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INNCOM DIRECT

Security Guide

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Support and Other Contacts

For technical assistance or further information, call your nearest Honeywell office.

Related documentation

- INNCOM Direct D1-528 Thermostat Product Datasheet 31-00716
- INNCOM Direct D1-528 Thermostat Installation Instructions 31-00721
- INNCOM Direct D1-529 Thermostat Product Datasheet 31-00717
- INNCOM Direct D1-529 Thermostat and D-X47 HVAC Controller Installation Instructions 31-00722
- INNCOM Direct D-X47 HVAC Controller Datasheet 31-00719
- INNCOM Direct D-578 Router Product Datasheet 31-00718
- INNCOM Direct D-578 Router Installation Instructions 31-00720

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Introduction

This document is intended to provide information that allows the customer to make all the process required to set INNCOM Direct devices correctly, from the device reception to the properly functioning and if needed the uninstallation and decommission of the product. Consider that this document is not intended to deeply specify all the features or functionalities. Also contemplate that specifically the scope of this manual is focused on Firmware. If more information is needed, please consult the User manual for every device.

Installation

The devices already have by default a firmware in the most updated version up to the moment the device was purchased, so the entire installation process does not require any firmware change.

For more information refer to Installation section in the below documents:

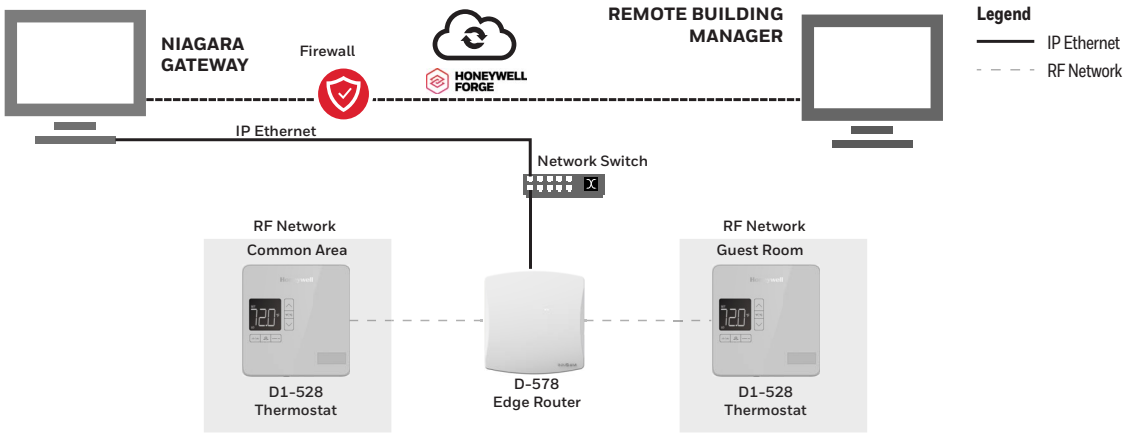
- INNCOM Direct D1-528 Thermostat Installation Instructions 31-00721-01
- INNCOM Direct D1-529 Thermostat and D-X47 Relay Installation Instructions 31-00722-01

