

FENWAL[®]

Smoke Detector PSD – 2 & 4 Wire Units

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Detector Bases (2- and 4-Wire)

for Smoke and Electronic Heat Detectors

Installation Instructions

70.104

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PURPOSE

This document provides instructions for mounting and wiring 2-Wire and 4-Wire Detector Bases that are used with the Smoke and Heat Detectors listed in the table below. The table also indicates the Detector UL Compatibility Identifier Number in the CID column:

Model	CID	Description
CPD-7051	I51FE1	Ionization Smoke Detector - discontinued !!
CPD-7051D	I51FE1	Ionization Smoke Detector - discontinued !!
CPD-7054	I51FE1	Ionization <i>Advanced</i> Smoke Detector (Open Area, Air Velocities 0-300 fpm) - discontinued !!
CPD-7054D	I51FE1	Ionization <i>Advanced</i> Smoke Detector (Open Area, Air Velocities 0-500 fpm) - discontinued !!
PSD-7155	P55FE1	Photoelectric Smoke Detector
PSD-7155P	P55FE1	Photoelectric Smoke Detector
PSD-7155D	P55FE1	Photoelectric Smoke Detector
PSD-7156	P56FE1	Photoelectric Smoke Detector with 135°F Thermal Sensor
PSD-7157	P55FE1	Photoelectric <i>Advanced</i> Smoke Detector (Open Area, Air Velocities 0-300 fpm) - our standard !!
PSD-7157D	P55FE1	Photoelectric <i>Advanced</i> Smoke Detector (Open Area, Air Velocities 0-4000 fpm)
THD-7052	P56FE1	Heat Detector (135°F Fixed Temperature & 15°F Rate-Of-Rise)
THD-7053	P56FE1	Heat Detector (135°F Fixed Temperature)

Models CPD-705X are dual chamber Ionization Smoke Detectors that sense visible and invisible products of combustion.

Models PSD-715X are optical Photoelectric Smoke Detectors that respond to a broad spectrum of both flaming and smoldering fire conditions.

Models THD-705X are thermistor-based electronic Heat Detectors with a 135°F (57°C) Fixed Temperature set point. The Model THD-7052 has a Rate-Of-Rise of temperature detection feature rated at 15°F (8.3°C) per minute.

All detectors are designed for 2-Wire and 4-Wire installation using the appropriate Detector bases. The Smoke and Heat Detectors are UL Listed for Open Area Protection applications per UL 268 and UL 521 respectively. Detectors may also be installed in systems intended for Releasing Device Service through use of a compatible Fire Alarm Control Panel.

DETECTOR BASES

MODELS

All the smoke and heat detector models identified above can be mounted on any base listed in the following table. The table also indicates the Base UL Compatibility Identifier Number in the CID column.

Part No.	Model	CID	Description
70-501000-001	2-WIRE	FE51A	2-W Base (Connects to circuit via screw terminals)
70-501000-002	2WRLT	FE52A	2-W Base w/ Remote LED & Test capabilities. Connects to detection circuit via screw terminals. Minimum Alarm Current 15 mA @ 24 VDC.
70-501000-005	2WRB	FE55A	2-W base w/ 2WRM, Remote LED & Test capabilities. Connects to detection circuit via pigtail leads. Minimum Alarm Current 19 mA @ 24 VDC.
70-501000-101	4WRB	N/A	4-W base w/ 4WRM, Remote LED & Test capabilities. Connects to detection circuit via pigtail leads. Minimum Alarm Current 35 mA @ 24 VDC.
70-500000-004	2WRM	N/A	SPDT Relay for 2WRB Bases. Contacts rated 1.0 A, 30 VDC / 0.5 A, 125 VAC.
70-500000-102	4WRM	N/A	SPDT Relay for 4WRB Bases. Contacts rated 1.0 A, 30 VDC / 0.5 A, 125 VAC.
70-501000-003	MA-001	MAFE1	Mechanical Adapter allows CPD-705X & PSD-715X Detectors to physically connect to Base P/Ns 70-201000-001, -002, -003, -005 & DH-22.

ACCESSORIES

Accessories available for the bases identified above are listed in the following table.

