SIEMENS

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Inspections Division
Approved with Conditions

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Installation Instructions
Models FDBZ492, FDBZ492-R and FDBZ492-HR

Air Duct Monitoring Housings

INTRODUCTION

Models FDBZ492, FDBZ492-R and FDBZ492-HR from Siemens Industry, Inc., are air duct monitoring housings containing sampling tubes. When used with a compatible smoke detector, smoke and combustion products are detected for shutdown of the duct system and/or operation of supplementary equipment as provided by the system control panel. See the following chart for usage.

Model	Compatible Detectors	Relay
FDBZ492	PE-11/-11C, FP-11/-11C, HFP-11, HFPO-11, SFP-11*, SFPO-11*, 8854, 8713, 8710, OP121, FDO421, FDOOT441, FDOOTC441, OP921, OOH941, OOHC941	No
FDBZ492-R	PE-11/-11C, 8854, OP121	Yes
FDBZ492-HR	FP-11/-11C, HFP-11, HFPO-11, SFP-11*, SFPO-11*, 8713, 8710, FDO421, FDOOT441, FDOOTC441, OP921, OOH941, OOHC941	Yes

NOTE **For compatible control equipment, see charts on the page 14 of this manual.**

TECHNICAL DATA

AIR DUCT CONDITIONS

Temperature Range:
PE-11/-11C, FP-11/-11C, HFP-11, HFPO-11, SFP-11*, SFPO-11*, 8854, 8710, 8713, FDOOTC441, OOHC941, 32°F (0°C) - 100°F (38°C) per UL 268

OP121, FDOOT441, OOH941, FDO421, OP921, 32°F (0°C) - 120°F (49°C) per UL 268

Altitude Range:
FDBZ492, FDBZ492-R and FDBZ492-HR — No altitude limitations
Relative Humidity Range:
0-95% (non-condensing/non-freezing)
Air Duct Velocity Range:
100-4000 ft/min – FDBZ492, FDBZ492-R and FDBZ492-HR
Sampling Tube Pressure Range of Differences:
Greater than 0.01 and less than 1.2 inches of water column

CAUTION

These air duct detectors are designed for detection and control of products of combustion in a duct system. **They are not to be used for open area protection.**
DO NOT USE air duct detectors with Alarm Verification.

*The SFP-11 and SFPO-11 are approved for use in Canada only.

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ASSEMBLY

This detector has a cover tamper (removal) switches. Care should be installing the cover. Squarely place the cover on the unit to aviod pos the switches.

NOTE

DO NOT SLIDE COVER INTO POSITION.

APPLICATION

The duct smoke detectors provide early detection of smoke and pro tion present in air moving through an HVAC duct supply, return, or both. These devices are designed to prevent the recirculation of smoke in areas by the air handling system's fans and blowers. Complete systems may be shut down in the event of smoke detection.

NOTE

For the correct installation of a duct smoke unit please refer to NFPA 72 (National Fire Alarm Code), NFPA 90A (Standard for Installation of Air Conditioning and Ventilation Systems) and NFPA 92A (Recommended Practice for Smoke Control Systems).

OPERATION

When the Models FDBZ492, FDBZ492-R and FDBZ492-HR are operating, a sample of air is drawn from the duct and passed through the sampling chamber by means of the input sampling tube. The air sample passes through the smoke detector mounted in the duct housing and is exhausted back into the duct through the outlet tube.

This detector is equipped with cover removal switches (SW1, SW2) that instantly provides a trouble condition upon removal of the clear cover. For all testing and inspection with the cover removed, the cover removal switches (designated as SW1, SW2 on PCB) must be manually depressed to simulate normal operation.

LED Indicator

The FDBZ492, FDBZ492-R and FDBZ492-HR contain an LED indicator (located on the smoke detector) capable of flashing either one of three distinct colors: green, yellow, or red. During each flash interval, the microprocessor based detector checks the following:

- for smoke in its sensing chamber
- that its critical smoke sensing electronics are operating.

