400 Series Plug-in Smoke Detector

SYSTEM SENSOR ®

Models Available

1451	Ionization Detector
1451A	Ionization Detector, ULC Listed
2451	Photoelectronic Detector
2451A	Photoelectronic Detector, ULC Listed
2451TH	Photoelectronic with Thermal
5451	Thermal Rate-of-Rise

SSV120-6

Product Overview

Low standby current

Two visible LEDs "blink" in standby and provide a 360° field viewing angle

Wide variety of mounting bases with built-in shorting spring

Detector head plugs easily into base

Built-in test switch

Field sensitivity metering of detector to meet the requirements of NFPA 72

Built-in tamper-resistant feature

SEMS screws for easy wiring

Optional recessed mounting

Removable cover and insect screen for field cleaning

UL LISTED

ULC

FM APPROVED

MEA approved

MSFM approved

System Sensor's 400 Series plug-in smoke detectors are designed to meet the performance criteria designated by UL/ULC. The ion and photo units have a sensing chamber sealed from back pressure air flow, dirt, and insects. This chamber is protected by a fine mesh screen which can be cleaned or replaced. Additional key features include a recessed mounting option, interchangeable ion, photo, or thermal detectors, a variety of mounting bases, and a full line of optional accessories.

Ionization. All 400 Series ionization smoke detectors include a specially designed dual source, dual unipolar detector chamber design which will sense the presence of smoke particles produced by fast combustion as well as slow smoldering fires. This chamber exhibits increased stability, significantly reduces nuisance alarms, and provides better performance at higher air velocities.

Photoelectronic. All 400 Series photoelectronic smoke detectors contain an optical sensing chamber designed to sense the presence of smoke particles produced by a wide range of combustion sources. A custom integrated circuit incorporates signal processing to reduce false alarms.

Thermal. The 400 Series thermal rate-of-rise with fixed heat detector contains a unique dual thermistor heat sensing circuit to provide maximum performance and solid state reliability. The Model 5451 is designed to initiate an alarm at 135°F and to respond to a temperature increase in excess of 15° per minute. This enables the heat detector to communicate an alarm to the central control panel prior to reaching the static set point for these high rates of rise, providing a timely response to both rapid and slow temperature increases. This model should be used in applications where rapid response is desired and where rapid temperature increases would only be caused by a fire emergency.

Mounting Base Selection Guide

Base Model Number	Version	Loop Type	Current Limit Resistor	Alarm Contact Type	Nominal Voltage	Current Draw on Alarm (mA)
B401B	UL/ULC	2-wire*	No	—	12/24VDC††	10–100**
B401BR	UL/ULC	2-wire*	Yes	—	24VDC	10–62
B402B	UL/ULC	4-wire	Yes	Form A&C	24VDC	14–39
B404B	UL/ULC	4-wire	Yes	Form A&C+A Supervisory	120VAC	75 mA AC Max
B406B	UL/ULC/EN-54	2-wire*	No	Form C	24VDC	12–100**
B401†	UL/EN-54	2-wire*	No	—	12/24VDC††	10–100**
B401R†	EN-54	2-wire*	Yes	—	24VDC	10–62

*Functionality contingent on panel compatibility.
**Must be limited by control panel.

Relay Contact Ratings:
Resistive or Inductive
(60% power factor) load.
Form A: 2.0A at 30 VAC/DC
Form C: 0.6A at 110VDC, 2.0A at 30VDC
          1.0A at 125VAC, 2.0A at 30VAC

†Flangeless base
†† Although B401B and B401 bases are capable of operating at 12 and 24 VDC, they cannot be used with the 5451 in 12 V applications.

Junction Box Selection Guide*

	Single Gang	3.5″ Octagon	4″ Octagon	4″ Square	50 mm	60 mm	75 mm
B401/B401R	No	No	No	No	Yes	Yes	No
B401B/BR	Yes	Yes	Yes	Yes	No	No	No
B402B/B406B	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B404B	No	No	Yes	Yes	No	No	No

* Box depth contingent on base and wire size.
  Refer to National Electrical Code of local applicable codes for appropriate recommendations.

Specifications

Operating Voltage/Alarm Current:
Mounting base dependent (see chart on page 2)

Standby Current:
Photo/Ion:
120 µA maximum
Thermal:
100 µA maximum

Sensitivity:
1.9% + ±6%/ft. Ion
3% + ±7%/ft. Photo

Weight:
1451, 2451, 2451TH:
0.5 lb. (227 gm)
5451:
0.3 lb. (136 gm)

Size:
3.2″/8.1 cm height
4.0″/10.2 cm diameter, unflanged base
6.2″/15.7 cm diameter, flanged base

Construction:
Flame retardant Noryl plastic

Operating Temperature:
1451, 2451:
32°F to 120°F (0°C to 49°C)
2451TH, 5451:
32°F to 100°F (0°C to 38°C)

