



PRT-RCU

Protege Room Controller

Installation Manual



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Contents

Introduction	5
Installation Requirements	6
Mounting	7
Removal	7
Grounding Requirements	8
Safety Grounding	8
Earth Ground Connection	8
Power Supply	9
Backup Battery	9
DC Power Supply	11
Auxiliary Outputs	11
Communications	12
RS-485	12
Encrypted Module Network	12
Module Wiring	13
End of Line (EOL) Resistors	13
Ethernet 10/100 Network Interface	13
USB Type-A	14
Inputs and Outputs	15
Digital Inputs	15
Trouble Inputs	15
Relay Outputs	16
Analog Inputs/Outputs	17
Hardware Configuration	20
Configuring a Controller via the Web Interface	20
Setting the IP Address from a Keypad	20
Temporarily Defaulting the IP Address	20
Defaulting a Room Controller	21
LED Indicators	23
Power Indicator	23
Status Indicator	23
Sync Indicator	23
Mechanical Diagram	24
Mechanical Layout	25

Technical Specifications	26
FCC Compliance Statements	28
Industry Canada Statement	29

Introduction

The Protege Room Controller combines all of the power of the Protege GX system with onboard hardware optimized for building automation. It is designed to connect to the Protege 5" Touchscreen, which provides a user-friendly interface for users to monitor and control heating and cooling, fans and other aspects of their homes and businesses.

Current features of the Protege Room Controller include:

- Temperature and fan control using a 2- or 4-pipe vertical fan coil system, air conditioner or heat pump
- Accepts AC or DC power supply with battery backup
- 8 digital inputs
- 2 relay outputs
- 2 analog inputs and 4 analog universal inputs/outputs
- All analog points support 0-10V, 4-20mA and NTC temperature input
- Multiple comm interfaces for connecting to a range of equipment: 3 RS-485, 2 USB-A and 1 ethernet interface
- Offers all of the powerful access control, intruder detection and integration features of a standard Protege GX controller through expander modules

Installation Requirements

This equipment is to be installed in accordance with:

- The product installation instructions
- The Local Authority Having Jurisdiction (AHJ)

Mounting

Protege DIN rail modules are designed to mount on standard DIN rail either in dedicated DIN cabinets or on generic DIN rail mounting strip.

When installing a DIN rail module, ensure that there is adequate clearance around all sides of the device and that air flow to the vents of the unit is not restricted. It is recommended that you install the module in a location that will facilitate easy access for wiring. It is also recommended that the module is installed in an electrical room, communication equipment room, secure cabinet, or in an accessible area of the ceiling.

1. Position the DIN rail module with the labeling in the correct orientation.
2. Hook the mounting tabs (opposite the tab clip) under the edge of the DIN rail.
3. Push the DIN rail module against the mount until the tab clips over the rail.

Removal

A Protege DIN rail module can be removed from the DIN rail mount using the following steps:

1. Insert a flat blade screwdriver into the hole in the module tab clip.
2. Lever the tab outwards and rotate the unit off the DIN rail mount.

Grounding Requirements

An effectively grounded product is one that is intentionally connected to earth ground through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent elevated voltages which may result in undue hazard to connected equipment or to persons.

Grounding of the Protege system is done for three basic reasons:

1. Safety
2. Component protection
3. Noise reduction

Safety Grounding

The object of safety grounding is to ensure that all metalwork is at the same ground (or earth) potential. Impedance between the Protege system and the building scheme ground must conform to the requirements of national and local industrial safety regulations or electrical codes. These will vary based on country, type of distribution system and other factors. The integrity of all ground connections should be checked periodically.

General safety dictates that all metal parts are connected to earth with separate copper wire or wires of the appropriate gauge.

Earth Ground Connection

The DIN rail enclosure and the DIN rail modules must be grounded to a suitable single-point earth ground connection in the installation. A minimum 14AWG solid copper wire (or thicker, in accordance with local authorities) shall be used from the Protege system's earth connection points.

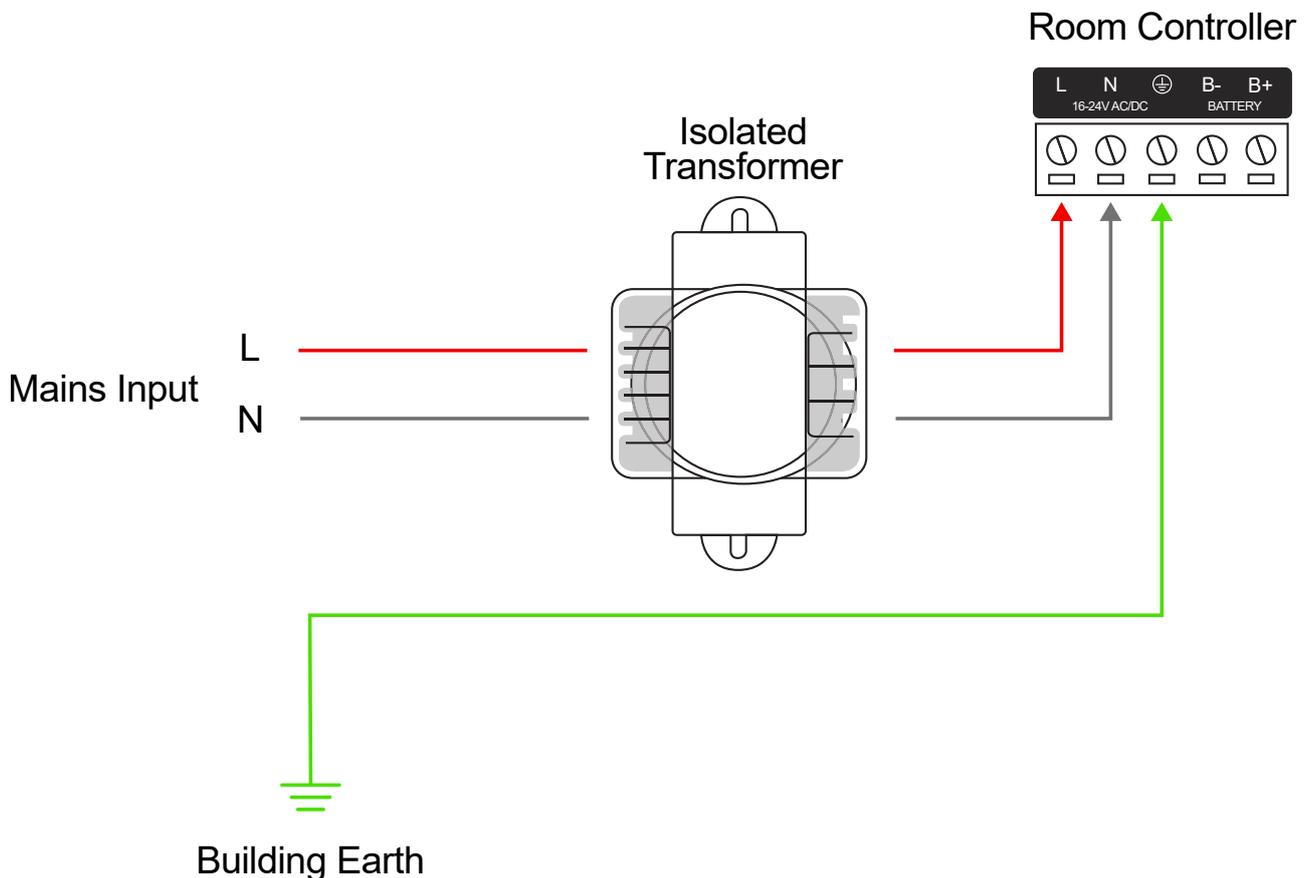
The DIN rail enclosure includes an earth ground single-point link connection via the metallic enclosure. This single-point link is the Protege system's earth ground. All modules that have earth ground connections and that are installed in the same enclosure shall be connected to this single point. A single-point earth ground connection avoids the creation of ground loops in the system and provides a single reference point to earth ground.

