Overview

The InFusion™ Controller II is Vantage's most powerful automation controller to date, featuring a new, extremely fast processor improving processing performance. Systems using the previous InFusion Controller may be upgraded by simply plugging in the new controller,* converting the project file in Design Center 3.3 or higher and downloading to the new controller. No changes are needed to the enclosure or the controller terminal board.

* See ***Replacing and/or Upgrading InFusion Controllers*** for additional information.

Features

- The InFusion Controller is the main "CPU" of Vantage's complete systems integration solution
- Plug and Play design makes it easy to install
- Automatic crossover support, RJ45 Ethernet connection
- Secure access – password protected
- Design Center connection through local network or offsite
  - Firmware updates, full or minor program changes
    - Auto restore of previous firmware and program code if update fails.
  - Diagnostics
  - Read system
  - Project control
- Built-in Ethernet jack
- Type-A, USB port (future features ready)
  - The USB port is not used on IC-II controllers to program from Design Center as in previous InFusion controller models
- Micro SD card support (included)
- Automatic System Backups to micro SD card
  - Manually through front panel – real time
  - Within 24 hours of programming system

  -then-
  - Weekly
  - Up to 52 backups total
  - Oldest backup is replaced when 52 limit is reached
  - Backups may be used to program system controllers
- Restore entire system from System Backups
  - Undo option from last Restore
- Power supply is field serviceable
- Ram and Flash memory
- One controller supports up to 120 WireLink™ stations and up to 120 RadioLink™ stations
- Local LCD interface provides limited control, status and diagnostics
- Lithium battery retains time and system status in a power outage
- Maintains real and astronomical time clocks
- Design Center software is used to program the Controller
- The Controller runs independent of a PC after initial setup and programming
- Application code is upgradeable through Design Center Software
- InFusion Controllers operate as stand-alone or networked
- Five Embedded RS-232 Ports
- Two RS-485 Ports (shared with SE buses 3 and 4; simultaneous RS-485 and SE bus connections are not possible)
- Manual Override Switch
- Reset Switch
- Built-in Protection, electronic isolation between controllers
- *The Vantage InFusion Controller Network can have up to thirty-one Controllers when connected via Ethernet

  *15 Controllers maximum on each Controller to Controller Bus run.

InFusion Controller Specifications

Description	Specification
Dimensions HWD	6.62" x 7.88" x 3.0" 168mm x 200mm x 76mm
Weight – 24V	3.55 lbs -or- 1.61 kg
Weight – 36V	4.4 lbs -or- 2 kg
Voltage	120-240V, 50/60Hz
Lightning / Surge Protection Static Shock IO. All ports/case	IEC 61000-4-2 Low Voltage, ITU-T K.20
Max. Length of *Combined* IC-II to IC-II Bus Network	2000 feet / 609 meters- using 16-18AWG 2-conductor, twisted pair, non-shielded wire
C2C, IC Network	Ethernet **(see *Screen 16*, p. 4)**
Station Bus Specification	2C, 16AWG / 1.31mm2, twisted, non-shielded, <30pF per foot. Separate a minimum of 12" / 30.5cm from other parallel communication and/or high voltage runs.
Station Bus Power Supply, IC-36-II	*Each* station bus run has a 60W power supply; • Station Bus Run 1 = 60W • Station Bus Run 2 = 60W
Station Bus Power Supply, IC-24-II	*Shared*, 35W max. power supply *combined* to both station bus runs.
Max. Wire Length Station Bus	609m / 2,000ft of cabling max. on each station bus. No station more than 305m / 1,000ft from Controller.
Wire Configuration of Station Bus	Daisy Chain, Branch, Star (contact support for *Station Bus Best Practices*)
Max. # WireLink Stations IC-36-II	Up to 60 Stations each bus or until the 60W supply per bus is used
Max. # WireLink Stations IC-24-II	Up to 50 Stations each bus *or* until the *shared* 35W supply is used
Max. Wire From IC to SE	200 feet / 61 meters
Maximum Power Draw IC-36-II	200W
Maximum Power Draw IC-24-II	150W
Cooling	Convection
Lithium Battery Backup	Disk battery CR2032, 3Volt 2.5 yrs. un-powered or 20 yrs. powered (field replaceable – see *Caution* at end)
Ambient Operating Temperature	0-40°C / 32-104°F
Ambient Operating Humidity	5-95% non-condensing
UL/cUL/CE/FCC Certified	YES

InFusion Controller II Part Numbers

Part #	Description
IC-24-II	Infusion controller 24V V2
IC-36-II	Infusion controller 36V V2
IC-DIN-II*	Infusion controller - DIN V2
PSU36-DIN	36V, DIN Controller Power Supply
ACPDXXSM2	24V, DIN Controller Power Supply
IC-PWR-36	IC 36 power supply replacement for IC-36-II
IC-PWR-24	IC 24 power supply replacement for IC-24-II

