User Manual

APAX-5522PE

IEC 61850-3 Certified PAC with Marvel XScale® CPU

ADVANTECH
eAutomation

Copyright

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Part No. XXXXXXXXXX Edition 1

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Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (OS, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.

Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
15. The power cord or plug is damaged.
16. Liquid has penetrated into the equipment.
17. The equipment has been exposed to moisture.
18. The equipment does not work well, or you cannot get it to work according to the user's manual.
19. The equipment has been dropped and damaged.
20. The equipment has obvious signs of breakage.
21. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
22. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
23. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Chapter 1

Overview

1.1 Introduction

IEC 61850-3 standards specify a number of “hardened” characteristics that network products should meet to withstand the potentially electromagnetically harsh substation environment: such as immunity to electrical surge, electrostatic discharges and other phenomena that would cause non-hardened devices to fail. The APAX-5000PE series modules are IEC 61850-3 compliant and can be used in power & energy applications e.g. smart substation for good protection features.

APAX-5522PE provides two serial (RS-232) ports, and two ethernet ports to communicate with other devices. Programmers can leverage the communication ability through Modbus/RTU master/slave and Modbus/TCP server/client.

1.2 System Architecture

APAX-5522PE can play as standalone controller. It needs to be inserted on the APAX-5002 backplane to get power. By assembling with other APAX-5000 I/O modules by backplanes, APAX-5522PE can communicate with other APAX-5000 I/O modules through the backplanes Refer to Section 3.1 for the assembly operation.

APAX-5522PE supports the redundant function. To leverage this functionality, two CPU modules (controllers), with the same control program, are installed in one system. After both controllers are enabled to have backup function, the APAX-5000 system will automatically delegate one of the two controllers as the master controller.

The master controller will run the control program to execute the control process, while another controller (the backup controller) is put on standby. The master controller will periodically send living message to the backup controller. If the backup controller dose not receive living message from master controller, it will automatically become master controller and take the control responsibility and restarts the control process execution. The maximum operation time for the backup controller to become master controller.

Changing master controller means there is something wrong for the previous master controller. Therefore, engineers can check or change the previous master controller with a new one and enable it to have redundant functionality, becoming a second

backup controller. Then if the new master controller fails again, the second backup controller will automatically take the control responsibility.

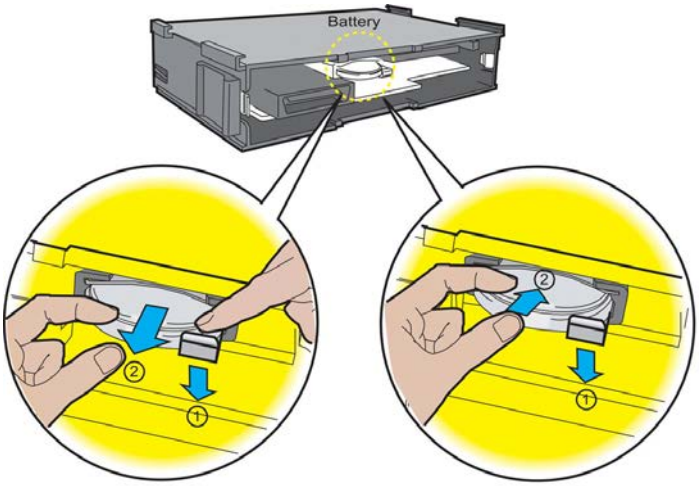
This mechanism ensures the control system will continuously run the control process. And the system won't be stopped even if controller fails.

1.3 Features

1.3.1 Battery Backup RAM

APAX-5522PE provides 512 KB battery backup RAM (256KB (File System) + 256KB (Direct Access)) for saving important data. This ensures that you have a safe place to store critical data. You can now write software applications without being concerned that system crashes will erase critical data from the memory. If there is no power provided to APAX-5522PE, the battery life can be 2 years. There is a BAT LED in the front panel of the APAX-5522PE, and it will be lit when the battery is out of power. Once the BAT LED is lit, please change the battery. Refer to figure below for the location of the battery and how to change the battery. Below is an example image of the APAX-5520.

Note! *After you remove the battery, the data can remain 30 minutes.*



Battery Specifications

- Battery Type: CR2032
- Electrical Properties
- Nominal voltage: 3.0 V
- Nominal capacity: 225 mAh
- Dimension:
  - Diameter: 20.0 mm
  - Height: 3.2 mm
  - Weight: 3.1 g

Warning! *Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.*

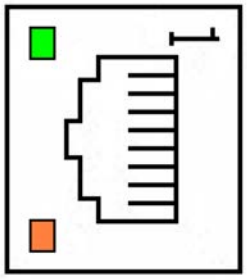
1.3.2 CF Slot for Data Storage

APAX-5522PE has built-in Microsoft Windows CE.NET and Linux operating systems. The operating system is installed in the flash. Your application program will also be stored on the flash. However, we strongly suggest not saving data to the flash. Repeat reading and writing will serious damage the flash life. APAX-5522PE delivers an internal CF slot for data storage. It only supports FAT, and the CF card size can be up to 1 GB. Refer to figure below for the location of CF slot and how to insert/plug CF.

Note! *There might be compatibility issues with certain brands of CF card. We strongly recommend using an Advantech SQFlash which is tested in the development stage. Contact Advantech support if you have any application enquiries.*

1.3.3 Ethernet Port

The APAX-5522PE is equipped with one Ethernet port which is fully compliant with IEEE 802.3u 10/100Mbpst. The Ethernet port provides a standard RJ-45 with upper left LED indicator on the front side showing Link/Activity (Off: Not Link, Green and Flash: Link and Activity), and lower left LED indicator showing LAN speed (Orange: 100 Mbps, Off: 10 Mbps). Refer to figure below for Ethernet port pin assignment.

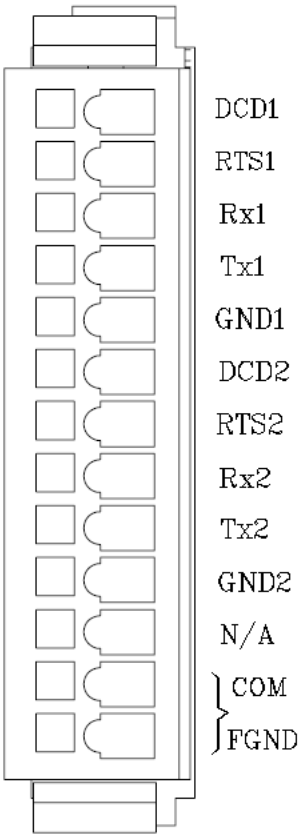


Pin	Assignment	Description
1	TD +	Transmit +
2	TD -	Transmit -
3	RD +	Receive +
4	N/C	not used
5	N/C	not used
6	RD -	Receive -
7	N/C	not used
8	N/C	not used

Note! *The Ethernet port is only used in LAN, not for connection to telecommunication circuits.*

1.3.4 RS-232 Communication Ability

APAX-5522PE delivers two isolated RS-232 serial communication interface ports to connect with other devices. APAX-5522PE RS-232 interface supports auto data flow control functionality: it automatically detects the direction of incoming data and switches its transmission direction accordingly.

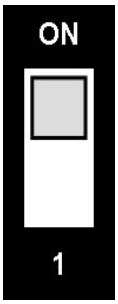
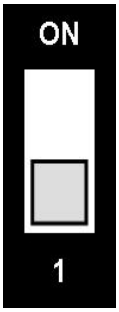


Pin	Assignment	Description
1	DCD1	DCD for COM1
2	RTS1	RTS for COM1
3	Rx1	Rx for COM1
4	Tx1	Tx for COM1
5	GND1	Ground for COM1
6	DCD2	DCD for COM2
7	RTS2	RTS for COM2
8	Rx2	Rx for COM2
9	Tx2	Tx for COM2
10	GND2	Ground for COM2
11	N/A	N/A
12	COM FGND	Frame GND for COM
13		

Note! *Refer to Appendix A for more detailed information about RS-232 communication.*

1.3.5 Controller ID Settings

APAX-5522PE supports backup function and it has to be configured to the different ID address. For ID setting, please see below.

ID Address Settings(SW1)	ID Address
	ID:0
	ID:1

1.3.6 Real-Time Clock (RTC)

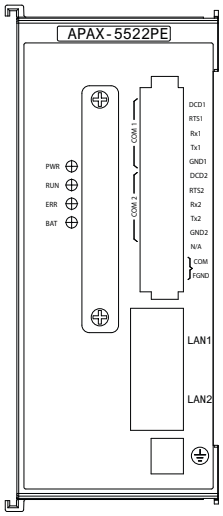
APAX-5522PE delivers built-in real-time clock, which programmers can use it in their application programs. When the power is loss, the RTC can still run using the power from battery which has been described in section 1.3.1.

