PANDUIT™
infrastructure for a connected world

SYNAPSENSE®
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Pressure Node Installation Manual

Release 7.4.1

Issue 1

Contents

Overview

A Pressure Node is a wireless node that measures air pressure differences between the data center room and its subfloor cavities or overhead plenum environments. A Pressure Node installation kit consists of the wireless pressure-sensing node and two low-pressure air hoses fitted with diffusers. Each diffuser resides in a location to measure the air pressure differential between the room and the subfloor or overhead plenums.

Once installed and operational, the node transmits air pressure data to the Web Console. Combined with other air pressure differential data collected from various locations in the data center, operators use this information to adjust fan speeds and relocate perforated tiles to increase CRAC/CRAH efficiency.

About this Installation Guide

This document provides guidelines and instructions for installing SynapSense® Pressure Node kits to designated service companies or the customer. The intended audience for this document consists of customers or partners of SynapSense Corporation, SynapSense installers, and SynapSense installation teams. SynapSense "Tier 1" training is highly recommended for installation engineers and others who are installing SynapSense hardware or closely involved with the installation of data center optimization equipment.

Organization

This installation guide describes the tasks for installing Pressure Nodes. Table 1 lists the chapters in this document with a short summary describing content for easy reference.

Table 1 – Chapter and Appendices Summary

Chapter	Description
Introduction	Introduces the Pressure Node, describes this guide, and lists Warnings and Precautions
Getting Started	Lists the hardware, software, and tool and additional material requirements for installing Pressure Node kits
Installing CRAC/CRAH Sensors	Provides guidelines and specific procedures for installing Pressure Nodes kit components in data centers
Appendix A – Maintenance	Describes maintenance activities necessary for optimum operation of Pressure Nodes
Appendix B – Environmental Monitoring System Commissioning Form	Provides lists of necessary information and checklists to commission an Environmental Monitoring System
Appendix C – Technical Support and Return Material Authorization	Describes the process for contacting Technical Support, opening a Support Case, and the Return Material Authorization (RMA) process

Document Conventions

Table 2 defines the style conventions used throughout this document.

Table 2 – Installation Guide Style Conventions

Item	Description
	Denotes a warning
	Denotes a safety warning of a physical or electrical nature

Document References

The documents listed in this section affect the activities in this document. Refer to the appropriate document for user-specific information.

- SynapSense Software Installation Guide
- Web Console™ User Manual
- MapSense™ User Manual
- Active Control™ User Manual
- Active Control™ Installation Guide

Compliance Notice

NOTICE:

This equipment has been tested and found to comply with the limits for a Class B 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.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

(3)

2. FCC Radiation Exposure Statement:

This device complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

3. ISED statements

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Ce dispositif contient les émetteurs/récepteurs autoriser-exempts qui sont conformes au permis RSS exempt du Canada d'innovation, de la Science et de développement économique. L'opération est sujette aux deux conditions suivantes:

(1) Ce dispositif peut ne pas causer l'interférence.
(2) Ce dispositif doit accepter n'importe quelle interférence, y compris l'interférence qui peut causer le fonctionnement peu désiré du dispositif.

Innovation, Science and Economic Development Canada ICES 003 Compliance Label: CAN ICES-3 (B)/NMB-3(B)

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

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de classe B est conforme à la norme canadienne ICES-003.

Warnings and Precautions

The following warnings and precautions pertain to Pressure Node installations. Failure to adhere to warnings and precautions could result in physical injury or damage to equipment, which may void the warranty.

Warning: Describes maintenance activities necessary for optimum operation of Pressure Nodes

Warning: Subfloor work poses significant trip/fall hazards and eye hazards from airflow-borne debris. Eye protection must be worn at all times when removing or replacing floor tiles and when working in or around areas with removed tiles.

Warning: When performing subfloor work in a data center, be careful not to stress, crush, pull, or disconnect wiring and hoses running underneath electrical and data cables, leak detectors, etc. (including fire alarm/suppression systems).

Safety Warning: Installation of this equipment must be in accordance with local and national electrical codes.

Safety Warning: This product contains Lithium metal primary cell batteries, which are NOT rechargeable. Recharging can cause battery leakage or cause the safety release vent to open. Inadvertent charging can occur if battery installation is backwards. Dispose of batteries appropriately after use.

Safety Warning: Lithium metal batteries may pose a fire, explosion, or burn hazard if misused. Do not open battery, dispose of in fire, heat above 100° C (212° F), expose contents to water, recharge, put in backwards, mix with used or other battery types as this may cause the batteries to explode or leak and cause personal injury.

Safety Warning: Lithium metal batteries must be properly packed and shipped in accordance with transportation standards.

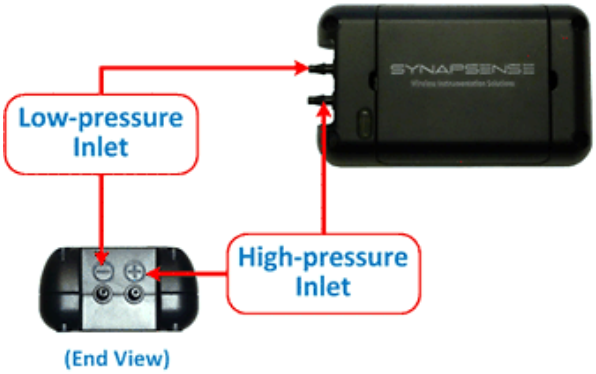
Safety Warning: Do not touch any electrical or computer/server equipment in the data center without approval from data center operators (including loose cables, pushcarts, and terminals).

Getting Started

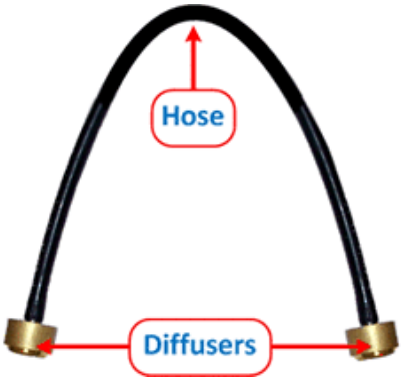
Required Hardware

The required hardware for this installation is included in the Pressure Nodes kit, which contains these components.

- One wireless Pressure Node module with four installed batteries



- One 5-foot long air hose fitted with diffuser tips on both ends. The hose is cut into two pieces, one for each Pressure Node inlet.
- Zip ties, 3M Command Strips, cable clips (not shown)



PLACE LOW-PRESSURE DIFFUSER IN STILL AIR.

