

# Installation Manual: PAD300-DUCTR Analog Addressable Duct Detector

## NOTICE TO THE INSTALLER

This manual provides an overview and the installation instructions for the PAD300-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.

Please refer to NFPA 72 and NFPA 90A for the proper installation of this PAD300-DUCTR module. The module shall only be installed with listed control panels. Refer to the control panel installation manual for proper system operation. This detector is not intended as a substitute for open area protection

## 1. Description

The PAD300-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 PAD300-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	Gray	White	White	White	White	White	27	White	White	White	White	White	White	53	White	White	White	White	White	White	78	White	White	White	White	White	103	White	White	White	White	White	White	
2	White	Gray	White	White	White	White	28	White	White	White	White	White	White	54	White	White	White	White	White	White	79	White	White	White	White	White	104	White	White	White	White	White	White	
3	White	White	Gray	White	White	White	29	White	White	White	White	White	White	55	White	White	White	White	White	White	80	White	White	White	White	White	105	White	White	White	White	White	White	
4	White	White	White	Gray	White	White	30	White	White	White	White	White	White	56	White	White	White	White	White	White	81	White	White	White	White	White	106	White	White	White	White	White	White	
5	White	White	White	White	Gray	White	31	White	White	White	White	White	White	57	White	White	White	White	White	White	82	White	White	White	White	White	107	White	White	White	White	White	White	
6	White	White	White	White	White	Gray	32	White	White	White	White	White	White	58	White	White	White	White	White	White	83	White	White	White	White	White	108	White	White	White	White	White	White	
7	White	White	White	White	White	White	33	White	White	White	White	White	White	59	White	White	White	White	White	White	84	White	White	White	White	White	109	White	White	White	White	White	White	
8	White	White	White	White	White	White	34	White	White	White	White	White	White	60	White	White	White	White	White	White	85	White	White	White	White	White	110	White	White	White	White	White	White	
9	White	White	White	White	White	White	35	White	White	White	White	White	White	61	White	White	White	White	White	White	86	White	White	White	White	White	111	White	White	White	White	White	White	
10	White	White	White	White	White	White	36	White	White	White	White	White	White	62	White	White	White	White	White	White	87	White	White	White	White	White	112	White	White	White	White	White	White	
11	White	White	White	White	White	White	37	White	White	White	White	White	White	63	White	White	White	White	White	White	88	White	White	White	White	White	113	White	White	White	White	White	White	
12	White	White	White	White	White	White	38	White	White	White	White	White	White	64	White	White	White	White	White	White	89	White	White	White	White	White	114	White	White	White	White	White	White	
13	White	White	White	White	White	White	39	White	White	White	White	White	White	65	White	White	White	White	White	White	90	White	White	White	White	White	115	White	White	White	White	White	White	
14	White	White	White	White	White	White	40	White	White	White	White	White	White	66	White	White	White	White	White	White	91	White	White	White	White	White	116	White	White	White	White	White	White	
15	White	White	White	White	White	White	41	White	White	White	White	White	White	67	White	White	White	White	White	White	92	White	White	White	White	White	117	White	White	White	White	White	White	
16	White	White	White	White	White	White	42	White	White	White	White	White	White	68	White	White	White	White	White	White	93	White	White	White	White	White	118	White	White	White	White	White	White	
17	White	White	White	White	White	White	43	White	White	White	White	White	White	69	White	White	White	White	White	White	94	White	White	White	White	White	119	White	White	White	White	White	White	
18	White	White	White	White	White	White	44	White	White	White	White	White	White	70	White	White	White	White	White	White	95	White	White	White	White	White	120	White	White	White	White	White	White	
19	White	White	White	White	White	White	45	White	White	White	White	White	White	71	White	White	White	White	White	White	96	White	White	White	White	White	121	White	White	White	White	White	White	
20	White	White	White	White	White	White	46	White	White	White	White	White	White	72	White	White	White	White	White	White	97	White	White	White	White	White	122	White	White	White	White	White	White	
21	White	White	White	White	White	White	47	White	White	White	White	White	White	73	White	White	White	White	White	White	98	White	White	White	White	White	123	White	White	White	White	White	White	
22	White	White	White	White	White	White	48	White	White	White	White	White	White	74	White	White	White	White	White	White	99	White	White	White	White	White	124	White	White	White	White	White	White	
23	White	White	White	White	White	White	49	White	White	White	White	White	White	75	White	White	White	White	White	White	100	White	White	White	White	White	125	White	White	White	White	White	White	
24	White	White	White	White	White	White	50	White	White	White	White	White	White	76	White	White	White	White	White	White	101	White	White	White	White	White	126	White	White	White	White	White	White	
25	White	White	White	White	White	White	51	White	White	White	White	White	White	77	White	White	White	White	White	White	102	White	White	White	White	White	127	White	White	White	White	White	White	
26	White	White	White	White	White	White	52	White	White	White	White	White	White																					

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

# INSTALLATION MANUAL: PAD300-DUCTR ANALOG ADDRESSABLE DUCT DETECTOR

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 #	PAD300-DUCTR
Operating Voltage	24.0V
Current Draw	500µA
Aux Power Voltage	24VDC
Aux Power Current Draw	30mA at Standby and 55mA at Alarm
Detector Head Model	PAD300-DD
Detector Head Type	Photoelectric
Sensitivity Test Method	Self diagnostic test
Air Velocity	300 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**