Chapter 2

Product Specifications

2.1 CPU Modules

2.1.1 APAX-5522PE



Control System

- CPU: Scale PXA270 520 MHz
- Memory: Flash 32M bytes, SDRAM 64M bytes
- RAM: Battery Backup RAM 256KB file system & 256K Direct Accesss
- Operating System: Windows CE.NET or Linux
- Real-time Clock: Yes
- Watchdog Timer: Yes
- Control Software: VS .Net Library/ automationX aX5 runtime
- Storage:1 x Type II CompactFlash card slot

Communication (Ethernet)

- LAN:2 x RJ-45 Port, 10/100 Mbps
- Protocol: Modbus/TCP Server and Client plus IEC60870-5- 101,103,104

Communication (Serial)

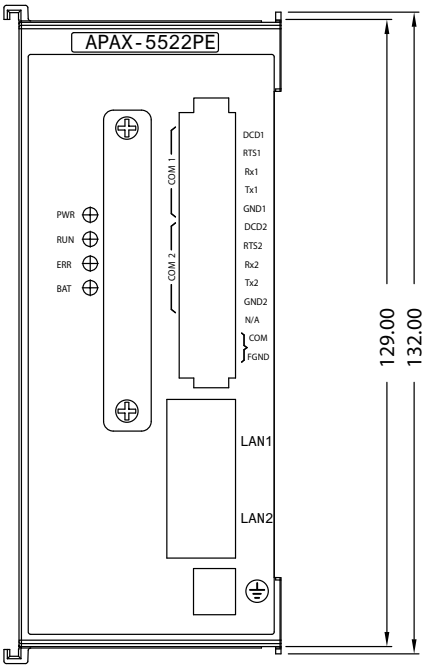
- Connectors: 2 x Isolated RS-232

Environment

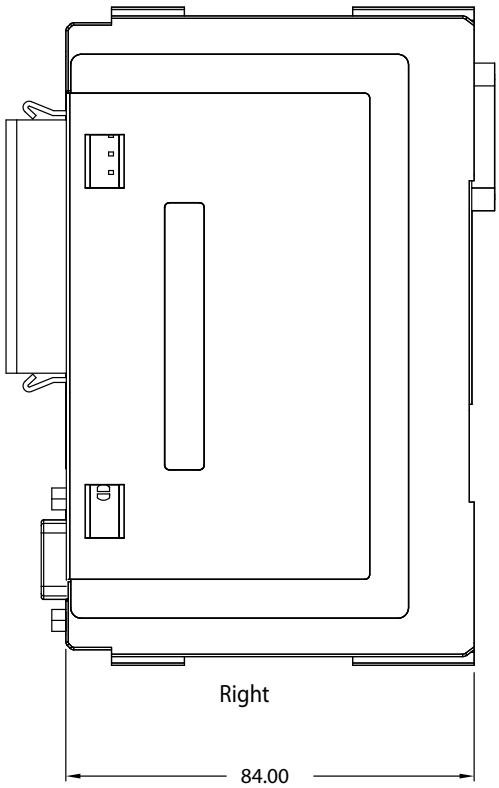
- Operating Temperature: -20 ~ 70°C
- Storage Temperature: -40 ~ 85°C
- Relative Humidity: 5 ~ 95% (non-condensing)

Note! *Refer to Chapter 4 for LED diagnostics*

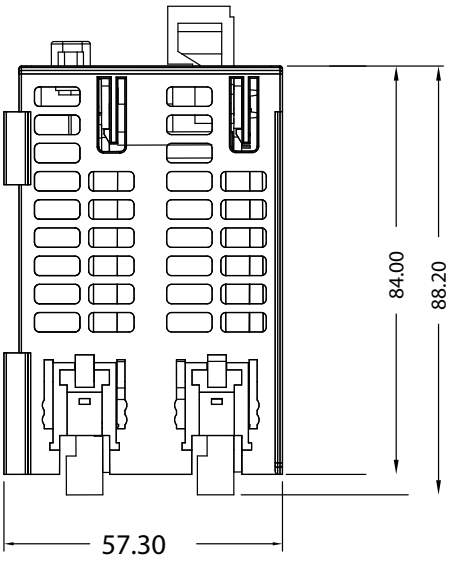
2.1.2 APAX-5522PE Dimensions



Front



Right



Bottom

2.2 Power Supply Modules

2.2.1 APAX-5343E

Input

- **Rated Voltage:** 115/230 V_{AC}
- **Voltage Range:** 90 ~ 264 V_{AC}
- **Input Current:** 1.5 A (at rated load)
- **Input Frequency Range:** 47 ~ 63 Hz
- **Inrush Current:** 50 A (one cycle at 25°C)
- **Installed Input Fuse:** F 3.15 A/ 250 V (not accessible)

Output

- **Output Power:** 72 watts
- **Power Loss at rated load:** approximated 8 ~ 9 W
- **Residual Ripple:** <240 mVpp
- **Startup Delay:** < 3 second
- **Rated Voltage:** 24 V_{DC}
- **Voltage Rise:** typical 60 ms
- **Rated Output Current:** 3 A
- **Output Current Limitation:** 3.5 ~ 4.3 A
- **Efficiency:** > 87% (at 115/230 V_{AC} Input Voltage, Rated load)

Protection

- **Isolation Protection (In/Out):** 42/42 V_{DC}
- **Over Voltage Protection:** Shutdown at approx. 25~27 V_{DC}, latch off mode
- **Over Load Protection:** Auto-recovery mode
- **Short Circuit Protection:** Auto-recovery mode

General

- **Certifications:** CE, FCC Class A, UL 508 (UL/cUL approval), Energy Star
- **Enclosure:** ABS + PC
- **Diagnostics LEDs:** 1 x Power
- **Dimensions (W x H x D):** 75 x 151 x 115 mm
- **Operating Temperature:** -10 ~ 55°C
- **Storage Temperature:** -20 ~ 70°C
- **Relative Humidity:** 5 ~ 95% (non-condensing)
- **Leakage Current:** < 3.5 mA

Chapter 3

Mechanical Installation

3.1 Mechanical Assembly and Power Connection

3.1.1 Standalone Controller (with Direct Power Input)

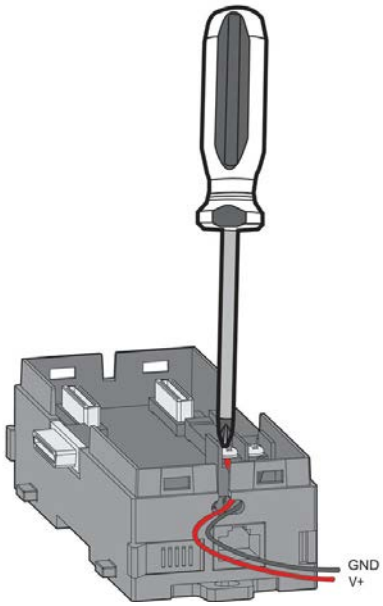
As introduced in Chapter 1, APAX-5522PE can perform as standalone controller. It needs to be inserted on one APAX-5002 backplane module. Insert One APAX-5000 I/O module on the same backplane module. That I/O module can be controlled by APAX-5522PE. If you want to have more APAX-5000 I/O modules to be controlled, simply stacked other APAX-5002 backplanes to the original backplane, and inserted APAX-5000 I/O modules on the stacked backplanes. It becomes one complete system, and APAX-5522PE can communicate with these APAX-5000 I/O modules through the backplanes.

Note! *If use APAX-5002L backplane, it doesn't support external power source connections and Local Bus IO extension functions.*

There are two ways that APAX-5522PE can be powered when it performs as a standalone controller. One way is to connect the DC power supply wire directly to the power connector on the backplane. Another way is using Advantech APAX-5343E power supply module, refer to Section 3.1.2 for more detail.

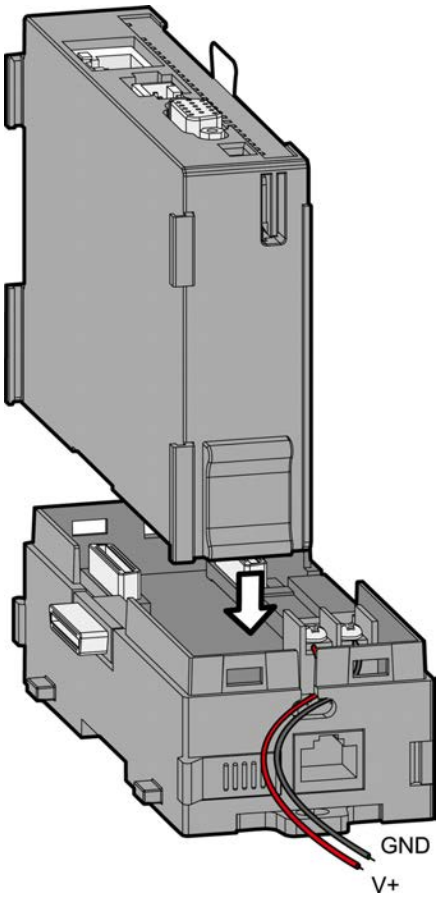
When you wire the power supply to the backplane, the power is transferred between backplanes, and provides to APAX-5522PE and other APAX-5000 I/O modules inserted on the backplanes. Refer to figures below for how to wiring the power to the backplane, and how to assembly APAX-5522PE and other APAX-5000 I/O modules with backplanes:

Step 1: Connect the power supply wire to the power connectors on the 2-slot APAX-5002 backplane module.