*See, *<LINK COMING* IC-DIN-II Installation Sheet>

Software/Firmware/Installation Requirements

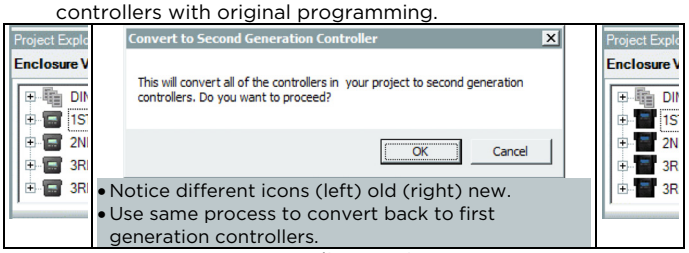
Design Center Software, version 3.3.X.X or higher must be used to program controller models with the "-II" at the end of the model number. Using IC-1 and IC-II controller models on the same system, is not supported. Installation of Vantage products should be performed or supervised by a *Certified Vantage Installer. Disconnect power when plugging in or un-plugging the controller.* The InFusion Controller is plugged into the Main Enclosure Terminal Board. ***This board is different for 24V and 36V controllers.*** The Main Enclosure Terminal Board is designed to only accept a Controller that matches the voltage of the Card. Make sure the IC is firmly seated before tightening locking screws. Please see *Surface Mount Enclosure for wall box and rack mount options.*

Powering the InFusion Controller
Use a dedicated breaker to power the IC-II. Maximum power draw by the IC-II is up to 200W for the 36V model or 150W for the 24V model. Multiple InFusion Controllers may share the same breaker when in close proximity.

InFusion Controller Setup in Design Center
Every new project in Design Center automatically includes an InFusion Controller. Additional controllers are added as the project grows, however it is possible to add additional Controllers at any time.

Replacing and/or Upgrading InFusion Controllers
To convert an existing project from IC-1 to IC-II controllers, open the file in Design Center 3.3* or higher and follow these steps:

1. Select *Enclosure View* and right click on the first controller and select *Convert to Second Generation Controller*.
2. The message box is opened explaining that all controllers will be converted. Answer *OK*.
3. All of the controllers are then converted to generation II controllers with original programming.

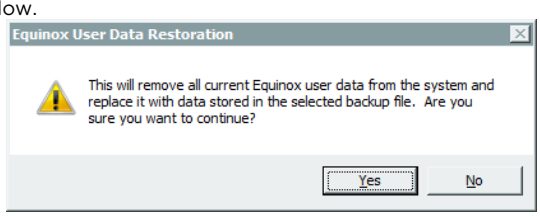


***IMPORTANT: Steps Upgrading Equinox Systems**
Projects with Equinox devices should do the following.

1) Program the system one more time with the old project file ***before*** replacing the controllers. (Only do *this* step if the old controllers will accept programming from Design Center),

2) With the newly converted file opened in Design Center, click on *System | Backup and Restore | Restore Equinox Data From Backup,*

3) Select the most recent **.EQUD* file; answer yes to the question below.



4) Design Center will program the system with the new file and restore Equinox data to new controllers stored in the **.EQUD* file.

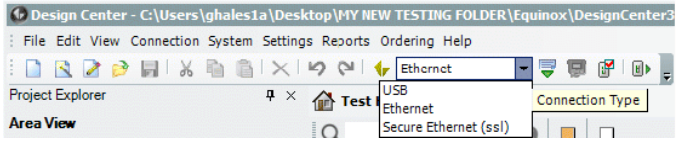
Programming the InFusion Controller
Most programming is created and edited in Design Center software and saved as a project file. Projects are then downloaded to the system controllers via a local or remote connection to the local network. It is recommended to have one micro SD flash card per system and that the SD card be placed in the same controller used to connect Design Center (faster). Design Center downloads the project via Ethernet.

Program Controller Using a *Direct* Connection from Computer
If the controller is not connected to the local network, it is possible to program the controller by connecting the computer directly to the controller via an Ethernet cable – standard or cross-over type.

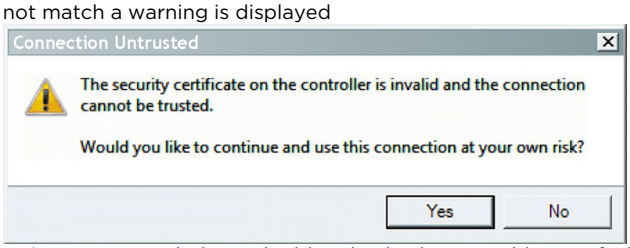
- Set the controller IP address to Default 192.168.0.<controller number>
- Set the computer's IP address to 192.168.0.40 or similar

(USB connection between Design Center and IC-II controllers is not supported.)

Ethernet Port Settings
- In Design Center select either a standard or secure (SSL) Ethernet connection.



- If using *Secure Ethernet* protocol, *Secure Sockets Layer* (SSL), recommended, Design Center checks a security certificate against a security certificate stored on the controller. If they do not match a warning is displayed



It is recommended to double check the IP address of the controller. If the IP address is correct, change the connection to standard Ethernet and re-download the controller firmware. This procedure will also require the system to be re-programmed after the firmware update. Updating all controllers firmware shipped with Design Center 3.3, or higher, should clear this error for future SSL connections.

Remote Programming and Maintenance
Remote programming and update capability may save unnecessary trips to actual sites. With remote updates, care should be taken to ensure that updates are complete and the system's new programming functions properly.

Remote Access Ethernet Port Settings
- For standard Ethernet connections, forward ports 2001 and 3001 to the IP address of the InFusion Controller.
- For Secure Ethernet connections (SSL), forward ports 2010 and 3010 to the IP address of the InFusion Controller.
- *When using a static IP address on the controller the gateway must also be setup on the controller.*
- Allow the *Ping* operation – used by Design Center to verify its connection.
- In Design Center enter the IP Address of the router or modem assigned from the ISP. Design Center may also require a User Name and Password if security has been enabled.

