INBIO X80 Series Access Control Panel User Manual

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About This Manual

This guide describes the function features and hardware structure of INBIO X80 series, illustrates installation of the access control panels, installation and connection of the peripheral devices.

Contents

Contents

1. Specifications and Cautions for Wiring

Before installation, ensure the power supply is switched off during the whole process, because it is very dangerous to operate the machine when it is powered on, and accidental contact with power cables may cause damage to the machine and even its core components and pose a threat to personal safety.

1.1 Wiring

● **Cable from Wiegand reader to a control panel**

According to the different readers choose various cables, usually optional 6 PIN, 7PIN, 9PIN RVVP (shielded twisted-pair) wires. Select this type of cables that connect to the reader Power (+12 V) and 2PIN diameter of GND can not less than 0.5 mm^2 ($\geq$AWG20), the others each PIN cable diameter is not less than 0.3 mm^2 ($\geq$AWG22). In wire connection, the shield layer of cable should be link to the Shield side of controller Wiegand interface, the maximum cable length should not exceed 100 meters. If use network line for reader power supply, require CAT-5 or above network cable, D0 and D1 in the wiring as possible as not to use the same twisted pair (will interfere with each other), the best way is D0 and GND, D1 and GND independence on a pair of twisted-pair.

● **Cable from inBIO reader to a control panel**

If adopt EXT485 communication port for reader power supply, choose 4PIN RVVP (shielded twisted-pair) wires or network cables, required wires diameter that the RVVP shielded twisted-pair can not less than 0.5 mm^2 ($\geq$AWG20), CAT-5 or above network cable. In wire connection, RS485 2PIN should take the same twisted pair, the network cable (+12V) and GND of Power supply need to be parallel and use double wires. Use EXT485 port for reader power supply, maximum cable length should not exceed 100 meters at most. Use the

1

reader independent power supply mode for the longer distance, so that up to the 1,000 meters.

● **Cable from an exit switch to a control panel**

It is recommended to use a two-core wire with a gauge over 0.3 mm^2. （≥ AWG22）

● **Cable from an electronic lock to a control panel**

It is recommended to use a two-core power cord with a cross-sectional area over 1.0mm^2（≥AWG17）. If the length is over 50M, consider a thicker wire, or combine multiple strands in parallel. The maximum length should be limited to 100M.

● **Cable from a door sensor to a control panel**

It is recommended to select a two-core wire with a gauge over 0.22 mm^2. （≥ AWG24）. A door sensor may be omitted if it is unnecessary to monitor online the open/closed status of a door, give out an alarm when the door is not closed for a long time or there is illegal access, and use the interlock function.

● **Cable for 485 communication**

Between control panels, it is recommended to use dedicated 485 shielded twisted pairs with a gauge over 0.22mm^2（≥AWG24）. (If 8-core twisted network cables are used, 485+ and 485- must be a twisted pair, with 6-core cables as spares, and it is also recommended to connect GND of the control panels with shielded cables.)

Cautions for 485 wiring:

1. 485 communication wires must be shielded twisted pairs, preferably with multiple strands as spares, and their maximum length should not exceed 1200m. It is recommended to have a bus less than 600m considering the stability.

2. The communication wires should be kept away from high-voltage wires as far as possible, and whenever possible, should be neither routed in parallel with nor bundled with power cables.

3. A 485 bus must be of hand-in-hand bus structure instead of star or fork connection.

4. A 485 relay is needed if there are more than 30 control panels or the length is over 500m.

5. The AC power supply device and chassis must be grounded physically and properly.

6. Connect the GND of all 485 devices with shielded cables.

7. In the case of unstable communication, connect one 120ohm terminal resistance between 485+ and 485- of the devices at both ends of the 485 bus.
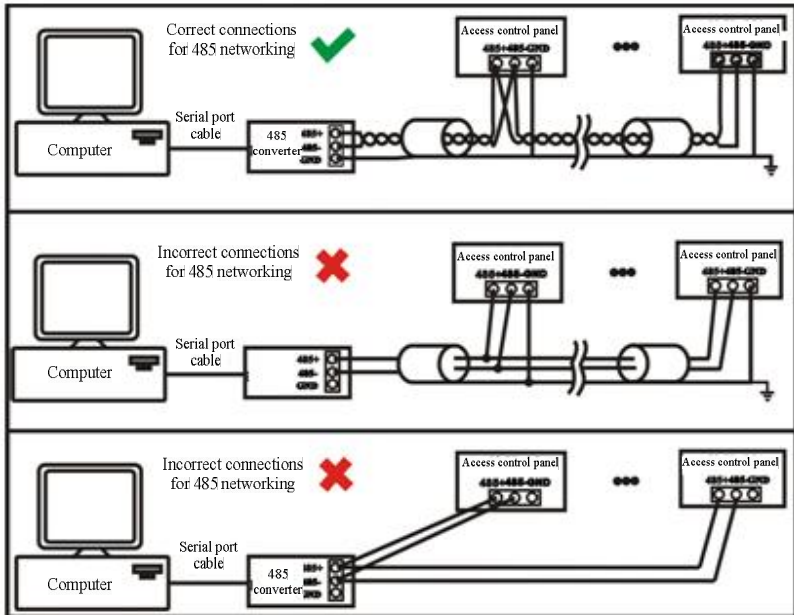
1.2 Cautions

1. All wires must run through casing pipes, for example PVC or galvanized pipes, to prevent failure caused by rodent damage. Although a control panel is designed with good antistatic, lightning-proof, and leakage-proof functions, ensure its chassis and the AC ground wire are connected properly and the AC ground wire is grounded physically.

2. It is recommended not to plug/unplug connection terminals frequently when the system is energized. Be sure to unplug the connection terminals before starting any relevant welding job.

3. Do not detach or replace any control panel chip without permission, because unprofessional operation may cause damage to the control panel.

4. 4. It is recommended not to connect any other auxiliary devices without permission. All non-routine operations must be communicated to our engineers in advance.

5. A control panel should not share one power socket with any other large-current device.

6. It is preferable to install card readers and buttons at heights of 1.4-1.5m above the ground, but the heights are subject to proper adjustment according to customers' usual practice.

7. It is advised to install control panels at places easy of maintenance, like **a weak electric well**.

8. It is strongly recommended that the exposed part of any connection terminal should **not be longer than 4mm**, and specialized clamping tools may be used to avoid short-circuit or communication failure resulting from accidental contact with excessive exposed wires.

9. To save access control event records, read data periodically from control panels.

10. Get prepared countermeasures according to application scenarios for unexpected power failure, like **selecting power supply with UPS**.

11. The connection between a card reader and a control panel **should not be longer than 100m**.

12. The connection between a PC and a control panel should be shorter than 1200m for RS485 communications. A length **within 600m** is recommended to make communications more stable.

13. To protect the access control system against the self-induced electromotive force generated by an electronic lock at the instant of switching off/on, it is necessary to **connect a diode in parallel** (please use the FR107 delivered with the system) with the electronic lock to release the self-induced electromotive force during onsite connection for application of the access control system.

14. It is recommended that an electronic lock and a control panel should **use respective power supplies**.

15. It is recommended to use the power supply delivered with the system as the control panel power supply.

16. In a place with strong magnetic interference, galvanized steel pipes or shielded cables are recommended and proper grounding is required.

2. Introduction of the Access Control System

INBIO280/480 is an access control system based on the TCP/IP communication technology, and is featured by the advantages of speediness, flexibility, convenience, and expandability. It is intended to manage security and protection for entrances and exits of important places like banks, hotels, equipment rooms, armories, confidential rooms, offices, smart communities, and factories.