Warning: Position the low-pressure diffuser (-) in an area of still air. Rapidly moving air provides incorrect pressure readings. Keep diffuser at least one foot away from server fan airflow, holes in the subfloor, or perforated floor tiles.

PLACE HIGH-PRESSURE DIFFUSER AWAY FROM OBSTRUCTIONS.

Warning: Position the high-pressure (+) diffuser away from air turbulence in the subfloor cavity (for example, large cable bundles, electrical boxes, wall outside corners, bends or edges, and concrete support columns).

BE CAREFUL WHEN REMOVING HOSES FROM A PRESSURE NODE.

Warning: Hose connections on the Pressure Node are brittle, particularly in subfloor cavities or cold aisles where chilled air is present. See Appendix A for more information.

Required Software

The Pressure Node installation requires the installation of the following SynapSense software:

- Web Console™
- MapSense™ (including optional Active Control™ software with MapSense project .dlz file exported to the Web Console)

Installation of SynapSense software generally takes place prior to hardware installation. This prevents redundancy of hardware verification activities. Refer to the SynapSense Software, Web Console, and MapSense Installation and User Guides for more information.

Required Tools and Materials

Table 3 lists the minimum tool and material requirements installers need to bring to the job site.

Table 3 – Required Tools and Materials

Item	Description/Comments
Attire	Proper dress and shoes for performing work in a data center (including areas inside the sub-floor and above ceiling tiles)
Ladder/Step Stool	To access all areas of the CRAC/CRAH units
Additional Parts	Spare ThermaNodes and batteries
Laptop	To configure settings (for example Modbus gateway)
Fasteners	Regular and plenum-rated zip ties, cable clips, and mounting brackets
Tools	7/32” Allen wrench, flashlight, diagonal cutters, utility knife, scissors, tile pullers, thin blade screwdrivers, torque wrench, pliers, wire strippers, and alcohol wipes
Multi-meter	Measures voltage in power sources
Label Maker	Create identification labels
Barcode scanner	Use to scan ThermaNode MAC IDs
Documentation	• A printed copy of this installation document • Web Console and MapSense User Guides • Printed MapSense layout of the data center showing installation locations
Identification	Photo ID to present to data center security personnel

Installing Pressure Nodes

General Installation Guidelines

Ensure software installation and required file exports before installing hardware

Be consistent.

- Match all node installations in appearance to ensure optimum data collection

Be neat.

- Ensure there are no hard turns or kinks in hoses during routing and installation
- Ensure each node provides a representative pressure measurement of the surrounding area
- Clean installation surfaces thoroughly with alcohol wipes and allow area to dry
- Ensure no tripping or other data center wiring hazards result from Pressure Node installation
- Adhere to safety regulations
- Inform customer when relocating nodes to ensure compliance with site safety protocols

Use plenum-rated zip ties and adhesive cable clips as needed.

- Attach plenum ties such that the locking mechanism is always on the inside
- Use diagonal cutters to clip plenum tie ends close to its locking mechanism
- Use cable clips as needed to ensure appropriate air pressure measurements

Installation Process Flow

Figure 1 shows the procedural flow for installing Pressure Nodes.

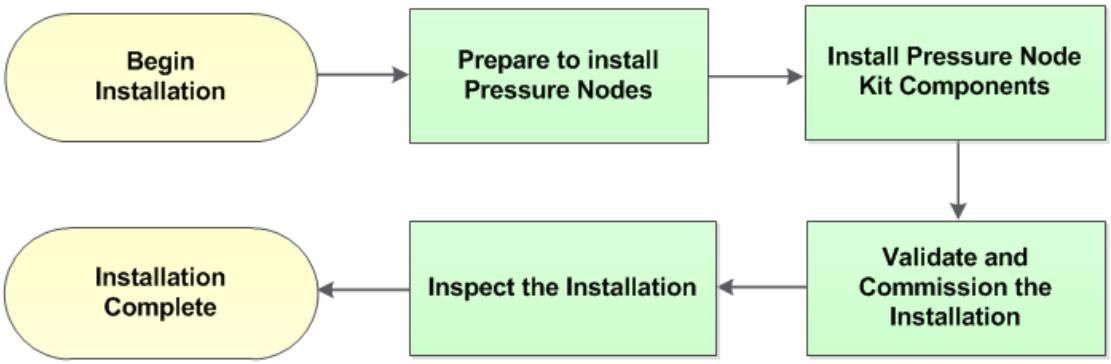


Figure 1 – Pressure Node Installation Process Flow

Preparing to Install the Pressure Node Hardware

The SynapSense Field Engineer is responsible for completing these steps to confirm installation readiness:

Assure the following steps are complete:

a. Required software is installed and configured.
b. Gateways are installed and powered on.
c. All products and tools necessary for installation are on site.

Verify the receipt of quantities and contents listed on packing/shipping list found in Box 1.

a. Place kits in front of each cabinet numbers on the kit bag (or as numbered on the printed MapSense layout).
b. Verify install team has all necessary tools and additional materials to complete installation and site is ready for installation.

For Pressure Nodes with MAC IDs not yet recorded or scanned, follow these steps:

a. Record the Pressure Node MAC IDs manually, or with a barcode scanner and upload into MapSense.
b. Access the site layout from the MapSense application. Refer to the MapSense User Guide.
c. Add and configure Pressure Node objects and associated IDs in the data center floor plan.

Export the MapSense project .dlz file from MapSense for viewing in Web Console.

For cable assembly installations with subfloor sensors, determine where the subfloor sensor routing will be located (rack and into the subfloor area).

Pressure Node Placement

Pressure Node and diffuser locations are either under server cabinets in overhead in air plenums.

