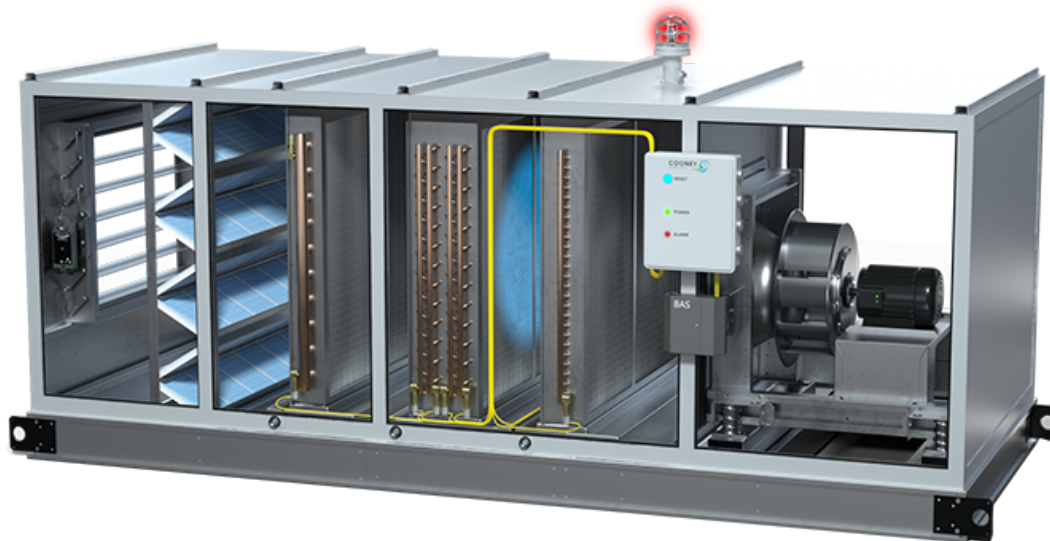


# COONEY SMART COIL

## Installation and Operation Guide



This document details the installation and operation of the Cooney Smart Coil System.

The scope of this document is to provide sufficient details for successful installation of the unit in new installation and to offer operational understanding of the main systems and features of the unit.

**Version 1.0**





# TABLE OF CONTENTS

<b>Introduction.....</b>	<b>2</b>
<b>Key Components .....</b>	<b>2</b>
Circuit Board .....	3
Control Box.....	3
Front Panel.....	3
Input Grommets.....	4
<b>Installation .....</b>	<b>4</b>
Building Management Block.....	4
Control Box.....	4
Power Block.....	7
Sensor Block .....	6
Sensor Grommets .....	6
<b>Operation.....</b>	<b>8</b>
Application of Power .....	8
BM Alarm State Actuation .....	9
General Fault Indicator .....	9
Power Up Indicators.....	8
Sensor Operation .....	8
System Reset.....	8
Zone Fault Indicators.....	8
<b>Troubleshooting.....</b>	<b>9</b>
Fuse .....	10
Photo Consultation .....	9
<b>Accessories .....</b>	<b>10</b>
Mounting Hardware.....	10
<b>Contact us .....</b>	<b>10</b>



# INTRODUCTION

The Cooney Smart Coil System to offer a featured and reliable sensing system which works hand in hand with the Cooney Coil Freeze Protection Systems (FPS).

The role of the Cooney Smart Coil System is to monitor up to 30 FPS units 24 X 7 and to take Alarm Actions on one or more Protection Events.

In the standard configuration, Alarm Actions are the following:

1. Latch the zone in fault with an internal LED light.
2. Illuminate the Front Panel Red Alarm Lamp.
3. Trigger a relay to Building Management systems that indicates an Alarm State.

The front panel and inside of the Cooney Smart Coil System are pictured here.



Illustration 1

## KEY COMPONENTS

Important elements of the Cooney Sensing Unit are the:

- Control Box
- Front Panel
- Functional Blocks of the internal Circuit Board: Front Panel Block, Sensor Block, Power Block, Building Management (BM) Block and Fuse.
- Input Grommets which provide a water tight entrance from outside wire sources into the Enclosure for Sensors, Building Management and Power Input.

These elements are summarized in the following section to familiarize the reader and covered in greater detail as explained for association to installation or operation in further sections of this document.

## Control Box



The Control Box enclosure is a left hinged, front lid, snap lock, gray Fiberglass / Polyester NEMA 4 rated 8" wide x 10" tall x 6" deep junction box.

There is a metal mounting back plate with electrically connected metal mounting standoffs for the Circuit Board.