There must be only **one** single earth grounding point per system.

Power Supply

Typically the room controller is supplied with 12-24V RMS from the mains supply via a minimum 30VA isolated transformer. A minimum of 12V RMS must be supplied to run the room controller. The room controller draws a maximum of 2A.

The room controller should be supplied by a dedicated electrical power source rated for a minimum 5 amp load and have a dedicated circuit breaker.



Warning:

- This installation should be made by qualified service personnel and should conform to all local codes.
- Termination of wiring to the room controller while power is applied or the battery is connected may cause serious damage to the room controller and will **VOID ALL WARRANTIES OR GUARANTEES**. Power the unit only after all wiring is completed.
- Extra care must be taken when wiring the AC inputs. Improper connection will cause permanent damage to the room controller.

Backup Battery

A backup battery should be connected directly to the room controller to provide a continuous source of power in the event of a power outage. The battery also plays an important role in power conditioning for the system.

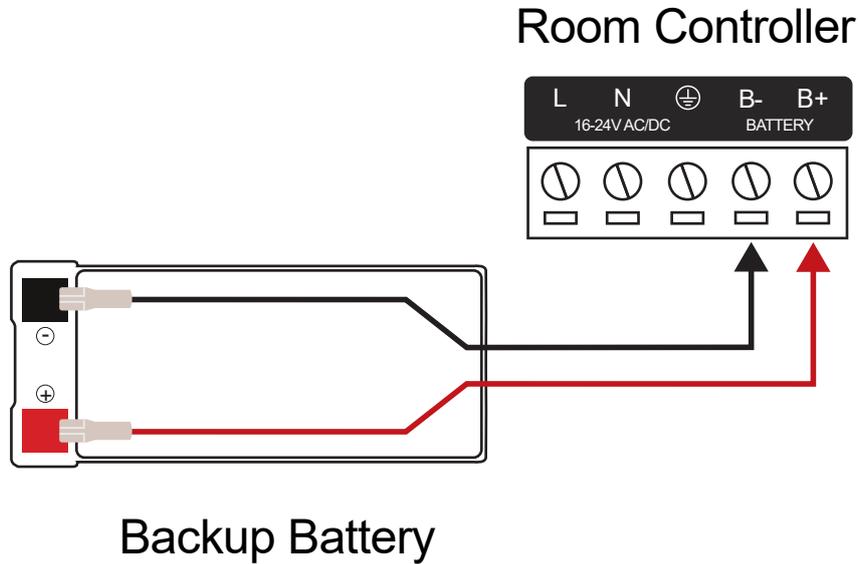
The battery must be a standard lead acid backup battery that can supply at least 12V DC with a minimum capacity of 7Ah. If more capacity is needed, it is recommended to use a single larger battery instead of connecting multiple batteries in parallel, as this can reduce the lifespan of the batteries.

When a battery is connected to the system, the room controller charges it at 400mA.

From the accessory bag provided with the battery:

1. Connect the **red** and **black** battery termination wires to the B+ and B- plugs.
2. Connect the spade terminals to the battery as shown below.

Connection of the battery in reverse will not damage the room controller, but will cause the battery circuit to disconnect until correct connection is made.