Based on the results of these checks, the LED indicator flashes as follows:

Flash Color	Condition	Flash Interval (Seconds)				
		PE-11/ PE-11C-/8854	FP-11/FP-11C/ HFP-11/HFPO-11/ SFP-11/SFPO-11/ 8710/8713	OP121	FDO421/OP921	FDOOT441/ FDOOTC441/-OOH941/ OOHC941
Green	Normal supervisory operation.	7	4	10	8	10
Yellow	Detector requires service (cleaning or repair) or is operating beyond its environmental specifications.*	7-30	4	5	4	4
Red	Alarm	2½	4	2½	1	1
No Flashes	Detector is not powered, or requires repair/replacement.	-	-	-	-	-

***Note:** OP121, FDO421, OP921, FDOOT441, FDOOTC441, OOH941, OOHC941 detectors are not serviceable and need replacement.

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Figure 1
Typical Mounting of Duct Housing

Figure 2
Recommended Locations in Duct Systems

MOUNTING THE AIR DUCT HOUSING

Location on Duct System

This guideline contains general information on duct smoke detector installation, but does not preclude the NFPA documents listed. Siemens Industry, Inc. assumes no responsibility for improperly installed duct detectors. To determine the correct installation position for a duct smoke detector, the following factors must be considered.

1) 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).

2) 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 outlet (low pressure) tube for the smoke duct detector should be greater than 0.01 inches of water and less than 1.2 inches of water.

3) 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.

4) When installing on the return side, install duct units prior to the air being exhausted from the building or diluted with outside "fresh" air.

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5) When installing duct smoke units downstream of filters, fi the filters will be detected, but if the filters become blocke flow through the duct unit will prevent the correct operatio detector. Duct units installed in the supply air side may mc equipment and/or filters.

6) Where possible, install duct detectors upstream of air hum downstream of dehumidifiers.

7) 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.

Duct Preparation

The Air Duct Housings come with an installation kit that contains the following items:

- Short return (outlet) sampling tube
- Stopper
- Two #12 x 3/4" sheet metal screws
- Mounting template (packaged separately)

Remove mounting template from the installation kit. Remove paper backing from the mounting template and affix it to the duct at the desired location. Using the template as a guide, drill (2) mounting holes, 3/32" (2.5mm) for the #12 X 3/4" sheet metal screws packaged in the installation kit. Drill or punch (2) 1¼" (32mm) holes for input sampling and outlet tubes, using the template as a guide. Clean all holes.

Sampling Tube Installation

The duct smoke detectors use a specially notched sampling tube, which may be ordered separately in one of four standard lengths.

ST-10	For duct widths of 6" to 1.0'
ST-25	For duct widths of 1.0' to 3.0'
ST-50	For duct widths of 3.0' to 5.0' (requires support)
ST-100*	For duct widths of 5.0' to 10.0' (requires support)

* This model is supplied as two 5 ft. sections with a coupling.
Assembly is required for installation.

NOTE

Each model is manufactured with a different number and size of sampling holes. Only the specific tube must be used for the specified duct width.

Standard sampling tubes are steel tubes with air intake holes drilled the entire length of the tube. These tubes can be cut to length and must span at least 80% the width of the duct. Sampling tubes over 3.0' must be supported on the opposite side of the duct. To ensure the correct operation, the red stopper (stopper in installation kit) must be inserted in the end of the air input sampling tube. If the input tube protrudes through the opposite side of the duct, the opening around the tube must be sealed. For custom duct widths, always use the next longest standard size and cut down to the exact requirement.

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NOTE: Mountings shown are typical. Detectors can be installed side, bottom or top of duct as long as proper tube operation and flow/pressure performance is maintained.

Figure 3
Sampling Tube Orientation

Once the airflow direction has been determined (refer to Figure 3), insert the input and outlet tubes into the duct housing.

1. Remove the cover from the housing.
2. Loosen the screw and rotate the tube retainer until the input tube is inserted and oriented properly. Ensure that the notched end of the tube is inside the housing and that the air input sampling tube is positioned so that the input holes are directly facing the airflow.
3. Once the tube is installed, rotate the retainer back into place and tighten screw.
4. Install the outlet tube in the remaining position. Once the tube is installed, rotate the retainer back into place and tighten screw.