Alarm Point, Thermal:
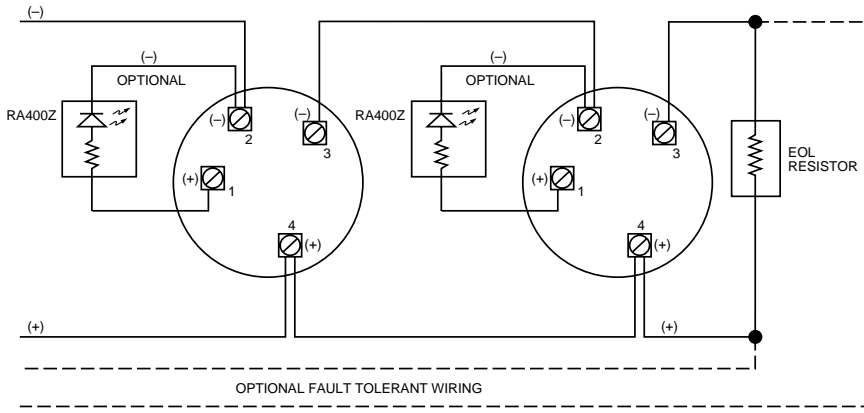135°F (57.2°C) or 15°F/min. rate of rise

Humidity Range:
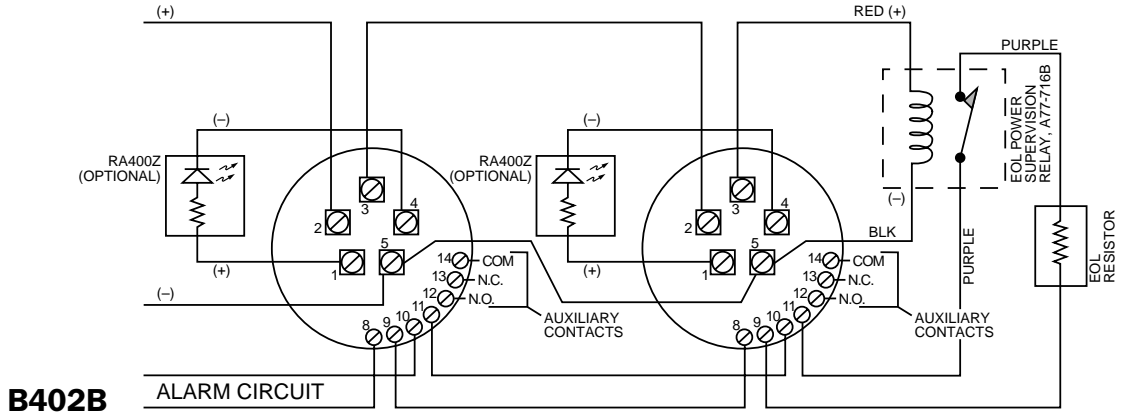10 – 93% RH non-condensing

Air Velocity Rating:
Ionization: 1200 fpm maximum
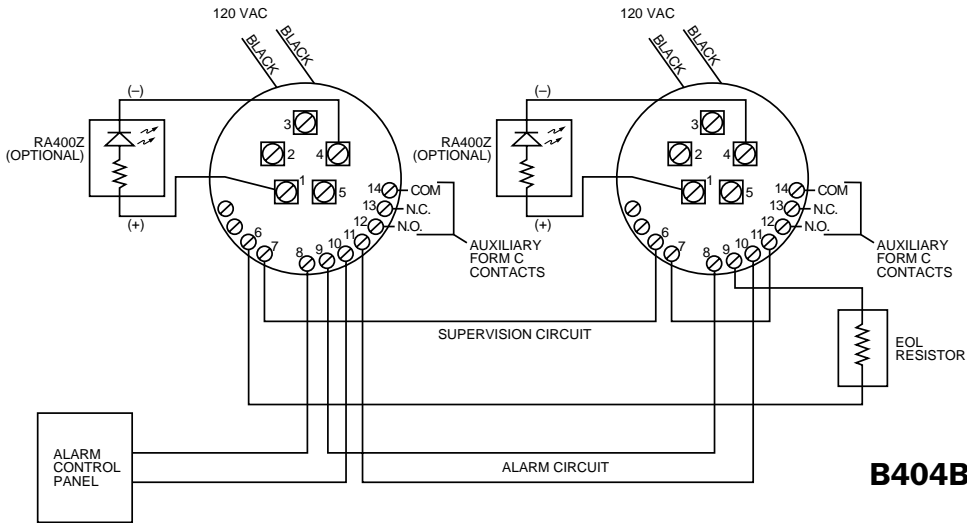Photoelectronic: 3000 fpm maximum