The whole access control system consists of management workstations and control panels. One management workstation can control multiple control panels. The system is capable of Ethernet and I/O port expansion. It can be expanded to support WIFI and GPRS and implement wireless networking and remote control. One INBIO480 control panel can connect eight inBIO readers or four inBIO readers add four Wiegand readers to provide four-door two-way control. One INBIO280 control panel can connect four inBIO readers or two inBIO readers add two Wiegand readers to provide two-door two -way control.

2.1 System Function Parameters

● The system is designed with multiple CPUs, and the reader, lock, exit switch, and door sensor of each door is controlled by their respective CPU, so that the access control can be done in real time with high reliability.

● Flash data backup is available to ensure the data can be saved for 10 years after power failure.

● The system is managed by specialized Access access-control software, which can provide real-time monitoring.

● The system can support 30 thousand cards, and save 100 thousand offline records.

- With the smart locking function, the system can lock a door automatically when it is detected opened and then closed.

- INBIO480 can provide four-door one-way or two-door two-way management; INBIO280 can provide two-door one-way management.

- The system is equipped with a 28×64 four-line LCD screen and a multi-functional keypad, which can provide various viewing and setting functions.

- TCP/IP and 485 communications are supported, and there is a communication status indicator and a power indicator.

- There are USB interfaces for external connection of a variety of peripheral devices.

- There are four analog extension input terminals, which can connect infrared body detectors, smoke detectors, gas detectors, window magnetic alarms, and wireless exit switches.

- There are multiple extension output relays, which can connect CAMERA control and alarm signals.

- During logic processing, the software can be used to set single-control-panel anti-passback, single-control-panel anti-tailing, and single-control-panel two-door interlock, three-door interlock, and four-door interlock. The subsequent versions will be able to implement cross-control-panel anti-passback and multi-door interlock through software settings.

- The verification modes support single-card opening, multi-card opening, password opening, and password + card opening.

2.2 Input and Output Ports

- Compatible with multiple types of front-end input devices:

  INBIO280

1) There are two card reader input ports, which can be used to control the buzzers and Leds of card readers, and support Wiegand 26, Wiegand 34, and Wiegand digit adaptive.

2) inBIO Reader input ports, can connect inBIO fingerprint reader.

3) The Wiegand password keypad is supported.

4) There are two door sensor on/off status input terminals.

5) There are two opening button input terminals.

6) There are four analog extension input terminals.

7) There are four relay output terminals: two electronic lock control outputs, and two auxiliary electronic lock control outputs.

8) There are two extension relay output terminals.

INBIO480

1) There are four card reader input ports, which can be used to control the buzzers and LEDs of card readers, and support Wiegand 26, Wiegand 34, and Wiegand digit adaptive.

2) inBIO Reader input ports, can connect inBIO fingerprint reader.

3) The Wiegand password keypad is supported.

4) There are four door sensor on/off status input terminals.

5) There are four opening button input terminals.

6) There are four analog extension input terminals.

7) There are eight relay output terminals: four electronic lock control outputs, and four auxiliary electronic lock control outputs.

8) There are two extension relay output terminals.

● Dynamic voltage protection

1) Dynamic voltage protection is available for all input/output terminals.

2) Instant over-voltage protection is available for the output terminals of all relays.

- For opening delay and opening timeout, an alarm may be set to last 1~255 seconds.

- Extension output can be disabled for 1~255 seconds.

- Input device setting:

  1) Door sensor input.

  2) Opening button.

  3) Extension input – enabled (N.O) or disabled (N.C), which is configurable.

- Output device setting:

  1) Relay output – NC, NO, COM relay outputs.

2.3 Network Communications

- There is one TCP/IP communication port, which connects a control panel and a control host. The TCP/IP communication rate is 10Mbps or 100Mbps.

- There is one RS485 communication port communicating at the rate of 38,400bps.

- When working offline, the communication ports can implement interaction and anti-passback (APB) between control panels.

- The communications between a control host and a control panel prove effective to prevent illegal access to the system through multiple times of verification and encryption.

2.4 Technical Parameters

- Working power supply: rated voltage 12V (±20%) DC; rated current ≤0.6A.

- Working environment: temperature 0°C~55°C; humidity 10%~80%.

- Output load: working voltage AC ≤ 30V, rated current ≤ 8A; DC ≤ 36V, rated current ≤ 5A.

- Card reader interface: TTL level signal, 12V DC, and 500mA card reader power supply.

- Card reader connection cable: 10-core shielded cable with 24AWG and maximum length of 100m.

- C-type relay output terminal: 10A contact current, 12V DC, with LED status indications.

- The connection terminals are detachable and made of alloy-steel non-magnetic flange materials.

- Outline dimensions: 242mm × 96mm × 60mm.

3. Connection of the Access Control System

3.1 Control Panel Installation

3.1.1 Installing a Control Panel

INBIO280/480 is connected to a standard 35mm (1.377") mounting slide through a clip unit. First use screws to mount the clip unit on a power distribution cabinet or ceiling, or any other shelter from rain (as shown in Figure ① below). Then connect INBIO280/480 to the upper edge of the mounting slide (Figure②), and press down the equipment and push it backwards until it is locked onto the slide (Figure③).
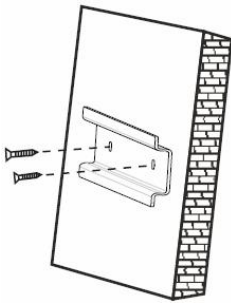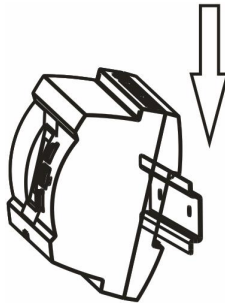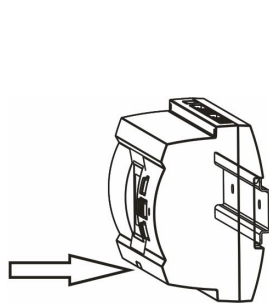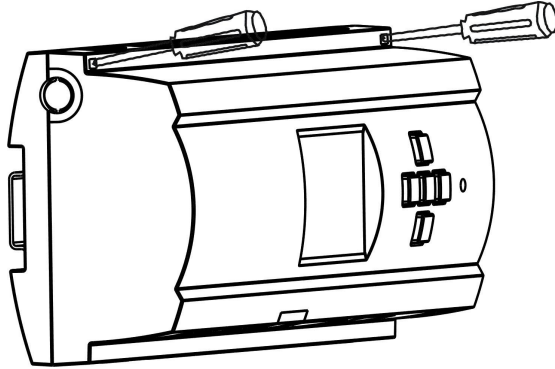

Figure ①   Figure ②   Figure ③

3.1.2 Opening the Enclosure

Before opening the enclosure of a control panel, detach all pluggable connectors.

The top cover of the enclosure is fixed by two block tongues. To open the enclosure, first push down the two block tongues with a screwdriver, and then rotate the enclosure off.