## Front Panel

You can see from Illustration 1, there are three active front panel elements:

1. Blue Reset, which is a press switch.
2. Green Power Indicator lamp.
3. Red Alarm Indicator lamp.

## Circuit Board

Shown here in illustration 2, the Circuit boards is mounted to the metal mounting plate of the Enclosure with four mounting screws and has the following functional blocks.

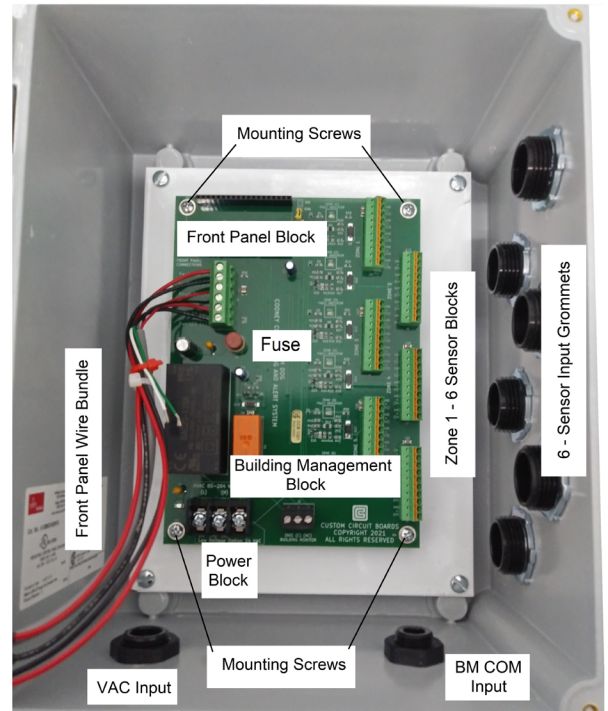


Illustration 2

### **Front Panel Block**

Labeled J2, this 6 connector Screw Terminal block provides connectivity to the Front Panel features as described previously via the Front Panel Wire Bundle.

### **Sensor Block**

The Sensor Block is comprised of 6 Zones, each being a 10 conductor spring tensioned terminal block, labeled (J4 – 9) which accept up to 5 Signal / Ground pairs for a total of 30 inputs from remote sensors.

### **Power Block**

Depending upon which option is selected, labeled either (J1) - 120VAC or (J10) - 24 VAC input, the power block is a three conductor screw terminal which accepts Line, Neutral and Ground inputs, providing power to the Smart Coil System.

### **Building Management Block**

Interface to a building management automation system is offered with a three conductor screw terminal labeled J3, with a center common, and Normally Open, Normally Closed counterparts.

### **Fuse**

Onboard 12v DC power is protected from the AC input side via the 2A fuse labeled F1.

## Input Grommets



To maintain the water-tight and outdoor ratings of the enclosure, all wiring enters the Enclosure via input grommets which are specific to the wire types for each function and briefly described here.

### **Sensor Input**

There are 6 – 3/4" grommet inputs on the right side of the Enclosure with sealed 5 port rubber bushings, designed to handle 5 Sensor Inputs per grommet for a total of 30 Sensor Lines.

### **Building Monitor Input**

There is 1 – 3/8" grommet input on the bottom right of the Enclosure for communication signal lines for connection to Building Automation and Monitoring systems.

### **VAC Power Input**

There is 1 – 1/2" grommet input on the bottom left of the Enclosure for 24VAC or 120VAC power to the unit.

## INSTALLATION

### **Control Box**

Mount the control box in an accessible location, either inside or outside of the air handler, using the provided mounting hardware. Illustration 3 shows the proper application of the optional mounting tabs.

Ensure the control box location can be reached by all sensor leads. If you are mounting the control box outside of the air handler, cut a hole in air handler wall to run sensor leads through. The hole size will vary based on the number of leads.

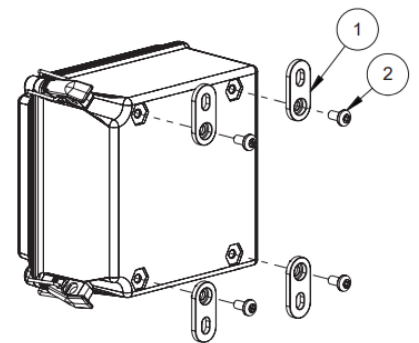


Illustration 3

### **Building Management Block**

A 3 conductor Screw Terminal Block (J3) is provided for external monitoring. The terminal block is connected to a double pole single throw (DPST) dry contact relay which is actuated by the Alarm State.