Part No.	Model	CID	Description
29-116788-001	-	N/A	EOL Supervisory Relay 24 VDC
06-117883-001	-	N/A	Smoke Detector Test Magnet
70-200000-911	RA-911	N/A	Remote Alarm Indicator
70-200000-914	RA-914	N/A	Remote Alarm Indicator w/ Smoke Detector Test Switch

RATINGS

The ratings for the detector bases are provided in the following table; the UL Compatibility Identifier Number is listed in the CID column.

Detector	Base Model or P/N	CID	Standby Voltage (VDC)	Max. Alarm Current (mA)	Max. Standby Current (µA)	Typical Standby Current (µA)
All Models	2-WIRE	FE51A	10.2 - 36.8	100	70	55
	2WRLT	FE52A	10.2 - 36.8	100	70	55
	2WRB	FE53A	11.4 - 35.0	100	70	55
	2WRB w/ LED	FE55A	11.4 - 35.0	100	70	55
	4WRB	N/A	16.3 - 30.8	100	70	55
All models with MA-001 Mechanical Adapter Base	70-201000-001	FE01A	11.4 - 33.5	100	70	55
	70-201000-002	FE02A	11.4 - 33.5	100	70	55
	70-201000-003	FE03A	11.4 - 33.5	100	70	55
	70-201000-005	FE05A	11.4 - 33.5	100	70	55

Note: Minimum Alarm Impedance = 195 ohms; Maximum Alarm Impedance = 630 ohms.

CONTROL UNIT SELECTION

For a complete list of UL Compatible Listed Control Panels refer Document No. 70.63 Detector-Control Panel Compatibility Listing. As per UL 268 Section 77.3.1(d) and UL 521 Section 54.3.1(d), this document also lists the maximum number of detectors that can be connected to each initiating device circuit of the control unit. This includes any detectors that employ an integral component, such as a relay or sounder that consumes power during an alarm condition.

DETECTOR INSTALLATION

SMOKE DETECTORS - OPEN AREA APPLICATIONS

Spacing

Smoke Detectors are UL Listed to be installed on maximum 30 foot (9.1 m) centers, typically on smooth ceilings up to 15 feet (4.6 m) high and will operate with minimum air circulation. Resultant maximum 900 square foot (83.6 m²) spacing may be used as a reasonable guide for comparable applications. Where special conditions exist (ceiling obstructions, high air exchange rates, etc.), reduced spacing must be used to achieve adequate protection. Computer rooms and other such installations may require spacing with a maximum of 200 square feet (18.6 m²) due to high air exchange rates. For additional information, consult NFPA 72 and the Fenwal Automatic Fire Detection Application Engineering Manual MC-402.

Per UL Listing, open area smoke detectors are intended for mounting on a ceiling not less than 6 inches (152 mm) from a wall, or on a wall not less than 4 inches (102 mm) nor more than 6 inches (152 mm) from the ceiling.

The following locations should always be avoided: areas with excessive exhaust fumes, kitchen areas, near fireplaces or furnace rooms, within three (3) feet of air supply ducts or air diffusers.

Air Velocities

Velocity Ratings of Detectors when used for Open Area protection are as follows:

Model	Open Area (fpm)	Model	Open Area (fpm)
CPD-7051	0 - 300	PSD-7155P	0 - 4000
CPD-7051D	0 - 300	PSD-7155D	0 - 300
CPD-7054	0 - 300	PSD-7156	0 - 300
CPD-7054D	0 - 500	PSD-7157	0 - 300
PSD-7155	0 - 300	PSD-7157D	0 - 4000

Mounting

Bases are mounted directly on the electrical junction boxes (3, 3.5, and 4 inch octagonal; 3 inch round; 4 inch square) without any type of mechanical adapter.

HEAT DETECTORS - OPEN AREA APPLICATIONS

Spacing

For UL/cUL applications, the Detectors are listed to be installed on 70 foot (21.3 m) centers, typically on smooth ceilings up to 15 feet (4.6 m) high and will operate with minimum air circulation. Detectors are intended for mounting on a ceiling not less than 35 feet (10.7 m) from a wall or partition.