3.1.3 Closing the Enclosure

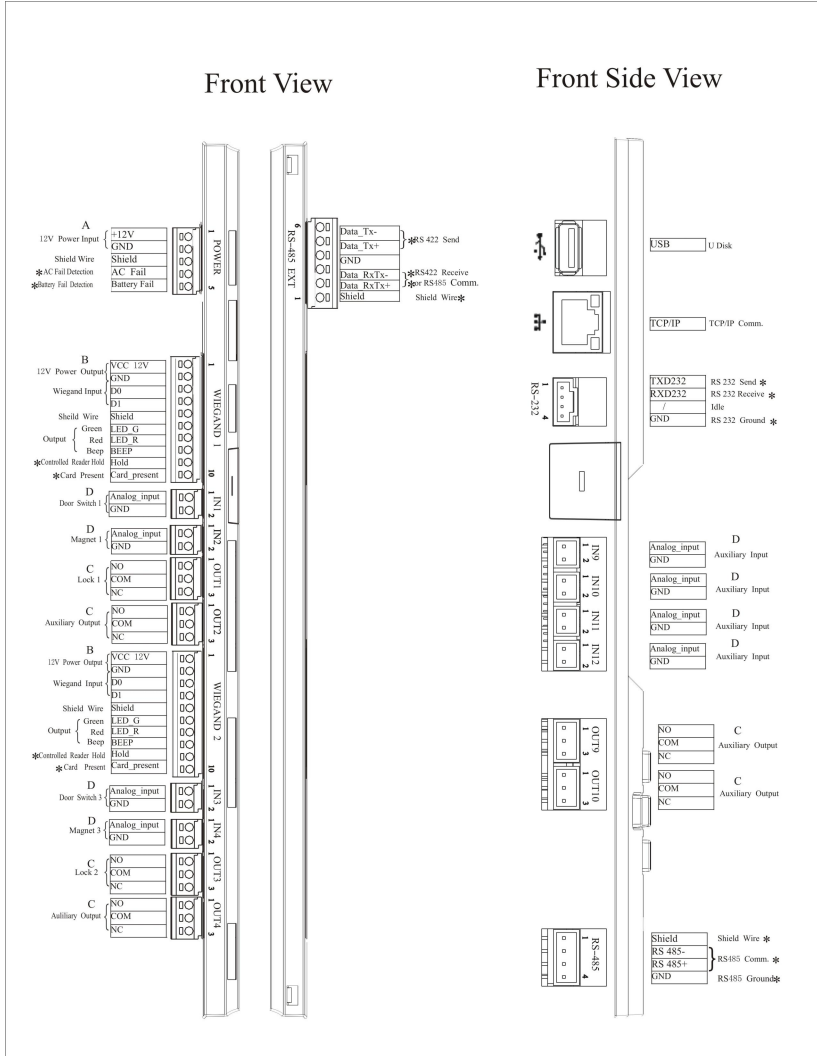Before aligning the covers, remove all the pluggable screw connectors.

Insert the hooks at the lower edge of the front cover into the slots at the lower edge of the plastic back cover ①. Ensure the Access logo is not reversed. Align the two block tongues at the upper edge of the front cover and back cover ②, and tap them slightly into the right position.

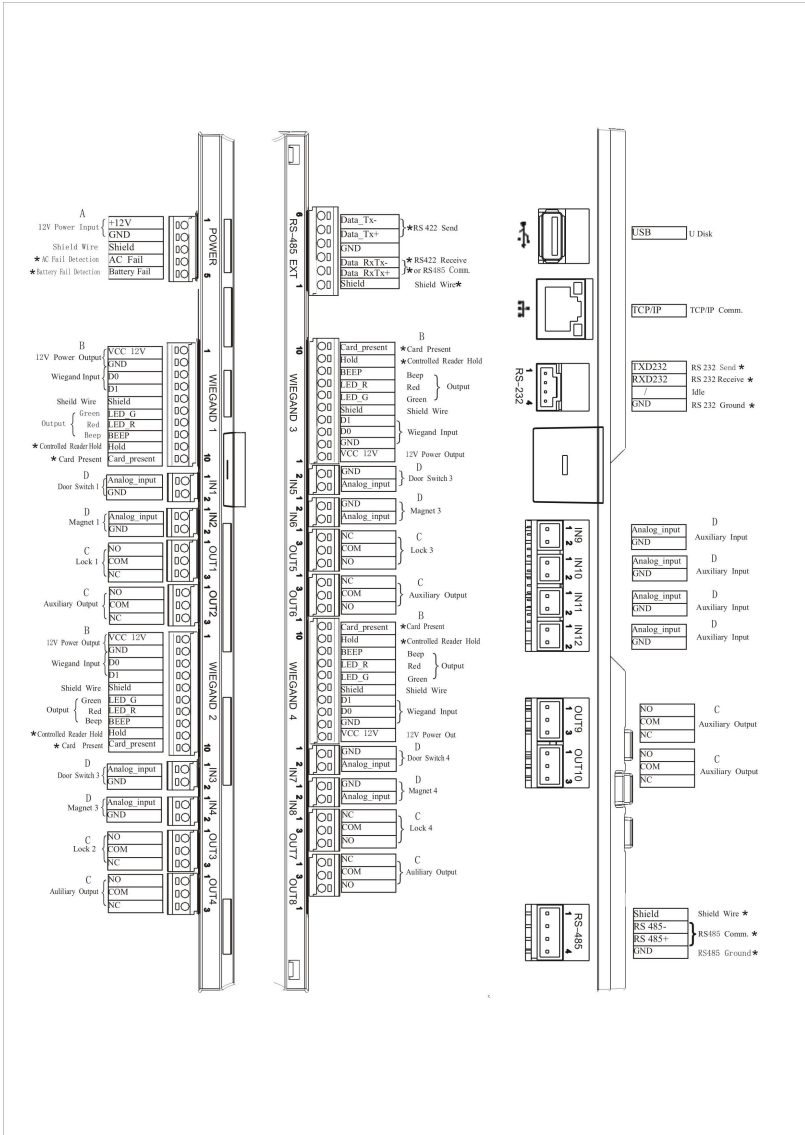The closing procedure is just opposite to the opening one.
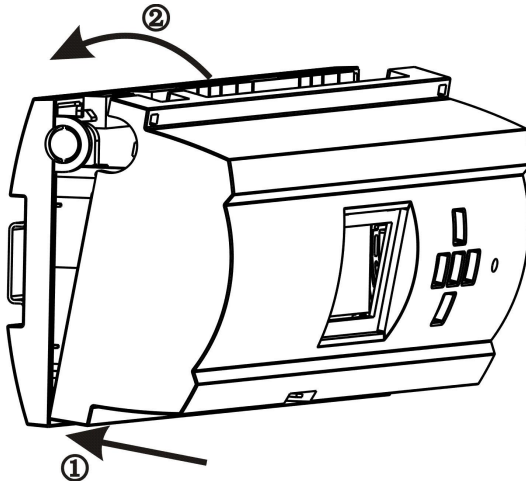
3.2 Control Panel Connection Terminals

INBIO280 terminal function diagram:

Front View

Front Side View

INBIO480 terminal function diagram:

A
12V Power Input { +12V / GND
Shield Wire — Shield
★AC Fail Detection — AC Fail
★Battery Fail Detection — Battery Fail
POWER

RS-485 EXT
Data_Tx- / Data_Tx+ — ★RS 422 Send
GND
Data_RxTx- / Data_RxTx+ — ★RS422 Receive / ★or RS485 Comm.
Shield — Shield Wire★

USB — U Disk
TCP/IP — TCP/IP Comm.
RS-232
TXD232 — RS 232 Send ★
RXD232 — RS 232 Receive ★
Idle
GND — RS 232 Ground ★

B
12V Power Output { VCC 12V / GND
Wiegand Input { D0 / D1
Shield Wire — Shield
Output { Green — LED_G / Red — LED_R / Beep — BEEP
★Controlled Reader Hold — Hold
★Card Present — Card_present
WIEGAND 1

WIEGAND 3
Card_present — ★Card Present
Hold — ★Controlled Reader Hold
BEEP — Beep
LED_R — Red } Output
LED_G — Green
Shield — Shield Wire
D1 / D0 — Wiegand Input
GND / VCC 12V — 12V Power Output

Analog_input
GND
Auxiliary Input
D

D
Door Switch 1 { Analog_input / GND
IN1
D
Magnet 1 { Analog_input / GND
IN2
WIEGAND 3
D
Door Switch 3 { GND / Analog_input
IN5
D
Magnet 3 { GND / Analog_input
IN6

IN9 / IN10 / IN11 / IN12
Analog_input / GND — D Auxiliary Input

C
Lock 1 { NO / COM / NC
OUT1
C
Auxiliary Output { NO / COM / NC
OUT2
C
Lock 3 { NC / COM / NO
OUT5
C
Auxiliary Output { NC / COM / NO
OUT6

