

## Installation Manual: PAD200-DUCTR Analog Addressable Duct Detector

### NOTICE TO THE INSTALLER

This manual provides an overview and the installation instructions for the PAD200-DUCTR module. This module is only compatible with addressable fire systems that utilize the PAD Addressable Protocol.

All terminals are power limited and should be wired in accordance with the requirements of NFPA 70 (NEC) and NFPA 72 (National Fire Alarm Code). Failure to follow the wiring diagrams in the following pages will cause the system to not operate as intended. For further information, refer to the control panel installation instructions.

The module shall only be installed with listed control panels. Refer to the control panel installation manual for proper system operation.

### 1. Description

The PAD200-DUCTR duct smoke detector provides early detection of smoke and products of combustion present in the air moving through HVAC ducts in commercial, industrial and residential applications. The PAD200-DUCTR is designed and built to meet all local requirements, as well as the NFPA regulations regarding duct smoke detectors.

Air sampling is accomplished by two tubes which protrude into the duct. An exhaust tube of one standard length (7") is supplied in the installation kit with the smoke duct unit. Once the duct width has been determined, the air intake sampling tubes must be ordered. Sampling tubes are supplied in three standard lengths: 2.5 ft., 5 ft., and 10 ft. and cut to size to fit the duct. Mounting the duct smoke unit is accomplished by the use of a template and 2 sheet metal screws, which are provided. Mounting can be achieved without the removal of the clear cover which is secured by 4 capture screws.

### 2. Setting the Address

All PAD protocol detectors and modules require an address prior to connection to the panel's SLC loop. Each PAD device's address (*i.e.*, *detector and/or module*) is set by changing the dip switches located on the device. PAD device addresses are comprised of a **seven (7) position dip switch** used to program each device with an address ranging from 1–127.

Figure 1. PAD Device Dip Switch Addresses Table (Addresses 1–127)

1	2	4	8	16	32	64	1	2	4	8	16	32	64	1	2	4	8	16	32	64	1	2	4	8	16	32	64	1	2	4	8	16	32	64
1							27							53							78					103								
2							28							54							79					104								
3							29							55							80					105								
4							30							56							81					106								
5							31							57							82					107								
6							32							58							83					108								
7							33							59							84					109								
8							34							60							85					110								
9							35							61							86					111								
10							36							62							87					112								
11							37							63							88					113								
12							38							64							89					114								
13							39							65							90					115								
14							40							66							91					116								
15							41							67							92					117								
16							42							68							93					118								
17							43							69							94					119								
18							44							70							95					120								
19							45							71							96					121								
20							46							72							97					122								
21							47							73							98					123								
22							48							74							99					124								
23							49							75							100					125								
24							50							76							101					126								
25							51							77							102					127								
26							52																											

Note: Each "gray" box indicates that the dip switch is "On," and each "white" box indicates "Off."

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The examples shown below illustrate a PAD device's dip switch settings: the 1st example shows a device *not addressed* where all dip switch settings are in the *default "Off" position*, the 2nd illustrates an *addressed PAD device* via the dip switch settings.

**Figure 2. Examples of PAD Device Showing Default Dip Switch Setting (Unaddressed) & Addressed PAD Device**



Before connecting a device to the SLC loop, take the following precautions to prevent potential damage to the SLC or device.

- Power to the SLC is removed.
- Field wiring on module is correctly installed.
- Field wiring has no open or short circuits.

### 3. Technical Specifications

Duct Detector Model #	PAD200-DUCTR
Operating Voltage	24.0V
Current Draw	500µA
Detector Head Model	PAD200-DD
Detector Head Type	Photoelectric
Sensitivity Test Method	Self diagnostic test
Air Velocity	100 to 4000 ft./min.
Ambient Temperature	32° to 120° F (0° to 49° C)
Humidity	10% to 85% Relative humidity (non-condensing)
Housing Material	Plastic backbox, clear plastic cover
Finish	Gray backbox with clear cover
Dimensions	13 1/2" L x 4 1/2" W x 2 1/4" D
Maximum Net Weight	2 lbs.
Relay Contact Rating	8A@30VDC, 10A@120VAC, 10A@250VAC
Sampling Tubes	2.5 ft., 5 ft., or 10 ft.
Sampling Tube Part Numbers	2.5' = 1000274, 5' = 1000275, 10' = 1000276

### 4. Wiring Diagrams

The wiring diagrams shown below illustrate how to wire PAD100-DRTS, MS-RA and MS-KA/P/R devices.