Note: This Alarm State indicator is a passive switch and meant for low voltage applications of 48 Volts or less and 4 amps max applied. It is not fused.

As labeled, pins 1 & 2 are Normally Open (NO) and pins 2 & 3 are Normally Closed (NC) during Non Alarm conditions (no valve deployment).

During an Alarm State, pins 1 & 2 are closed and pins 2 & 3 are open, indicating that one or more valve(s) have deployed. The output will remain in the Alarm State until the fault condition has abated and the reset button is manually pressed.



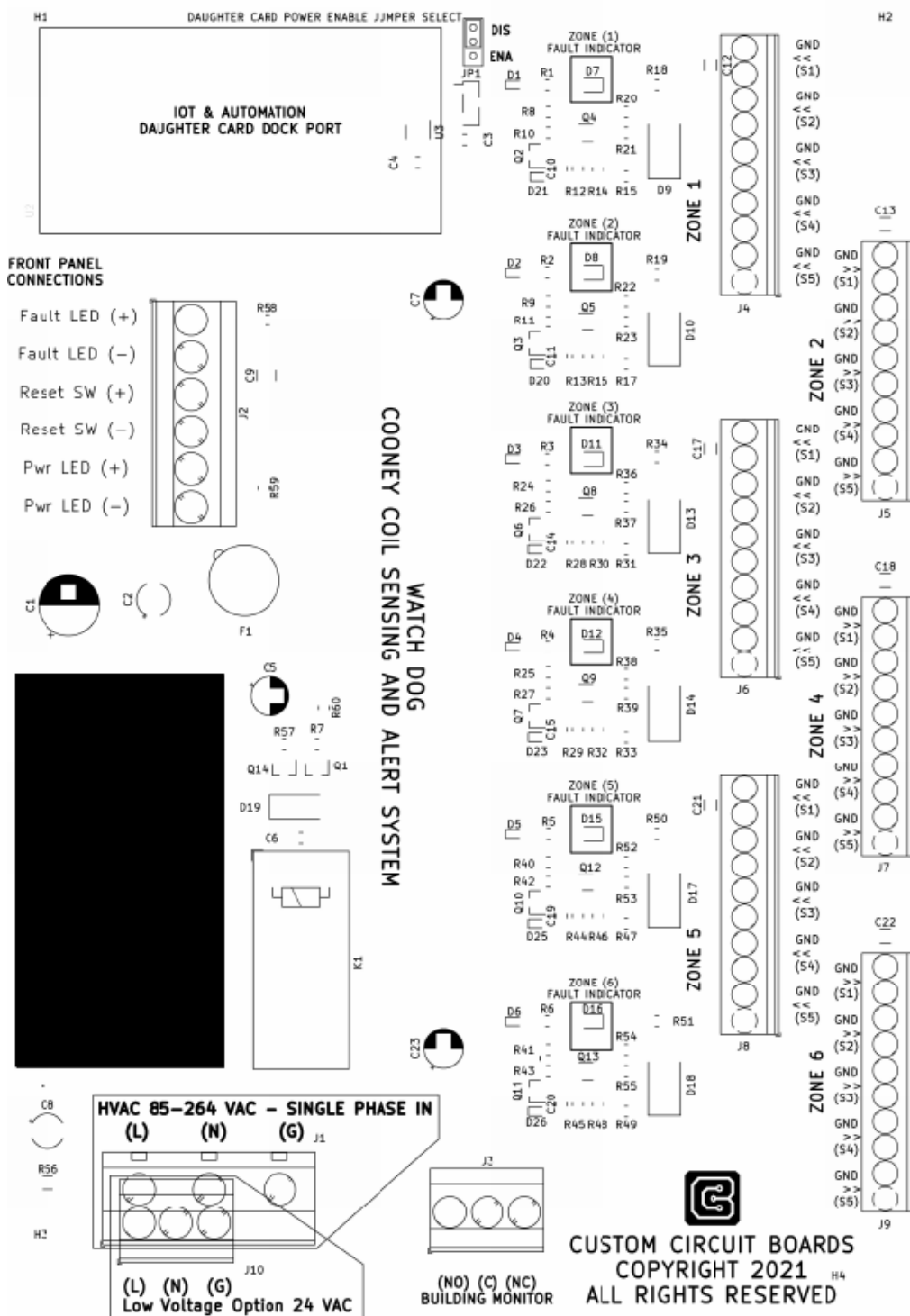


Illustration 4

Installation of BM wiring should enter the enclosure via the BM Grommet and be connected appropriately to the J3 terminal. Loosen the vertical screw of each terminal to allow for conductor placement, and then tighten the screw to compress and secure the wire conductor lead at each port. Do not over tighten the screw terminal. Snug torque is suggested.