For FM applications, the listed spacing is 35 foot x 35 foot (10.7 m x 10.7 m). Where special conditions exist (ceiling obstructions, etc.), reduced spacing must be used to achieve adequate protection.

As per UL 521 Section 55.2, in order to minimize the possibility of false alarms, detectors shall not be mounted in a location where the thermal air path to it may be obstructed. For additional information, consult the Fenwal Automatic Fire Detection Application Engineering Manual MC-402, NFPA-72 and the local AHJ.

Mounting

Bases are mounted directly on the electrical junction boxes (3, 3.5, and 4 inch octagonal; 3 inch round; 4 inch square) without any type of mechanical adapter.

SMOKE DETECTORS - DUCT APPLICATIONS

General

The NFPA states that Duct Smoke Detectors must not be used as a substitute for open area protection. Duct detection is intended for use in the control of air handling equipment for the purpose of closing dampers or shutting down of air handling units. A Model RA 914 Remote Test Station must be used in conjunction with all detectors used in ducts. This limits the types of bases that may be used to the 2WRLT, 2WRB and 4WRB. See Figures 2 through 5 for wiring details.

Pre-installation Rules

Fenwal recommends actual measurements of the air flows and examination of engineering specifications that define expected velocities in all models of equipment used to determine if a location is suitable for air duct detection operation. An Alnor Instrument Co., Chicago, IL Model 6000P Velometer, or equivalent may be used to check the duct air velocity.

Air Velocities

Velocity Ratings of Detectors when used for In-Duct applications are as follows:

Model	In-Duct (fpm)	Model	In-Duct (fpm)
CPD-7051	500 - 2000	PSD-7155P	500 - 4000
CPD-7051D	500 - 2000	PSD-7155D	500 - 4000

Installation Rules

1. Refer to NFPA 72 Appendix-A for detector installation requirements.
2. Locate Detectors approximately 6-duct widths downstream from bends or inlets. These locations are fairly uniform in non-turbulent airflow and homogenous with respect to air/smoke mixing.
 - Exception:** Where it is physically impossible to locate the detector accordingly, the detector can be positioned closer than 6-duct widths, but as far as possible from the opening, bend or deflection plates.
3. Locate duct detectors so that dampers do not restrict air flow at the detector location.
4. Locate air duct detectors on the return duct of the equipment's air handling system. However, detectors should not be installed in the return air damper branch.
5. Locate detectors on branch lines if close identification of the source of alarm is required.
6. Locate detectors on the downstream side of filters to sense fires in the filters. However, it should be noted that should the filters block the air flow, sufficient air flow may no longer be present for proper operation of the duct detector.
7. Locate detectors, whenever possible, where they can be conveniently observed and readily serviced.
8. Locate detectors in return air ducts ahead of mixing areas.
9. Do not locate detectors immediately following outside air inlets except to monitor smoke entry to the handling system from an adjacent area.
10. When possible, locate detectors upstream of air humidifiers and downstream of dehumidifiers.

INSTALLATION AND WIRING NOTES AND CAUTIONS

1. To ensure proper installation of the detector head to the base, be sure wires are properly dressed at installation. Position all wires flat against the base. Take all slack in the outlet box. Route wires away from connector terminals.
2. If the supplied jumper wire has been installed between terminals 6 and 7 (by inserting the jumper into the holes provided in the contact blades of terminals 6 and 7) to test detector loop continuity, be sure to remove the jumper before installing the detector head.
3. Do not loop wire under Terminal 1. Break wire run to provide supervision of connections.
4. Observe detector polarity when using LED return wire and when using Remote Test option.
5. All relays are shown in normal position (POWER ON). Ratings of Auxiliary contacts are as specified in DETECTOR BASES.
6. The end-of-line supervisory device shall be compatible with the control unit used. The end-of-line supervisory relay utilized shall be and rated for the DC supply voltage used. The Fenwal end of line relay P/N 29-116788-001 is rated for 24 VDC operation.
7. When detectors employ the 2WRB base with relay, all detectors on a loop must be equipped with this option and all must be interconnected to perform a common function.
8. Model RA-911 P/N 70-200000-911 Remote LEDs can be installed with both Smoke (CPD & PSD) and Heat (THD) Detectors.
9. Model RA-914 P/N 70-200000-914 Remote Test Switches can be installed only with Smoke (CPD & PSD) Detectors.
10. Do not install detector heads until the area has been thoroughly cleaned of construction debris, dust, etc.
11. As per UL 268 Section 77.1.7, Smoke Detectors are not to be installed with detector guards unless the combination has been evaluated and found suitable for that purpose.