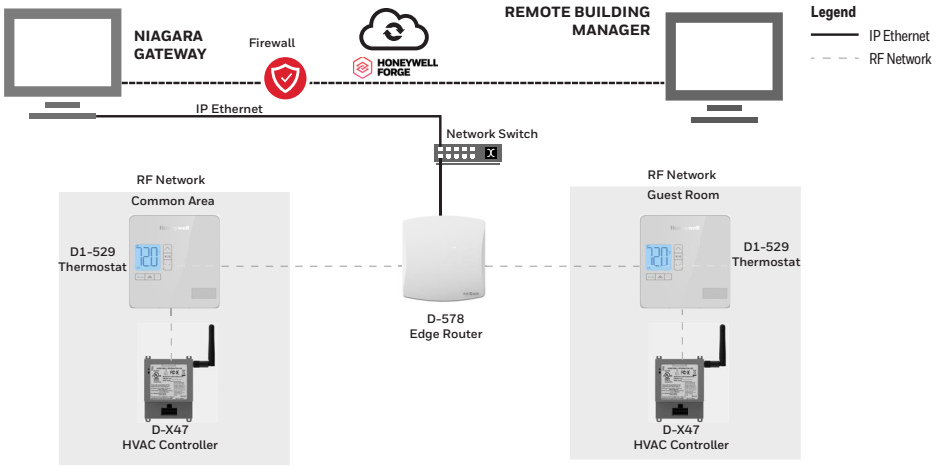
System Overview

To ensure the system works as intended, consider two configurations depending on the thermostat model.

The most notable difference is that D1-528 model can be connected directly to the HVAC unit, but in the case of D1-529, a D-X47 HVAC controller is used between the thermostat and HVAC unit.

Both configurations can be observed in the diagrams below.





It must be ensured that the devices are properly connected and powered.

Configuration

Initialization Mode

Power up for the first time puts the thermostat in Initialization Mode. This mode provides the contractor or electrician with a simple setup for the thermostat to control the intended HVAC equipment before normal use. This feature is of the highest priority due to the main objective of having an easy commissioning process.

The thermostat's Initialization mode has five options. The user shall be able to navigate between stages with the up and down arrow buttons but shall not be able to skip mandatory stages.

For more information refer to Initial Configuration section in the below documents:

- INNCOM Direct D1-528 Thermostat Installation Instructions 31-00721-01
- INNCOM Direct D1-529 Thermostat and D-X47 Relay Installation Instructions 31-00722-01

Key Management

The RF Mesh network uses a unique, secure property key for RF communication in-room and towards the D578 edge router. The key is generated and promulgated by the D578.

Prepare D578 edge router to exchange property keys with the devices.

To get the D578 edge router ready to exchange property keys with the devices, perform the following steps:

1. Make sure D578 is connected to the server. If the D578 is not connected to the server, it will not be possible to exchange property keys with the devices.
2. Once the server and D578 are connected, press the edge router button 6 times within 2 seconds. The red LED will start blinking very rapidly. This is an indicator that the edge router has opened a time window to exchange the property keys with the devices.

The edge router will close this time window automatically after 10 hours (the red LED will stop blinking rapidly). Once the time window is closed, it will not be possible to exchange property keys with the devices until the time window is opened again (step 2).

It is possible to close the time window manually before the timeout of 10 hours. Perform the steps below to close the time window manually:

1. With the time window opened (red led blinking very rapidly) press the edge router button 6 times within 2 seconds. The red LED will stop blinking. This is an indicator that the edge router has closed the time window and that it is no longer exchanging the property keys with the devices.

Each time the time window is opened, the edge router will exchange the same set of property keys it originated the first time.

Passing property keys to D-X47 and D1-528

To make D-X47 and D1-528 receive property keys, power up the devices and on the mesh network while the D578 is in key exchange mode, red LED blinking very rapidly. The devices will get the property keys automatically, there are no further steps for these two devices.

Prior to receiving the property key, the LED of D-X47 will turn on for a second every second. Once the D-X47 establishes a connection with the server, its LED will turn on for 256ms every second. This is an indicator that the D-X47 is communicating successfully with the edge router using the new property keys.

Prior to receiving the property key, the D1-528 LCD will not display any dots in the lower right-hand corner. Once the D1-528 establishes a connection with the server, three dots will appear in the lower right-hand corner of the screen. This is an indicator that the D1-528 is communicating successfully with the edge router using the new property keys.

Note: *A connection with the server will also happen if all devices are using global key. It is necessary to exchange property keys between edge router and devices first so that communication can be established but using property keys.*

Passing property keys to D1-529

There are two ways D1-529 can get the property keys:

1. By performing **Ptr** process during D1-529's Initialization mode.
2. By an automatic key sync between D1-529 and D-X47 in normal operation mode.