## Sensor Block

The sensor block is comprised of six fault detection zones and six associated Terminal Connectors labeled J4, J5, J6, J7, J8, J9 for Zone 1, Zone 2, Zone 3, Zone 4, Zone 5, Zone 6 respectively.

Each Terminal Connector has 10 spring tensioned wire lead inputs that are identified with Signal / Ground Pairs to accommodate up to 5 Sensor Input cable pairs per connector.

You can see from Illustration 4 that markings on the board at each Connector indicate GND >> S(n), to identify the Signal / Ground Pairings.

In a Standard, Non-Shielded Sensor Cable, there are no polarity requirements for the White and Black Sensor Cable pair.

The GND / S(n) is provided in support of an optional Ground Shielded Sensor Cable Pair, where there are two conductors and a shield conductor for better noise immunity.

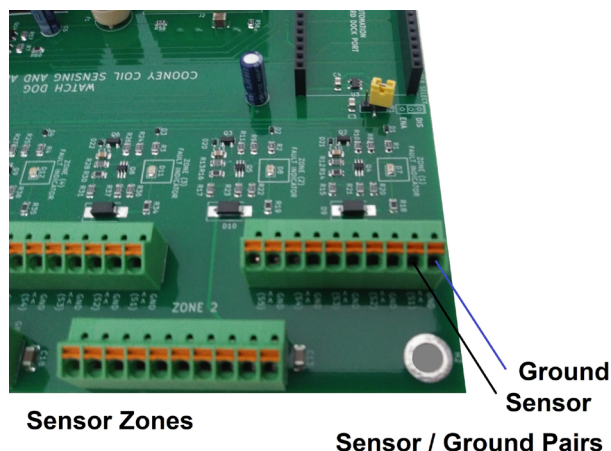


Illustration 5

In this case, both the shield and neutral (white) conductor of the Sensor Cable would be twisted together and installed to the Ground Side of the Sensor / Ground Pair Input.

Sensor conductors are placed into the barrel of each contact input by first depressing the orange spring tension control with a small flat blade screwdriver, insert the conductor lead and release.

## Sensor Grommets

Sensor Cables should enter the enclosure through the associated Sensor Grommet. Each of the six grommets may accommodate up to 5 sensor cables for a total of 30 Sensor Cables.



Illustration 6

Shown here in Illustration 6, inside of each Sensor Grommet is a five port rubber skinned over bushing / seal which is designed to offer the flexibility to install from 1 to 5 conductor cables while maintaining a water tight seal.

It is necessary to puncture the cable port being penetrated, while leaving other unused ports intact.

When the Cap is tightened, all cables within are compressed and strain relieved.

# Power Block



There are two power options for the Cooney Smart Coil System: 120VAC and 24VAC. Visually determine which Power Option to be installed and make the appropriate connections. Illustration 7 to the right characterizes the power block for a 24VAC version, as opposed to the 120VAC version shown in illustration 4 above.

For 120VAC function, the J1 connector will be populated with a three conductor terminal barrier HV block and align to the above: (L) (N) and (G) markings. 24VAC function will populate J10 with a low voltage, three conductor screw terminal block and align to the (L) (N) and (G) markings below.

In either case, first insure that no power is applied to the supply input lines prior to working with these potentially dangerous conductors

Connection should be made in all cases with Single Phase AC voltage using three conductor lines of Live, Neutral and Ground. These should be installed to the associated screw terminal marked (L), (N) and (G) respectively.

Installation of the VAC supply wiring should enter the enclosure via the VAC

Input Grommet and be connected appropriately to the J1 or J10 terminal, depending upon option.

Loosen the vertical screw of each terminal to allow for conductor placement, and then tighten the screw to compress and secure the wire conductor lead at each port. Do not over tighten the screw terminal. Snug torque is suggested.