WIRING DIAGRAMS

Figures 1, 2, 3 and 4 are typical wiring diagrams of 2-Wire Detector systems and Figure 5 shows a 4-Wire detector system (field wiring is shown dashed).

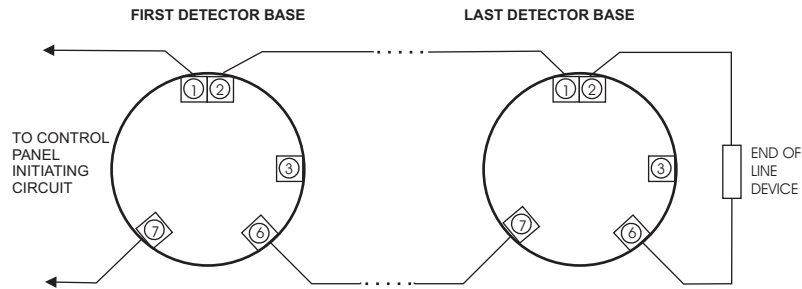


Figure 1. Detector Using 2-Wire Base (Less Options)

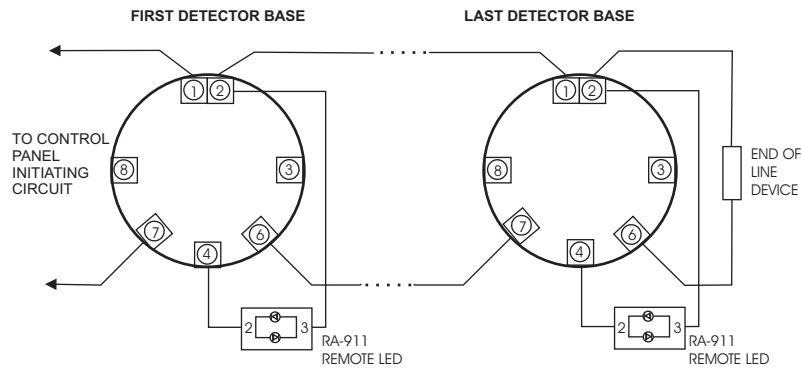


Figure 2. Detector Using 2-Wire 2WRLT Base with Remote Indicator Option

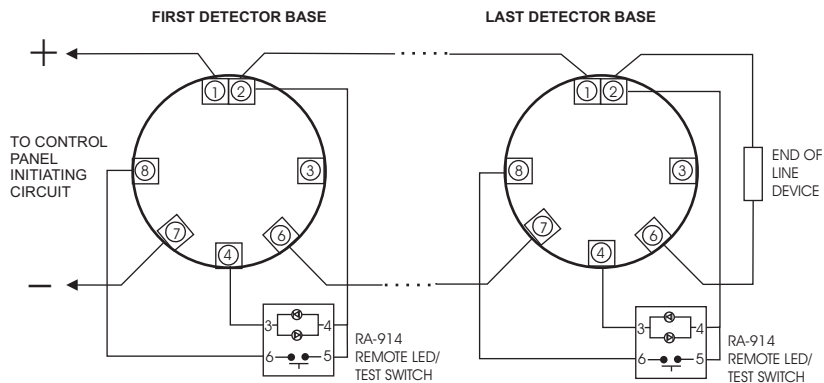


Figure 3. Detector Using 2-Wire 2WRLT Base with Remote Indicator and Remote Test Switch Option