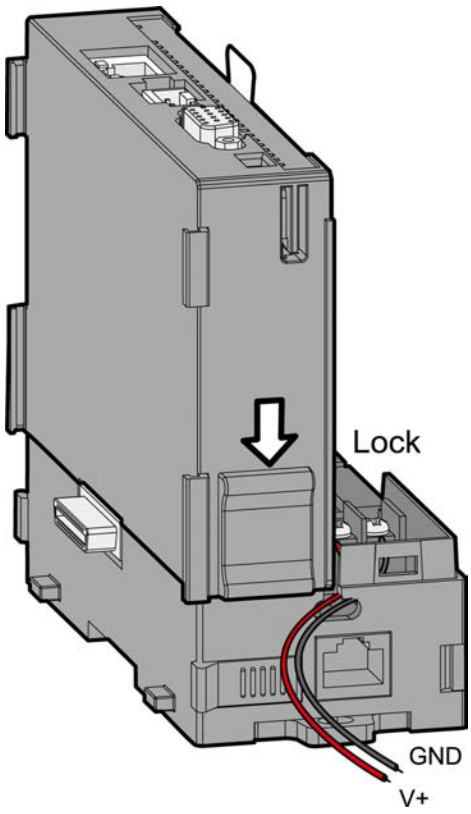


Warning! *If you use APAX-5000 digital modules in the same system, use different power supplies for the system and the the digital channels on digital modules, to have isolation protection between digital channels and system.*

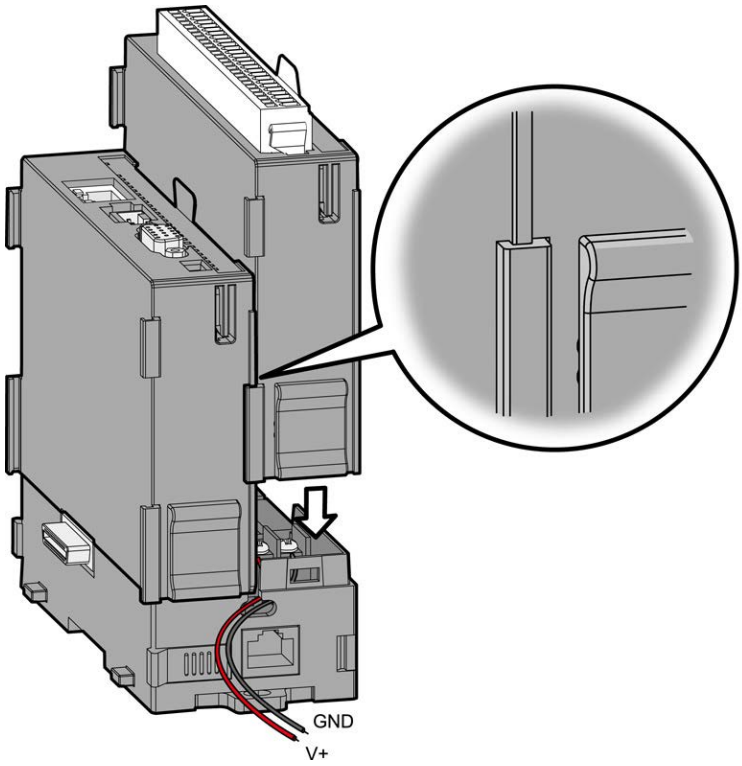
Step 2: Insert APAX-5522PE on the APAX-5002 backplane module.



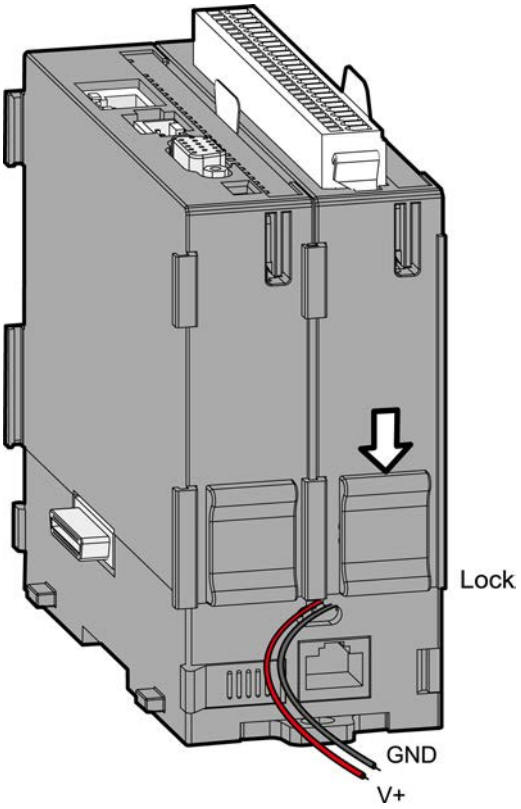
Step 3: Lock APAX-5522PE to the APAX-5002 backplane by pulling down the module locks on two sides.



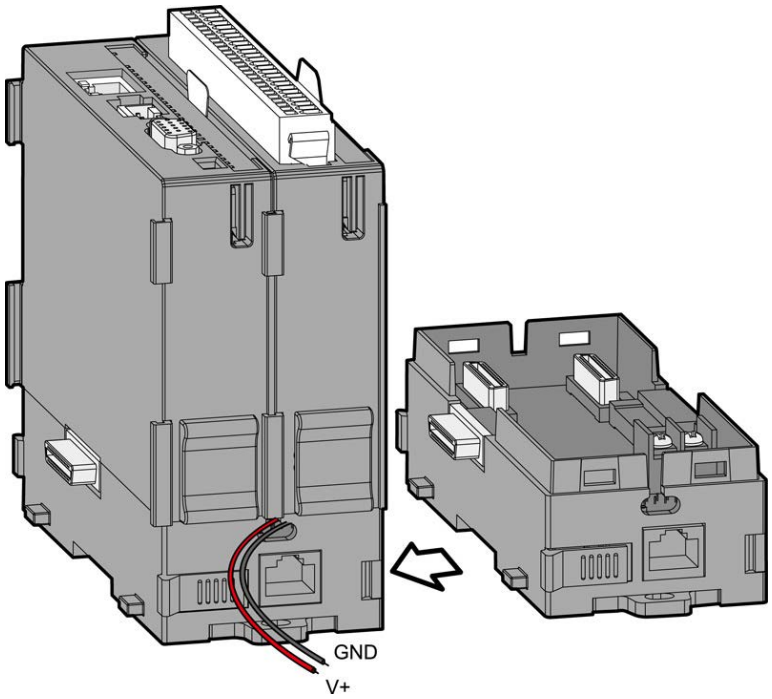
Step 4: Insert another APAX-5000 I/O module on the same APAX-5002 backplane. Use tongue-and-groove slots to move the module.



Step 5: Lock that APAX-5000 I/O module to the APAX-5002 backplane by pulling down the module locks on two sides.

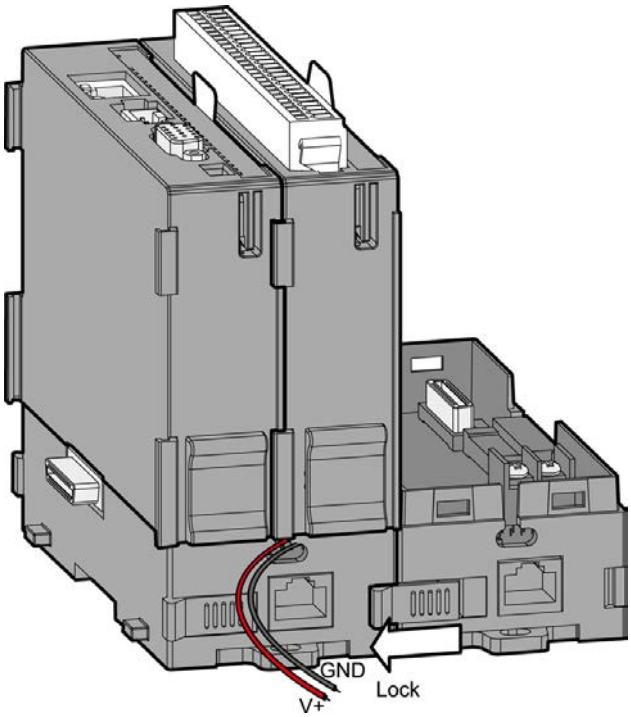


Step 6: If you need more than one APAX-5000 I/O module, stack another APAX-5002 backplane to the original APAX-5002 backplane.



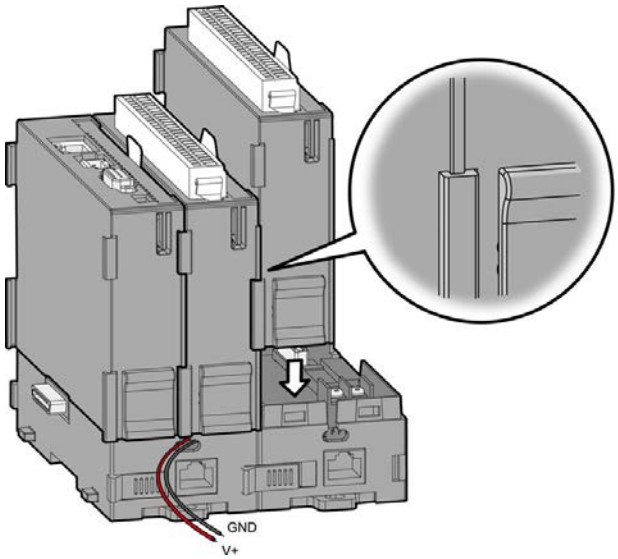
Warning! *When you assembly different backplanes together, remember to turn off the power connected to the backplane. If not, the backplanes may be damaged. Turn on the power again after you complete the assembly for all backplanes.*

Step 7: Lock the stacked APAX-5002 backplane to the original APAX-5002 backplane by the backplane locks on two sides.



Note! *If you want to provide more power to the system, you can connect another power supply wire to the power connections on the second APAX-5002 backplane. (The wiring procedure is the same as step 1)*

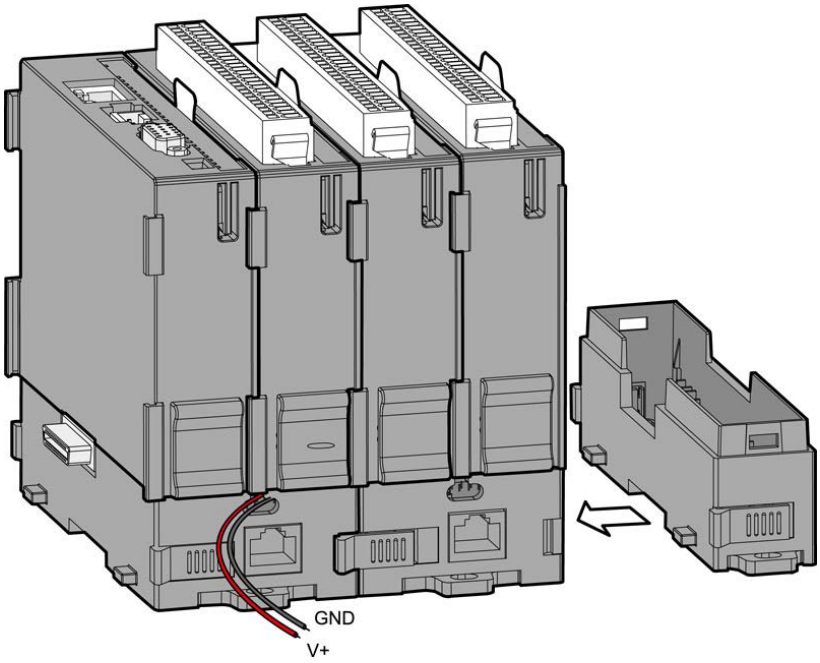
Step 8: Insert another APAX-5000 I/O module on the second APAX-5002 backplane.