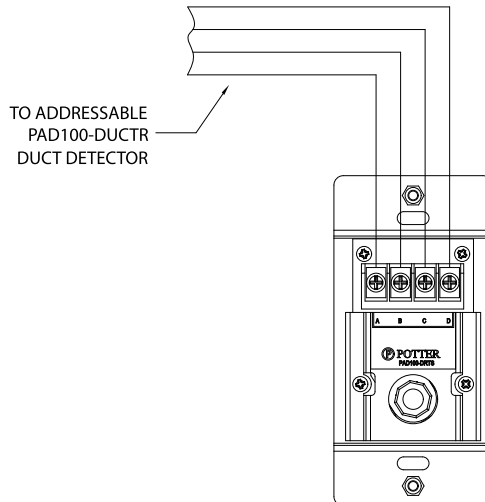


Figure 4. Example of Wiring a PAD100-DRTS

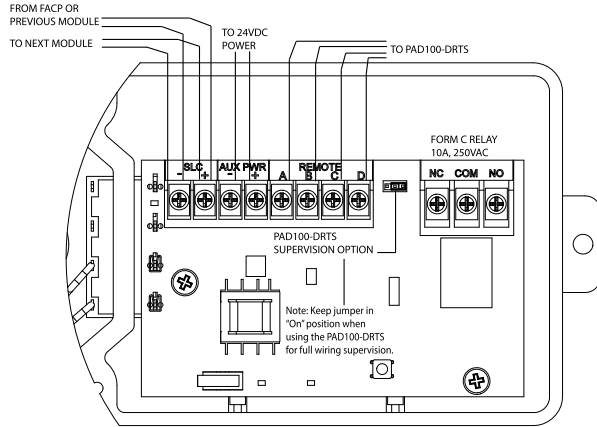


Figure 5. Example of Wiring a MS-RA

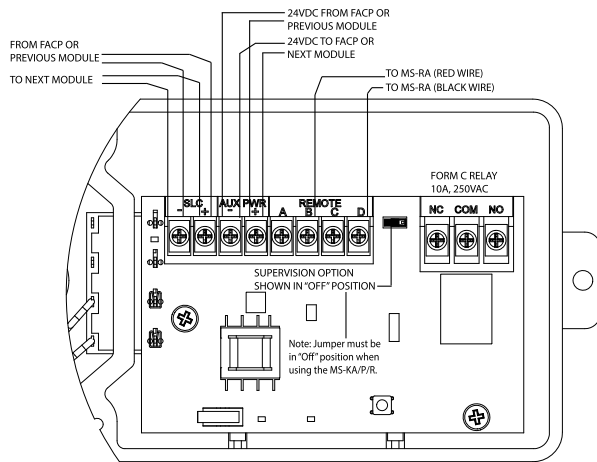
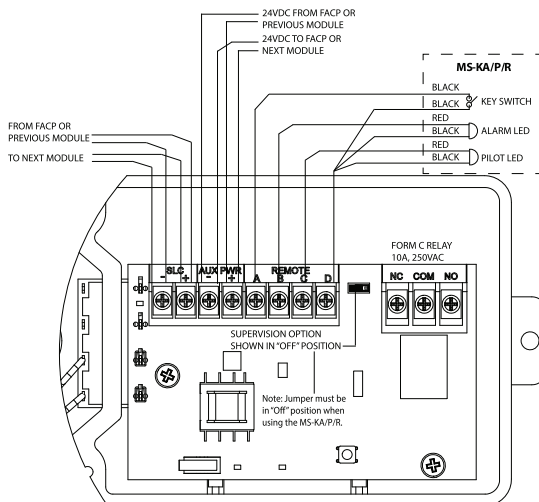


Figure 6. Example of Wiring a MS-KA/P/R



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 PAD300-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 PAD300-DUCTR duct smoke detector, the following factors must be considered.

- A. A uniform non-turbulent (laminar) airflow between 300 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 PAD300-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.

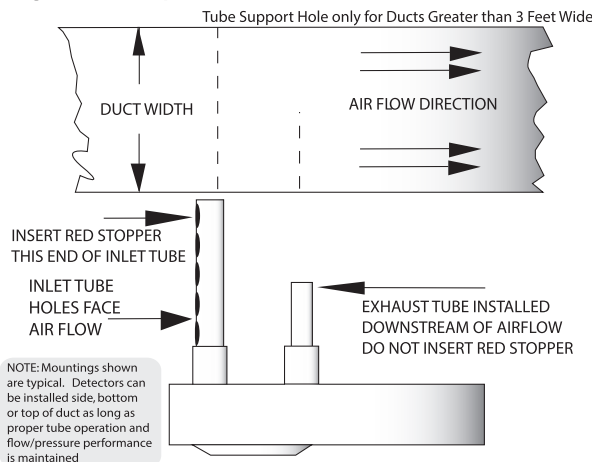
**SAMPLING TUBE ASSEMBLY:** The PAD300-DUCTR duct smoke detectors employ a specially notched sampling tube, which may be ordered separately in one of four (4) standard lengths.

- 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 PAD300-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 PAD300-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 300 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 DUCT and DUCTR are under normal conditions 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.
- DUCT and 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 PAD300-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.