Mounting

After securing the input and outlet 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 input and outlet tubes and then attaching them to the duct unit), hold the duct unit assembly in position and use (2) # 12 X ¾" sheet metal screws (packaged in the installation kit) to secure the duct smoke detector to the HVAC duct sheet metal.

Air Duct Sampling Tube Pressure Measurement

The Model PDM-3 Pressure Differential Measuring device should be used to ensure that the sampling tube pressure differential is within the specified limits. The differential pressure between the two tubes should be greater than 0.01 inches of water and less than 1.2 inches of water. Qualified personnel should take measurements in accordance with the PDM-3 instructions, P/N 315-085535.

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WIRING

Conduit Knockouts

Determine knockout size required based upon installation wiring. Refe
Select knockout and remove by placing screwdriver at center of knock
a hammer until the knockout breaks out. Clean the hole before installi

Figure 4
Removing the Knockouts

Wiring

The FDBZ492, FDBZ492-R and FDBZ492-HR should be connected as shown in Figures 5, 6, 7 and 8. *Note any limitations on the number of detectors and restrictions on the use of remote devices permitted for each circuit.*

The FDBZ492 is used with the 8854, PE-11/PE-11C, FP-11/FP-11C and OP121. It is also used with the HFP-11/HFPO-11, 8710, 8713 detector in the FireFinder-XLS, FS-250 or MPC6000, 7000 System. The FDBZ492 is also used with the SFP-11/SFPO-11 detector in the FS-250C System. The FDBZ492 is also used with the FDO421, FDOOT441, FDOOTC441, OP921, OOH941, OOHC941 detector in the Desigo and Cerberus Fire Alarm Systems. The FDBZ492-HR must be used for the relay version. Also, all optional accessories in the same loop must be compatible with the detector series being used. These devices should be interconnected as shown in Figure 7 and wired to the DLC, FS-DLC or FDLC. (Refer to the DLC Installation Instructions, P/N 315-033090, or the FS-250, P/N 315-049353, or the FS-250C Manual, P/N 315-049589C, or the MPC-6000/MPC-7000 Manual, P/N 315-447309, as applicable.) The HFP-11, HFPO-11, SFP-11, SFPO-11, 8710, 8713, FDO421, FDOOT441, FDOOTC441, OP921, OOH941, and OOHC941 are polarity insensitive detectors. Line 1 and Line 2 can be either line of the loop. *Note any limitations on the number of detectors and restrictions on the use of remote devices permitted for each circuit.*

WARNING

When replacing a detector with a different model, be aware that existing detector accessories connected to the base or air duct housing that were compatible with the old detector may not be compatible with the new detector. Always read the Installation Instructions accompanying the detector to determine detector and accessory compatibility.

Installation Of Smoke Detectors

To Install:

- Remove cover by loosening the four screws. Take off the cover and set it aside.
- Align detector with base and insert detector.
- Rotate detector clockwise while gently pressing on it until the detector drops fully into base.
- Then rotate the detector clockwise until it stops and snaps in place.
- Replace cover and tighten the four screws.

To Remove:

- Rotate the detector counterclockwise until stop is reached.
- Pull detector out of base.

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TESTING

Only qualified service personnel should test these units. To assu
of the detector and control panel, both the Sensitivity and the F
be conducted. The minimum test schedule may be found in the
NFPA 72 for installations in the U.S. and CAN/ULC-S537, The Ver
Systems, for installation in Canada.

Sensitivity Test

The PE-11/-11C, 8854, OP121 detector monitors its smoke sens
and requires no test equipment. A green flash of the detector LED indicates that the smoke sensitivity is within its listed limits.

NOTE

The following detector models are analog types that must be programmed for the air duct application using the control unit configuration tool; that is, CSG-M, Zeus, FS-CT2, Desigo Programming Tool or Cerberus Programming Tool, as applicable.

To test the FP-11/-11C detector refer to its installation instructions. See Table 9.

To test the HFP-11/HFPO-11/SFP-11/SFPO-11 detector refer to its installation instructions. See Table 9.

These tests ensure that the detector is within its listed and marked sensitivity range. For additional instructions on applying the *Sensitivities* mode, refer to the FireFinder-XLS Manual, P/N 315-033744, the DPU Manual, P/N 315-033260 or the SDPU Manual, P/N 315-033260C.