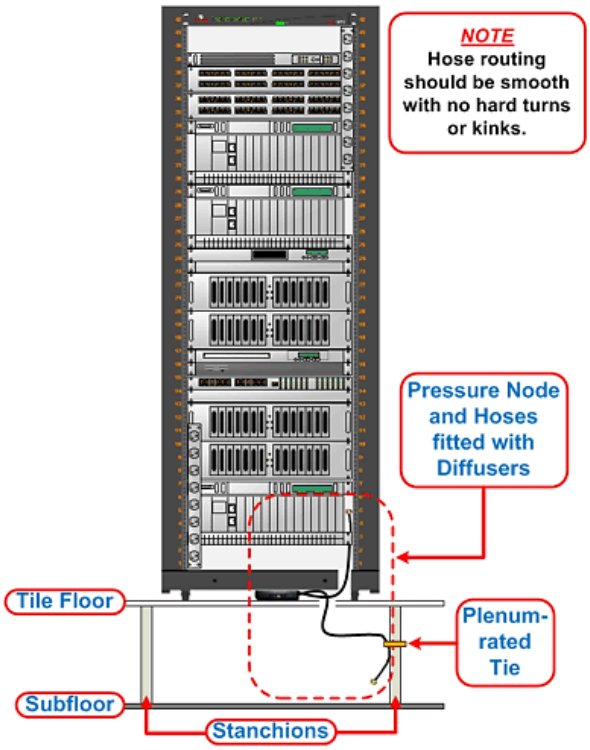
Installing Pressure Node Kits

This section provides the steps for installing Pressure Nodes. After installing the Pressure Nodes, see Validating and Commissioning the Pressure Node Installation to validate the installation and commission pressure nodes. See Inspecting the Installation to complete the installation.

In all configurations, hose lengths should not be excessive (short or long) and routing is smooth. Avoid hard turns and kinks.

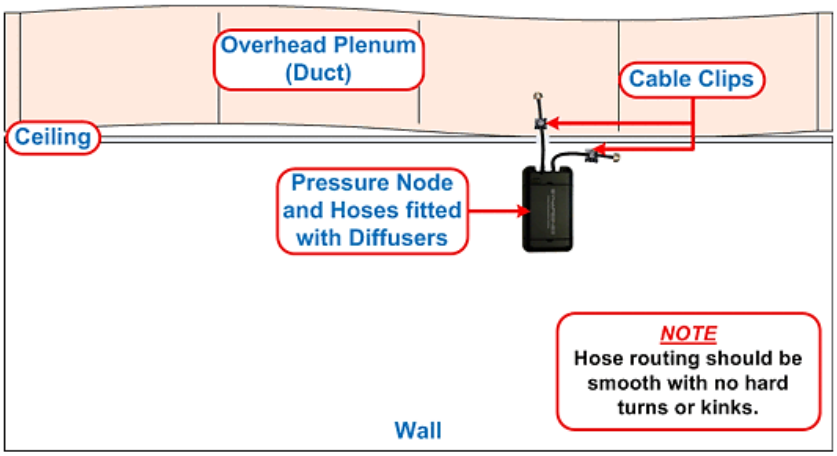
Cabinet/Floor to Subfloor

Pressure Nodes located under the cabinet on the tile floor have one hose/diffuser inserted up through a hole in the cabinet floor and routed to the side of the server (away from fans). The second hose/diffuser routes through a hole in the tile floor and is secured to the stanchion with a plenum-rated zip tie.



Overhead Plenum Installation

In the diagram below, the Pressure Node mounts on the wall with one hose/diffuser inserted through a hole in the ceiling and the vent cover in the overhead plenum. The second hose/ diffuser mounts to the wall with the aid of a cable clip.



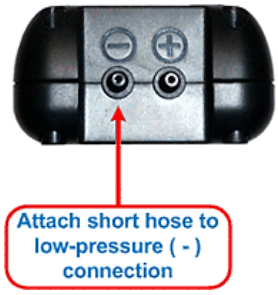
Warning: Position the diffusers in areas of still air.

Hose connections may be brittle, particularly in chilled subfloor or cold aisles areas.

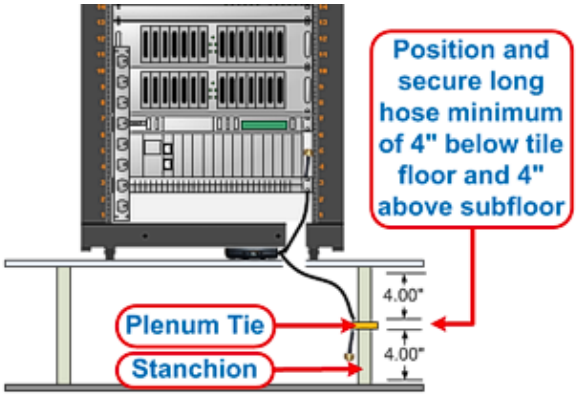
Cabinet and Subfloor Installation

Perform the following steps to install a Pressure Node in or underneath a cabinet:

1. Prepare and route the diffuser hose.
   a. Determine Pressure Node location (inside or underneath cabinet)
   b. Determine necessary lengths for the low- and high-pressure hoses: low pressure hose length one (1) ft. maximum; high pressure hose length three (3) ft. maximum. Otherwise, cut to fit hose.
   c. Cut diffuser hose using scissors or utility knife.
   d. Attach short hose to the low-pressure (-) inlet using gentle but firm pressure.

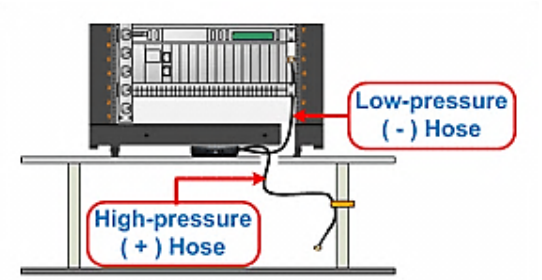


   e. Remove tile to the subfloor cavity near the cabinet with a tile puller.
   f. Secure the long diffuser hose to the stanchion with a plenum-rated zip tie, with diffuser pointed down.



Warning: Do not allow diffusers to lay on subfloor. Position the diffuser on stanchion a minimum of four inches from the subfloor and four inches from the underside of the tile floor.

g. Route the non-diffuser end of the long hose through the hole in the tile floor.
h. Route the short hose (already attached to Pressure Node) through hole in the cabinet floor.



i. Using gentle but firm pressure, attach the long diffuser hose to the high-pressure inlet (+) on the Pressure Node.