B
12V Power Output { VCC 12V / GND
Wiegand Input { D0 / D1
Shield Wire — Shield
Output { Green — LED_G / Red — LED_R / Beep — BEEP
★Controlled Reader Hold — Hold
★Card Present — Card_present
WIEGAND 2

WIEGAND 4
Card_present — ★Card Present
Hold — ★Controlled Reader Hold
BEEP — Beep
LED_R — Red } Output
LED_G — Green
Shield — Shield Wire
D1 / D0 — Wiegand Input
GND / VCC 12V — 12V Power Out

OUT9 / OUT10
NO / COM / NC — C Auxiliary Output

D
Door Switch 3 { Analog_input / GND
IN3
D
Magnet 3 { Analog_input / GND
IN4
D
Door Switch 4 { GND / Analog_input
IN7
D
Magnet 4 { GND / Analog_input
IN8

C
Lock 2 { NO / COM / NC
OUT3
C
Auxiliary Output { NO / COM / NC
OUT4
C
Lock 4 { NC / COM / NO
OUT7
C
Auxiliary Output { NC / COM / NO
OUT8

RS-485
Shield — Shield Wire ★
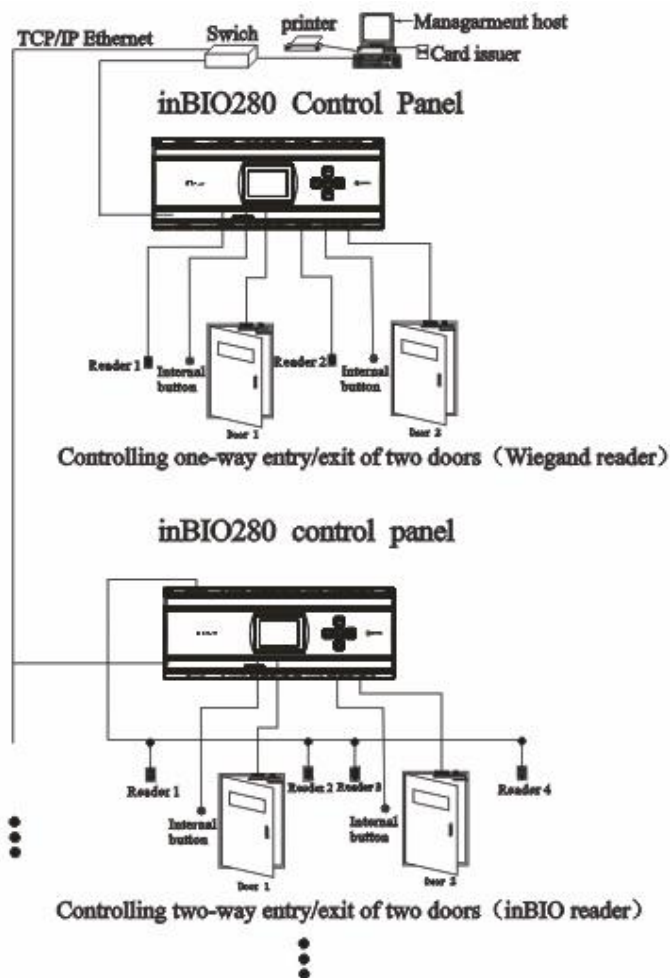RS 485- / RS 485+ — RS485 Comm. ★
GND — RS485 Ground ★

Descriptions of the terminals:

1. GPRS, WIFI, and all descriptions marked with ***** are extended functions. If you need any of them, please contact our business representatives or pre-sales technical support personnel.

2. The IN9, IN10, IN11, and IN12 are customized auxiliary input ports, which, for example, can connect exit switches, door sensors, fire alarms, and smoke detectors.**3.** The OUT2, OUT4, OUT6, OUT8, OUT9 and OUT10 are customized auxiliary output ports, which can connect alarms, cameras, and door bells.

3. All the customized auxiliary input and output terminals mentioned above are set through the access control software. Please see the software instructions for details.

4. INBIO280 has two fewer access control terminals than INBIO480.

3.3 Control Panel System Installation

The INBIO280/480 access control management system consists of two parts: management workstation (PC) and control panel (INBIO280/480). A management workstation and a control panel communicate via a TCP/IP network.

INBIO280 system installation diagram:

Controlling one-way entry/exit of two doors（Wiegand reader）

Controlling two-way entry/exit of two doors（inBIO reader）

INBIO480 system installation diagram:

Controlling one-way entry/exit of four doors（Wiegand reader）

Controlling two-way entry/exit of four doors（inBIO reader）
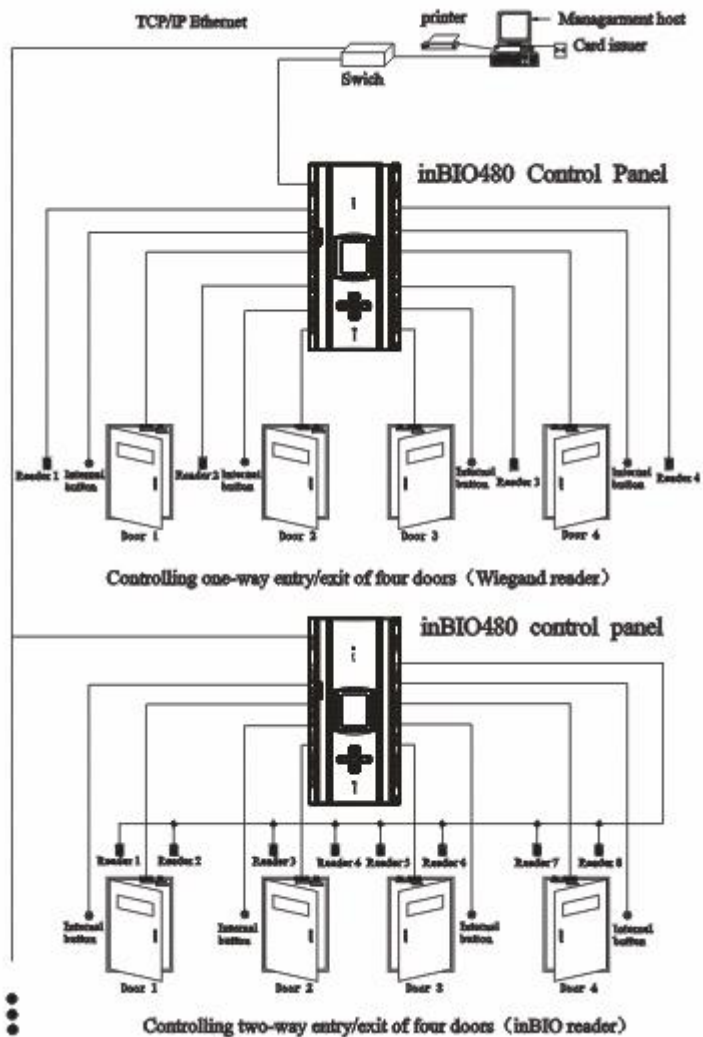
3.4 Control Panel Wire Installation

Notes:

1. Before connection, make sure the power supply is disconnected, because connection with power connected will cause severe damage to the equipment.