Functional Test

Smoke Testing

Using P/N 500-649750 TG-11 smoke test canister with testing nozzle model AD-TGN P/N 500-649717 (purchased separately) available from Siemens Industry, Inc., insert the test gas nozzle into the hole in the red plug in the unit cover. Press can against cover for about 1/2 second to release gas into the chamber.

CAUTION

DO NOT SPRAY GAS FOR MORE THAN ½ SECOND. OVERUSE OF TEST GAS MAY RESULT IN DETECTOR CONTAMINATION.

After 15 to 20 seconds the detector will go into alarm, illuminating the detector LED and causing the duct unit functions to operate; alarm relays will change state, and the alarm related remote accessories, if attached, will function.

If no test gas is available to conduct functional testing, remove cover and, while holding down the cover removal switch, blow smoke from a smoldering cotton wick or punk directly at the head to cause an alarm. The alarm indicator on the detector should illuminate within one minute.

NOTES:

1. Up to 30 air duct housings can be installed on one initiating circuit, except as noted in Note 2.
2. When an FDBZ492-R is used to control a fire safety function, the FDBZ492-R must be the ONLY device on the initiating circuit.
3. Do not use looped wire under base terminal.
4. Break wire run to provide supervision of connection.
5. The green grounding screw in the wiring compartment of the air duct housing is not used.
6. Please follow Pin designation in Table 1, 2.

WARNING

If the relay contacts are being used to control 120 VAC operated equipment, ensure that the conduit is properly attached to the internal metal ground strap, using the proper conduit locking nuts. **Failure to provide proper grounding may result in fatal electrical shock and violation of national and local codes.**

Model FDBZ492

For Wiring Information
Refer to Table 1

TABLE 1

TB1 - Pin Designations	Description
7	Not Used
6	Device Loop + / Remote +
5	Device Loop +
4	Not Used
3	Remote Control
2	Device Loop-
1	Device Loop - / Remote -

† SEE REMOTE DEVICE INSTRUCTIONS FOR WIRING DETAILS:

DEVICE	INSTALLATION INSTRUCTIONS
RLC-11, RLW-11	P/N 315-094925
RSAC-11, RSAW-11	P/N 315-094926
FDBZ492-RTL	P/N A610335440

MODEL FDBZ492-R

For Wiring Information
Refer to Table 2

TABLE 2

TB1 - Pin Designations	Description
1	Device Loop +
2	Not Used
3	Device Loop -
4	Device Loop/Rem -
5	Remote Control
6	Device Loop - / Remote +
7	Relay Normally Closed Contact (NC)
8	Relay Common Contact (COM)
9	Relay Normally Open Contact (NO)

MULTIPLE REMOTE DEVICES

If remote devices are supported by the initiating circuit, each detector/base may have up to 2 remote devices with the following configurations and restrictions only:

Remote Device 1	Rem Dev
FDBZ492	RLC-11
FDBZ492	RSAC-11
FDBZ492	FDBZ4

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Figure 5
Typical Connections for the FDBZ492 / FDBZ492-R Using PE-11 / PE-11C, 8854, or OP121 Detectors

NOTES:

1. The relay contacts are shown after a reset pulse, which represents the non-alarm condition.
2. The green grounding screw in the wiring compartment of the air duct housing is not used.
3. Please follow the pin designation on Table 3 - 4.
4. For connection to FDBZ492-RTL only. This allows manual control of the relay output of FDBZ492-HR for testing purposes only. The LED on the FDBZ492-RTL indicates the status of the relay: GRN in supervisory state; RED in alarm state.