To make D1-529 receive property keys by performing **Ptr** process, perform the following steps:

1. Make sure D-X47 has property keys already (steps in section Passing keys to D-X47 and D1-528 have already been performed).
2. D1-529 will get the property keys when partnering it with a D-X47 during **Ptr** operation (in Initialization mode). For accomplishing this, perform **Ptr** process as usual (the key exchange will happen in the background). If the D1-529 receives the property keys successfully, its buzzer will sound and the string “Ctd” will appear in the LCD.

When in normal operation mode, the key sync feature will allow the two-component solution to automatically have the same property key. When the D1-529 detects it has no communication with the D-X47, D1-529 will trigger an automatic periodic key sync that will happen every 8-10 minutes for 3 retries. After the 3 retries have passed, D1-529 will start performing the periodic key sync every 3 hours (to avoid excessive battery consumption). In addition, the periodic key sync can be triggered manually by executing any key press in D1-529 and if the D1-529 doesn't have communication with the D-X47.

Either through the **Ptr** process or a key sync, the D-X47 is the device that passes the property keys to the D1-529.

There could be several scenarios as shown in the table below.

Scenario	By Ptr process (Init mode in D1-529)	By key sync (on normal operation mode)
D1-529 and D-X47 both are on global key.	Devices will bind.	No key sync necessary since devices are both on global key and communicating.
D1-529 and D-X47 both are on the same property keys.	Devices will bind.	No key sync necessary since devices are both on the same property key and communicating
D1-529 and D-X47 are each on different property keys.	D-X47 will pass its keys to D1-529, and they will bind.	Automatic key sync will happen and D-X47 will pass its property keys to D-X47
D-X47 is on property key and D1-529 is on global key.	D-X47 will pass its keys to D1-529, and they will bind.	Automatic key sync will happen and D-X47 will pass its property keys to D-X47
D-X47 is on global key and D1-529 is on property key	D1-529 will display **bnd** in screen and devices will not bind until D-X47 gets property keys	D1-529 will not communicate with D-X47 until D-X47 gets the property keys

Contract Establishment Between Edge Router and Devices

Contract establishment

Devices D-X47, D1-528 and D1-529, when receiving property keys from a D578 edge router, will establish a contract with that edge router, and the bond that unites them is the D578´s MAC address. This contract establishment will prevent these devices from accepting property keys from another D578 edge router (either by accident or on-purpose). This is useful for the scenario where property keys are being deployed in a building (with its own D578 edge router) which is next to another building already using its own property keys (and that has its own D578 edge router). With this feature, deploying property keys in the first building will not disturb the already-commissioned second building.

Note: *Do not put 2 or more different D578 edge routers to exchange property keys at the same time since this could create an undesired mixture of devices using different property keys. In other words, do not deploy property keys to two different group of devices from two different D578 edge routers at the same time. First, deploy property keys to 1 group of devices from 1 D578 edge router (turn off the other group of devices and the other edge router). After this first deployment is ready, you can start deploying property keys from the second D578 edge router to the second group of devices.*

Contract Invalidation

Devices, once they have a contract established with one edge router, will not accept property keys coming from any other edge router. So, removing one edge router and replacing it with another one will not work right away; the contract in the devices needs to be invalidated first before they are able to accept property keys from a new edge router and establish a new contract.

There are two ways to invalidate the contract in a device:

1. **Manual self-invalidation**: This will invalidate the contract only on the device from which this manual self-invalidation is triggered.
2. **Invalidation by broadcast**: D1-528 or a D-X47 can be used to broadcast a periodic invalidation command. All others D1-528s and D-X47s, when receiving this command, will invalidate their contract. This invalidation command is a deep mesh packet so, the mesh should help for the propagation of this command.