2. The access control wires must be separated according to heavy and light current; the control panel wires, electronic lock wires, and exit button wires must run through their respective casing pipes.
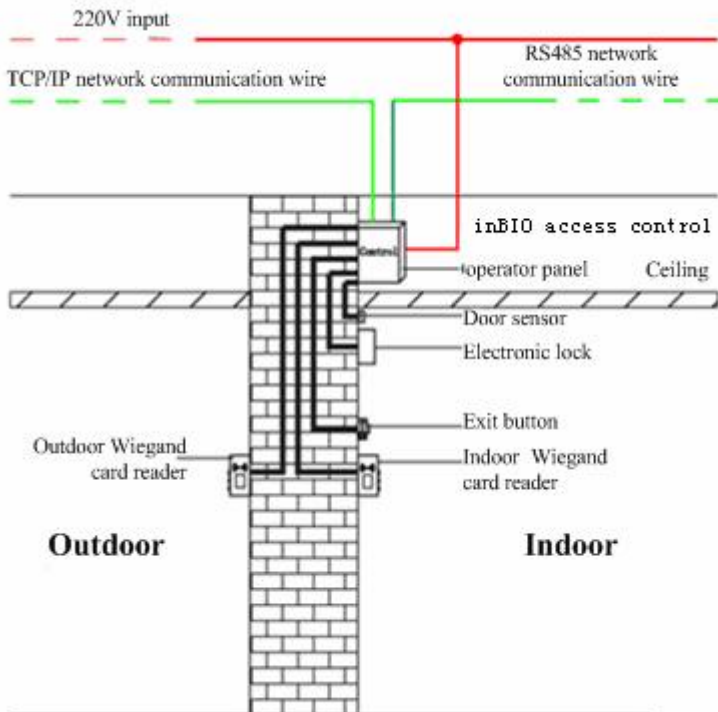
3.5 Wiegand Card Reader Connection

Each Wiegand card reader interface is connected with a 10-pin pluggable screw connector. These interfaces are connected in a point-to-point mode, and each interface supports only one card reader; each cable cannot exceed 100m. A card reader carries out addressing according to its corresponding interface number.
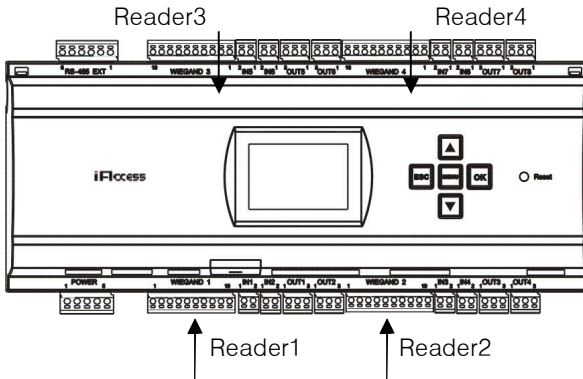
Note: The figure takes INBIO480 for example. INBIO280 has no 3# readers and 4# readers。

The following table illustrates connection between a card reader and a control panel using our company's KR300 Wiegand card reader and INBIO280/480 as an example.

INBIO280/480				KR300 Wiegand Card Reader	
	1	VCC 12V	Red (DC+12V)	Power connection wire	
	2	GND	Black (GND)	Power ground wire	
	3	D0	Green (WD0)	Wiegand connection wire	
	4	D1	White (WD1)		
	5	Shield	—	—	
	6	LED_G	Orange	Green indicator	
	7	LED_R	Brown	Red indicator	
	8	Beep	Grey	Buzzer	
	9	Hold	—	—	
	10	Card_present	—	—	

Different types of card readers have connection wires in different colors. Please refer to the respective connection instructions.

3.6 Exit Switch Connection

An exit switch is a switch installed indoors to open a door. When it is switched on, the door will be opened. An exit switch is fixed at a height of about 1.4m above the ground. Ensure it is located in the right position without slant, and its connection is correct and secure. (Cut off the exposed end of any unused wire and wrap it with insulating tape.) Note to guard against electromagnetic interference. (like light switches and computers).

It is recommended to use two-core wires with a gauge over 0.3 mm^2 as the connection wire between an exit switch and a control panel.
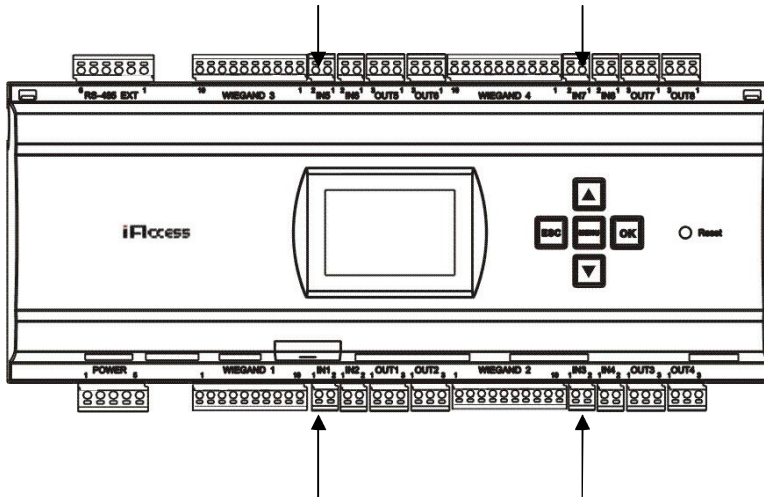
Note: The figure above takes INBIO480 for example. By contrast, INBIO280 has two fewer exit switch connection terminals.

3.7 Door Sensor Installation

A door sensor is used to sense the open/closed status of a door. With a door sensor switch, an access control panel can detect illegal opening of a door, and will trigger an output of alarm. Moreover, if a door is not closed within a specified period of time after it is opened, the door control panel will also prompt an alarm.

It is recommended to select a two-core wire with a gauge over 0.22 mm^2. A door sensor may be omitted if it is unnecessary to monitor online the open/closed status of a door, give out an alarm when the door is not closed for a long time or there is illegal access, and use the interlock function.
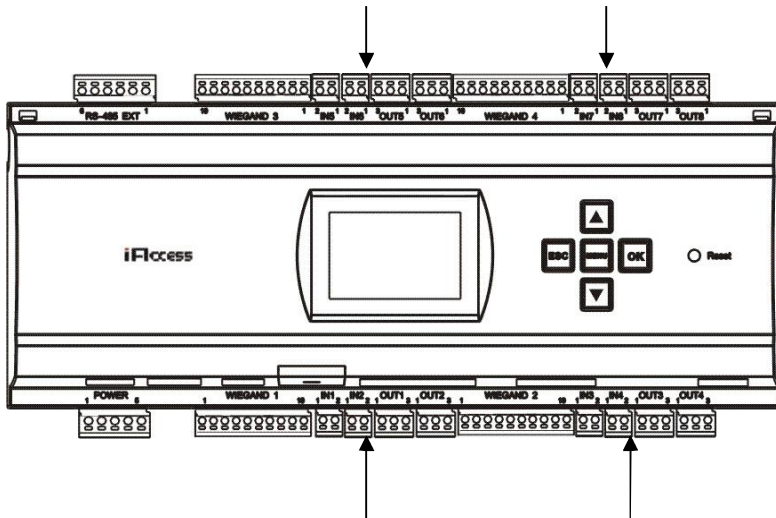
Note: The figure above takes INBIO480 for example. By contrast, INBIO280 has two fewer door sensor connection terminals.

3.8 Relay Output Connection

To operate a lock or an alarm system, INBIO480 is equipped with eight relay outputs (including the four ones OUT5, OUT6, OUT7, and OUT8 that are unavailable with INBIO280). The output ports are connected to 3-pin pluggable screw connectors, as shown in the figure below (taking INBIO480 for example): OUT1, OUT2, OUT3, OUT4, OUT5, OUT6, OUT7, and OUT8.
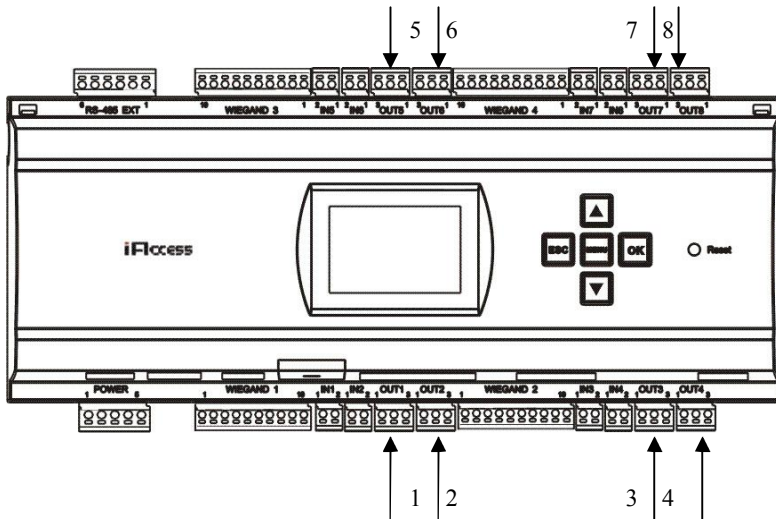
Note: The figure above takes INBIO480 for example. By contrast, INBIO280 has no OUT5, OUT6, OUT7, and OUT8 connection terminals.