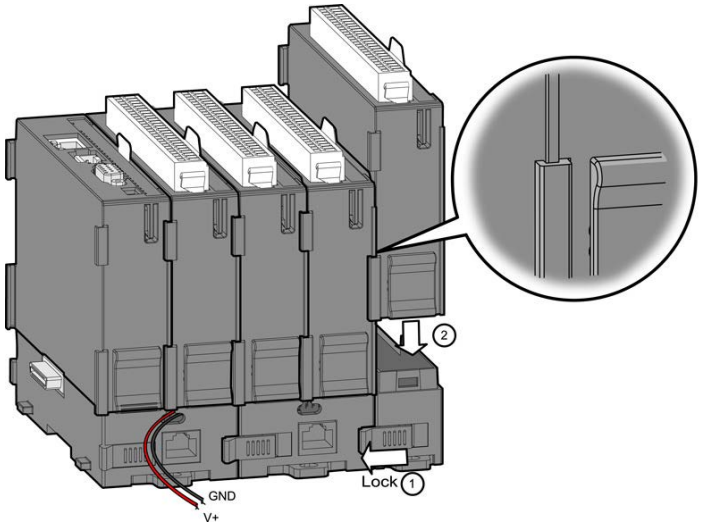


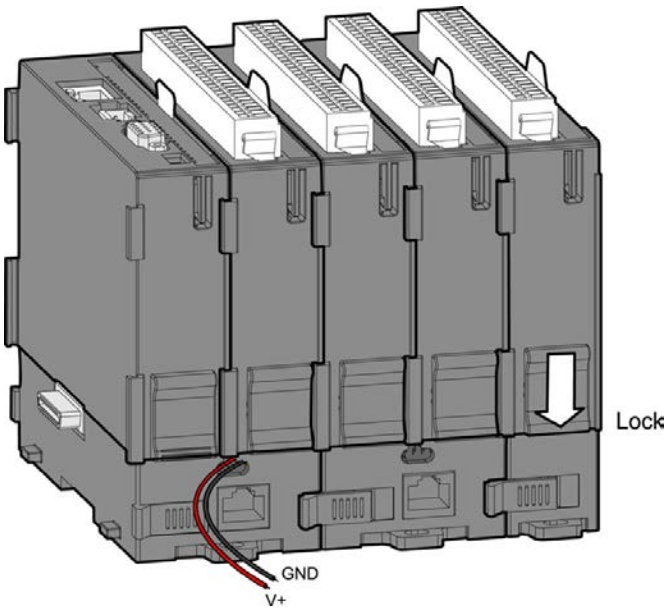
Step 9: Lock that APAX-5000 I/O module to the second APAX-5002 backplane by pulling down the module locks, similar as step 5.

Step 10: If needed, repeat step 8 ~ 9 to have another APAX-5000 I/O module on the second APAX-5002 backplane.

If you need more APAX-5000 I/O module, repeat Step 6 ~ Step 10 until all necessary APAX-5000 I/O modules are inserted on the backplanes. When the total number of APAX-5522PE and APAX-5000 I/O modules is odd, you can use 1-slot APAX-5001 backplane module as the last backplane in the system.







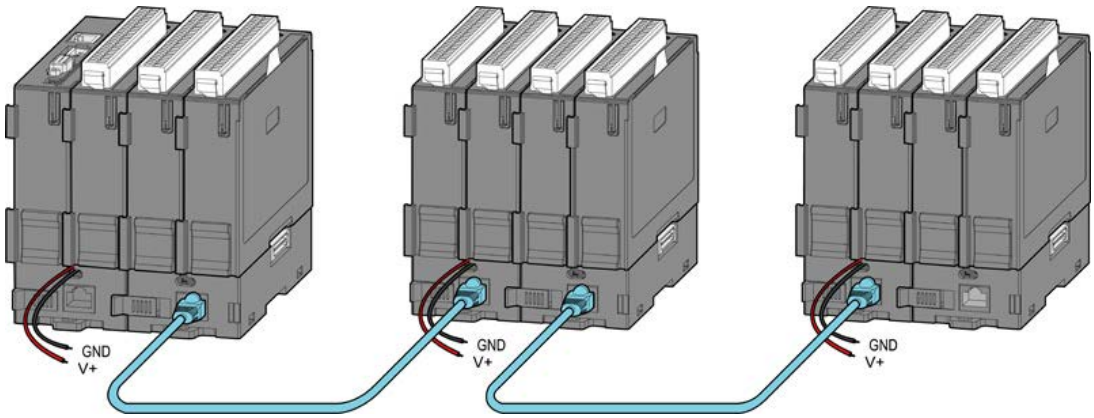
There is an expansion port on front side of APAX-5002. With this port, users can build a remote expansion architecture, remaining fast local-bus data transmission speed. Standard Ethernet cables can be used to connect any two APAX-5002. However, shielded industrial Ethernet cable MUST be used instead of standard Ethernet cable when the system is used in harsh environment, such as factory automation. Unmanaged industrial Ethernet switches (such as Advantech EKI-2528) with 100 Mbps transmission speed can also be used between two APAX-5002. Therefore, you can flexibly build any remote expansion with line, tree or star topology. All the APAX-5000 I/O modules can benefit from the remote expansion architecture with local bus speed. Refer to figure below for the expansion topology.

Warning! *1. DO NOT use managed switch, hub or router between backplanes for expansion.*

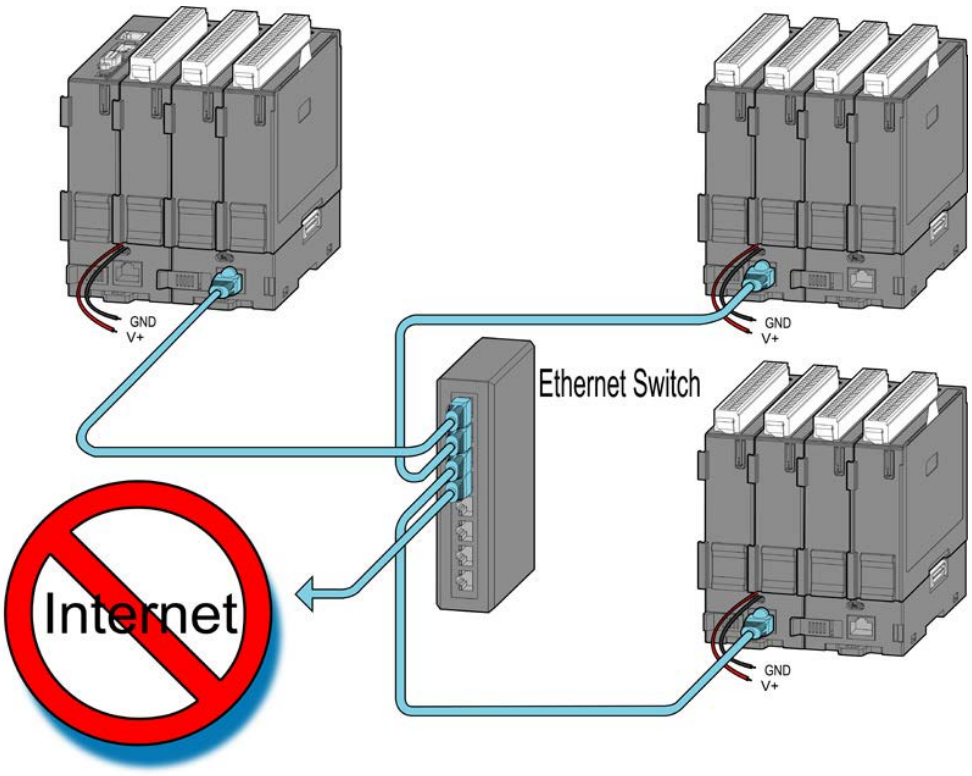
2. The network for the expansion should be a local network, NOT to connect with other external network (such as public network in enterprise network, including Internet).