**Figure 3. Example of Wiring a PAD100-DRTS**

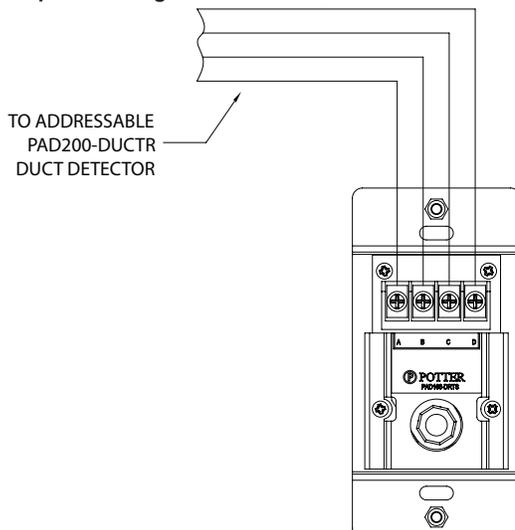


Figure 4. Example of Wiring a PAD100-DRTS

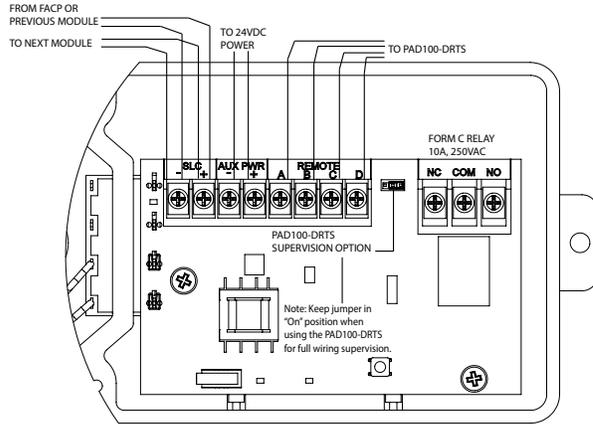


Figure 5. Example of Wiring a MS-RA

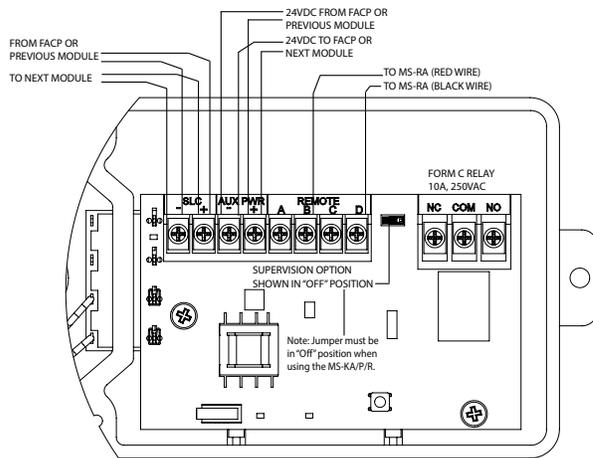
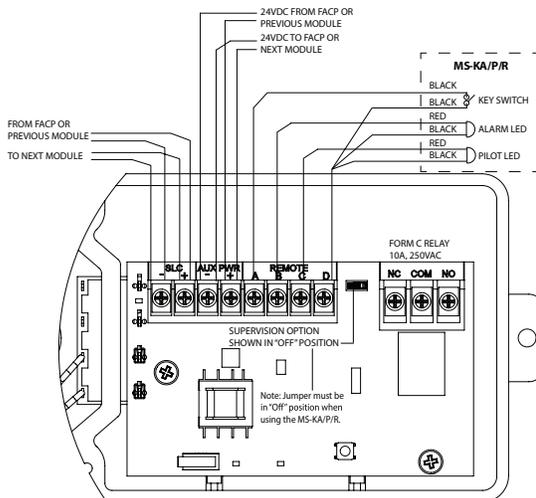


Figure 6. Example of Wiring a MS-KA/P/R



Notes:

- SLC wiring style supports the Class A, Class X and Class B.
- SLC loop wiring and Aux PWR wiring are power limited and supervised.
- All wiring is between #12 (max.) and #22 (min.).
- Wire Preparation – Strip all wires 1/4 inch from their edges as shown here:
  - Stripping too much insulation may cause a ground fault.
  - Stripping too little may cause a poor connection and subsequently an open circuit.