Backup Memory via Micro SD Card
A micro SD flash card slot is provided for program backup and allows automatic backups periodically performed by the controller.

- Stores backup of all programming for project file.
- Stores graphic rich web interface (i.e., WebPoint Lite).
- SD cards directly accessed using Design Center Diagnostics.
- InFusion System (all Controllers) may be programmed/re-programmed from the sd card connected to any Controller without running Design Center or connecting a computer.
- Typically, only one micro SD card is recommended per system.
- Replace the existing micro SD card when inserting an Equinox multiple license micro SD card.

Controller to Controller Wiring
C2C Ethernet Bus
Today's integrated devices use ever increasing amounts of metadata. For this reason it is recommended to use C2C Ethernet communication between multiple controller systems. Each controller should have its own Ethernet connection to the local network. In turn the local network should have access to the internet. With this type of connection it may be necessary to assign unique Channels from the IC's front panel, in case more than one InFusion Design Center System is on a network (See ***Front Buttons | Screen 16*** later in this document). With this type of connection InFusion network distances are only limited to the network itself. C2C Ethernet connection must be ***Enabled***.

Controller Bus
When connecting multiple controllers via *Controller Bus*, Vantage recommends the use of 16-18 AWG 2-conductor, twisted pair, non-shielded wire from IC to IC. *This is a polarized connection* with "+" and "–" screw terminals. The maximum wire length sum for all controllers connected together may be up to 2,000ft. using the above wire specification.

Main Enclosure Terminal Board – Terminator Switch
If one InFusion Controller is used, the *Controller Bus Termination* switch is always ON. This switch is located on the *Main Enclosure*

Terminal Board. If multiple Main Enclosures are used ONLY the first and last Main Enclosure Terminal Boards on each Bus should have the *Controller Bus Termination* switch ON. ***NOTE:*** *Termination switch has no affect on C2C communication.*

When updating an existing Vantage system to generation II controllers the existing *Controller Bus* may be left. However, when possible run Ethernet to each controller on the updated system and enable *C2C Ethernet Bus* communication. The new controller will use the C2C connection as primary and use the *Controller Bus* as a backup.

For additional Enclosure wiring information, please see:
Enclosure Instructions (click to open).

Connecting Two Controllers Via Front Ethernet Port
Two InFusion Controllers may be connected to each other using the Ethernet ports on the front of each Controller. The maximum length of the network cable is 328ft or 100meters. C2C Ethernet connection must be ***Enabled*** – see *InFusion Controller Front Panel Button Operation* (below). **NOTE:** This is generally not recommended as the two controllers will not have internet access when connected this way.

Front Buttons
Through front panel buttons on the InFusion Controller edit or see, *time, IP connection, IC Information* and other settings. The Controller may also be placed in *service mode* from the front controls.
Service Mode: Press and hold EXIT; pres and release RESET. Continue holding Exit for about 5 seconds, then release. Press RESET by itself to exit service mode

The following contains additional detailed information on some of the LCD screens on front of the controller:

SCREEN 4, IP SETTINGS – A static IP address may be assigned to the IC. Once a static IP address has been assigned to the Controller and saved, the NM: (NetMask) address displays automatically. With the NetMask field highlighted click the Adj. button to change settings for NM, GW, DNS1, and DNS2. Adjust each communication protocol as needed. The NM and GW settings are necessary for the controller's internet access and the connection of remote Equinox devices.

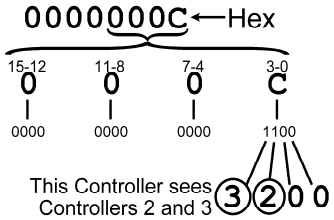
SCREEN 6, DHCP – This screen allows the InFusion Controller to obtain an IP address automatically through DHCP. Record this address in the Design Center project file for future connections through Ethernet.

SCREEN 7, CONTROLLER INFORMATION – This screen shows information about the IC.

- *Uptime* – the amount of time the IC has been operating without losing power, reported in *days:hours:minutes*.
- *RAM* – Free Memory / Total Memory
  - RAM: This is the active memory, Random Access Memory and is volatile.
- *Flash* – Free Memory / Total Memory
  - Flash memory is nonvolatile like the Hard-Drive on a computer. This is the main memory storage area for all programming. Data is compressed when downloaded.
- *Backup* – System must contain a micro SD card to create a current backup of the system via the micro SD card. Answer Yes or No to create or cancel the new backup.
- *Restore** – System must contain a micro SD card. Pressing button 3 or 4 will open a screen allowing the selection from a history of backups. Select which backup is wanted with Up/Down buttons and then press Select. Answer Yes or No to execute or abort the restore.
  **This will re-program all of the controllers on the system from the selected backup.* When a backup has been manually executed an *Undo* option appears in the backup history list.