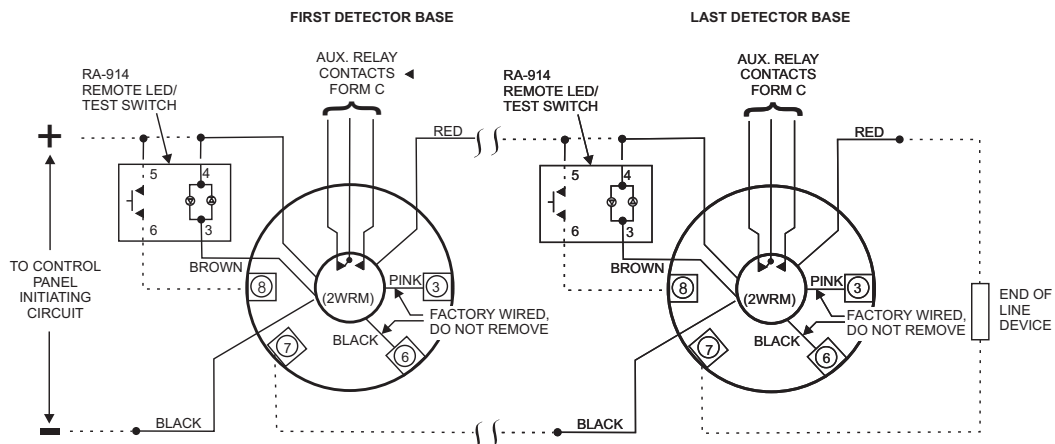


Figure 4. Detector Using 2-Wire 2WRB Base with Relay Module

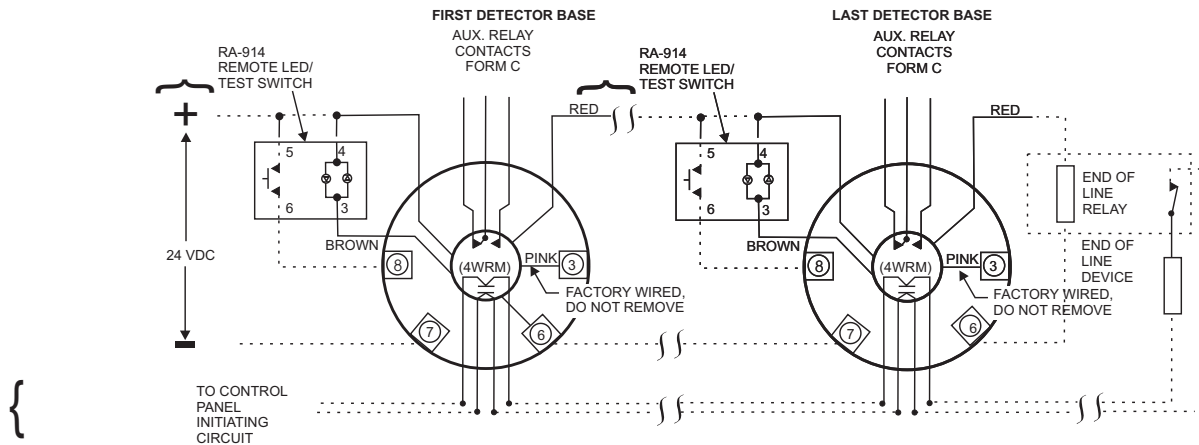


Figure 5. Detector Using 4-Wire 4WRB Base with Relay Module

BASE OPTIONS

LOCKING FEATURE

The detector bases include a locking feature that prevents removal of the detector without using a tool. To eliminate this feature, break off the locking tab shown in Figure 6, then install the detector. To remove the detector from the base once the locking feature has been activated, insert a small screwdriver into the slot on the base to push the plastic tab while simultaneously turning the detector head counterclockwise (see Figure 6).