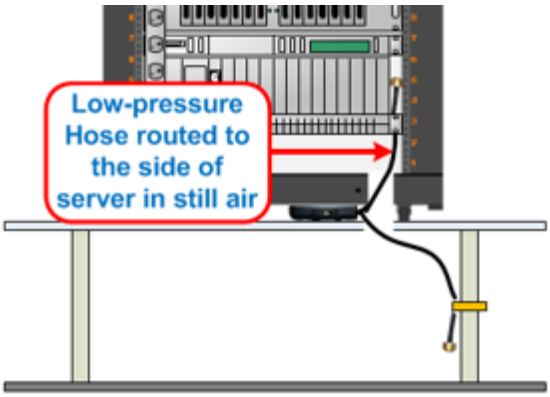
2. Activate, position, and secure the Pressure Node.

a. Once hoses are connected, activate the Pressure Node by inserting a thin blade screwdriver into the recessed slot of the node and slide the switch to the ON position
b. Ensure the Pressure Node is active. Light Emitting Diodes (LEDs) on the Pressure Node will blink during activation. Full activation sequence lasts from 10 minutes to over an hour depending on the network environment.

c. Clean area where Pressure Node will reside with alcohol wipes. Allow area to dry thoroughly.
d. Attach 3M Command Strips to the underside of the Pressure Node (if not already present).

3. Finalize hose routing, replace tiling, and clean area.

4. Route the low-pressure (short) hose to the side of the server so the diffuser is in still air. Ensure hose routing is under existing wires and cables to prevent inadvertent disconnection.
5. If needed, secure short hose/diffuser with cable clip to prevent hose from moving freely.
6. Remove tools and debris from cabinet and subfloor areas.
7. Replace tile over subfloor cavity.



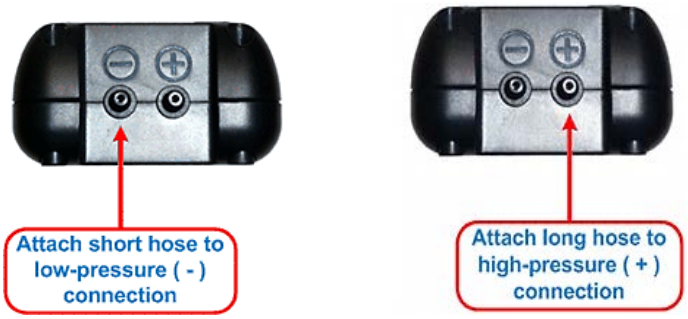
Overhead Plenum Installation

Perform the following activities to install a Pressure Node in an overhead plenum.

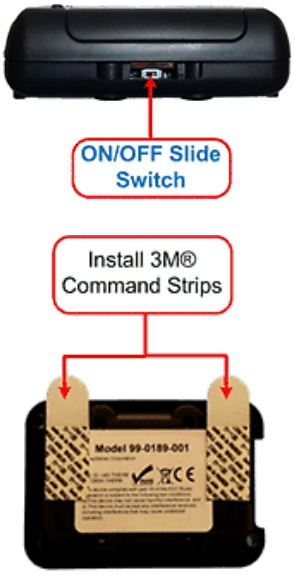
1. Prepare diffuser hose and plenum.
   a. Determine Pressure Node installation location on the wall near the overhead plenum.
   b. Remove plenum cover.
   c. Clean area where Pressure Node will reside with alcohol wipes. Allow area to dry thoroughly.
   d. Determine necessary lengths for the low- and high-pressure hoses, using one-third/two-thirds ratio (60” hose cut to 20” and 40” lengths) with the low-pressure hose usually shorter than the high-pressure hose.

Warning: Hose lengths depend on the data center’s overhead plenum configuration. The low-pressure hose is usually shorter than the high-pressure hose.

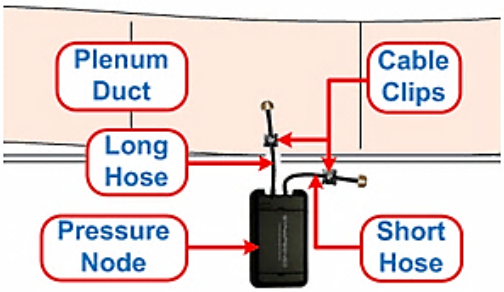
   e. Cut diffuser hose into required lengths using scissors or a utility knife.
   f. Using gentle but firm pressure, attach hoses to the appropriate inlets on the Pressure Node.



2. Activate, position, and secure the Pressure Node.
   a. Once hoses are connected, activate Pressure Node by inserting a thin blade screwdriver into the recessed slot of the node and slide the switch to the **ON** position.
   b. Ensure Pressure Node is active. Light Emitting Diodes (LEDs) on the Pressure Node will blink during activation. Full activation sequence lasts from 10 minutes to over an hour depending on the network environment.
   c. Attach 3M Command Strips to the underside of the Pressure Node (if not already present). Remove adhesive covers from 3M Command Strips.
   d. Install Pressure Node to the wall/ceiling and press firmly for 30 seconds to ensure a secure bond.



3. Route the hose, replace vent, and clean area.
    a. Place the long hose a minimum of six inches inside the plenum ducting. Ensure diffuser is not in a “T” junction as pressure reading will not be accurate.
    b. Remove adhesive cover on a cable clip and install inside the plenum duct near the long hose.
    c. Secure long hose to cable clip.
    d. Secure short hose, if dangling with cable clip installed to the wall or ceiling.
    e. Replace vent cover on plenum.
    f. Remove tools and debris from area.



Replacing an Existing Pressure Node 2 with a New Pressure Node 3

The new SynapSense Pressure Node 3 is supported in Release 7.4.1 and later. To replace an existing Pressure Node 2 with a new Pressure Node 3, use the following steps.

Note: A user needs to have privileges to replace configuration and export projects in MapSense.

1. Open MapSense as an Administrator.
2. Open the project file.
3. Set the MapSense user level to **Expert**.
4. Locate the old Pressure Node 2 in the MapSense project
5. Update MAC ID to the one associated with new pressure 3 node.
6. Right click the node, and select **Replace Configuration** from context menu. Follow the screen to select **Component Palette** - **Environmentals** - **Wireless** - **Pressure** - **Pressure** 3. Click **OK** button.
7. On the **Replace/Update Configuration** dialog, select one of the following options:
    a. **Replace**: Completely replace the component
    b. **Update**: maintain the historical data
8. Save the project.
9. Export the project to the ES server.