If the 12V DC power supply inside INBIO280/480 is used to supply power to external devices, each relay output can work in the "wet" mode and is an electricity value; if the external power supply system uses no-voltage contacts, each relay output can work in the "dry" mode and is a Boolean value. The jumpers in the wet mode and dry mode are described as follows:

Dry/Wet mode jumper

Wet mode jumpers:
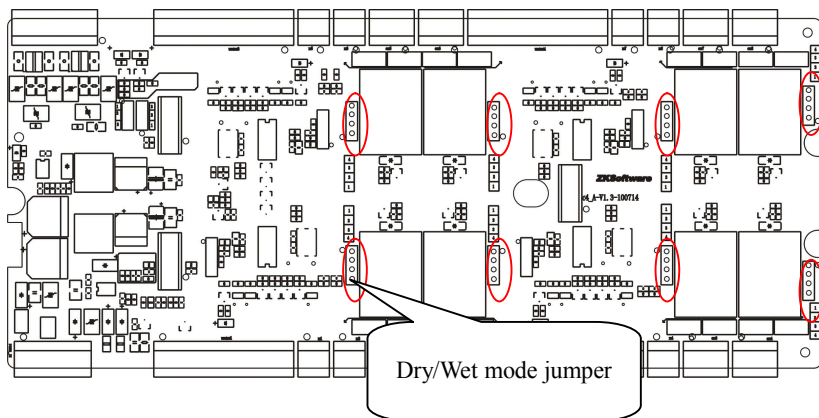
Dry mode jumpers:

✎ **Note**: The factory default jumping is set as dry mode. Each relay jump line with a **distribution** of jumper cap.

The distribution of jumper cap
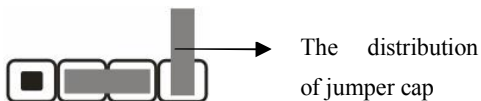
The following describes the relay output connection, for example, the connection with the lock.
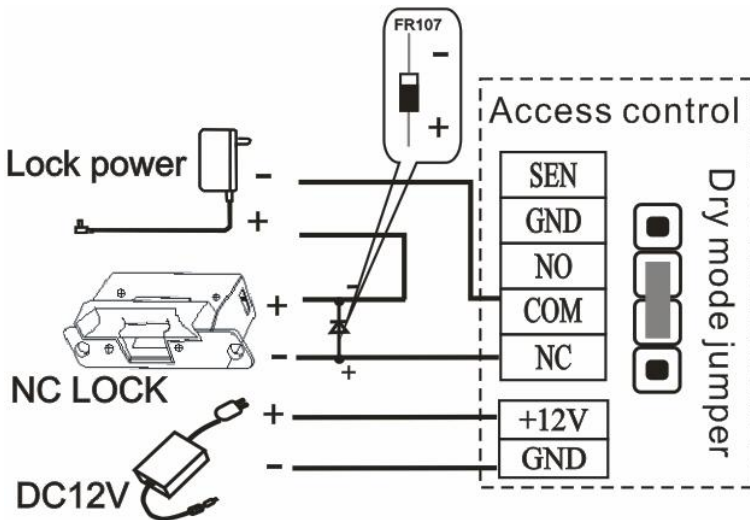
1. Wet mode：External power supply for NO Lock
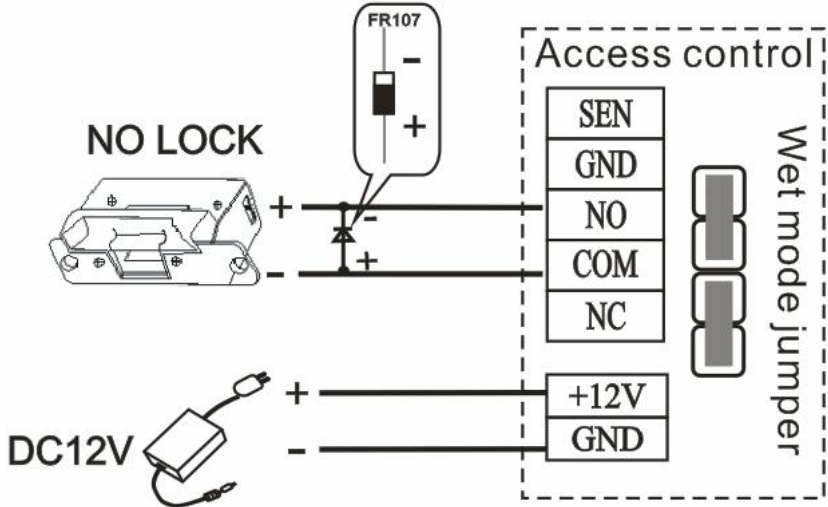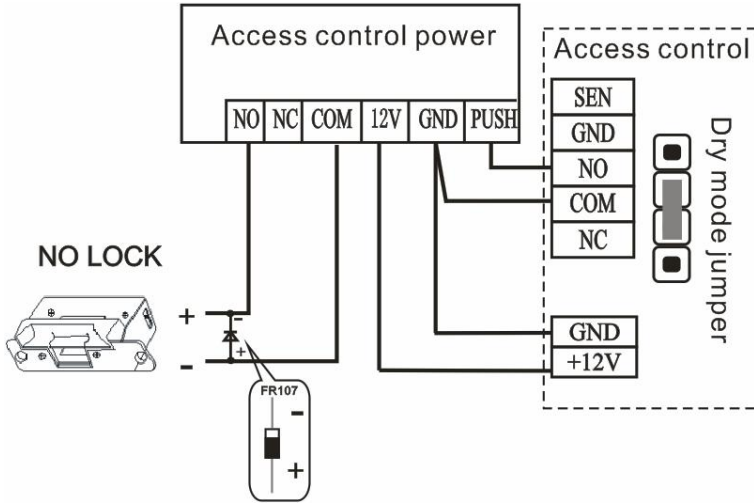