3. Cat 6 Ethernet cable is strongly recommended for better data transmission quality.

4. It is suggested to power on APAX-5522PE and all the I/O modules together to avoid any unpredictable situation.



Note! *For the line topology, as shown by figure above, the maximum distance between two backplanes is 100 m. And there are maximum 30 APAX-5002 backplanes used in the system for line topology to remain real-time performance.*



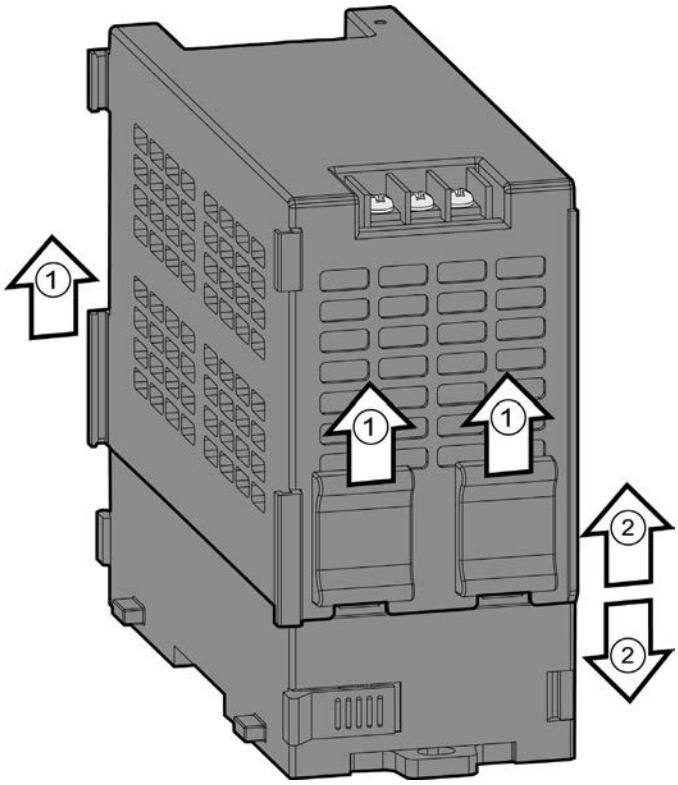
Warning! *For the star topology, use unmanaged industrial Ethernet switches (such as Advantech EKI-2528) with 100 Mbps transmission speed for expansion. DO NOT use management switch, hub or router between backplanes. The network for the expansion should be a local network, NOT to connect with other external network (like public network in enterprise network, including Internet).*

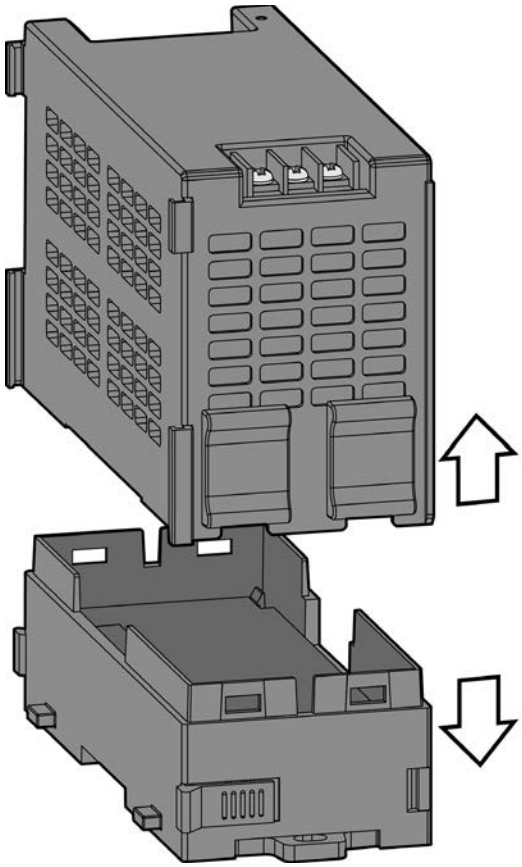
3.1.2 Standalone Controller (with APAX-5343E as Power Input)

APAX-5522PE and other APAX-5000 I/O modules can also be powered by the APAX-5343E power supply module, connected to the left side of the whole system. The power can be transferred to APAX-5522PE and other APAX-5000 I/O modules though the backplanes.

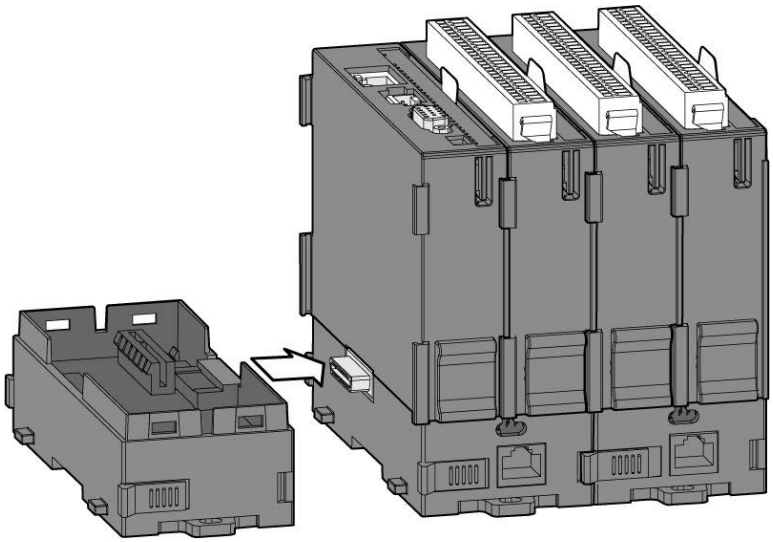
Step 1: Follows the procedures described in Section 3.1.1 to assembly APAX-5522PE and other APAX-5000 I/O modules into one complete system. The only difference is that you don't need to connect the power supply wiring to the power connectors on the backplane (step 1 in Section 3.1.1).

Step 2: Pull up the module locks on the upper case of one APAX-5343E. Then you can separate the upper case of APAX-5343E from its backplane.

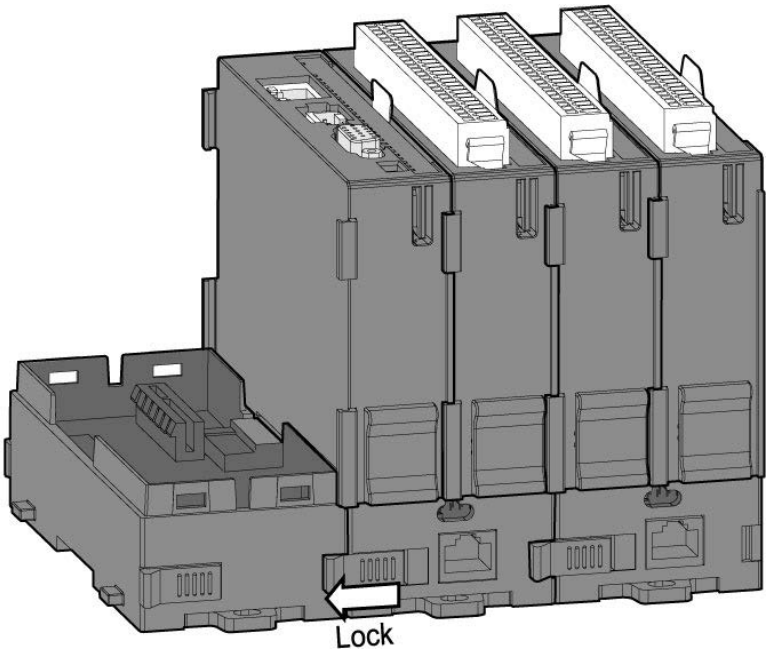




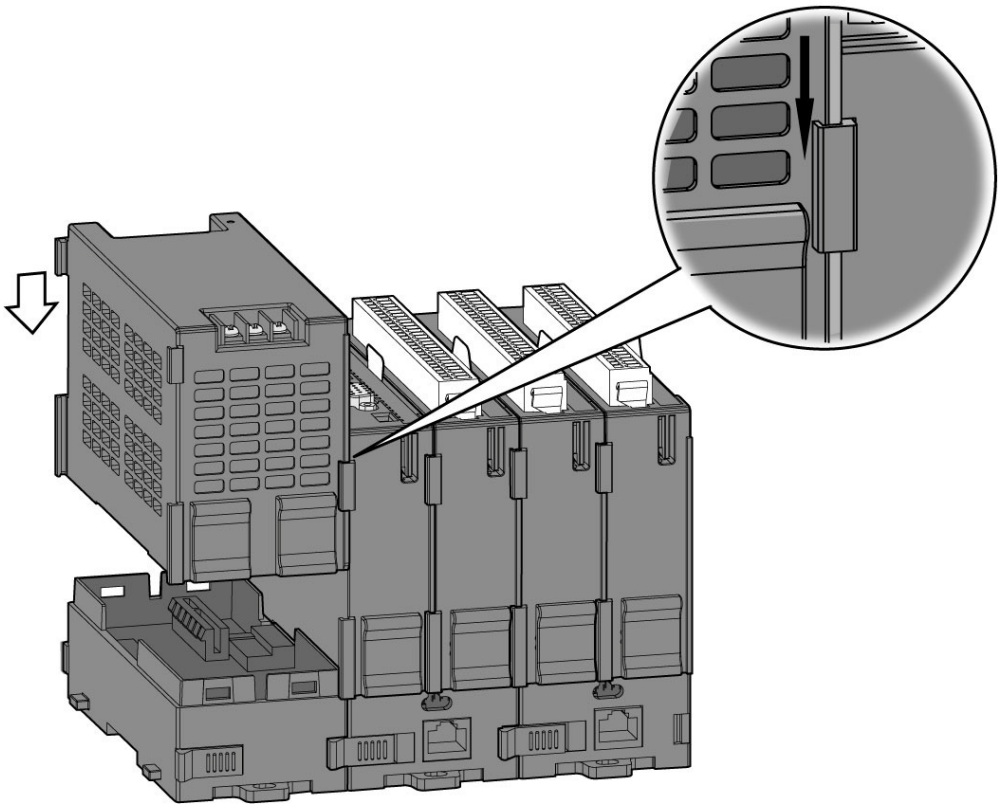
Step 3: Stack the backplane of APAX-5343E to the left side of the first APAX-5002 backplane in the system.