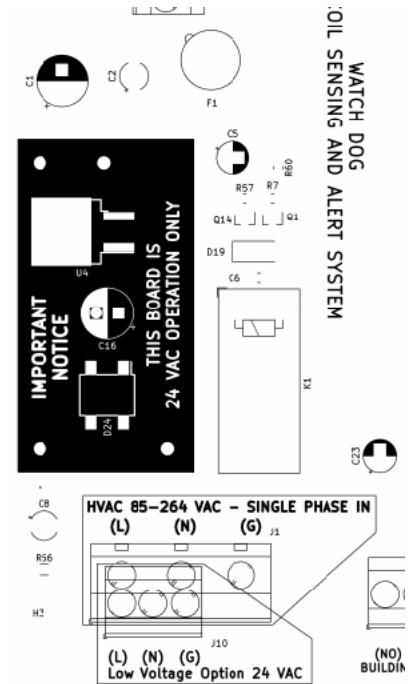


Illustration 7





## OPERATION

For a successful and smooth installation, first make a quick verification of proper connections to the Power Block, Sensor Block, BM Block and insure that the Unit is securely mounted. Following this review, complete the following steps to determine success of the installation.

### Application of Power

At this time, power can be applied from the supply breaker panel.

### Power Up Indicators

Once power is supplied, you should observe the following state:

1. Front Panel Green Power lamp lit.
2. Front Panel Red Alarm lamp lit.
3. Building Management Relay set to Alarm State.
4. Six LED Zone indicators on the PCB are lit.

If this is not the condition, remove power and reassess the connections on the Front Panel Connector, Sensors and VAC.

### System Reset

From the above All Set status, press and release the Front Panel Reset Button once. This should cycle the system to Ready state which is summarized as:

1. Red Front Panel Alarm lamp is no longer lit.
2. Building Management Relay resets to Ready State.
3. Six LED Zone indicators on the PCB are no longer lit.

The system is now in Ready State, or Operational State.

### Sensor Operation

Sensor operation has three tiers of action with Zone Fault indicators, General Fault Indicator and BM Alarm State actuation. All of which should be verified.

### Zone Fault Indicators

On the circuit board, you will note six zone fault indicators which are identified as Zone (1) Fault Indicator to Zone (6) Fault Indicator. These respectively match the six Sensor Blocks and are used to help narrow which zone(s) are at fault. (continued)



(continued) Following system reset, these six indicators should not be illuminated. If one or more is illuminated there is a sensor fault being actively detected on the offending Zone.

## **General Fault Indicator**

As earlier mentioned, this is the Front Panel Red Lamp, which illuminates to indicate that one or more of the Zone Fault indicators has been triggered and that the system is in an Alarm State. A System Reset should clear this condition, also assuming that no Zones are in fault.

## **BM Alarm State Actuation**

Finally, the Building Management output indicates the System state by toggling the relay condition which is connected to the BM Terminal Block.

As mentioned, in Ready State, continuity from (NO) to (C) is open circuit and (NC) to (C) is closed circuit.

During Alarm State, this continuity condition flips to indicate to the BM system that an Alarm Condition exists; hence continuity from (NO) to (C) is now closed and (NC) to (C) is now open.

Following a System Reset, Ready and Alarm states can be induced for testing purposes with the following technique.

At one or more sensor inputs, dip the sensor end into a cup of water or squeeze the two leads simultaneously between a wet finger and thumb. This will simulate a Freeze Event / Valve Deployment and latch a fault in the associated Zone.

A latched fault will light the PCB Zone (n) Fault Indicator LED associated with the trip, Light the Red Front Panel Alarm lamp and toggle the Building Management Relay to Alarm State.

A Reset should clear this state and your installation is ready for Operation.

It is suggested to conduct this test cycle on each Sensor line.

# **TROUBLESHOOTING**

## **Photo Consultation**

After verifying the connection steps above, if standard operation is not achieved, take a photo of both the Front Panel and inside the enclosure. For the inside shot, be sure and get the back side of the front panel which includes the Front Panel Wire bundle.

With those two photos, make a call to our engineering support at (610) 783-1136 and email the photos to [info@cooneycoil.com](mailto:info@cooneycoil.com).



## Fuse

If it appears there is no power to the Circuit Board, as in the case that power is applied and all seven fault indicators did not light, then it may be valid to check the 12 v dc 2A fuse. If there is a blown fuse, it is best to make a visual inspection to determine cause. When this condition is cured, a new fuse may be reinstalled.

Replacement fuses can be commonly purchased from sources such as Digikey.

Replacement part number:

1 Fuse      2 Amp Fuse      WK4957BK-ND      Littlefuse

## ACCESSORIES

### Mounting Hardware

Mounting Hardware is provided in a separate package and included for potential wall mounting applications. Illustration 8 shows this accessory for easy identification.



Illustration 8

## CONTACT US

For additional questions and engineering support contact us:

**(610) 783-1136**

**info@cooneycoil.com**

**Cooney Engineered Solutions**

**20130 Valley Forge Circle**

**King of Prussia, PA | 19406**