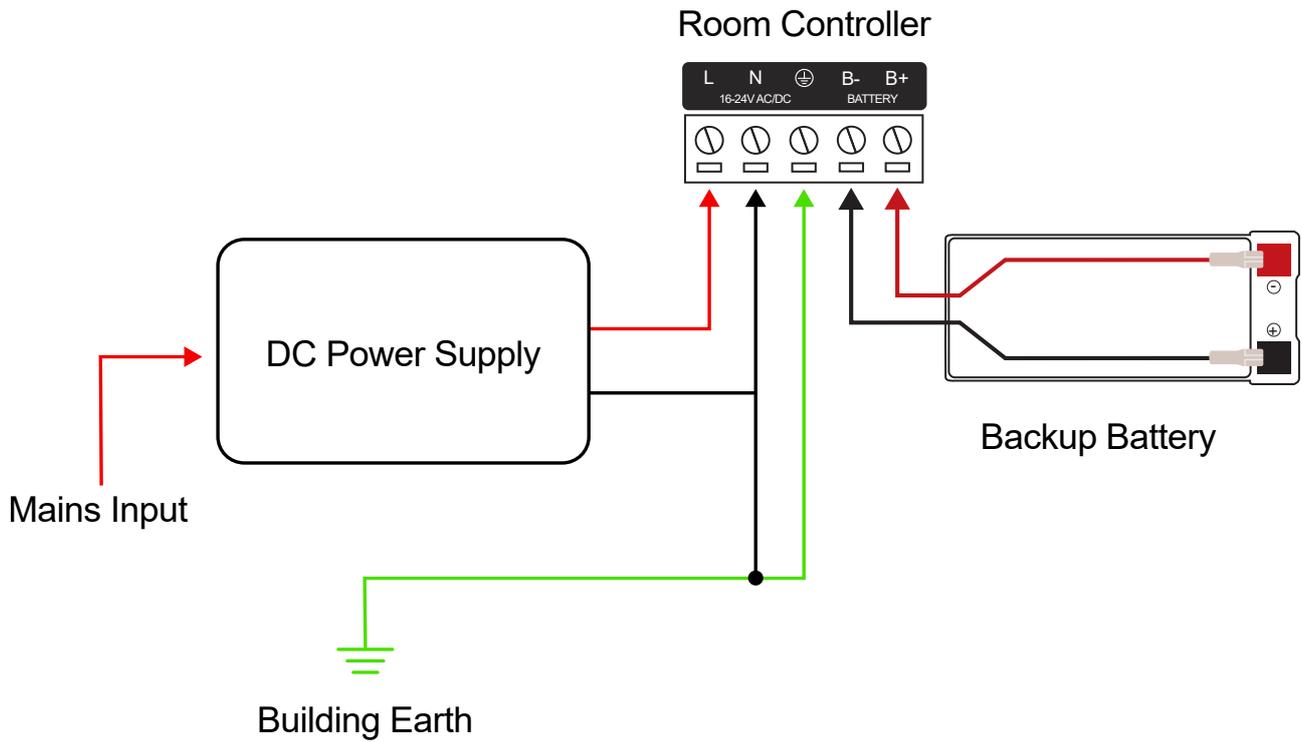


Warning:

- Only attach standard lead acid batteries.
- Do not connect the battery wires or B+ and B- plugs of the module to any other ancillary device (siren, lock, mag clamp, etc.).
- An incorrect connection may cause erroneous faults or serious damage to the module and will **VOID ALL WARRANTIES OR GUARANTEES.**

DC Power Supply

The room controller can also be supplied by a 16-30V DC input at a maximum of 2A.



Auxiliary Outputs

The room controller provides two sets of 12V DC auxiliary outputs (V+ and V-).

These are connected via electronic fuse to a voltage regulator that is supplied by the input terminals (L and N). The power supplied by the auxiliary outputs should be included in the total current consumption of the room controller unit.

The electronic fuse provides defense against overloads, short-circuits, voltage surges and excessive inrush current. The auxiliary outputs also provide reverse polarity protection so that connecting them in reverse does not damage the unit.

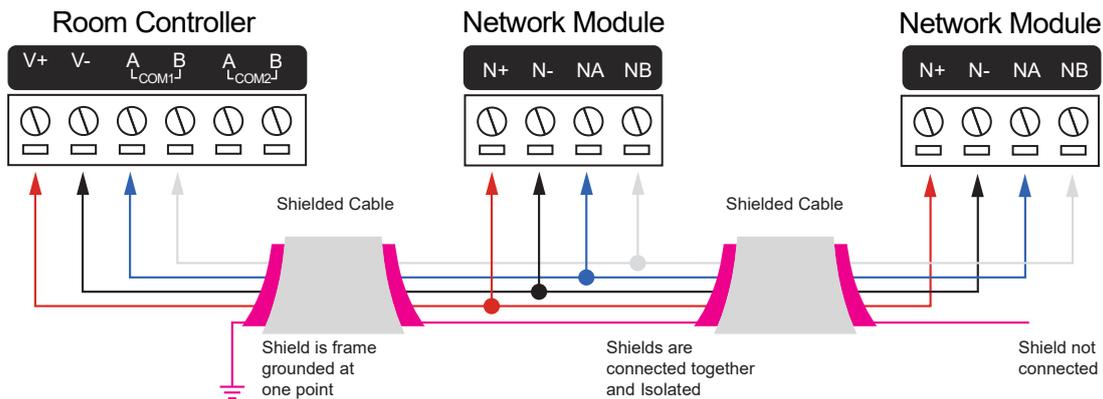
Communications

RS-485

The controller provides three RS-485 ports for connecting Protege and third-party devices. Port 1 is used to connect the Protege encrypted RS-485 module network. Ports 2 and 3 are available for connecting additional automation hardware that the controller is compatible with.

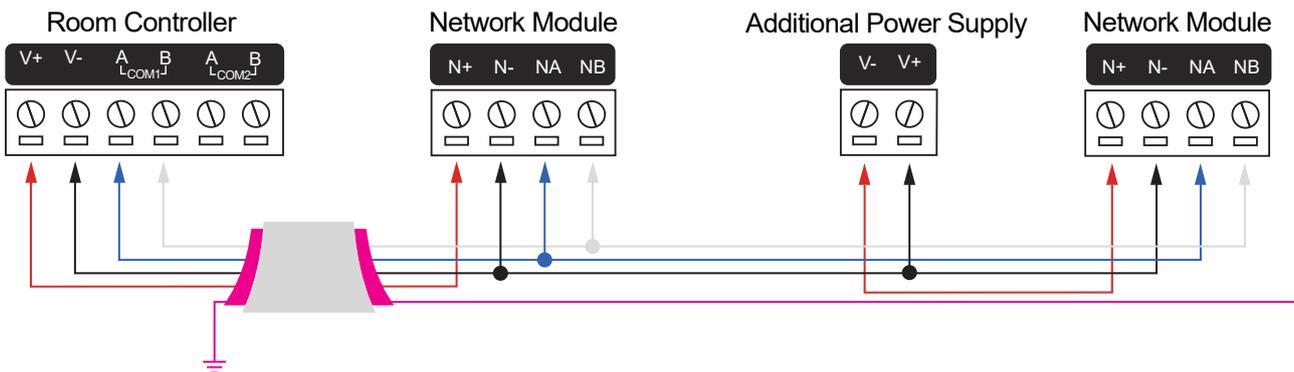
Encrypted Module Network

Connect the Protege encrypted RS-485 module network to the COM1 port on the room controller as shown below:



If a shielded cable is used, the shield must be connected at only one end of the cable. **DO NOT** connect a shield at both ends.

The V+ and V- ports supply 12V DC to power the connected expander modules. Ensure that the room controller is capable of supplying the peak current drawn by all modules. If more power is required, an additional 12V DC power supply (such as PRT-PSU-DIN-4A) may be inserted into the encrypted module network where needed.



When using multiple power supplies it is important to ensure that all ground connections (V-) are connected between all power supplies and that no power connections (V+) are connected between any power supplies. Connections from more than one 12V supply may cause failure or damage to the unit or the device supplying network power.