WARNING

If the relay contacts are being used to control 120 VAC operated equipment, ensure that the conduit is properly attached to the internal metal ground strap, using the proper conduit locking nuts. **Failure to provide proper grounding may result in fatal electrical shock and violation of national and local codes.**

MODEL FDBZ492

For Wiring Information
Refer to Table 3

TABLE 3

TB1 - Pin Designations	Description
7	Not Used
6	Not Used
5	Remote +
4	Remote -
3	Device Loop -
2	Device Loop +
1	Not Used

MODEL FDBZ492-HR

For Wiring Information
Refer to Table 4

TABLE 4

TB1 - Pin Designations	Description
1	Not Used
2	Not Used
3	Remote +
4	Remote -
5	Device Loop -
6	Device Loop +
7	Not Used
8	Relay Normally Closed Contact (NC)
9	Relay Common Contact (COM)
10	Relay Normally Open Contact (NO)
11	Connection to + Power terminal of FDBZ492-RTL
12	Connection to the Control terminal of FDBZ492-RTL
13	Connection to the - Power terminal of FDBZ492-RTL

Figure 6
Typical Connections for the FDBZ492 / FDBZ492-HR Using FP-11 / FP-11C Detectors

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NOTES:

1. The relay contacts are shown after a reset pulse, which represents the non-alarm condition.
2. Refer to the RL-HW / RL-HC Installation Instructions, P/N 315-033230.
3. The green grounding screw in the wiring compartment of the air duct housing is not used.
4. For polarity insensitive topology, follow the pin designation on Table 5, 6 (Figure 7)
5. For connection to FDBZ492-RTL only. This allows manual control of the relay output of FDBZ492-HR for testing purposes only. The LED on the FDBZ492-RTL indicates the status of the relay: GRN in supervisory state; RED in alarm state.

WARNING

If the relay contacts are being used to control 120 VAC operated equipment, ensure that the conduit is properly attached to the internal metal ground strap, using the proper conduit locking nuts. **Failure to provide proper grounding may result in fatal electrical shock and violation of national and local codes.**

MODEL FDBZ492

For Wiring Information
Refer to Table 5

TABLE 5

TB1 - Pin Designations	Description
7	Not Used
6	Not Used
5	Remote TB1
4	Remote TB3
3	Line 1
2	Line 2
1	Remote TB2

MODEL FDBZ492-HR

For Wiring Information
Refer to Table 6

TABLE 6

TB1 - Pin Designations	Description
1	Not Used
2	Not Used
3	Remote TB1
4	Remote TB3
5	Line 1
6	Line 2
7	Remote TB2
8	Relay Normally Closed Contact (NC)
9	Relay Common Contact (COM)
10	Relay Normally Open Contact (NO)
11	Connection to + Power terminal of FDBZ492-
12	Connection to the Control terminal of FDBZ492
13	Connection to - Power terminal of FDBZ492-I

Figure 7
Typical Connections for the FDBZ492 / FBDZ492-HR Using Compatible Addressable Detectors in Polarity Insensiti

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Refer to the following Installation Instructions for additional infor
each of these detectors:

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TABLE 9

Detector	Installation Instruction
PE-11	315-094198
PE-11C	315-095626
FP-11/-11C	315-095921
HFP-11	315-033290
HFPO-11	315-034800
SFP-11	315-033290C
SFPO-11	315-033290C
FDO421	A6V10323926
FDOOT441	A6V10324655
FDOOTC441	A6V10324657
8854	315-094198FA
OP121	A6V10281367
8710	315-033290FA
8713	315-033290FA
OP921	A6V10323928
OOH941	A6V10324659
OOHC941	A6V10324661

The FP-11, HFP-11, SFP-11, HFPO-11, SPFO-11, 8710, 8713, FDO421, FDOOT441, FDOOTC441, OP921, OOH941, and OOHC941 detectors can also be tested individually using the DPU. Refer to the DPU Manual, P/N 315-033260. The SFP-11 and SFPO-11 detectors can be tested individually using the SDPU. Refer to the SDPU Manual, P/N 315-033260C.

MAINTENANCE

The performance of the air duct detector unit may be adversely affected by dirt or foreign matter on the sampling tubes or detector. If the air holes in the input sampling tube become restricted, the unit cannot receive a proper air sample, and performance is impaired. It is recommended that the sampling tubes be checked and cleaned periodically. The detector maintenance program should consist of periodic cleaning of dust from the detector head by using a vacuum cleaner. For cleaning Models PE-11, PE-11C, FP-11, FP-11C, HFP-11, HFPO-11, SFP-11 or SFPO-11, refer to the detector's Installation Instructions (See Table 9).