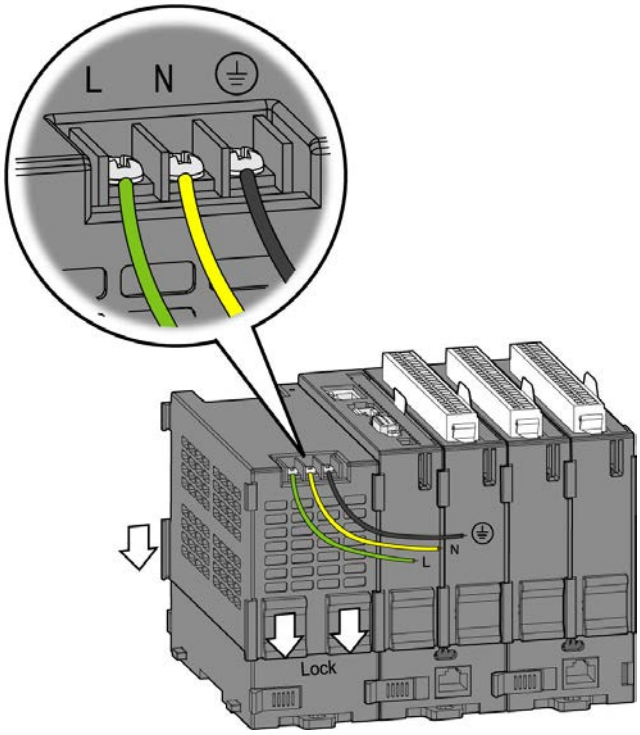
Step 4: Lock the stacked APAX-5343E backplane to the APAX-5002 backplane by the backplane locks on the APAX-5002 backplane.



Step 5: Insert the upper case of APAX-5343E back on its backplane. Use tongue-and-groove slots to move the upper case.



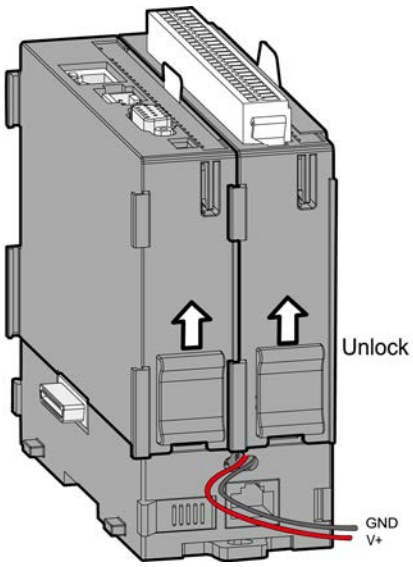
Step 6: Lock the upper case of APAX-5343E to its backplane by pulling down the module locks on the upper case. Connect AC power code to the power connectors on the upper case of APAX-5343E. Then the whole system is powered-on.



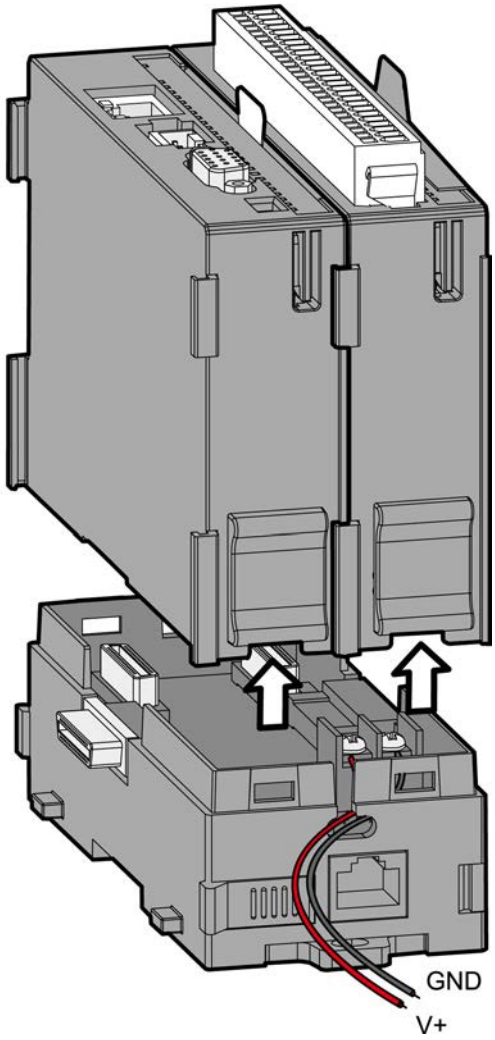
3.2 Decommissioning and Disposal

APAX-5522PE supports hot-swap functionality. It means APAX-5522PE can be removed from the backplane or inserted on the backplane when the complete system is power-on. This helps saving maintenance effort and cost. The hot-swap functionality is implemented by the module locks. Please follow the procedure below:

Step 1: Pull up the two module locks on side of APAX-5522PE.



Step 2: Detach APAX-5522PE from the backplane.



Repeat Steps 1 ~ 2 for the APAX-5000 I/O modules disassembly.

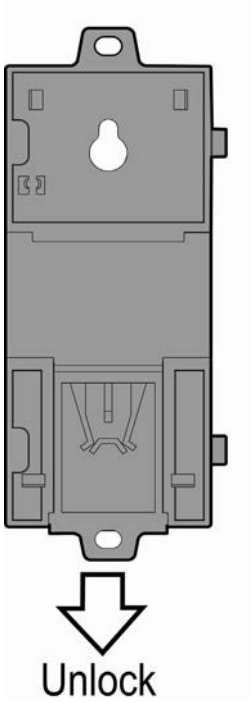
The device must be fully dismantled in order to dispose of it. Electronic parts must be disposed of in accordance with national electronics scrap regulations.

3.3 Mounting

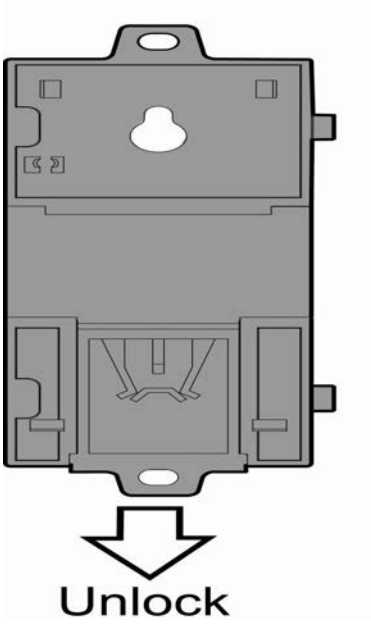
3.3.1 DIN-rail Mounting

APAX-5522PE module can be mounted through backplane to the following DIN rails: 35 x 7.5 mm or 35 x 15 mm. Below are the procedures for the DIN-rail mounting.

Step 1: Pull down the DIN-rail lock at the back of APAX-5002 backplane.



Step 2: Attach the APAX-5002 backplane on the DIN rail.

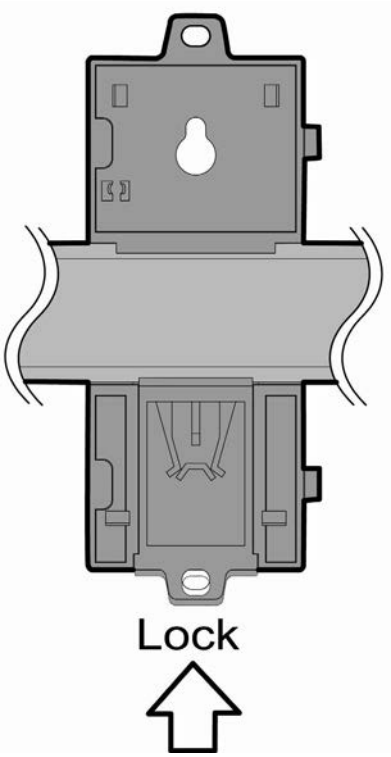


Step 3: Repeat Step 1 ~ Step 2 until necessary APAX-5002 backplanes are all attached on the DIN rail.

Note! *When the total number of APAX-5522PE and APAX-5000 I/O modules is odd, you can use APAX-5001 (1-slot backplane) as the last backplane in the system. And the procedure to attach APAX-5001 on the DIN rail is similar as APAX-5002*

Step 4: Move all backplanes to stack them together. Then slide the backplane locks on the backplanes to fasten all backplanes. (Similar to Step 6 and Step 7 in section 3.1.1)

Step 5: Slide the DIN-rail lock of all backplanes into the position, to fix all backplanes to the DIN rail.



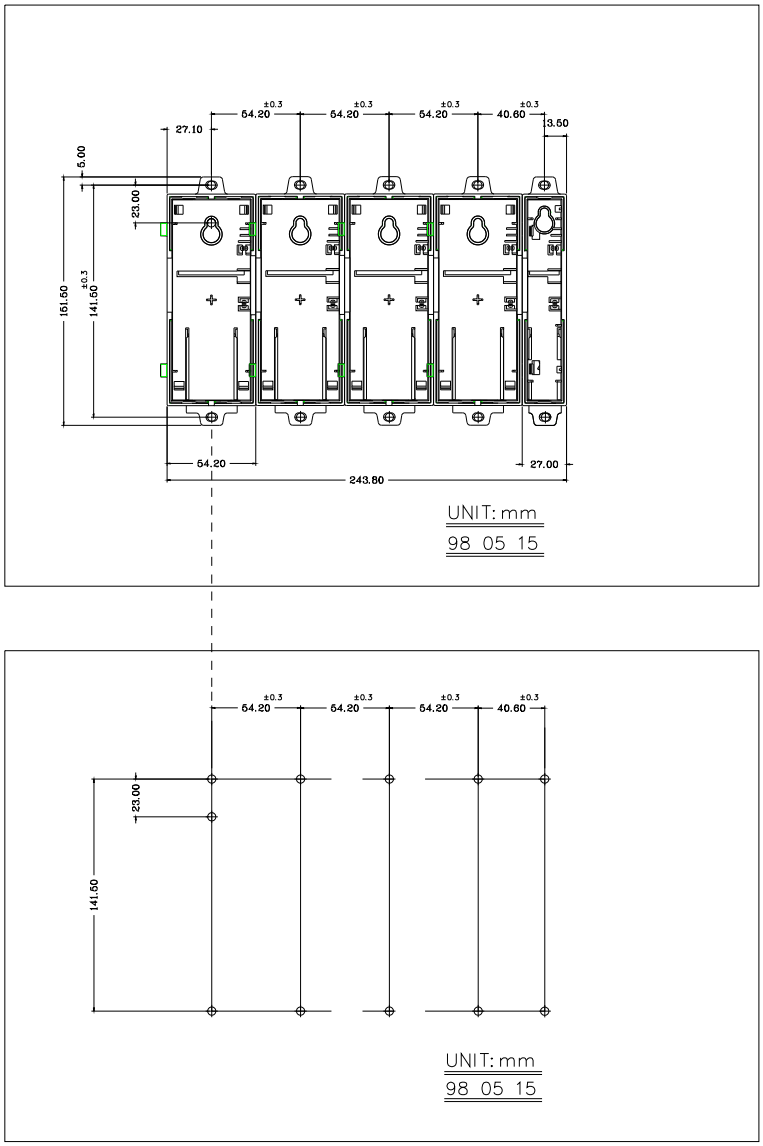
Step 6: Insert the APAX-5522PE module and all necessary APAX-5000 I/O modules to the backplanes. (Similar to Step 2, Step 4 and Step 8 in section 3.1.1)