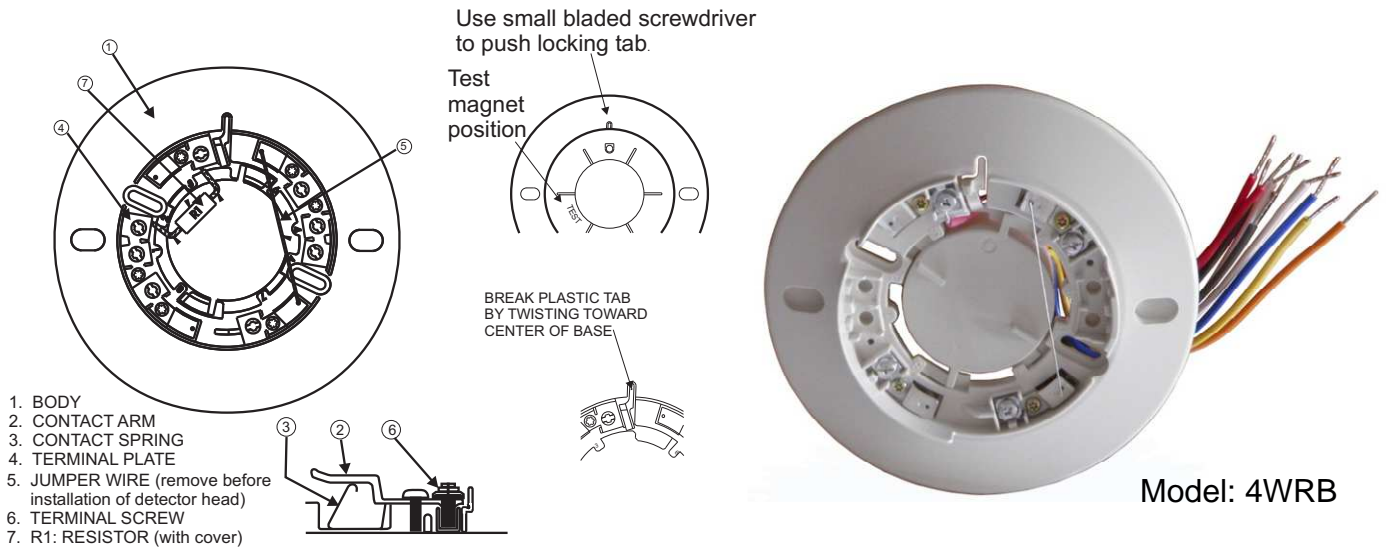


Figure 6. Detector Using 2-Wire Base (Less Options)

RELAY MODULES

Relay Modules are not recommended for stand-alone operation. The installation and allowable configurations of the 2-wire 2WRM and 4 wire 4WRM are as follows:

Model 2WRM

Install a 2WRM into a 2WRLT base to function as a 2WRB as follows:

1. Remove resistors connected to terminals 2 to 3 and 3 to 4 on the 2WRLT base.
2. Insert the 2WRM into the base.
3. Secure into position by twisting clockwise as shown in Figure 7.
4. Wire the 2WRM and base according to Figure 4.
5. Secure the wire under terminals 3 and 4 shown in Figure 7.

Sensor bottom view:



Model 4WRM

Install a 4WRM into a 2WRLT or 2WRB base to function as a 4WRB as follows:

1. Remove resistors connected to terminals 2 to 3 and 3 to 4 if converting the 2WRLT base. Remove the 2WRM if converting the 2WRB.
2. Insert the 4WRM into the base.
3. Secure into position by twisting clockwise as shown in Figure 7.
4. Wire the 4WRM and base according to Figure 5.
5. Secure the wire under terminals 3 and 4 shown in Figure 7.

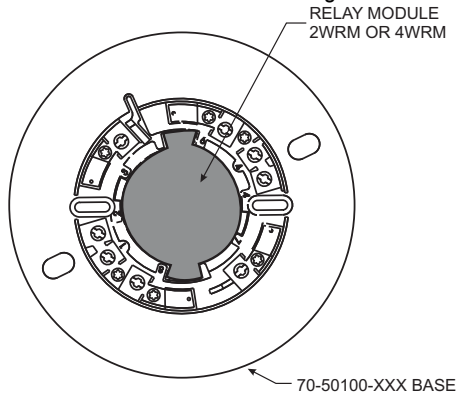


Figure 7. Relay Module

MECHANICAL RETROFIT ADAPTER (MA 001)

The MA-001 (P/N 70-501000-003) is used to allow all old style Fenwal bases (Series 70 201000-XXX) to accept the CPD-705X, PSD-715X and THD-705X detectors. No rewiring is required to retrofit the base. Install as follows:

1. Align the components as shown in Figure 8.
2. Mate the MA-001 to the existing base and twist clockwise to lock in.
3. Mate the new detector to the MA-001 and twist clockwise to secure.