## 5. Mechanical Installation Instructions

**LOCATION PREREQUISITES:** This guideline contains general information on the PAD200-DUCTR duct smoke detector installation, but does not preclude the NFPA and/or ICC documents listed. Potter Electric Signal Company assumes no responsibility for improperly installed duct detectors. To determine the correct installation position for a PAD200-DUCTR duct smoke detector, the following factors must be considered.

- A. A uniform non-turbulent (laminar) airflow between 100 ft/min. to 4,000 ft/min. must be present in the HVAC duct. To determine duct velocities, examine the engineering specifications that define the expected velocities or use an Alnor model 6000AP velocity meter (or equivalent).
- B. To minimize the impact of air turbulence and stratification on performance, a duct smoke detector should be located as far as possible downstream from any obstruction (i.e. deflector plates, elbows, dampers, etc.). In all situations, confirmation of velocity and pressure differential within specifications is required.  
  
The pressure differential between the input sampling high pressure) tube and exhaust (low pressure) tube for the PAD200-DUCTR duct smoke detector should be greater than 0.01 inches of water and less than 1.2 inches of water.
- C. Identify a code compliant location (supply or return side, or both) for the installation of the duct unit that will permit easy access for viewing and serviceability.
- D. When installing on the return side, install duct units prior to the air being exhausted from the building or diluted with outside "fresh" air.
- E. When installing duct smoke units downstream of filters, fires occurring in the filters will be detected, but if the filters become blocked, insufficient air flow through the duct unit will prevent the correct operation of the duct detector. Duct units installed in the supply air side may monitor upstream equipment and/or filters.
- F. Where possible, install duct detectors upstream of air humidifiers and downstream of dehumidifiers.
- G. To prevent false alarms, the duct detector should not be mounted in areas of extreme high or low temperatures, in areas where high humidity exists, or in areas where the duct may contain gases or excessive dust.

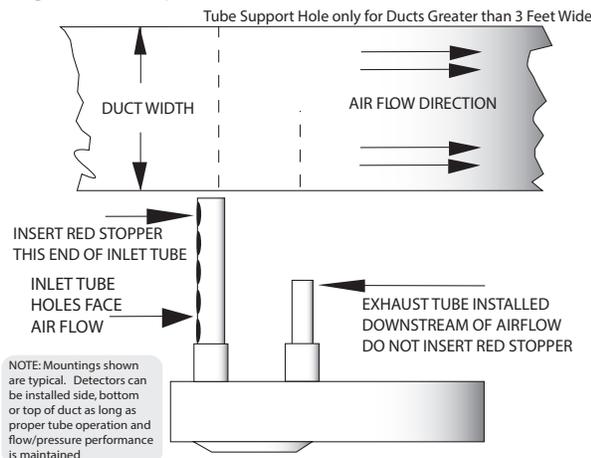
**SAMPLING TUBE ASSEMBLY:** The PAD200-DUCTR duct smoke detectors employ a specially notched sampling tube, which may be ordered separately in one of four (4) standard lengths.

- STN-1.0 For duct widths of 6" TO 1.0'
- STN-2.5 For duct widths of 1.0' TO 3.0'
- STN-5.0 For duct widths of 3.0' TO 5.0'
- STN-10.0 For duct widths of 5.0' TO 10.0'

Standard sampling tubes are steel tubes with air intake holes located the entire length of the tube. These tubes must be cut to length and should span the entire width of the duct. Sampling tubes over 3.0' must be supported on the opposite side of the duct. To ensure the correct operation of the sensing tube, the red end cap (red stopper in installation kit) must be inserted in the end of the air intake sampling tube. For custom duct widths, always use the next longest standard size and cut down to the exact requirement.