The device will send a SAC alarm when it has invalidated its contract. This SAC alarm is sent to the server and contains the following information:

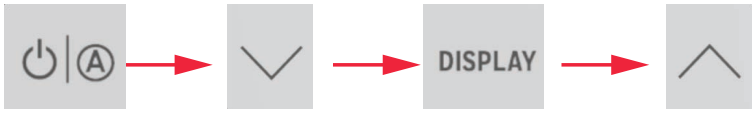
SAC Alarm Code	Parameter 1 (high byte)	Parameter 1 (low byte)	Parameter 2 (high byte)	Parameter 2 (low byte)
0xF368	Invalidation reason	Device address	Room ID high byte	Room ID low byte

Where the invalidation reason could have one of the following values:

- 0x01: contract invalidation by manual self-invalidation.
- 0x02: contract invalidation by invalidation broadcast.

For replacing an existing edge router with a new one in a building that is already using property keys, perform the following steps:

1. Connect new D578 to server (Niagara or TermDMS) and make sure this connection is successfully established.
2. Get the D578 edge router ready to exchange property keys with the devices by pressing its button 6 times within 2 seconds (for more information, go to section Prepare D578 edge router to exchange property keys with the devices in this document).
3. Invalidate the contract in all devices from the building. For the one-component solution, in D1-528, go to rUn menu (through Service Mode), scroll to option 170 and press DISPLAY. Then, enter the following button sequence.



   This will make the D1-528 start broadcasting the invalidation command to all devices in the building. The buzzer will produce a short beep as a confirmation of the successful execution of this operation.
   For the two-component solution, in the D1-529, follow the exact same steps as with D1-528 (rUn menu, scroll to option 170, press DISPLAY and enter special button sequence). For the two-component solution, the D1-529 only serves as the user interface; it is the D-X47 the one that will start broadcasting the invalidation command to all devices in the building.
   All other devices, after capturing and processing this invalidation broadcast, will send SAC Alarm 0xF368 as explained earlier in this section.

Once the steps above have been performed, the devices in the building will now be able to accept the new property keys coming from the new D578 edge router and should be able to establish a successful communication with it.

To speed up the contract invalidation in a property, the broadcast of the invalidation command can be started from several devices at the same time (from 2 or more D1-528s or D-X47s).

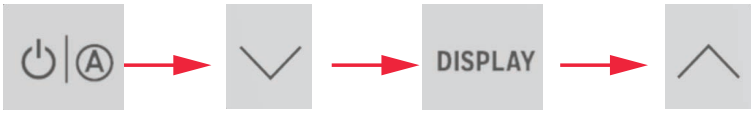
The D1-528 or D-X47 will automatically stop broadcasting the invalidation command after 10 hours. Alternatively, this broadcast can be stopped manually by performing the same actions as in step 3 above but this time using option 171 from rUn menu.

Eventually, all devices should be online with the new edge router using the new property keys except for those devices that were used to broadcast the invalidation command. This is because those devices only broadcasted the command to invalidate others, but their own contracts were never invalidated, so they have not received the property keys from the new edge router yet. This means that these devices should self-invalidate their contracts. For doing this contract self-invalidation, stop the broadcast (option 171 from rUn menu) and then perform the same actions as in step 3 above but this time using option 140 from rUn menu.

The table below summarizes all actions related to contract invalidation accessible from rUn menu.

rUn menu option	Task executed
170	Start broadcast of invalidation command.
171	Stop broadcast of invalidation command.
140	Perform self-invalidation of contract.

For all options above, press DISPLAY to select the option and then enter the following button sequence:



This button sequence was implemented with the purpose to avoid triggering all these operations accidentally. If a mistake is made when entering this sequence, the device will not execute any action. To re-enter the sequence, the user can exit by pressing F/C key and try again.

Note: *The contract in a device can only be invalidated by the invalidation command coming from a device that belongs to the same property. This is because the invalidation command carries in its payload the MAC address of the property; when another device captures it, this other device will filter the command by the MAC address. This means that, if there are two properties, A and B, and the invalidation broadcast is started in property A, then the devices in property B will not invalidate their contracts because property B is using a different MAC address. You would need to use a device from property B to invalidate the contract in the devices from property B.*

For contract invalidation, there are some restrictions:

1. If the device (D-X47 or D1-528) has an invalid contract already, then such device cannot be used to broadcast the invalidation command. The buzzer will produce a longer and deeper tone to alert the user of this situation when executing task 170 from rUn menu.