Module Wiring

The recommended module network wiring specifications are:

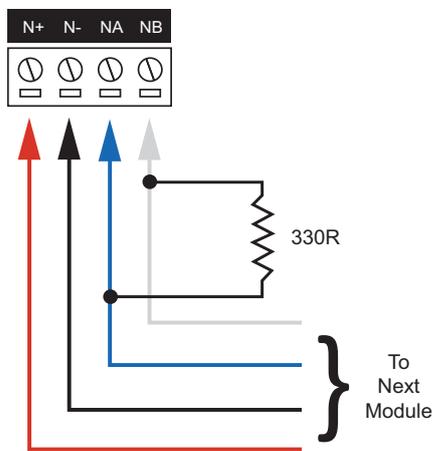
- Minimum 24AWG (0.51mm) shielded twisted pair with characteristic impedance of 120 ohm
- Maximum total length of cable is 900m (3000ft)
- CAT5e / CAT6 are also supported for data transmission when using ground in the same cable (to a maximum length of 100m (328ft))

Warning: Unused wires in the cable must not be used to carry power to other devices.

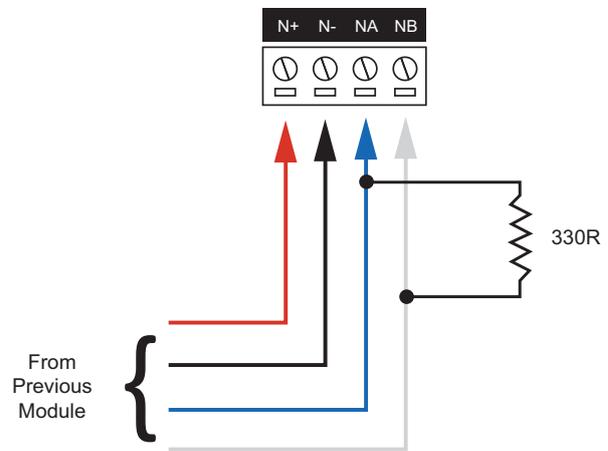
End of Line (EOL) Resistors

The 330 ohm EOL (End of Line) resistor provided in the accessory bag **must** be inserted between the NA and NB terminals of the **first** and **last** modules on the RS-485 network. These are the modules physically located at the ends of the RS-485 network cabling.

First Module on RS-485 Network



Last Module on RS-485 Network



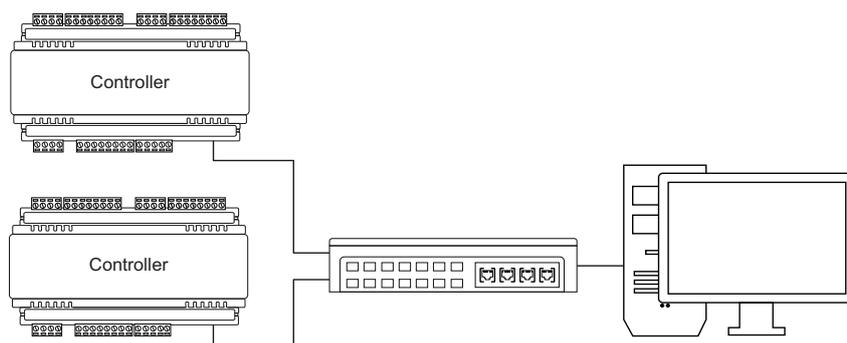
Ethernet 10/100 Network Interface

The communication between the Protege system and the controller uses a 10/100 ethernet network operating the TCP/IP protocol suite. The IP address of the controller can be configured using an LCD keypad terminal or via the built-in web interface. The default IP address is set to a static address of 192.168.1.2 with a subnet mask of 255.255.255.0. These IP address settings are commonly used for internal networks.

Installing the module on an active network requires knowledge of the configuration and structure for the network. Always consult the network or system administrator and ask them to provide you with a fixed IP address that can be assigned to the module.

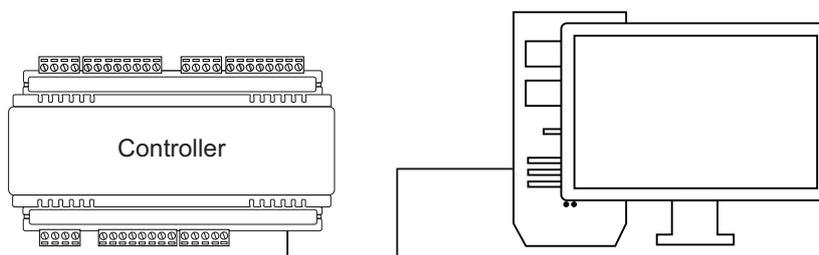
When installing an ethernet connection the module should be interfaced using a standard segment (<100m in length) and should be connected to a suitable ethernet hub or switch:

Ethernet 10/100 Switch Hub Connection



Temporary direct connections can be used for onsite programming by using a standard ethernet cable.

Ethernet 10/100 Direct Connection



The LED indicator on the ethernet port indicates the ethernet communication status:

- **Solid Green:** Link established
- **Blinking Yellow:** Data transfer

USB Type-A

The room controller provides two Type-A USB ports. Either port may be used to connect additional hardware that the controller is compatible with.

A Protege DIN Rail Cellular Modem (PRT-4G-USB) may be connected to USB1 using a USB-A to USB-C cable. This enables the room controller to receive programming downloads and manual commands, send events and report alarms without a wired ethernet connection.

For more information, see the Protege DIN Rail Cellular Modem Installation Manual.

Inputs and Outputs

Digital Inputs

The room controller provides 8 digital inputs for monitoring the state of devices. These accept an input voltage of:

- **AC:** 5-28V RMS
- **DC:** 5-30V DC

The input sink current is 6mA maximum.

There are four isolated groups of inputs, allowing you to isolate different AC/DC signals in a system. The following table shows which digital inputs use each common:

Common	Digital Inputs
C1	DI1
C2	DI2
C (left)	DI3 DI4 DI5
C (right)	DI6 DI7 DI8

Connecting an input to the incorrect common may cause damage to the module.

Devices connected to the inputs can be installed to a maximum distance of 300m (1000ft) from the module when using 22 AWG wire.

Digital inputs are programmed as controller inputs CP1:1 to 8 in Protege GX. Each one can be configured for normally closed or normally open operation.

Trouble Inputs

The room controller has up to 64 trouble inputs for monitoring and reporting on trouble conditions.