Validating and Commissioning the Pressure Node Installation

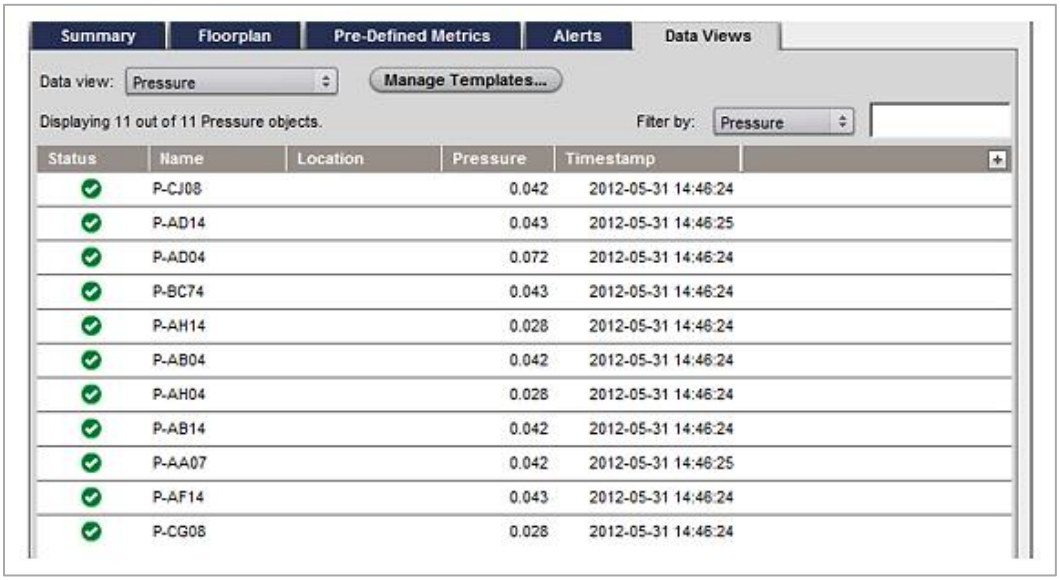
Validate and commission the Pressure Node installation by activating the Pressure Node and confirming node communication with the SynapSense Web Console software application. Refer to the Web Console User Guide for detailed information.

Before beginning the following steps, first verify (with lead supervisor or installer) all necessary installation activities, including software installation and file exports are completed. Assure all peripheral hardware and software is powered on and functional (gateway, server, etc.).

1. Confirm sensor node operations and communications. Refer to the Web Console User Guide for detailed information.
   a. Open Web Console and select the data center from the **Sites** list.
   b. Click the **Data View** tab.
   c. Select **Nodes** from the **Data View** drop-down menu. A tabular view of the Cabinet Node data displays.
2. Verify green checkmarks display for each installed object in the **Status** column.
3. If a red "**X**" displays for an object in the **Input** column, check for loose connections, obstructed diffusers, and reversed hose connections. Correct the errors and repeat the previous steps for software communication validation.

NOTE: Reset the node as needed by turning it OFF and ON and allowing time to rejoin the network.

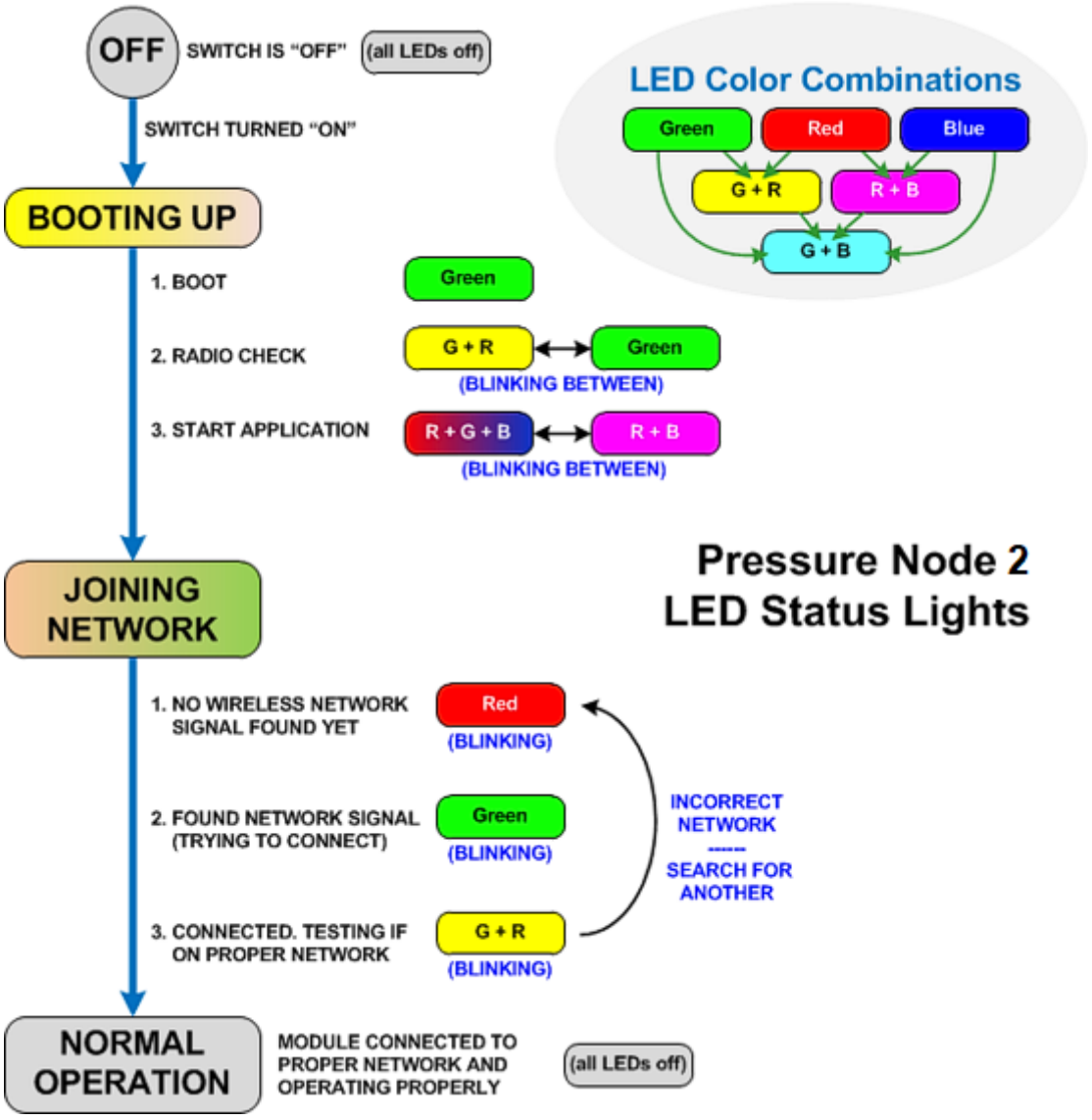
4. If there are no loose connections, obstructions, or reversed hose connections, reset the Pressure Node by sliding the switch to the "OFF" state and then to the "ON" state. Allow time for the module to connect to the network and repeat the previous steps for software communication validation.