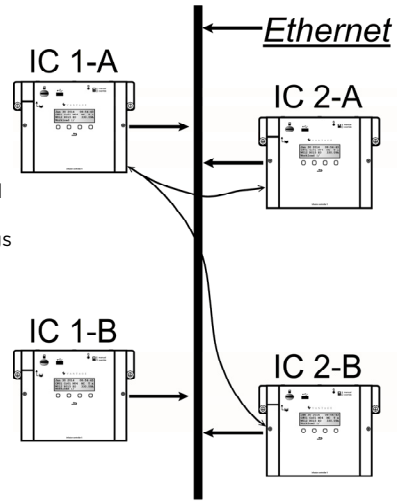
SCREEN 16, C2C SETTINGS – This screen is very important when using IP for controller to controller communication. *C2C— Ethernet*: (Eth:) must be **Enabled**.
Channel: Because more than one InFusion System may be on a single network a unique channel (Chn:) number may be assigned to the controllers for each InFusion System. The *Peer* number is assigned automatically.
Example, it is possible to have two or more ICs with address 1, address 2, and etc., in a large building containing two or more InFusion systems. These InFusion systems can all be on one network. Assigning a unique channel number to each Controller group allows the identically addressed controllers to operate as independent systems on the same network.

Peers: This is a bitmask of all controllers visible to this controller displayed in HEX. Convert to binary to see controllers position. Each "1" in binary, is a Controller.



Example: Peers:
Channels: –

Example A:
IC 1-A sees both IC 2-A and IC 2-B controllers. It does not know which IC 2 belongs to its network. At the same time IC 1-B also has the same problem.

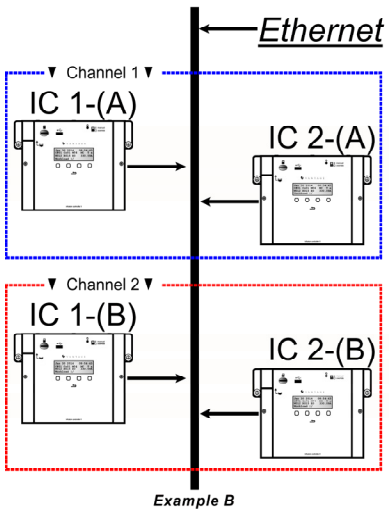


Example A

Example B:
The "A" controllers and the "B" controllers have been assigned ***channel*** numbers **1** and **2** respectively:

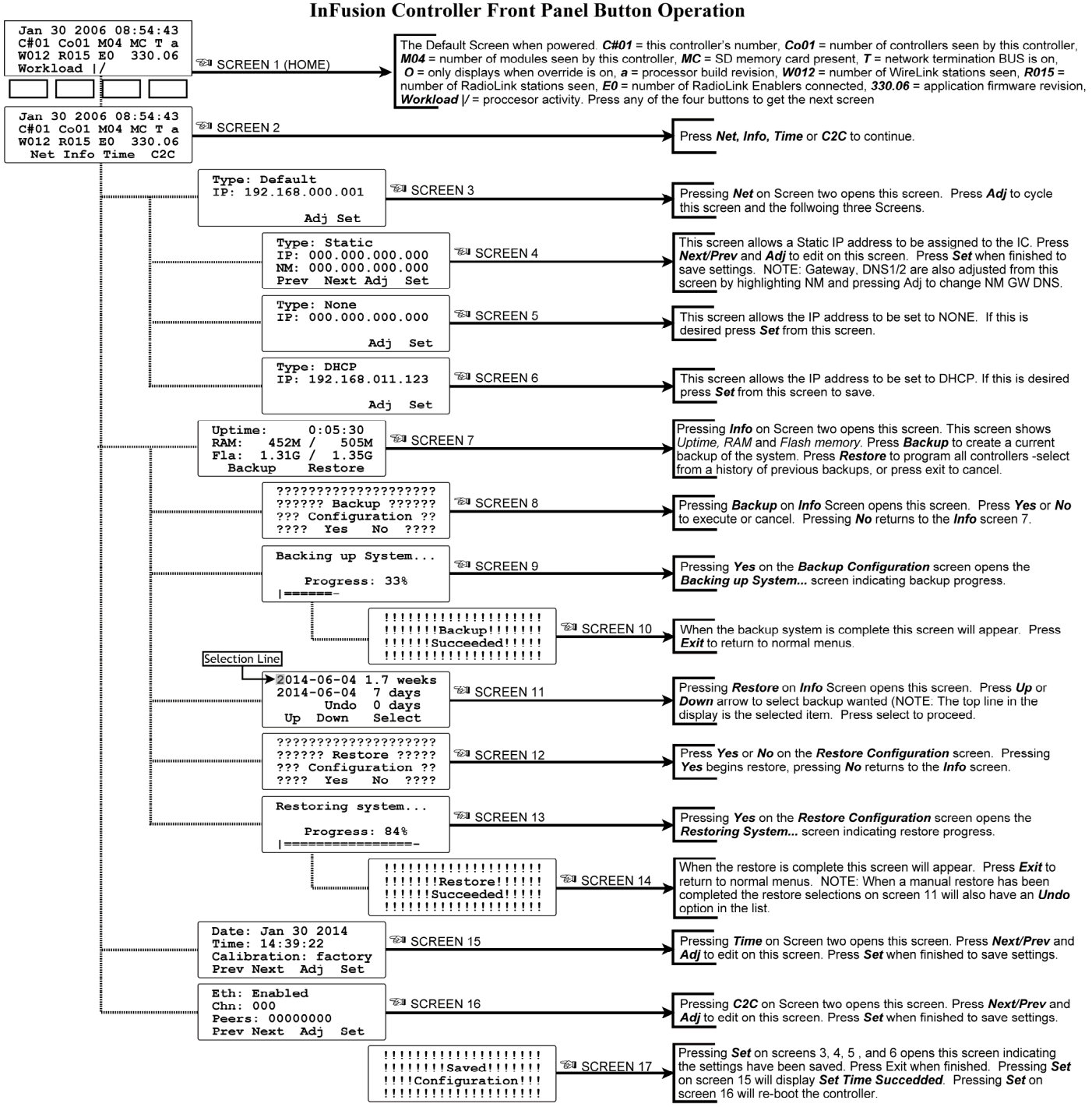
- **Channel 1** for IC 1-A and IC 2-A.
- **Channel 2** for IC 1-B and IC 2-B.