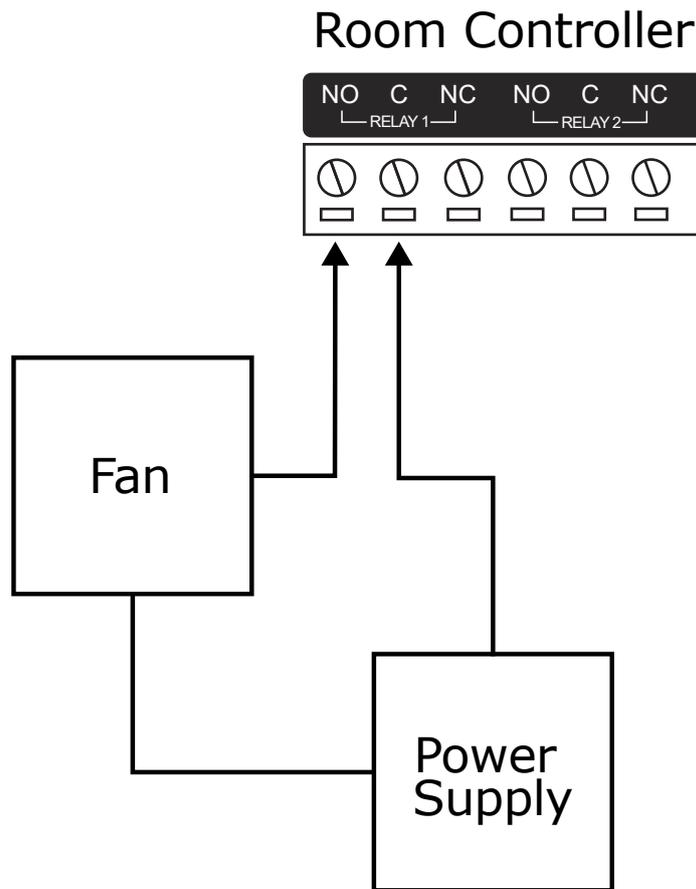
Input Number	Description	Default Trouble Group	Default Trouble Group Option
CP001:01	Reserved	-	-
CP001:02	Power Supply Failure	General	AC Failure
CP001:03	Reserved	-	-
CP001:04	Real Time Clock Not Set	General	RTC/Clock Loss
CP001:05	Service Report Test	-	-
CP001:06	Service Report Failure to Communicate	General	Reporting Failure
CP001:07	Reserved	-	-
CP001:08	Auxiliary Failure	General	Power Fault

Input Number	Description	Default Trouble Group	Default Trouble Group Option
CP001:09	Reserved	-	-
CP001:10	Reserved	-	-
CP001:11	Reserved	-	-
CP001:12	Reserved	-	-
CP001:13	Module Communication	System	Module Loss
CP001:14	Module Network Security	System	Module Security
CP001:15	Reserved	-	-
CP001:16	Reserved	-	-
CP001:17	Reserved	-	-
CP001:18	Reserved	-	-
CP001:19	Reserved	-	-
CP001:20	Report IP Reporting Failure	System	Hardware Fault
CP001:21	Reserved	-	-
CP001:22	Modbus Communication Fault	System	Hardware Fault
CP001:23	Protege System Remote Access	System	Hardware Fault
CP001:24	Installer Logged In	System	Hardware Fault
CP001:25	Reserved	-	-
CP001:26	Reserved	-	-
CP001:27	Reserved	-	-
CP001:28	Reserved	-	-
CP001:29	System restarted	System	Hardware Fault
CP001:30	Reserved	-	-
CP001:31	Reserved	-	-
CP001:32	Reserved	-	-
CP001:33	Controller Group Link Lost	System	Hardware Fault
CP001:64	Reserved	-	-

Relay Outputs

The room controller provides two onboard relay outputs, which are programmed as CP001:03 and CP001:04 in Protege GX. The outputs are Form C relays with normally open and normally closed contacts.

Example: Switching a fan motor on/off from Relay 1



Warning: Relay outputs can switch to a maximum capacity of 7A. Exceeding 7A will damage the output.

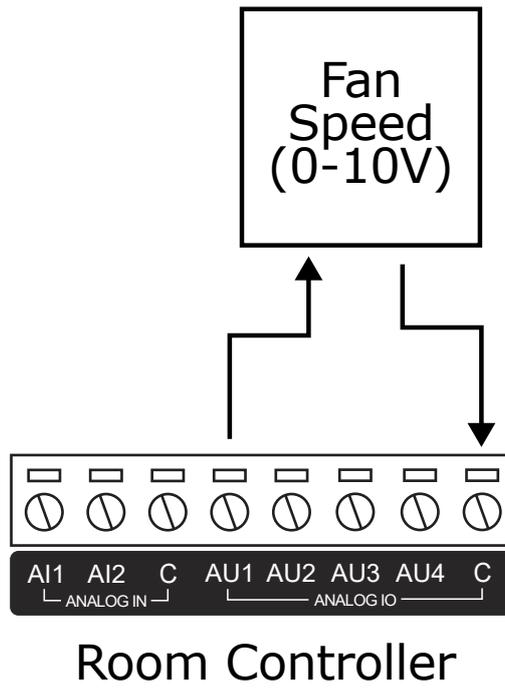
Analog Inputs/Outputs

The controller provides six analog input/outputs which can be used for monitoring and controlling automation devices. The table below shows which functions are available for each analog input/output:

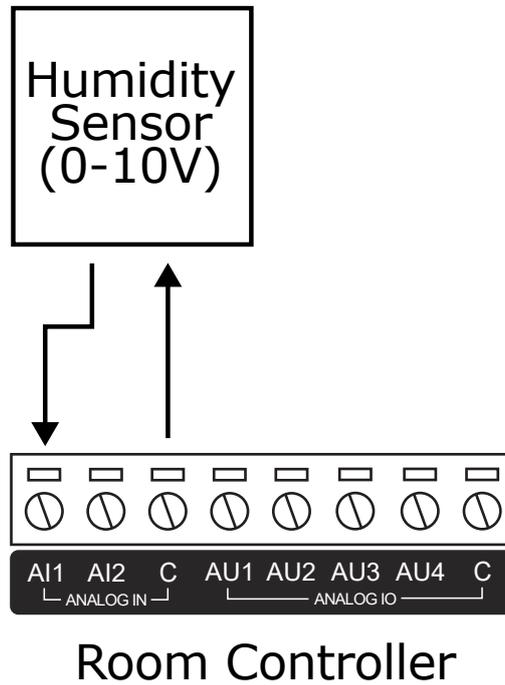
Analog Input/Output	Supported Functionality
Analog inputs: AI1, AI2	Analog Input 0-10V Analog Input 4-20mA (with a 500 Ω external resistor) NTC Temperature Input 10k Ω NTC
Analog universal: AU1, AU2, AU3, AU4	Analog Input 0-10V Analog Input 4-20mA (with a 500 Ω external resistor) NTC Temperature Input 10k Ω NTC Analog output 0-10V (source current 10mA maximum)

Devices connected to the analog inputs/outputs can be installed to a maximum distance of 300m (1000ft) from the module when using 22 AWG wire.