Pressure Node LED Status Lights

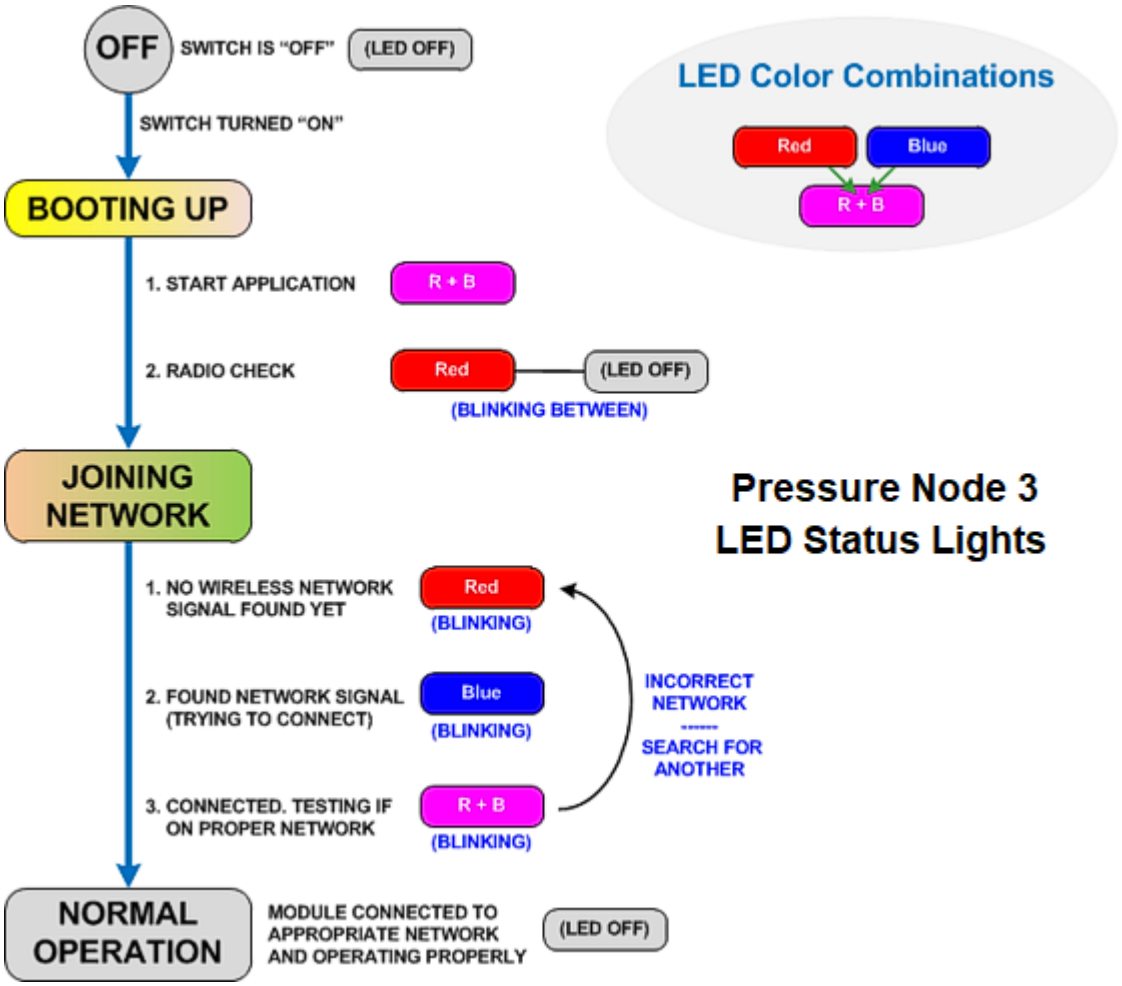
Pressure Node 2

The Pressure Node 2 communicates status via three LEDs (Light Emitting Diodes), visible through a translucent plastic cover on the topside corner of the case. The following diagram shows the typical color sequences displayed as the node powers on and joins a wireless network. Typically, the sequence from **OFF** to **Normal Operation** may take 10 minutes to over an hour depending on the network environment in the data center.


OFF
SWITCH IS "OFF"
(all LEDs off)
SWITCH TURNED "ON"
BOOTING UP
1. BOOT
Green
2. RADIO CHECK
G + R
Green
(BLINKING BETWEEN)
3. START APPLICATION
R + G + B
R + B
(BLINKING BETWEEN)
JOINING NETWORK
1. NO WIRELESS NETWORK SIGNAL FOUND YET
Red
(BLINKING)
2. FOUND NETWORK SIGNAL (TRYING TO CONNECT)
Green
(BLINKING)
3. CONNECTED. TESTING IF ON PROPER NETWORK
G + R
(BLINKING)
INCORRECT NETWORK
SEARCH FOR ANOTHER
NORMAL OPERATION
MODULE CONNECTED TO PROPER NETWORK AND OPERATING PROPERLY
(all LEDs off)
LED Color Combinations
Green
Red
Blue
G + R
R + B
G + B
Pressure Node 2
LED Status Lights

Pressure Node 3

The Pressure Node 3 communicates status via LEDs (Light Emitting Diodes), visible through a translucent plastic cover on the topside of the plastic case. Typically, the sequence from an **OFF** state to **Normal Operation** may last from 10 minutes to over an hour, depending on the network environment in the data center. The diagram below explains the typical sequence of colors displayed when the Pressure Node 3 first activates and connects to the appropriate wireless network.



NOTE: In a high-noise environment, the LED toggles between red and blue for 5 seconds after 12 noise scan toggles, and then proceeds to the next color. This behavior indicates that the device is running in very noisy environment and may perform unreliably. When this behavior is observed, the installer should consider moving the device to a different location.

Inspecting the Installation

Inspect the installation to ensure appropriate sensor placement and a clean installation area.