2. Wet mode：External power supply for NC Lock
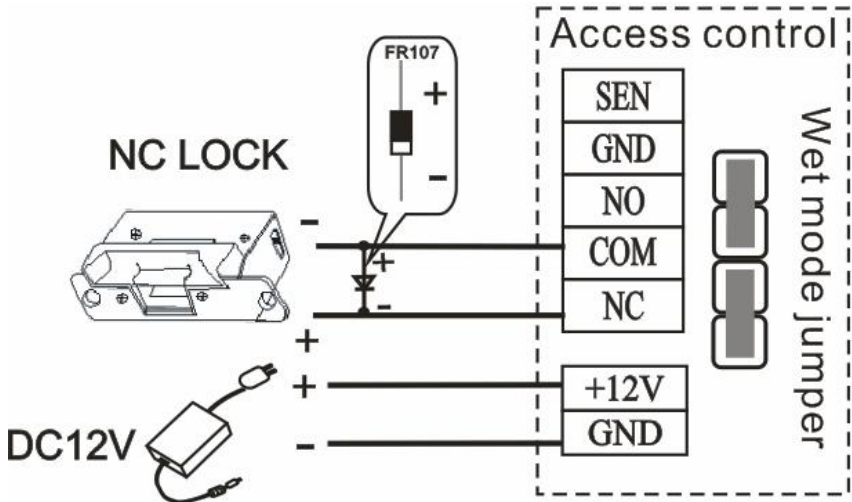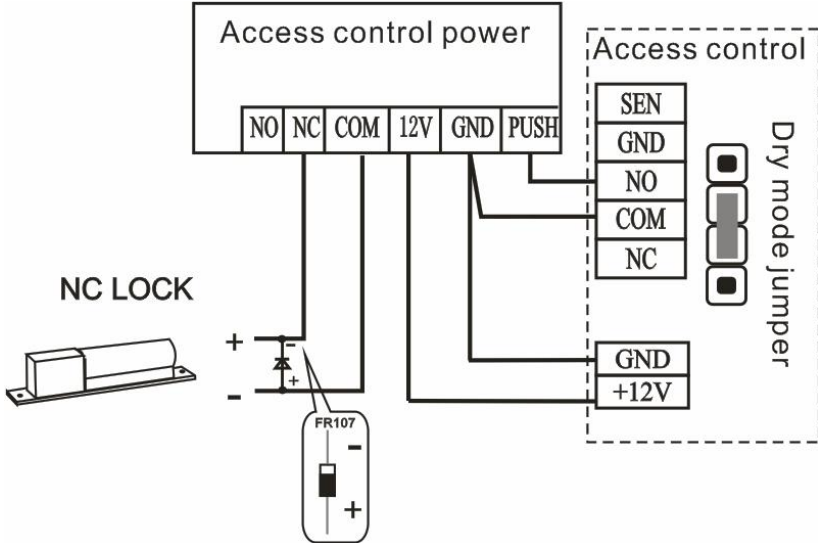
3. Dry mode：External power supply for NO Lock
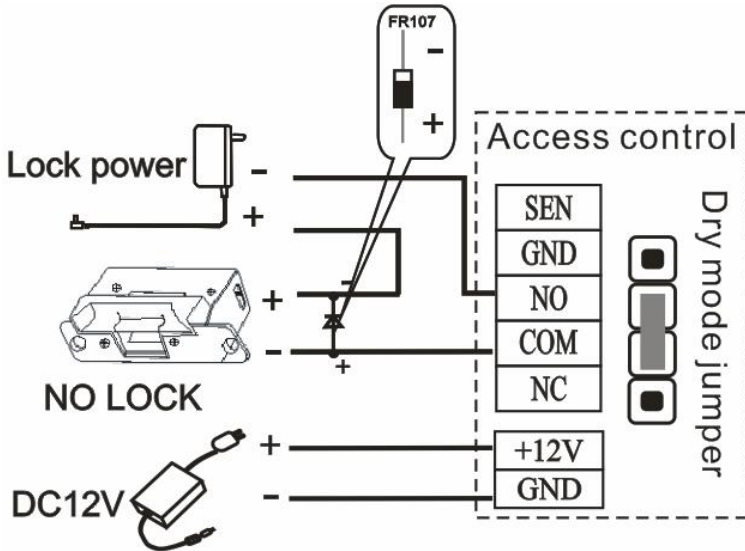
4. Dry mode：External power supply for NC Lock

5. Dry mode：The system control the Normally Open lock use the switch value.

6. Dry mode：The system control the Normally Close lock use the switch value.

3.9 Connection of Auxiliary Input and Output Devices

● **Auxiliary input device**

INBIO280/480 has four analog inputs, which serve multiple purposes. For example, they may connect infrared body detectors, smoke detectors, gas detectors, window magnetic alarms, and wireless exit switches. Auxiliary inputs are set through relevant access control software. For details, please see *Access User Manual.* The inputs are connected to 2-pin pluggable screw connectors: IN9, IN10, IN11 and IN12.
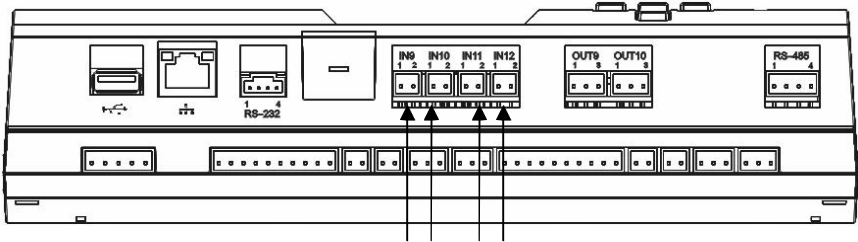
Auxiliary input device

● **Auxiliary output device**

INBIO280/480 has two analog outputs, which serve multiple purposes. For example, they may connect locks, monitors, alarms, and door bells. Auxiliary outputs are set through relevant access control software. For details, please see *Access User Manual.*
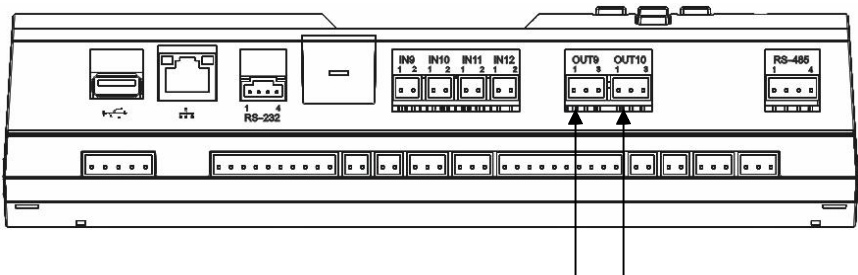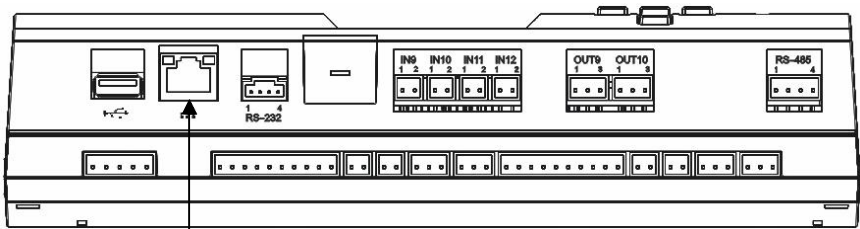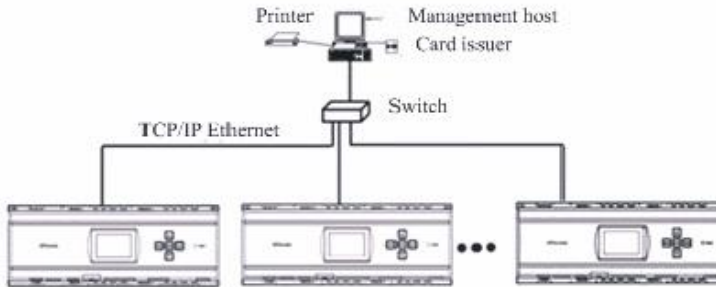

Auxiliary output device

3.10 Control Panel System Networking

3.10.1 TCP/IP Communication

INBIO280/480 provides one TCP/IP communication port, which is used to connect another control panel and control host. The TCP/IP communication rate is 10Mbps or 100Mbps.
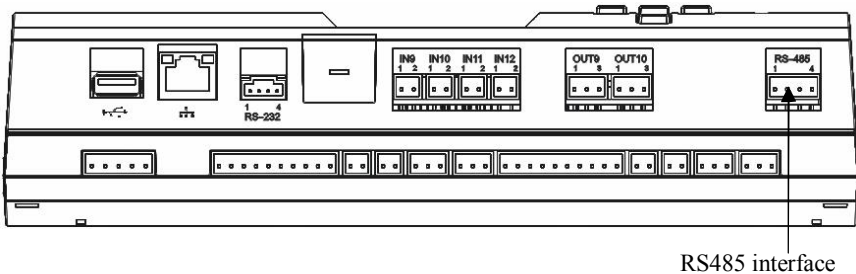

TCP/IP interface

inBIO280/480 Control panel

When the management host visits INBIO280/480 control panels by TCP/IP, it is necessary to view their respective IP address. For details, please see "4.1 Viewing Communication Information".