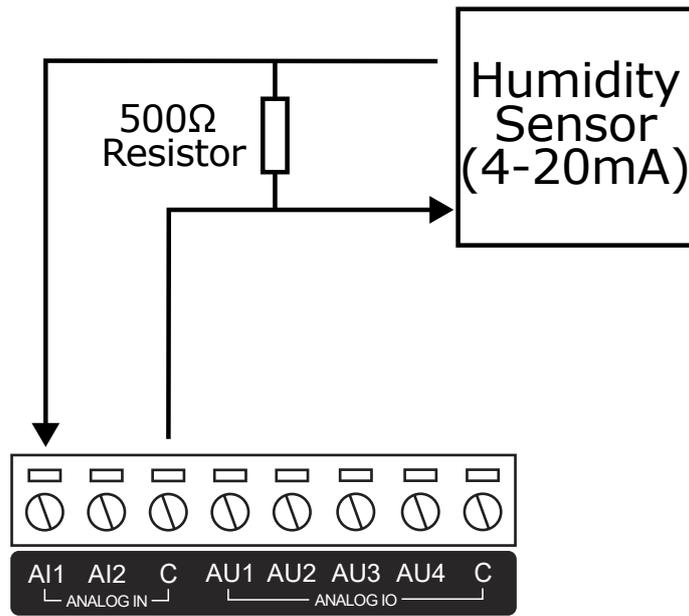
Example: Controlling the speed of a fan motor on AU1



Example: Monitoring a 0-10V humidity sensor on AI1

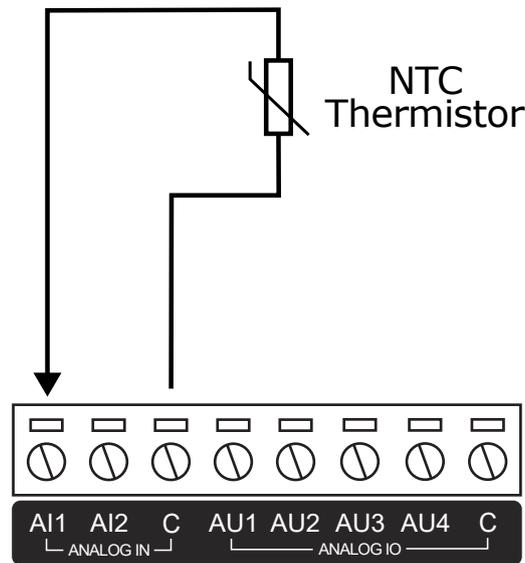


Example: Monitoring a 4-20mA humidity sensor on AI1



Room Controller

Example: Monitoring an NTC temperature sensor on AI1



Room Controller

Hardware Configuration

Configuring a Controller via the Web Interface

The controller's built-in web interface allows you to configure system communication and security settings, including login, IP address, subnet mask, gateway and DNS settings, as well as security certificates.

For information on using the controller's web interface to configure IP network and security settings, see the Protege GX Integrated System Controller Configuration Guide, available from the ICT website.

Setting the IP Address from a Keypad

If the current IP address of the controller is not known it can be viewed and changed using a Protege keypad.

1. Connect the keypad to the module network.
2. Log in to the keypad using any valid installer code. The default installer code is 000000.
If the default code has been overridden and you do not know the new codes you will need to default the controller (see [Defaulting the Controller](#) in this document) to reset the code.

Note that this will erase **all** existing programming as well as setting up the default installer code.

3. Once logged in select **Menu 4** (Install Menu) then **Menu 2** (IP Menu) and view or edit the IP address, network mask, and gateway as required.

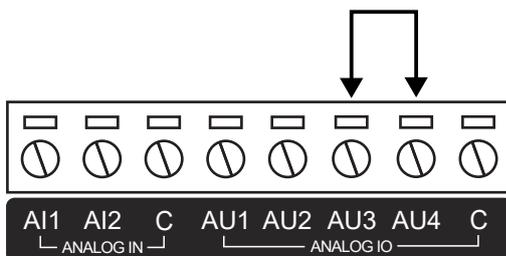
Once the settings have been changed you must save the settings by pressing the **[Arm]** key. You will be prompted to confirm the changes by pressing **[Enter]**. You must then restart the controller, either through the menu **[4], [2], [2]** or by cycling the power, for the settings to take effect.

Temporarily Defaulting the IP Address

If the currently configured IP address is unknown it can be temporarily set to 192.168.111.222 so that you can connect to the web interface to view and/or change it. This will also temporarily disable HTTPS security, which may help resolve some connection issues.

This defaults the IP address for as long as power is applied, but does not save the change permanently. Once the link is removed and power is cycled to the unit the configured IP address is used.

1. Remove power to the controller by disconnecting the AC or DC input and battery.
2. Wait until the power indicator is off.
3. Connect a wire link between **AU3** and **AU4**.



4. Power up the controller. Wait for the status indicator to begin flashing steadily.

Accessing the Controller

- When the controller starts up it will use the following temporary settings:
 - IP Address:** 192.168.111.222
 - Subnet Mask:** 255.255.255.0
 - Gateway:** 192.168.111.254
 - DHCP:** Disabled
 - Use HTTPS:** Disabled
- Connect to the controller by entering `http://192.168.111.222` into the address bar of your web browser, and view or change the IP address and other network settings as required.

Remember to change the subnet of your PC or laptop to match the subnet of the controller.

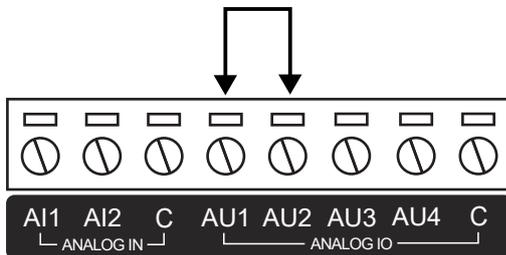
- Remove the wire link(s) and power cycle the controller again.
The controller will now use the configured network settings.

Defaulting a Room Controller

The controller can be factory defaulted, which resets all internal data and event information. This allows you to remove all programming and start afresh.

Defaulting the controller resets the IP address to the factory default IP of 192.168.1.2

- Remove power to the controller by disconnecting the AC or DC input and battery.
- Wait until the power indicator is off.
- Connect a wire link between **AU1** and **AU2**.