1. Verify sensor placement.
    a. All pressure node and diffuser installations are positioned consistently.
    b. Diffuser placement above floor and subfloor (as needed).
    c. Zip ties and clips do not interfere with fans or bind or rub against surfaces.
2. Clear the installation area.
    a. Remove all debris and tools from the data center floor.
    b. Replace all floor tiles and close all cabinet doors.
    c. Properly discard all packaging, snipped zip tie ends, etc.

Appendix A – Maintenance

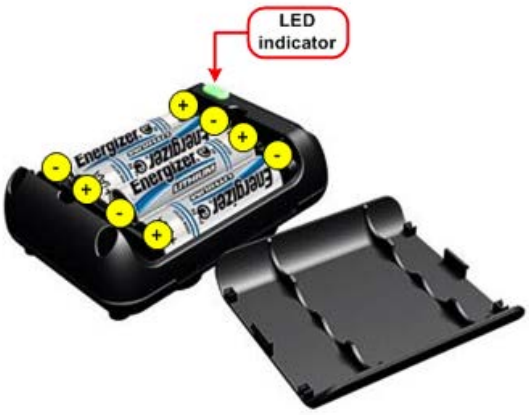
In this appendix:

This appendix describes maintenance activities necessary for optimum operation of Pressure Nodes.

Battery Replacement

Pressure Node modules come from the factory with four pre-installed AA-size batteries arranged in two redundant pairs under a removable plastic cover plate.

Follow these steps to change module batteries:



1. Turn the Pressure Node off by sliding the power switch to **OFF**.
2. Open the plastic cover using a small screwdriver to pry it open.
3. Replace the batteries (**four for Pressure Node 2, two for Pressure Node 3**) with Energizer L91 Lithium/Iron Disulfide AA or equivalent for battery configuration. Using incorrect battery types may damage product and/or compromise performance.
4. Replace the plastic cover positioning the SynapSense label text right side up (readable) after installing the Pressure Node.
5. Turn Pressure Node on by sliding its power switch to **ON**.

Removing a Pressure Node Diffuser Hose

Warning: Hose connections may be brittle, particularly in chilled subfloor or cold aisles area.

Remove a diffuser hose by following these steps.

1. Carefully slice the hose lengthwise from the inlet connection using a utility knife.
2. Peel and remove the hose from the inlet connection.
3. Clean any debris from the inlet.
4. Attach new diffuser hose.

Appendix B – Environmental Monitoring System Commissioning Form

FRM-007 Environmental Monitoring System

Project Name		Project Number	Customer PO Number
Customer Name		**Site Name**	**Site Address**
Contacts	**Name**	**Phone Number**	**Email Address**
Customer Main Contact			
System Owner Contact			
Customer PM			
SynapSense PM			
Environmental Monitoring Commissioning Completion			
Date:	XX/XX/XXXX		

Approvals				
Tittle:	**Print Name:**	**Signature:**	**Contact #:**	**Date:**
SynapSense				

Project Manager				
Field Engineer				
Customer				
Customer Rep.				

Site Network Information					
	Name	**Building/Rack Location**	**IP Address**	**Software/ Firmware Ver.**	**Login username/password**
01	Environmental Server				
02	Switch				
03	Desktop PC				
04	Laptop				
05	Wireless Router				
06	Wireless Repeater				
07	Other:				

SynapSense Gateways					
01					
02					
03					
04					

05					
06					
07					
08					

Project Information							
	Node Type	Shipped Qty.	Change Order Qty.	Installed Qty.	Spares Qty.	RMA Qty.	TOTAL Qty.
01	CRAH Temp/Hum						
02	Gateway						
03	Pressure2 Assemblies						
04	Rear Node Assemblies						
05	Vertical LI String						
06	SynapSense Server						
	Total WSN Nodes						

Environmental Server Specifications	
Operating System Version/type:	
Processor:	
RAM:	
Hard Disk Space/Available Disk Space:	
Browser Type/Version:	

Environmental Server Information	
Server Type:	
Customer or SynapSense Supplied/VM:	
Environmental Install Drive:	

MySQL Install Drive	
MySQL Backup Drive:	
MySQL Port:	
LiveImaging Install Drive:	
Device Manager Install Drive:	
Reserved Ports	
List of Customer Applications:	
SynapSense Software Login Information	
Environmental Server Login/Password	
SynapSense WebConsole	
User Name/Password	
User Name/Password	
SynapSense Console Address	http://

Environmental Monitoring Commissioning Checklist			
	Checklist Item Description	þ	**Notes**
	SynapSense Software Configuration		
01	Site Network Information documented		
02	Environmental Server Information documented		
03	SynapSense Software Information documented		
04	Environmental Server/PC configured to local time		

Environmental Monitoring Commissioning Checklist			
	Checklist Item Description	þ	**Notes**
	SynapSense Wireless Network (WSN)		
05	Gateways configured and active in WSN (1 Master, others slave)		
06	Gateway floor locations & labels correspond to MapSense locations		
07	All active nodes visible in WSN		
08	All unused nodes disabled		
	General Hardware Installation		
09	All SynapSense hardware (servers, power cords, desktops, etc.) labeled		
10	All SynapSense node floor space locations have corresponding labels		
11	MapSense object names correspond to node labels		
12	MapSense object types match installed node configurations		
13	MapSense object locations correspond to floor space locations		
	Server Rack ThermaNodes™		
14	Verify cabinet doors open/close without pulling wiring harness forwards/backwards		
15	Verify access to ThermaNode ON/OFF switch		
16	Verify ThermaNode wiring harness installation:		
	• Disconnects are properly located (able to remove doors)		
	• Taut, secure & presentable, free from crimping, pinching, etc.		
17	Verify Rack ThermaNode temperature sensors are optimally located		
	• Top rack intake sensor installed 1-2U below top server		
	• When no servers between top and middle sensors, no need to relocate		
	• All sub-floor temp. sensors located in sub-floor space		
	CRAC/CRAH ThermaNodes™		
18	Verify return and supply sensors locations (Return air inflow, Supply air outflow)		