Step 7: Slide the module lock of the APAX-5522PE module and all necessary APAX-5000 I/O modules into the position, to fix these modules to related backplanes. (Similar to Step 3, Step 5 and Step 9 in section 3.1.1)

Note! *If the total number of APAX-5000 module is odd, you can use the APAX-5001 as the last backplane. All the mounting procedure is similar to APAX-5002 mounting.*

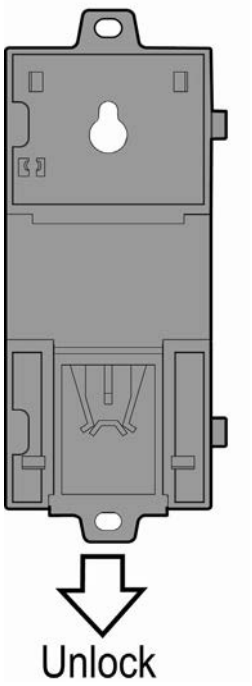
3.3.2 Wall (Panel) Mounting

Mount the APAX-5522PE module to a wall (panel) through backplane using two screws per module. Use M4 or #8 panhead screws. Refer to figure below for the dimensional template:

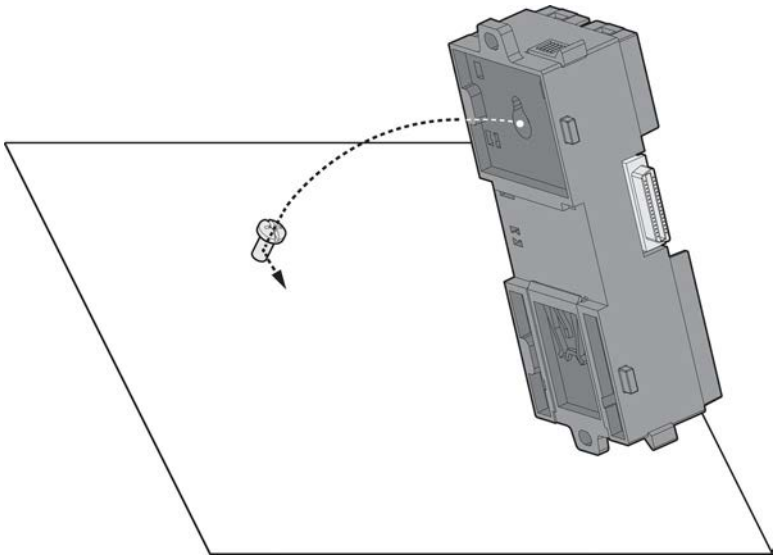


Below are the procedures for the wall (panel) mounting.

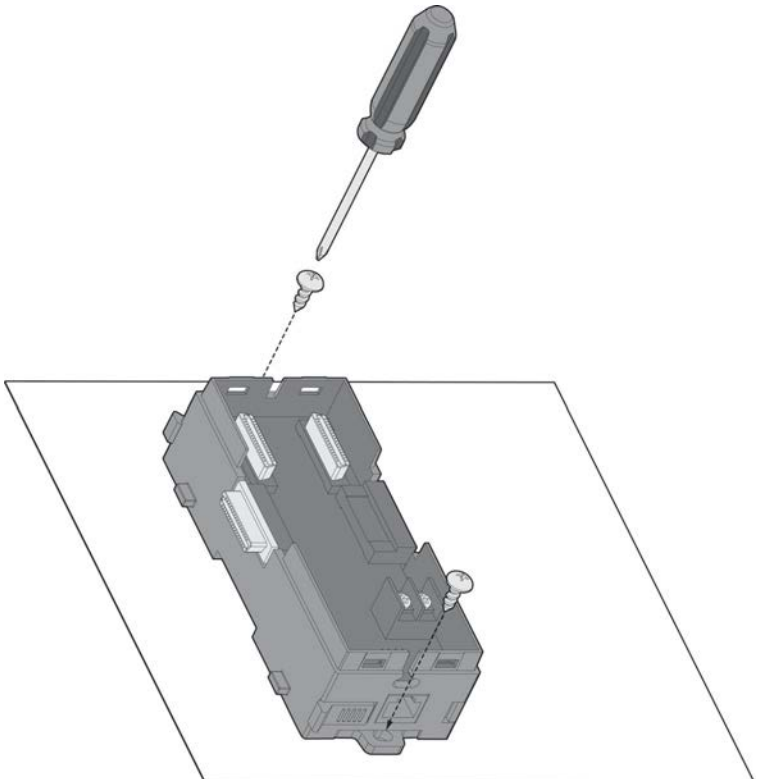
Step 1: Pull down the DIN-rail lock at the back of the first APAX-5002 backplane.



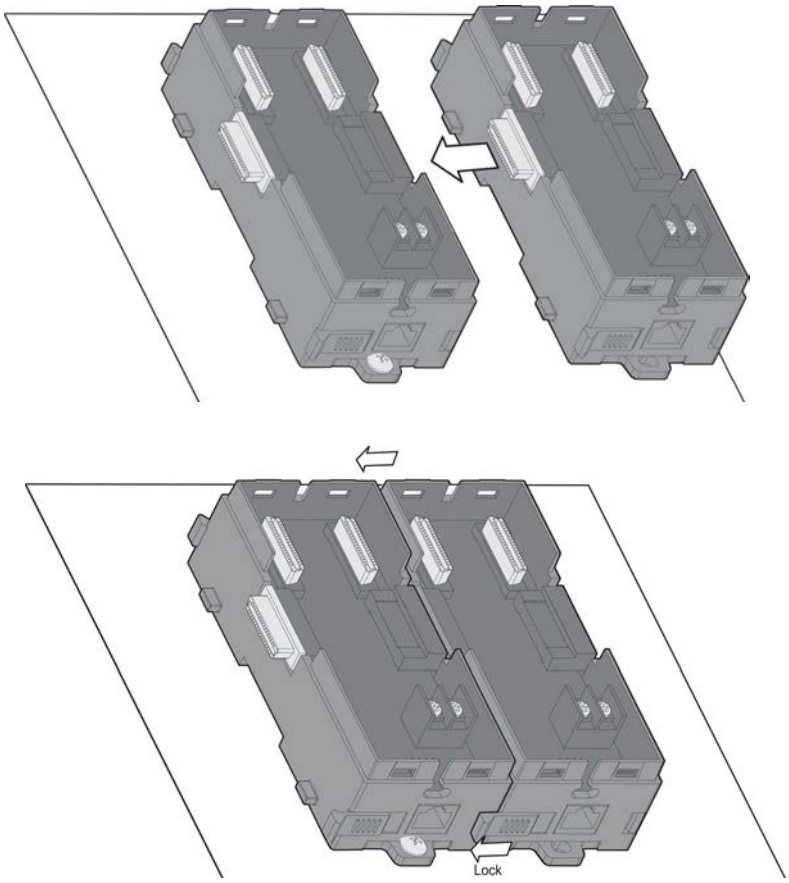
Step 2: Hang the APAX-5002 backplane onto the screw on the wall (panel). The screw for APAX-5002 to hang should be special-designed. We have provided it in accessory.



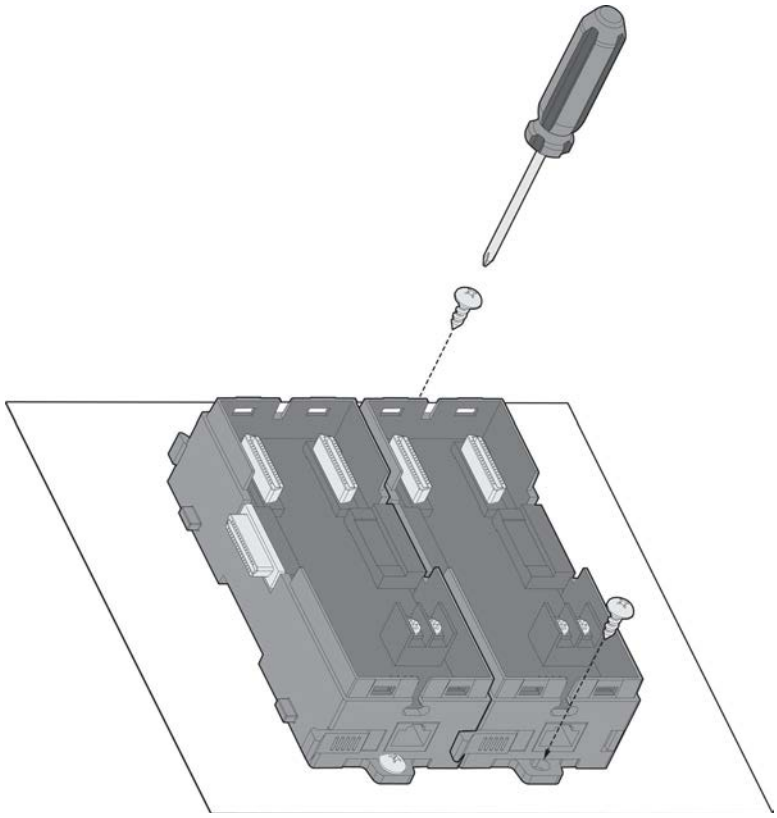
Step 3: Mount the first APAX-5002 backplane to the wall (panel) using two standard M4 or #8 panhead screws. We also provide the two screws in accessory.