3.10.2 RS485 Communication

RS485 interface

In RS485 communication, one bus may be connected with 64 access controllers. It is recommended to connect with no more than 32 devices.

1. 485 communication wires must be shielded twisted pairs, preferably with multiple strands reserved, the recommended bus length of RS485 communication is less than 600 meters.

2. The communication wires should be kept away from high-voltage wires as far as possible, and whenever possible, should be neither routed in parallel with nor bundled with power cables.

3. A 485 bus must be of hand-in-hand bus structure instead of star or fork connection.

4. A 485 relay is needed if there are more than 30 control panels or the length is over 500m.

5. The AC power supply device and chassis must be grounded physically and properly.

6. Connect the GND of all 485 devices with shielded cables.

7. In the case of unstable communication, connect one 120ohm terminal resistance between 485+ and 485- of the last device (by setting the jumper, as shown in the figure below).
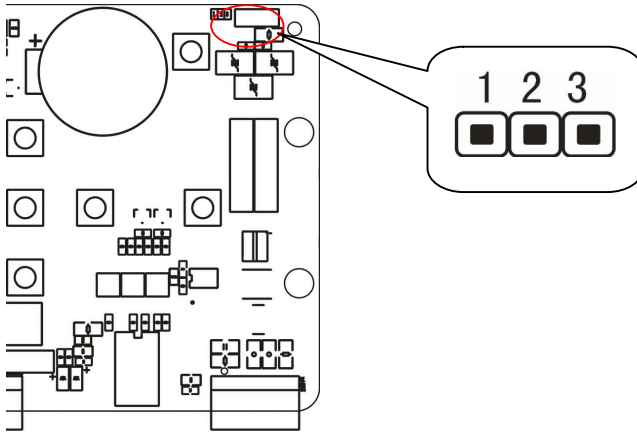
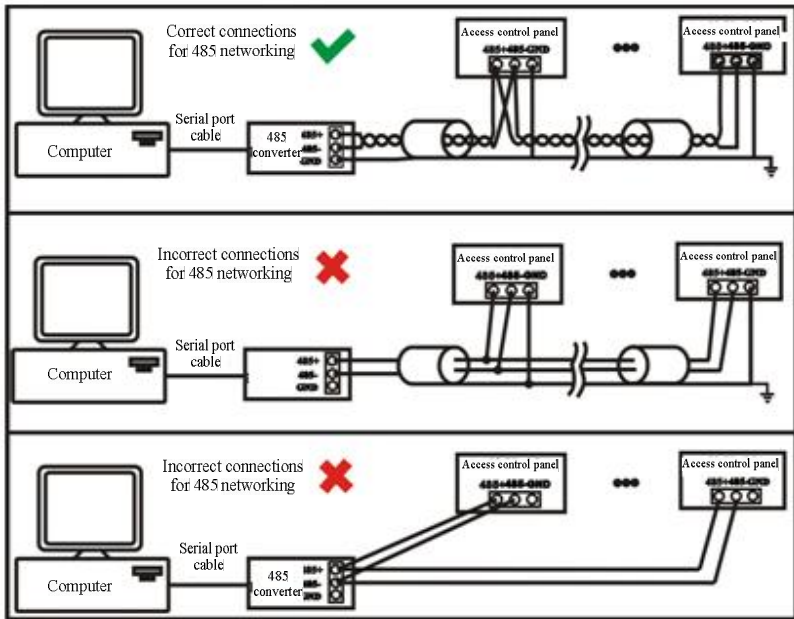Terminal resistance jumper positions

When no terminal resistance is connected (factory setting), the jumper is set as follows:
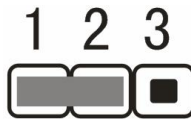
When a terminal resistance is connected, the jumper is set as follows:

Correct connections for 485 networking

When the management host visits INBIO280/480 control panels by means of 485 communication, it is necessary to set their respective 485 address. For details, please see "4.3 485 Address Setting".

4. Operation Instructions

When the equipment is powered on, the screen will display the initial interface as shown below:

```
Welcome
      10:12
10-09-09      THU
```
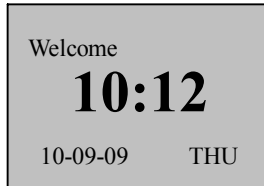
Press the **MENU** button to enter the menu interface:

```
Menu
►CommInfo
  Sys Info
  Set 485 Add    46
```
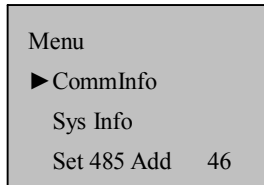
4.1 Viewing Communication Information

View the communication information status of the equipment to facilitate access of the management host.

Press the ▲/▼ buttons in the menu interface to select **Communication Info**, and press the **OK** button to enter the communication information interface, as shown below:

```
CommInfo
► IP Addr
  NetMask
  Gateway
---------------------
  MAC Addr
  485 Add
  BaudRate
```
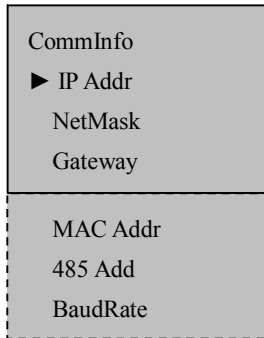
In the communication information interface, you can view some information about the equipment, including its IP address, subnet mask, gateway address, MAC address, 485 address, and baud rate.

The values of the items above can be set through relevant software. For details, please see *Access User Manual*. Certainly, the 485 address can be set directly through the equipment.

4.2 Viewing System Information

In the system information interface, you can view all information about the equipment, including user capacity, quantity of registered users and remaining quantity, record capacity, quantity of existing records and remaining quantity, and equipment information.

Press the ▲/▼ buttons in the menu interface to select **System Info**, and press the **OK** button to enter the system information interface, as shown below:

```
Sys Info
►User Info
 Record
 Dev Info        46
```
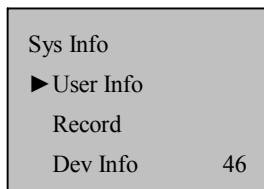
User Info: displays user information capacity, quantity of registered users, and remaining quantity.

Record: displays record capacity, quantity of existing records, and remaining quantity.

Dev Info: displays delivery date, serial number, manufacturer, equipment name, firmware version number, and baud rate.

Press the ▲/▼ buttons to select desired information, and press the **OK** button to enter the associated interface.

User Info		Record		Dev Info	
Capacity：	3000	Capacity：	10000	Dev Info	
Used：	17	Used：	8260	►Manu Time	
Spare：	2983	Spare：	1740	Serial Num	
ESC	OK	ESC	OK	Vendor	

| |
|---|
| Device Name |
| FirmwareVer |
| MCU Version |

4.3 485 Address Setting

To use RS485 communication, you need to set a 485 address for your equipment to facilitate access of the management host.

In the menu interface, press the ▲/▼ buttons to select **485 Address Setting**, then press the **OK** button to enter the address setting interface, and press the ▲/▼ buttons to select a desired address from 1~254.

```
Sys Info
      User Info
      Record
   ►Dev Info        46
```
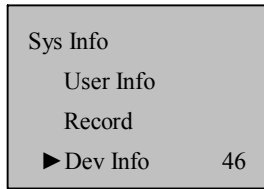
When the setting is completed, press the **OK** button to confirm.