This now allows each controller on the network to only talk to its co-controllers and ignore other controllers.

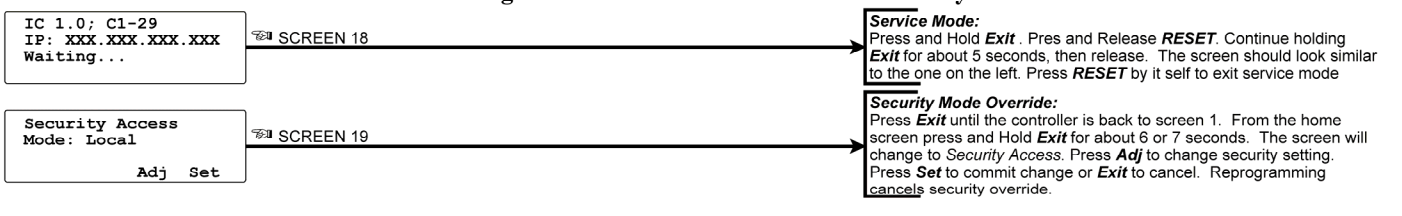


Example B

InFusion Controller Front Panel Button Operation



Placing Controller In Service Mode and Security Mode



New Controller Firmware/Design Center 3.3 Features

Design Center 3.3 is compatible with IC-1 and IC-II controllers. Many of the new 3.3 features are available in both versions of the InFusion Controller.

New Features

- Security
- Backup and Restore
- Enhanced Email Support
- Remote Location Firmware Updater – IC-II only

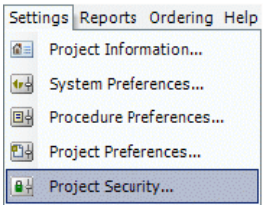
SECURITY

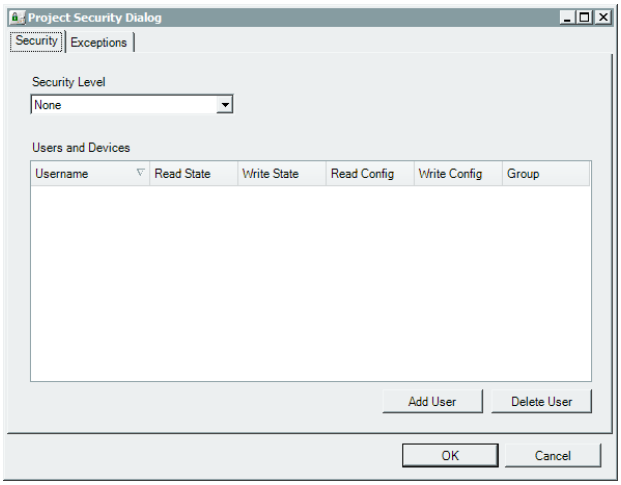
Security Levels and Users Table

Security Levels	Level Requirements For Groups	
	Admin	*User*
None	• No credentials required from any connection	• No credentials required from any connection
Remote	• Credentials required for all remote connections including Design Center	• Credentials required for all remote connections using Host Commands • Connections from Design Center; not allowed
Local	• Credentials required for all local or remote connections including Design Center	• Credentials required for all local or remote connections using Host Commands • Connections from Design Center; not allowed

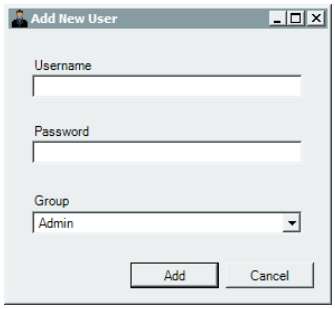
Setting Up Controller/Project Security

1. By default project security will be OFF when a new project is started.
2. To turn on project security in a new or existing project, click on *Settings* and select *Project Security*. The *Project Security Dialog* opens.