Step 4: Stack Another APAX-5002 backplane to original backplane. Lock the back-plane together.

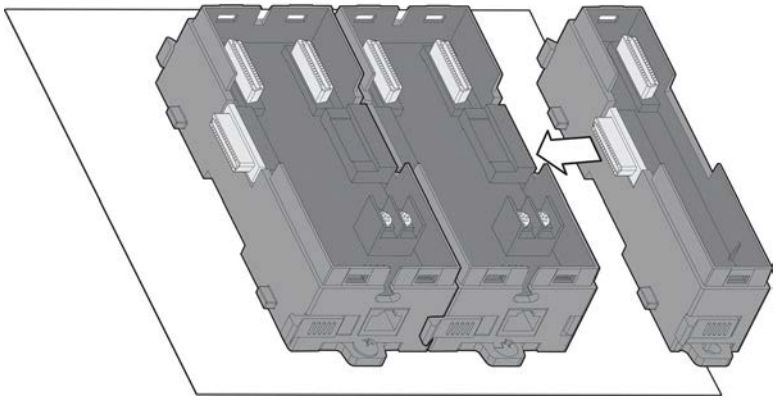


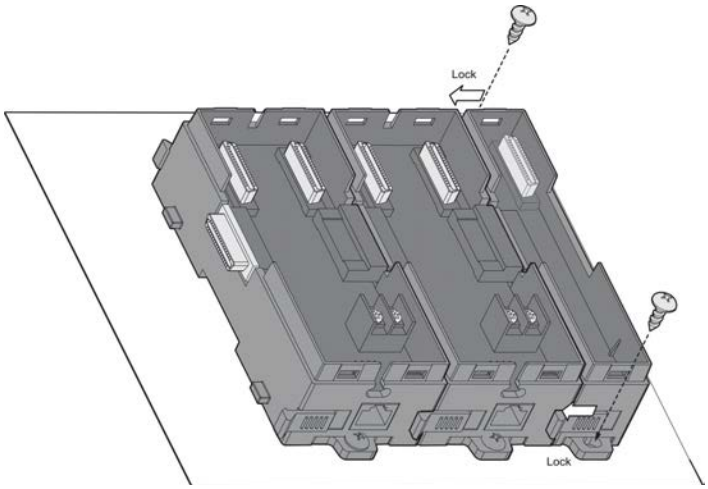
Step 5: Mount that APAX-5002 backplane to the wall (panel) using two standard M4 or #8 panhead screws.



Step 6: Repeat Step 4 ~ Step 5 until all necessary APAX-5002 backplane are screwed on the wall (panel).

Note! *When the total number of APAX-5522PE and APAX-5000 I/O modules is odd, you can use APAX-5001 (1-slot backplane) as the last backplane in the system. The procedure to screw APAX-5001 on the wall (panel) is similar as APAX-5002.*

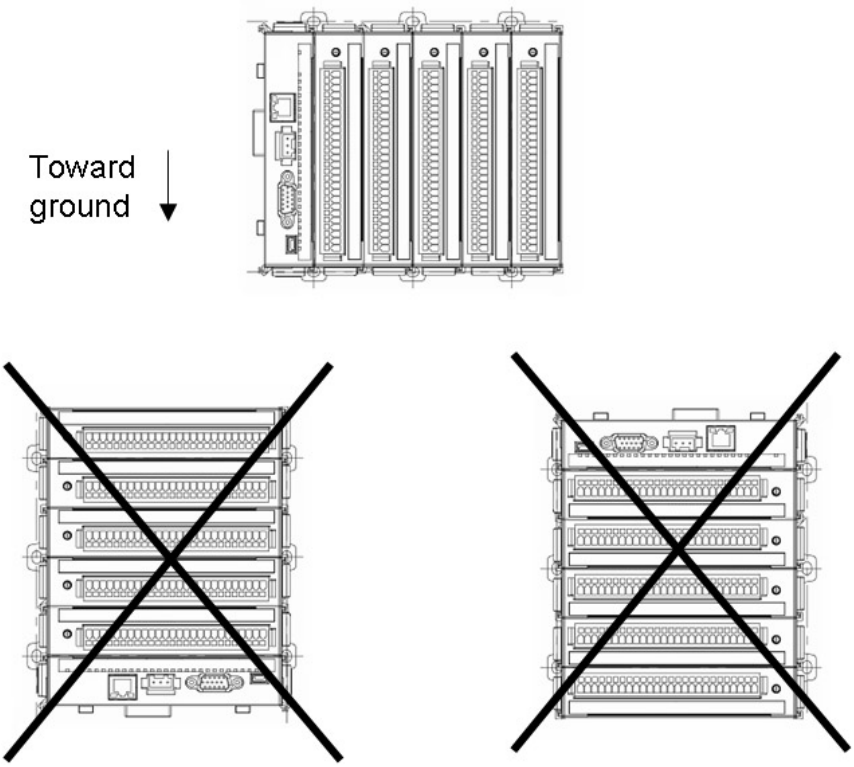




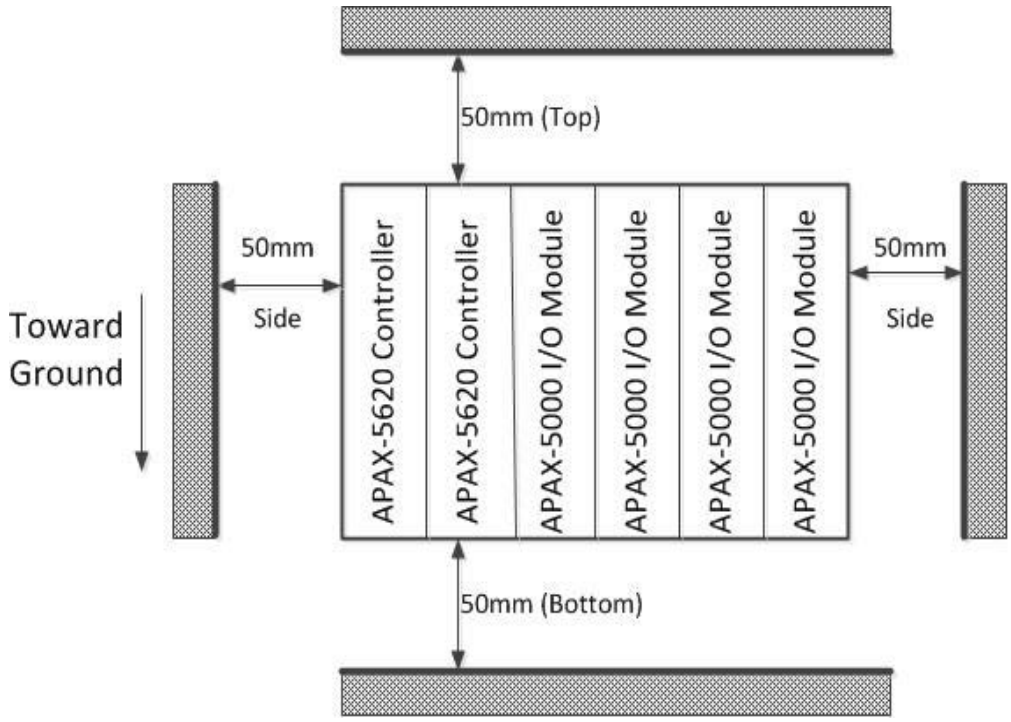
Step 7: Insert APAX-5522PE and all necessary APAX-5000 I/O modules to the back-planes. (Similar to Step 2, Step 4 and Step 8 in section 3.1.1)

Step 8: Lock APAX-5522PE and all necessary APAX-5000 I/O module to the back-plane by pull down the buckle. (Similar to Step 3, Step 5 and Step 9 in section 3.1.1)

Warning! *APAX-5522PE will generate a significant heat, which is dissipated via a passive ventilation system. This system requires the unit to be mounted correctly. In order to have better ventilation, no matter DIN-rail or wall mounting is adopt, remember to locate APAX-5522PE at the first slot on the first backplane. Besides, APAX-5522PE and all APAX-5000 I/O modules should be placed vertically. (Refer to figure below)*



We suggest remaining enough clearance space from enclosure walls and adjacent equipments. No closer than 50 mm (2 in.) apart on all sides, as shown below. This provide ventilation and makes assembly more easily.



Chapter 4

Error Handling and Diagnostics

4.1 Error Handling and Diagnostics

There are four LED for diagnostics on the front panel of APAX-5522PE. Below are the meanings for the 4 LEDs:

- PWR: When the APAX-5522PE is powered, this LED will be lit (Green)
- RUN: Programmer can use software to define when this LED is lit. (Green)
- ERR: Programmer can use software to define when this LED is lit. (Orange)
- BAT: When the battery is out of power, this LED will be lit (Orange). Once this LED is lit, you need to change the battery. Refer to Section 1.3.1 for how to change the battery.

Note! *For APAX-5522PEKW, If you download KW program to it and select to run the program, the RUN LED will flash to notice the program is running.*