- Power up the controller. Wait for the status indicator to begin flashing steadily.
- Remove the wire link **before making any changes to the controller's configuration**.

The system will now be defaulted with all programming and **System Settings** returned to factory configuration, including resetting the IP address and all network configuration, and removing all operator records.

- Defaulting the controller resets the IP address to the factory default IP of 192.168.1.2.

Earlier versions of the controller firmware do not reset the IP address. If the controller is not available on 192.168.1.2 you will be able to connect to it via its previous IP address.

- Any configured system settings (e.g. **Default Gateway**, **Event Server**) are reset to their default values.
- Any custom HTTPS certificates are removed and the default certificate is reinstalled.

Earlier versions of the controller do not have a default HTTPS certificate installed. If the controller is not available via HTTPS, connect to it via HTTP.

- All operator records are removed and the admin operator must be recreated.
- All other programming is removed.

After Defaulting a Controller

Before making any changes to the controller's configuration or upgrading the firmware, **remove the wire link used to default the controller.**

After defaulting a controller a number of essential steps will need to be performed to resume normal operation. Not all of the following steps will necessarily be required, depending on your site configuration:

1. Connect to the controller's web interface using HTTPS, unless it is an older controller with no default certificate loaded, then it will connect using HTTP.
2. Recreate the admin operator and log in to the controller's web interface.

If you are not prompted to create the admin operator, the default username is admin with the password admin.

3. Reset the controller's IP address to its previous value.
4. Reconfigure any additional network settings.
5. Reinstall previously installed custom HTTPS certificates.
6. Restore any other system settings as required by your site configuration.

LED Indicators

The room controller has three LED indicators.

Power Indicator

The power indicator is lit when the correct input voltage is applied to the controller.

Note that this indicator may take several seconds to light up after power has been applied.

State	Description
On (green)	Correct input voltage applied
Off	Incorrect input voltage applied

Status Indicator

The status indicator displays the status of the controller.

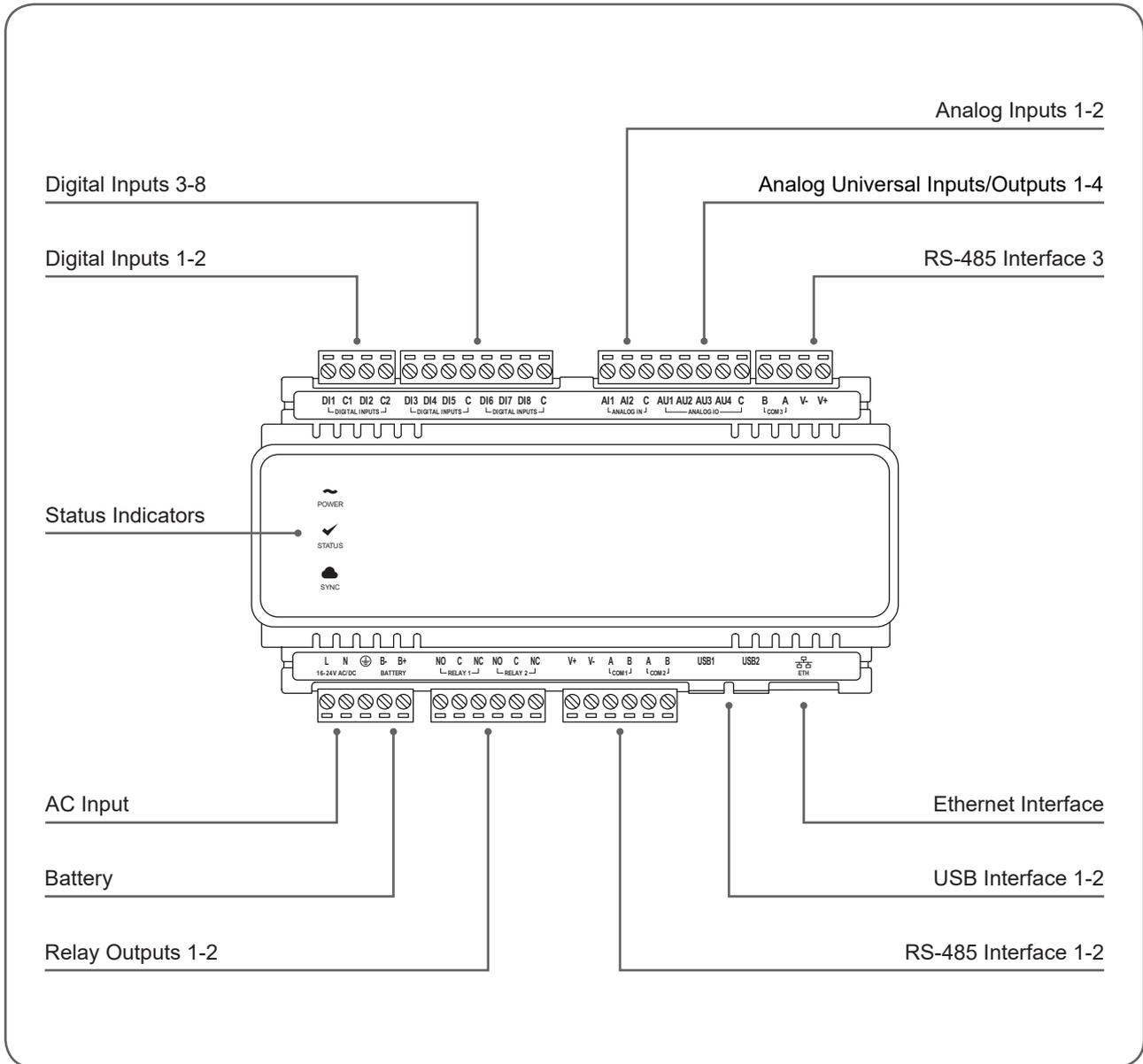
State	Description
Flashing (green) at 1 second intervals	Controller is operating normally

Sync Indicator

This indicator is currently not used.