**"NO-TOOLS" TUBE INSTALLATION:** The PAD200-DUCTR duct smoke detector provides a unique, patented mechanism for installation and/or removal of the sampling and exhaust tubes from either the front or rear of the detector housing. Once the airflow direction has been determined, insert the inlet and exhaust tubes into the duct smoke detector. If the cover is in place, the tubes may be inserted into the back of the detector via the key-slots provided. Simply push the tube into place against the spring loaded retainer, and turn into the correct position, allowing the key to "lock" the tube in the desired orientation. For front side installation, simply rotate the tube retainer until the tube may be inserted and oriented properly. Once the tube is installed, rotate the retainer back into place to lock down the tube. Ensure air intake sampling tube is positioned so that the inlet holes are directly facing the airflow.

**Figure 7. Example of the PAD200-DUCTR Duct Detector Placement**



**MOUNTING:** After securing the sampling and exhaust tubes to the duct smoke unit, (or initially placing the tubes through the 1¼" holes drilled or punched in the HVAC duct to accept the inlet sampling and exhaust tubes and then attaching them to the duct unit), hold the duct unit assembly in position and use (2) # 12 X ½" sheet metal screws (packaged in the installation kit) to secure the duct smoke detector to the HVAC duct.

**AIR SAMPLING VERIFICATION:** To ensure correct operation of the duct unit use a Magnehelic differential pressure gauge, Dwyer 2000 or 4000 Series (or equivalent) to determine the differential pressure between the inlet (high side) and exhaust (low side) tubes. The differential pressure between the two tubes should be greater than 0.01 inches of water and less than 1.2 inches of water.

**Note:** For proper operation, the velocity adaptor insert must be installed for air velocities of 100 to 4000 feet per minute. This adaptor comes installed but can be removed in order to service the detector head. The adaptor must be reinstalled after the detector head service is complete.

## 6. Operational Testing

When the PAD200-DUCTR is under normal condition in standby mode, the alarm indicator LEDs on the detector head will pulse approximately once every 4 seconds.

**Note:** When a panel is configured to not flash LEDs, the LEDs on the detectors will not flash at any time.

## 7. Functional Testing

**Note:** Be sure to dis-engage all alarm signal services, releasing devices and extinguishing systems, prior to performing the following test, except automatic testing by the FACP. Be sure to re-engage these systems when all testing is complete.

## 8. Walk Test

The FACP must be placed into Walk Test Mode and follow the steps below. Use the appropriate steps outlined below for the detector that is to be tested.

**Notes:**

- Failure to alarm during a test indicates a defective detector. Replace detector immediately.
- PAD200-DUCTR – Use ANSI/UL listed aerosol such as Home Safeguard Model 25S and SDi Smoke Centurion as acceptable to the Authority Having Jurisdiction (AHJ).
- Insert the test gas nozzle into the test port on the unit cover.

## 9. Maintenance

The detector should be cleaned as needed. Detectors installed in environments more prone to dust may need cleaning based on build-up of dust. Clean unit by removing cover and using soft cloth, vacuum or dry compressed air. Clean sensing tubes as needed to allow for the free flow of air through both inlet and exhaust tubes.

Consult your local code and AHJ requirements for required maintenance schedules.

**These instructions do not purport to cover all the details or variations in the equipment described, nor provide for every possible contingency to be met in connection with installation, operation and maintenance.**

**Specifications subject to change without prior notification.**

**For Technical Assistance contact Potter Electric Signal Company at 866-956-1211.**

**Actual performance is based on proper application of the product by a qualified professional.**

**Should further information be desired or should particular problems arise, which are not covered sufficiently for the purchaser's purpose, the matter should be referred to a distributor in your region.**

# NOTICE

It is possible that the internal relay in the PAD200-DUCTR may be shipped in the non-normal / activated state. To ensure that the internal relay is set to the normal state, connect the module to the SLC loop and reset the control panel before terminating the wiring to the module's output.