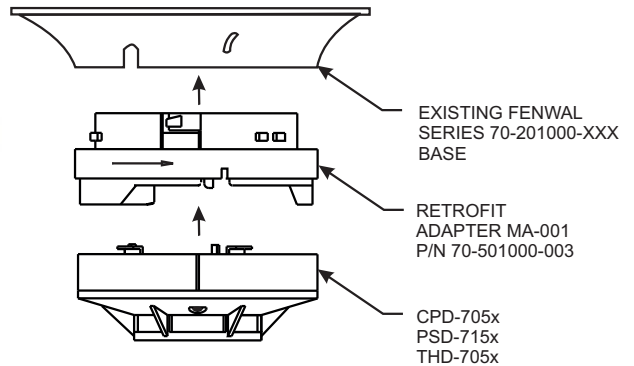


Figure 8. Installing Mechanical Adapter MA-001

DETECTOR TESTING AND SENSITIVITY METERING

FREQUENCY

Testing shall be performed upon installation of the detector and once a year thereafter as stated in NFPA-72 latest edition. Smoke Detector sensitivity shall be metered within one year of installation and every alternative year thereafter as stated in NFPA 72. **The Authority having jurisdiction may dictate which test to perform.**

GO-NO GO TEST FOR SMOKE (CPD & PSD) DETECTORS

Equipment Required

- Test Magnet P/N 06-117883-001, OR
- Canned Smoke

Test Method

1. Disengage Alarm Signal Devices, Releasing Devices and Extinguishing Systems prior to performing the following test.
2. Use extreme caution when using magnet in EDP Facilities. To be safe, notify EDP management of the intent to use a magnet in their facilities.
3. After powering the detector head for approximately 1 minute, check to see that the indicator LEDs flash. Failure to flash indicates a nonfunctioning detector or faulty wiring. Recheck wiring and replace detector head if necessary.

4. Position the long axis of the test magnet against the side of the detector housing marked 'TEST' for at least 15 seconds (See Figure 6). The detector should alarm as indicated by steady illumination of the alarm indicator. To return each detector to normal operation, reset the control unit. OR
5. Allow smoke to enter the detector-sensing chamber for a minimum of 10 seconds. When sufficient smoke has entered the chamber, an alarm will be indicated by continuous illumination of the LED. Reset each detector and/or control unit after it alarms before attempting to test additional detectors in the same zone.
6. Failure to alarm in tests 4 or 5 indicates a detector requiring service.
7. After taking appropriate corrective action, re-engage Alarm Signal Devices, Releasing Devices and Extinguishing Systems and ensure that the entire system is returned back to normal.

SENSITIVITY METERING FOR SMOKE (CPD & PSD) DETECTORS

The equipment and method used to meter Smoke Detector sensitivity is dependent on the Smoke Detector model. Select as follows and refer to the document indicated for additional details:

Tester	Detector Model	Reference Document
ST-001	CPD-7051, CPD-7051D, PSD-7155, PSD-7155P, PSD-7155D, PSD-7156	70.50
DST-003	CPD-7054, CPD-7054D, PSD-7157, PSD-7157D	70-103

HEAT TEST FOR HEAT (THD) DETECTORS

Equipment Required

- Commercially available low powered heat gun

Test Method

1. Disengage Alarm Signal Devices, Releasing Devices and Extinguishing Systems prior to performing the following test.
2. After powering the detector head for approximately 1 minute, check to see that the indicator LEDs flash. Failure to flash indicates a nonfunctioning detector or faulty wiring. Recheck wiring and replace detector head if necessary.
3. Carefully heat the detector for a minimum period of 10 seconds using a low powered heat gun and maintaining a minimum 1-foot distance between its nozzle and the detector. Avoid overheating the detector plastic housing. Use of open flame devices is not recommended as discoloration of the plastic housing is likely and this is a potentially hazardous practice. The detector should alarm as indicated by steady illumination of the alarm indicator LEDs. To return each detector to normal operation, reset the control unit.
4. Failure to alarm in test 3 indicates a defective detector requiring service.
5. After taking appropriate corrective action, re-engage Alarm Signal Devices, Releasing Devices and Extinguishing Systems and ensure that the entire system is returned back to normal.