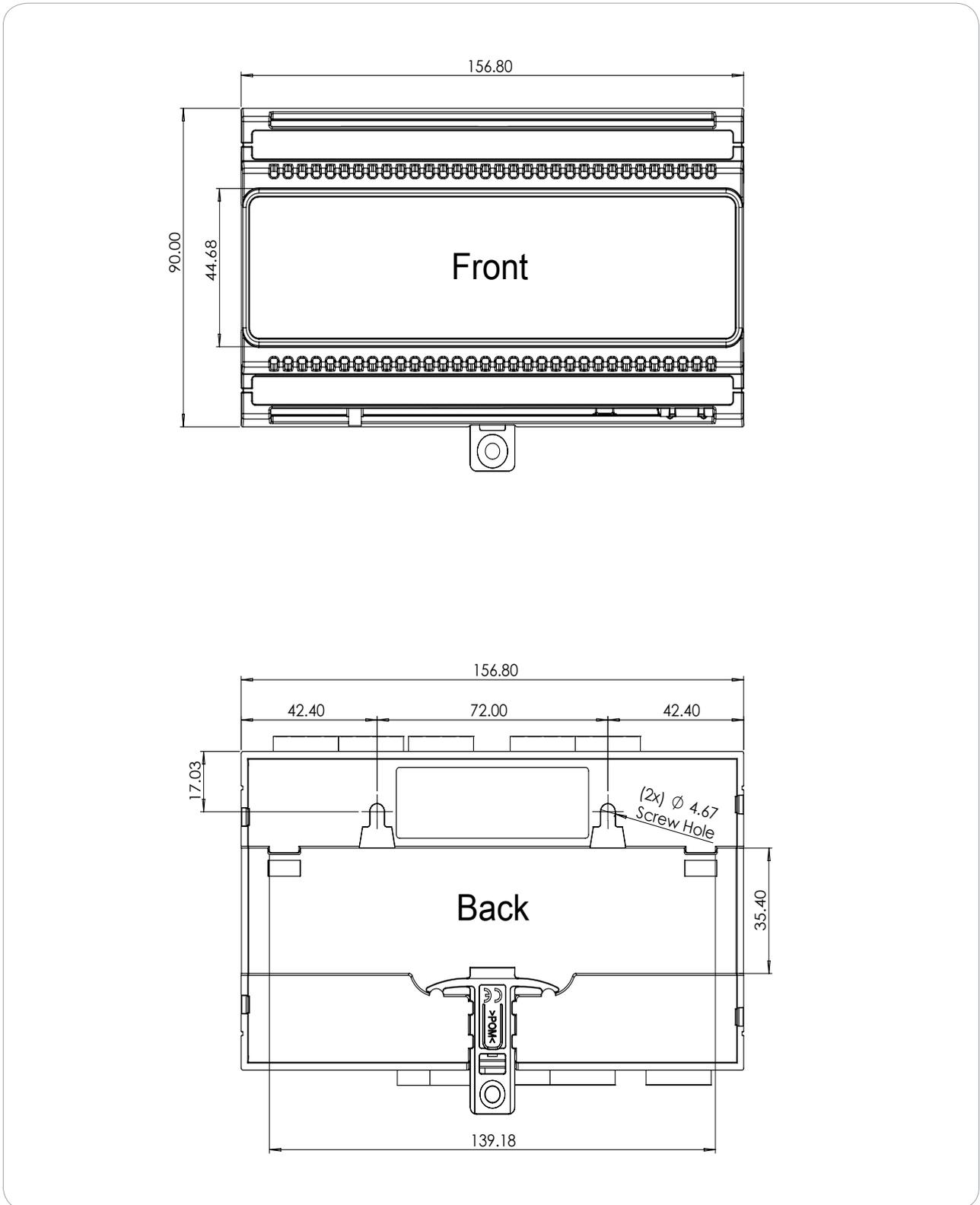
Mechanical Diagram

The mechanical diagram shown below outlines the essential details needed to help ensure the correct installation of the room controller.



Mechanical Layout

The mechanical layout below outlines the essential details needed to help ensure correct installation and mounting. All measurements are shown in millimeters.



Technical Specifications

The following specifications are important and vital to the correct operation of this product. Failure to adhere to the specifications will result in any warranty or guarantee that was provided becoming null and void.

Ordering Information	
PRT-RCU	Protege Room Controller
Power Supply	
Operating Voltage	12-24V RMS
Operating Current	0.1-2A
Undervoltage Lockout	Connection at > 11V DC Disconnection at < 9.0V DC
DC Output (Auxiliary)	10.45-13.85V DC 0.5A (typical) Electronic shutdown at 0.58A Short-circuit, overvoltage, overload, surge and reverse polarity protection
Battery Type	12V Lead Acid Battery Minimum 7Ah recommended Reverse polarity protection
Battery Charge Current	0.4A
Communication	
Ethernet	10/100Mbps ethernet communication link
RS-485	3 RS-485 communication interface ports
USB	2 USB Type-A 5V output PTC fuse protected with 0.4A trip current
Inputs	
Digital Inputs	8 digital inputs (4 isolated groups) 5-28V RMS or 5-30V DC Response time 100ms maximum Sink current 6mA maximum Surge, short-circuit and reverse polarity protection
Outputs	
Relay Outputs	2 Form C relays - 7A N.O/N.C. at 30V AC/DC resistive/inductive
Analog I/O	
Analog Inputs	2 analog inputs (0-10V) Configurable for 4-20mA or NTC temperature input (10k Ω NTC) Input sink current 1mA maximum Surge, short-circuit and reverse polarity protection

Analog Universal	4 configurable analog inputs/outputs (0-10V) Configurable for 4-20mA or NTC temperature input (10k Ω NTC) Input sink current 1mA maximum Output source current 10mA maximum Surge, short-circuit and reverse polarity protection
Dimensions	
Dimensions (L x W x H)	156 x 90 x 60mm (6.14 x 3.54 x 2.36")
Net Weight	TBC
Gross Weight	TBC
Operating Conditions	
Operating Temperature	-10° to 55°C (14° to 131°F)
Storage Temperature	-10° to 85° C (14° to 185° F)
Humidity	0%-93% non-condensing, indoor use only (relative humidity)
Mean Time Between Failures (MTBF)	560,421 hours (calculated using RDF 2000 (UTE C 80-810) Standard)

The size of conductor used for the supply of power to the unit should be adequate to prevent voltage drop at the terminals of no more than 5% of the rated supply voltage.

Integrated Control Technology continually strives to increase the performance of its products. As a result these specifications may change without notice. We recommend consulting our website (www.ict.co) for the latest documentation and product information.

FCC Compliance Statements

FCC PART 15, WARNINGS: INFORMATION TO USER

This equipment complies 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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not authorized by the party responsible for compliance could void the user's authority to operate this product.

This device complies with Part 15 of the FCC rules.

Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

NOTE: THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Industry Canada Statement

ICES-003

This class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

CAN ICES-3 (A)/NMB-3(A)

Designers & manufacturers of integrated electronic access control, security and automation products.
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