Environmental Monitoring Commissioning Checklist			
	Checklist Item Description	þ	**Notes**
19	Verify return and supply sensors located in respective airflow path		
20	Verify CRAC/CRAH ThermaNode installation is in the supply air flow path		
21	Verify sensor wiring harness does not rub against sharp edges or is able to get pinched		
22	Verify sensor wiring harness does not obstruct possible maintenance		
Pressure Nodes			
23	Verify hose connections correspond to low (-) and high (+)pressure areas		
24	Verify hose routing:		
	• (-) low-pressure hose, route to side of server or outside plenum duct (avoiding rapid airflow)		
	• (+) high pressure hose, route to sub-floor or inside plenum duct		
25	Secure pressure nodes and verify for trip hazards		
Validate Sensor Installation			
26	Verify Server Rack ThermaNode Intake > exhaust temperatures		
27	Verify CRAC/CRAH node return > supply air temperature		
28	Verify Pressure node data is (+) positive		
WebConsole			
29	Verify necessary Alerts are enabled		
30	Verify email server is configured (option)		
31	Communicate active Alerts with site team		
32	Create customer: user name and passwords		
Training			
33	Conduct Software and Hardware training		
34	Provide Customer Support Information		
Final			

Environmental Monitoring Commissioning Checklist			
	Checklist Item Description	þ	**Notes**
35	Run Support Dump		
36	Copy last DL file		
37	Attach WSN Screen Shot		
Notes			

	RMA #	Sensor Type	Name	Part No.	Serial No.	MAC ID
01						
02						
03						
04						
05						
06						
07						
08						
09						
10						
11						
12						
13						
14						
15						
16						

Environmental Monitoring Commissioning Checklist							
	Checklist Item Description					þ	Notes
17							
18							
19							
20							

Appendix C – Technical Support and Return Material Authorization

This appendix describes how to contact Technical Support, open a Technical Support Case, and receive a Return Material Authorization (RMA) to return a SynapSense product for replacement. Not all problems will result in an RMA.

Panduit Technical Support

Severity 1 & 2 Issues

Americas +1-866-721-5302
EMEA +44-1291-674661
APAC +65 63 057 044

UTC between 08:00 and 23:00

Severity 3 & 4 Issues, Email – normal business hours

SystemSupport@Panduit.com

Opening a Technical Support Case

Follow these steps to open a Technical Support Case

1. Search the SynapSense Knowledge Base at http://www.synapsense.com/ (click **Support Login** at the top of the page).
   a. Login using your email and password.
   b. Search the knowledgebase for the symptom. If the knowledgebase solution does not resolve the issue, enter a Technical Support Case.

Describe the following information:

a. Symptoms or how to reproduce the problem.
b. Damage to the product, such as dropping or exposure to condensing humidity.
c. Attempted measures to resolve the problem.
d. How long has it been in service? Include all information regarding the device history: "Dead" on arrival? Failed upon initial installation? Failed after initial install, but nothing changed with the unit. Failed upon some subsequent action (moved, redeployed, SMOTA, etc.).
e. Part number (underside of most nodes).
f. Serial number (underside of most nodes), typically beginning with PR or AM.
g. MAC ID (on the exposed barcode label).
h. Quantity.

Return Material Authorization

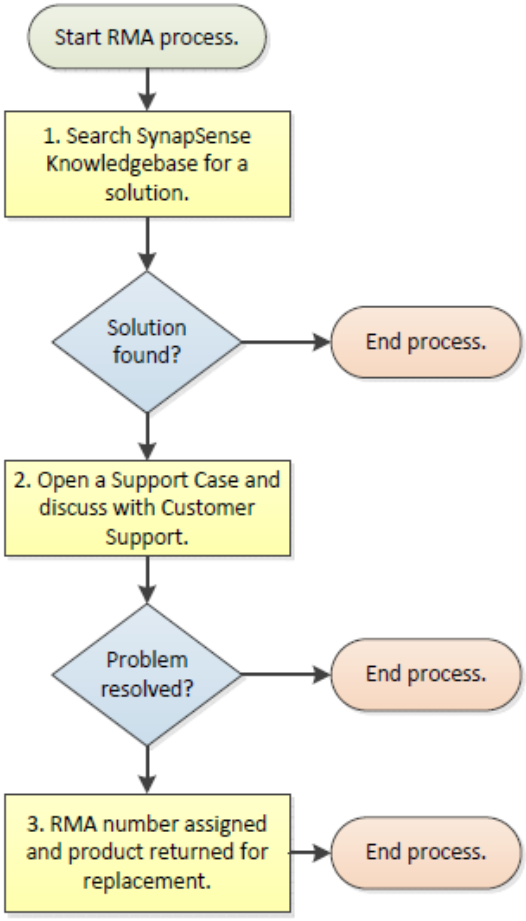
SynapSense products carry a one year warranty from date of purchase and have a low failure rate and most customer inquiries result in a solution without returning the product. It is important to SynapSense to provide a high quality product; therefore, all failures are taken seriously and we ask that all damaged or non-functional products be returned for root cause analysis.

When it is necessary to return a damaged or defective product, a Return Material Authorization (RMA) is required. Returns are only accepted with an accompanying RMA number issued by SynapSense Technical Support.

Returning SynapSense Products

If a product supplied by SynapSense is suspected to be damaged or non-functional in any way, follow these steps to resolve the problem and, if necessary, return the product for replacement.

The procedure for returning damaged or non-functioning products is described below.



1. Search the SynapSense Knowledge Base at http://www.synapsense.com/ (click **Support Login** at the top of the page).
   a. Login using your email and password.
   b. Search the knowledgebase for the symptom. If the knowledgebase solution does not resolve the issue, enter a Support Case.
2. Describe the following information:
   a. Symptoms or how to reproduce the problem.
   b. Damage to the product, such as dropping or exposure to condensing humidity.
   c. Attempted measures to resolve the problem.
   d. How long has it been in service? Include all information regarding the device history: "Dead" on arrival? Failed upon initial installation? Failed after initial install, but nothing changed with the unit. Failed upon some subsequent action (moved, redeployed, SMOTA, etc.).
   e. Part number (underside of most nodes).
   f. Serial number (underside of most nodes), typically beginning with PR or AM.
   g. MAC ID (on the exposed barcode label).
   h. Quantity.

What Happens Next?

A Customer Support Engineer will contact you within one business day. The Engineer may ask additional questions or have you perform activities to attempt to resolve the issue. If the Engineer is unable to resolve the problem, you will be asked to return the product. A replacement product will be shipped to you at no charge.

Include the Support Case Number (RMA number) on the mailing/shipping label when returning the product. Products received without a valid RMA number are returned to the sender. Send returns to:

SynapSense Corporation
Customer Support RMA – RMA # _____
340 Palladio Parkway, Suite 530
Folsom, CA 95630