DETECTOR MAINTENANCE TESTING AND MAINTENANCE

The recommended requirement for detector maintenance consists of an annual cleaning of dust from the detector head by using the suction of a vacuum cleaner. Cleaning programs should be geared to the individual environment in conformance with NFPA 72.



Do not attempt disassembly of the factory sealed smoke or heat detectors. This assembly is sealed for your protection and should not be opened for servicing. Opening of the detector will void its warranty.

SPARE PARTS

Smoke and Heat Detectors and Bases are factory repairable only and have no field serviceable spare parts. No field repair should therefore be attempted. For service, return the device intact to Kidde-Fenwal.

SPECIAL CONSIDERATIONS FOR CPD-705X DETECTORS

The Model CPD-7051, CPD-7051C, CPD-7051D, CPD-7054 and CPD-7054D Detectors contain Americium 241 as the radioactive source. This source is shielded by a stainless steel housing and has a maximum activity of 0.8 microcuries (29.6 kBq).

DETECTOR DISPOSAL

The United States Nuclear Regulatory Commission (USNRC) allows the user of Americium 241 filled smoke detectors to dispose of them without obtaining a license.

Under the Code of Federal Regulations, Part 10 (10CFR), Paragraph 30.20, any person receiving, using, owning, etc., by-product material in detectors designed to protect life or property from fires or airborne hazards is automatically granted a general license which, conversely, exempts them from a specific license, thereby allowing them to both receive and dispose of smoke detectors without returning to the manufacturer.

ORDERING INFORMATION

DETECTOR HEADS - IONIZATION SMOKE

Part No.	Model	Description
70-510000-001	CPD-7051	Ionization Smoke Detector (UL) all CPD Models are discontinued !!!
70-540000-001	CPD-7054	Ionization <i>Advanced</i> Smoke Detector (cUL _{US})
70-540000-002	CPD-7054D	Ionization <i>Advanced</i> Smoke Detector (cUL _{US})

DETECTOR HEADS - PHOTOELECTRIC SMOKE

Part No.	Model	Description
71-550000-001	PSD-7155	Photoelectric Smoke Detector (UL)
71-550000-002	PSD-7155P	Photoelectric Detector for Air Velocities up to 4,000 fpm (UL)
71-560000-001	PSD-7156	Photoelectric Detector with 135F Thermal Sensor (UL)
71-570000-001	PSD-7157	Photoelectric Advanced Smoke Detector (cUL_{us})
71-570000-002	PSD-7157D	Photoelectric <i>Advanced</i> Smoke Detector (cUL _{us})

DETECTOR HEADS - HEAT

Part No.	Model	Description
70-520000-001	THD-7052	135°F Fixed Heat Detector w/ 15°F Rate-Of-Rise (cUL _{us})
70-530000-001	THD-7053	135°F Fixed Heat Detector (cUL _{us})

DETECTOR - BASES

Part No.	Model	Description
70-501000-001	2-WIRE	2 Wire Standard Base
70-501000-002	2WRLT	2 Wire Base with Remote LED & Test Capabilities
70-501000-005	2WRB	2 Wire Base with Auxiliary Relay, Remote LED & Test
70-501000-101	4WRB	4 Wire Base with Auxiliary Relay, Remote LED & Test
70-500000-004	2WRM	Spare 2 Wire Relay Module
70-500000-102	4WRM	Spare 4 Wire Relay Module

DETECTOR - ACCESSORIES

Part No.	Model	Description
06-117883-001	-	Test Magnet
29-116788-001	-	EOL Supervisory Relay
70-200000-911	RA-911	Remote Alarm Indicator
70-200000-914	RA-914	Remote Alarm Indicator w/ Smoke Detector Test Switch
70-500000-002	ST-001	Smoke Detector Sensitivity Tester
70-500000-003	DST-003	Wireless Infrared Smoke Detector Sensitivity Tester
70-501000-003	MA-001	Mechanical Retrofit Adapter



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These instructions do not purport to cover all the details or variations in the equipment described, nor do they provide for every possible contingency to be met in connection with installation, operation and maintenance. All specifications subject to change without notice. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to KIDDE-FENWAL, INC., Ashland, MA 01721.