The cleaning and test program is recommended for 6 month intervals, or more frequently, if needed, depending on the individual detector environment. Consult your local code and AHJ requirements for required maintenance schedules.

CAUTION

Under no circumstances is the detector portion of the unit to be disassembled by anyone other than an authorized Siemens Industry, Inc. Systems Technician. For service, contact your nearest authorized Siemens Industry, Inc. Service Representative.

CAUTION

If the fire alarm system is connected to a central station or fire department, or operates external devices such as fans, extinguishers, etc., connected, notify appropriate personnel and disconnect the external devices until all tests are completed. After testing, reset the system, reconnect the devices, and notify the personnel that the system is operating again.

COMPATIBLE CONTROL EQUIPMENT

FDBZ492 AND FDBZ492-R USING PE-11/-11C/8854/OP121 DETECTOR

Module Equipment Compatibility Identifier	Module Installation/ Wiring Instructions
CDC-4 (FireFinder-XLS)	P/N 315-034100-8
CP-35 (SYSTEM 3)	P/N 315-084902-22
*CZM-1B6 (MXL, MXL-II)	P/N 315-095355-9
CZM-4 (MXL, MXL-II)	P/N 315-090826-10
HZM (FireFinder-XLS, FS-250, FC2050, FC2025, FC2005, FC922, FC924, FC901)	P/N 315-034850-6
SXL-EX	P/N 315-095997-8
SZE-4X (SXL-EX)	P/N 315-096018-8
SZE-8AX (SXL-EX)	P/N 315-096022-8
*SZM (FS-250C)	P/N 315-034850C-4
ZU-35 (SYSTEM 3)	P/N 315-083222-18
8705 (MPC-6000/MPC-7000)	P/N 315-447309-8

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FDBZ492 AND FDBZ492-R USING FP-11/-11C DETECTOR

Module Equipment Compatibility Identifier	Module Installation/ Wiring Instructions
ALD-2I (MXL, MXL-I)	P/N 315-091464-13
MMB-2 (MXL)	P/N 315-095097-8
MMB-3 (MXL)	P/N 315-048860-7
SMB-2 (MXL-I)	P/N 315-095931-7

FDBZ492 AND FDBZ492-HR USING HFP-11, HFPO-11, 8710, 8713 DETECTOR

Module Equipment Compatibility Identifier	Module Installation/ Wiring Instructions
DLC (FireFinder-XLS)	P/N 315-033090-10
FS-DLC (FS-250)	P/N 315-049353-10
FDLC (MPC-6000/MPC-7000)	P/N 315-447309-8
FC2050, FC2025	P/N A6V10337045
FC2005	P/N A6V10333722
FC922, FC924	P/N A6V10356958
FC901	P/N A6V10336754

FDBZ492 AND FDBZ492-HR USING FDO421, FDOOT441, FDOOTC441, OP921, OOH941, OOHC941 DETECTOR

Module Equipment Compatibility Identifier	Module Installation/ Wiring Instructions
FC2050, FC2025	P/N A6V10337045
FC2005	P/N A6V10333722
FC924, FC922	P/N A6V10356958
FC901	P/N A6V10336754

FDBZ492 AND FDBZ492-HR USING SFP-11 OR SFPO-11 DETECTOR

Module Equipment Compatibility Identifier	Module Installation/ Wiring Instructions
FDLC (FS-250C)	P/N 315-049589C-1

The detector model number is the compatibility identifier.

*Control equipment does not support remote accessories; e.g., lamps or relays.

ELECTRICAL RATINGS FOR PE-11/-11C, 8854, OP121

Voltage	16-27 VDC
Ripple	3V peak-to-peak
Supervisory Current	110 uA max.
Start-up Time	50 seconds max.

	PE-11/-11C Detector	PE-11/-11C Detector + Remote Device
Alarm Current	33 - 50mA	50 - 70mA

ELECTRICAL RATINGS FOR HFP-11, HFPO-11, SFP-11, SFPO-11, 8710, 8713, FDO421, FDOOT441, FDOOTC441, OP921, OOH941, OOHC941

Electrical ratings are not provided here for these detectors. Guidance for detector loop loading, along with loop wire electrical specifications are provided in the applicable control unit instructions given in the above Compatible Control Equipment tables.