2. If the device (D-X47 or D1-528) is broadcasting the invalidation command, then the contract of such device cannot be self-invalidated. The buzzer will produce a longer and deeper tone to alert the user of this situation when executing task 140 from rUn menu. The invalidation command broadcast needs to be stopped first (after 10 hours or through option 171 from rUn menu) so that the contract in the device can then be self-invalidated.

Other important comments:

- Key sync feature between D-X47 and D1-529 will take care of the contract validation and invalidation in D1-529.
- If a factory boot is performed in the D578 edge router, it will lose whatever property keys it has already generated. If this same D578 is reconnected and is prepared to exchange property keys with the network devices again, the D578 will generate new property keys. For this scenario, it is not necessary to invalidate the contract in the network devices because the edge router was never replaced, so, the property is still using the same MAC address as before. In this case, the network devices will simply catch the new property keys coming from this same D578 edge router.

Usage

After Installation and configuration, the user will notice that the thermostat is working correctly.

When setup is complete, the user exits Initialization Mode by pressing the ^{o}F/^{o}C button, and pressing DISPLAY button in Str, letting the user know that the thermostat has stored the complete configuration. The thermostat shall reset and begin in Normal Operation Mode with default EMS settings.

Once Initialization Mode is completed, the thermostat shall begin in Normal Operation Mode every time it is powered up.

A thermostat in Normal Operation looks like the next picture

And the user can confirm it works correctly corroborating some of the features like the ones in the table below.

Feature	How to
Update temperature value	Use the UP and DOWN arrows and confirm the temperature is changing in the display.
Change temperature scale	Use the °F/°C button and confirm it changes the scale.
Change the fan set up	Use the Fan button to change the configuration selected in the initialization mode.
Test cooling	Set target temperature below room temperature. Ensure HVAC unit comes on and produces cooling. **NOTE**: If networked and outside temperature is enabled toward rooms, cooling may be locked out below 45 °F outside air temperature.
Test heating	Set target temperature above room temperature. Ensure HVAC unit produces heating. **NOTE**: If networked and outside temperature is enabled toward rooms, heating may be locked out above 80 °F outside air temperature.
Test fan operation	If more than one fan speed enabled, use the FAN button on the thermostat to make the unit cycle through all available fan speeds. Verify by sound level and/or airflow.

To test further or troubleshoot, refer to the installation manuals.

Now tested, the system should be functional for HVAC control in the space.

Maintenance

In case a FW update is needed such as new features, feature enhancements or security updates; a new Firmware will be released and provided. To upgrade the Firmware, follow the steps in the section below.

Firmware Upgrade

Over The Air (OTA) firmware upgrade is done using the INNCOM Direct Gateway Dashboard. For a complete more information see INNCOM Direct Gateway Configuration Guide - 31-00708-01.

The firmware upgrade process via an OTA firmware wizard is a step-by-step process to update the software running on a device (Thermostat, Edge Router, or Relay). Users typically initiate the process by accessing the Firmware Upgrade

Wizard service within the Gateway. Once started, the wizard will guide you through the process, providing status updates and prompting you to take the necessary actions.

During the upgrade process, the wizard displays progress bars to keep you informed of the status of each device being upgraded. If multiple devices are selected, the dashboard can organize upgrades in parallel or queue them sequentially based on system capabilities and user preferences. Upon completion, the wizard provides confirmation of the successful upgrade and any relevant post-upgrade instructions, allowing you to verify the updated firmware version and ensure the device is functioning properly.

Factory Default

To make factory default refer the below documents:

- INNCOM Direct D1-528 Thermostat Installation Instructions 31-00721-01
- INNCOM Direct D1-529 Thermostat and D-X47 Relay Installation Instructions 31-00722-01.

Decommissioning

In the case that decommissioning is necessary, the best way to do it is by follow these 3 steps:

1. Make a factory reset as explained in the section Factory Default.
2. Power the device off.
3. Package it carefully and have it delivered to a Honeywell location

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