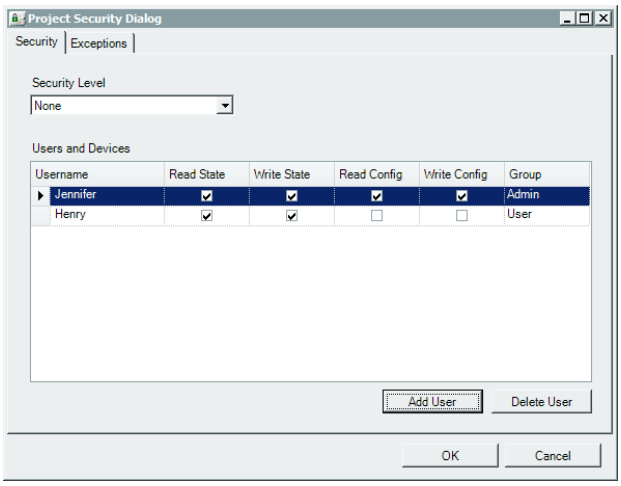




3. Initially the *Security Level* is set to *None* and no *Users and Devices* exist. If the security level is changed to *Local* or *Remote*, at least one *Admin* user must be added before exiting the dialog box.
4. To create a user press *Add User.* The *Add New User* dialog box opens.
5. Enter a *Username* and *Password* and select *Admin* or *User* to assign a group.
6. Press *Add* to add the new user.
   a. *Admin*, have all permissions selected by default. *Admin* is required by Design Center with security enabled.
   b. *Users,* cannot connect to the controller from Design Center. *Users* only have *Read State* and *Write State* permissions using Host Commands.



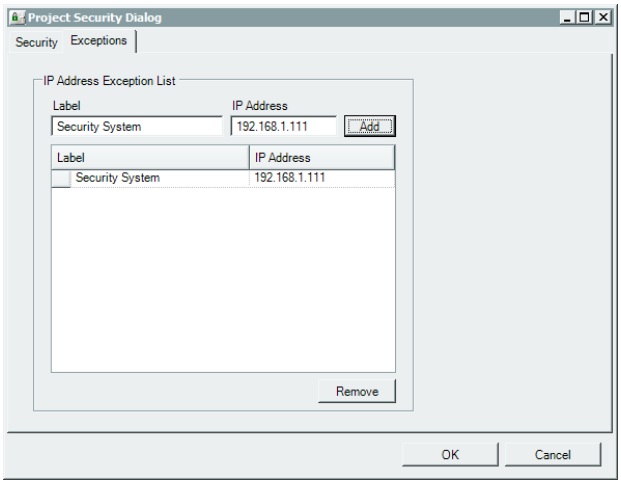
   i. Custom permissions may be selected for either group member type.



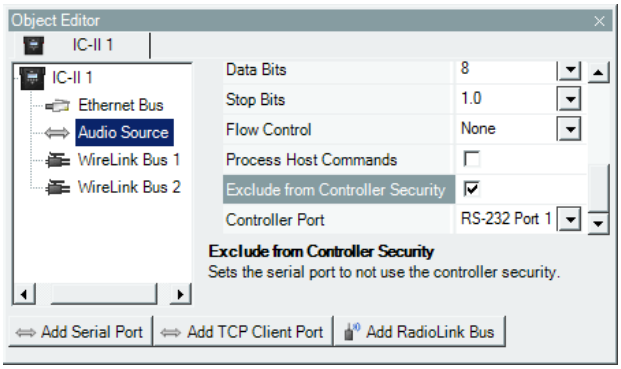
7. The *Remote* security level requires proper credentials for any remote connection.
8. The *Local* security level requires proper credentials for local or remote connections – highest security level.
9. The security setting is sent to the controller when programming or updating the system.
10. All security settings are saved with the project.

Exceptions to Security

1. IP Address Exception List
   a. If a third party device is not capable of sending a username/password, the IP Address of that device can be entered into the exception list. This excludes the device at that IP Address from security settings.

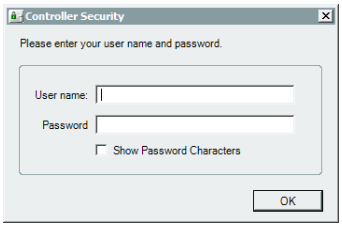


2. Serial Port Exception
   a. If a third party device connected to a serial port is unable to send a username/password, check the *Exclude from Security* checkbox in *Object Editor*. This excludes the device from the security settings.

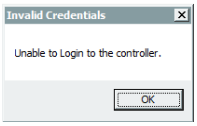


Connecting Design Center With Security Enabled

1. If the *Security Level* is set to *None,* connecting to controller proceeds normally.
2. If the *Security Level* is set to *Remote,* local connections proceed normally while remote connections require proper credentials.



3. With security enabled Design Center prompts for a user name and password.
   a. Entering an Incorrect user name and/or password results in an *Invalid Credentials* message.



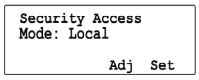
4. If authentication is accepted, the username and password are not required again while the project is open and the IP address remains the same.

Ethernet Connection

5. The dealer will be allowed to choose if they want a secure connection or an unsecured connection. For remote connections forward ports to the IP address of the InFusion Controller.
   a. Secured ports (SSL) are: 2010, 3010
   b. Standard ports are: 2001 and 3001

Temporary Security Override

1. A Security override feature exists on the controller through the panel buttons on the front of the Controller.
   a. From controller press ***Exit*** until the controller is back to screen 1, the Home page. From the Home page press and hold ***Exit*** for about 6 seconds – until the screen changes.



   b. Press ***Adj*** to change security setting to *None* or *Remote*. Press ***Set*** to commit change. The change will be active until system is reprogrammed. Pressing the ***Exit*** button without making changes cancels the controller screen without saving changes.
   c. NOTE: If security has not already been programmed on the controller, adjusting the security setting via the controller buttons does not do anything.

