and display elements of touch screen within one (1) year and for touch elements of the touch screen and batteries within 90 days from the date of shipment.

The warranty period shall commence from the date of delivery to user, which shall be recorded in writing.

This warranty does not apply to any defects resulting from any action of Buyer, including but not limited to improper installation, misapplication and mishandling, accidental damage, unauthorized modification and intended damage. In no event will we be liable to you for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use or inability to use the products.

We will, at our sole option, repair or replace defective device or component. Any repaired device or component reserves 90 days of warranty and the warranty period prior to that will automatically become invalid.

We reserve the final right to interpret the section.