BACKUP AND RESTORE

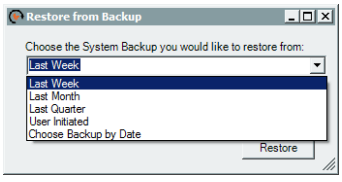
Using backup and restore

The backup and restore feature requires that one or more controllers on the system contain a micro SD Card.

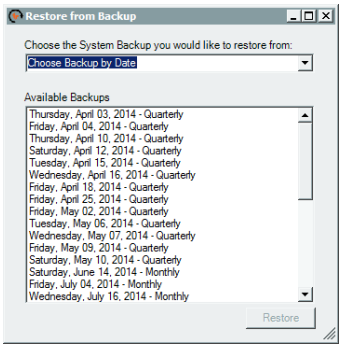
- Recommendation: The Controller used to connect Design Center contains the system's micro SD card.
- Recommendation: Install one micro SD card per system.

Backup and Restore From Design Center

1. In Design Center click on *System* | *Backup And Restore* and select from:
   a. Full System Backup
   b. Full System Restore
   c. Restore Equinox Data From Backup.
      i. Option "c", restores Equinox profile information on controller and opens programming screen.
2. If Backup is selected the system writes the current controller programming to the micro sd card.
3. If Restore is selected the system opens a selection menu.
   a. Last Week
   b. Last Month
   c. Last Quarter
   d. User Initiated (only shows when a manual backup operation has been selected)
   e. Choose Backup by Date



4. Choose Backup by Date opens a complete history.
5. These same operations may be performed from the controller via the front panel buttons. See *InFusion Controller Front Panel Button Operation* (above).

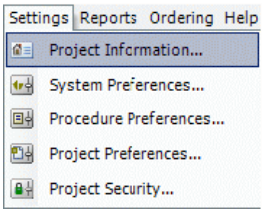


ENHANCED EMAIL

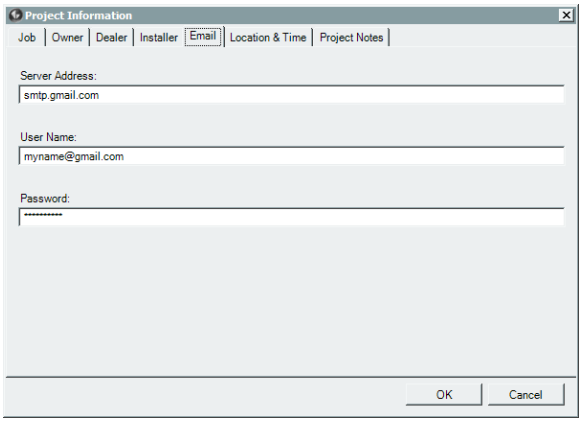
Expanded Email Options

1. Design Center 3.3 comes with new controller firmware containing enhanced email support.
   a. Gmail
   b. Yahoo
   c. Outlook.com
   d. Etc.

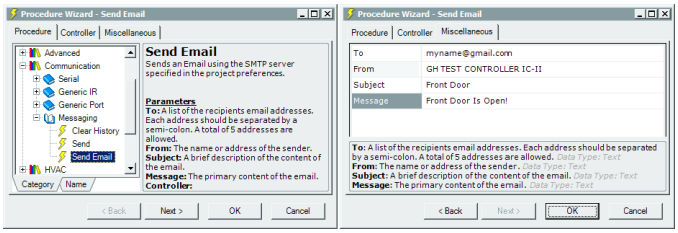
   NOTE: IC-1 and IC-II could differ in email support – IC-1 has a smaller *OpenSSL* library do to memory restrictions. Test to verify email operation on all email services.
2. In Design Center click on *Settings* and select *Project Information*.



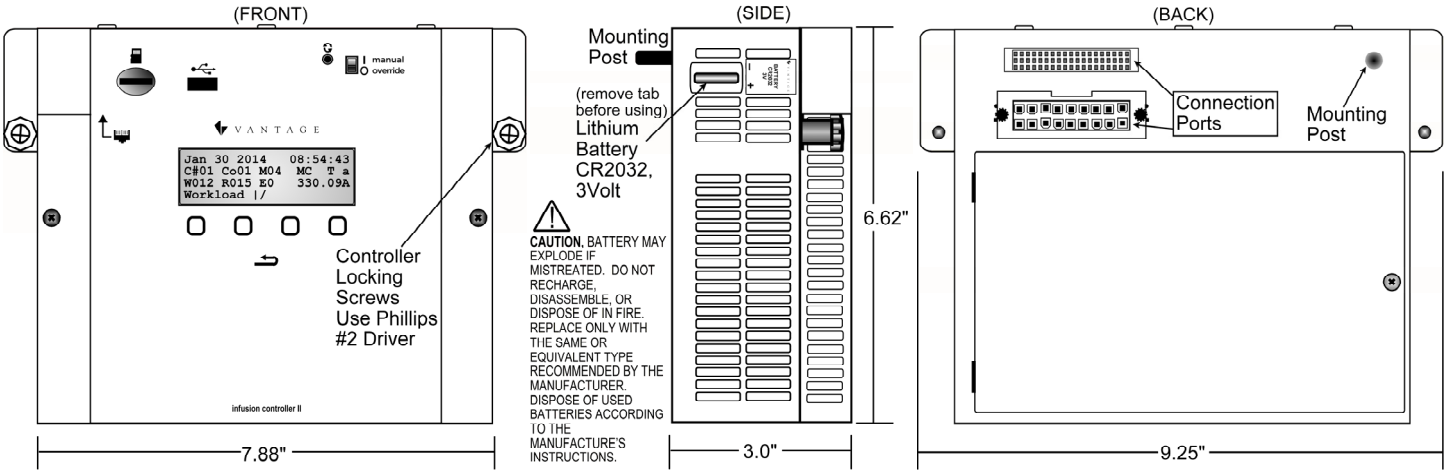
3. In the *Project Information* window, select the *Email* tab to open the email setup window.



4. The *Server Address* is the SMTP server information, for example, *smtp.gmail.com*. The correct SMTP server information is needed for the Email service being used. Please check with the email service provider for the specific SMTP Server information.
5. The *User Name* is the user name used when setting up an email account, for example, *myname@gmail.com*.
6. Finally the *Password* is the password required to access your email account.
7. Click OK when finished.
8. Tasks may be assigned to send emails as part of their execution process. NOTE: Email setup in any Design Center project helps the project be future ready for new features.
9. In Design Center select *Communication* | *Messaging* | *Send Email*.

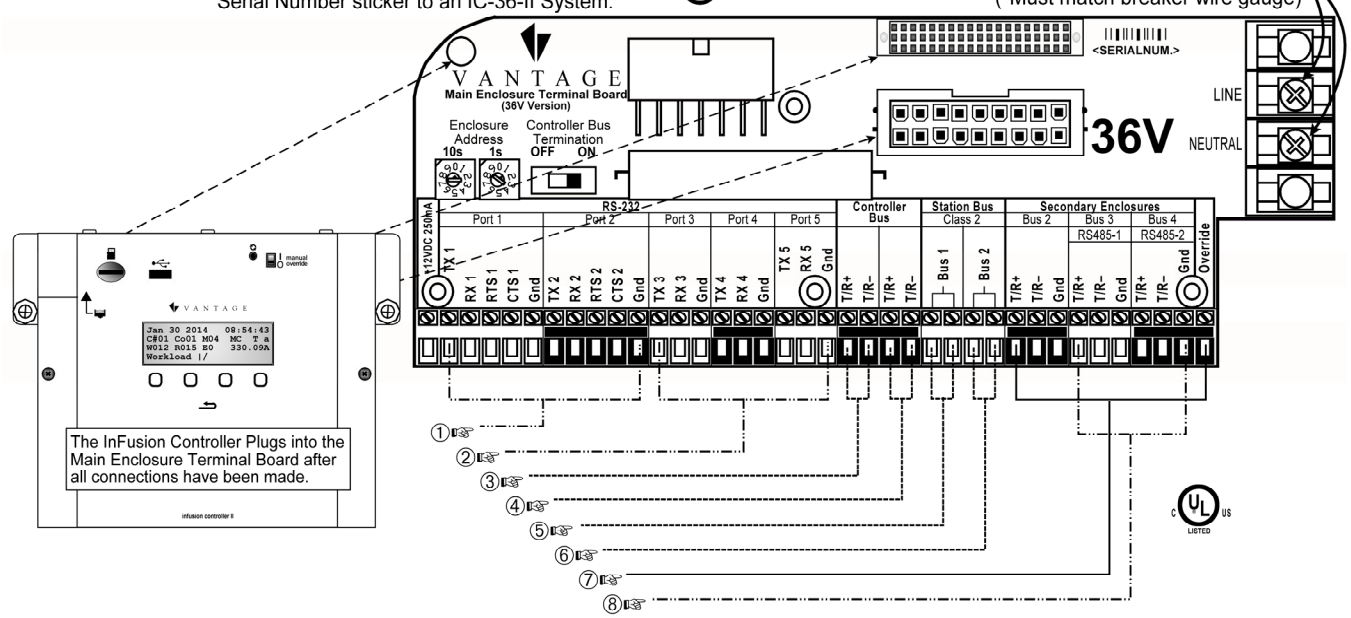


InFusion Controller and Main Enclosure Terminal Board



CAUTION: For retrofit jobs, this board is also available in a 24V version for the IC-24-II Controller. ***NEVER*** connect stations that do not display a circle (36) symbol on the Serial Number sticker to an IC-36-II System.

Torque: 20 inch pounds
Wire Range: 14-10 AWG*
(*Must match breaker wire gauge)



Wire Types
- 6C 18-24AWG
- 2C 18-16AWG
- 4C 18AWG

Wiring Key
1. RS232 Ports, Flow Control
2. RS232 Ports, Flow Control Via Software
3. Previous Controller Bus
4. Next Controller Bus
5. Station Bus Run-1
6. Station Bus Run-2
7. To Secondary Enclosure Board (A) Switch
8. RS485 Ports (If not used for Secondary Bus)
   (See maximum wire lengths above)

Possible Ground Loop Issues

All RS-232/RS-485 connections between *third party* equipment and RS-232/RS-485 connections on the Main Enclosure Terminal Board, *may* produce a ground loop. Often the third party connected RS-232/RS-485 device is not using the same power source or is far away from the Vantage enclosure resulting in a possible ground loop or data noise condition. If this condition is suspected, Vantage recommends a third party RS-232/RS-485 Opto (optical) Isolation connection. Opto Isolation provides a communications link and is an important consideration if a system uses different power sources, has noisy signals or must operate at different ground potentials.