Smoke Detector Spacing:
For ion, photo, and photo/thermal detectors on smooth ceilings (as defined in NFPA 72), spacing of 30 feet (900 sq. ft.) may be used as a guide. For thermal detectors on smooth ceilings (as defined in NFPA 72), spacing of 50 feet (2500 sq. ft.) may be used. Other spacing may be used depending on ceiling height, high air movements, and other conditions or response requirements.
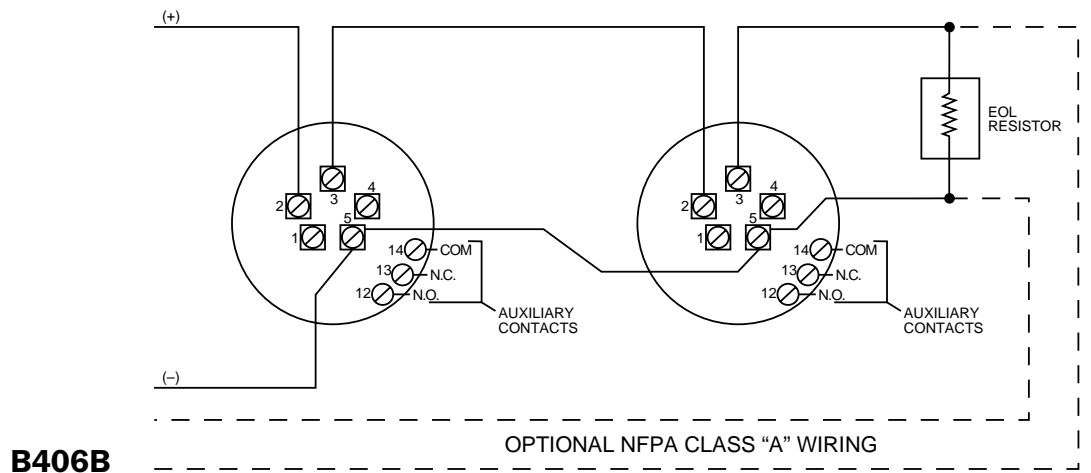
B401 Series

(–)

OPTIONAL

RA400Z

(–)
2

(–)
3

(+)
1

4 (+)

(–)

OPTIONAL

RA400Z

(–)
2

(–)
3

(+)
1

4 (+)

EOL RESISTOR

(+)

(+)

OPTIONAL FAULT TOLERANT WIRING

B402B

(+)

RED (+)

PURPLE

EOL POWER SUPERVISION RELAY, A77-716B

(–)

RA400Z (OPTIONAL)

(–)

2
3
4

1
5

(+)

(–)

14 — COM
13 — N.C.
12 — N.O.

8 9 10 11

AUXILIARY CONTACTS

RA400Z (OPTIONAL)

(–)

2
3
4

1
5

(+)

14 — COM
13 — N.C.
12 — N.O.

8 9 10 11

AUXILIARY CONTACTS

BLK

PURPLE

EOL RESISTOR

ALARM CIRCUIT

B404B

120 VAC

BLACK
BLACK

(–)

RA400Z (OPTIONAL)

(+)

3
2   4
1   5

6 7 8 9 10 11

14 — COM
13 — N.C.
12 — N.O.

AUXILIARY FORM C CONTACTS

120 VAC

BLACK
BLACK

(–)

RA400Z (OPTIONAL)

(+)

3
2   4
1   5

6 7 8 9 10 11

14 — COM
13 — N.C.
12 — N.O.

AUXILIARY FORM C CONTACTS

EOL RESISTOR

SUPERVISION CIRCUIT

ALARM CONTROL PANEL

ALARM CIRCUIT

B406B

(+)

2
3   4
1   5

14 — COM
13 — N.C.
12 — N.O.

AUXILIARY CONTACTS

2
3   4
1   5

14 — COM
13 — N.C.
12 — N.O.

AUXILIARY CONTACTS

EOL RESISTOR

(–)

OPTIONAL NFPA CLASS "A" WIRING

Ordering Information

Part No.	Description
1451	Ionization detector. Must be mounted to one of the B40X series bases listed in Mounting Base Guide.
1451A	Same as above, Canadian model
2451	Photoelectronic detector. Must be mounted to one of the B40X series bases listed in Mounting Base Guide.
2451A	Same as above, Canadian model
2451TH	Same as model 2451 above, but with a 135°F (57.2°C) fixed temperature, restorable, bi-metallic heat sensor.
5451	Fixed heat detector with rate-of-rise. Alarm point at 57.2°C (135°F). Must be mounted to one of the 400 Series Bases listed in Mounting Base Guide.

Accessories	Description
RA400Z	Remote annunciator for 2- or 4-wire systems, 3–32V. Use with ion and photo plug-in detectors. Fits standard U.S. single gang electrical box.
B401BH	Sounder base with B401. Requires an external 24 VDC power supply. Mounts to 4″ square electrical box (1^1/$_2$″ minimum depth).
MOD400R	Detector sensitivity test tool. (See below.) Use with most analog or digital multimeters. Satisfies requirement of NFPA 72 for sensitivity testing. (See below.)
RMK400	Recessed mounting kit for use with B401 or B401R mounting bases only. (See below.)
SMK400	Surface mounting kit provides for entry of surface wiring conduit. For use with B401 or B401R mounting bases only.
A77-716B	End of line relay for power supervision, 12/24 VDC, 4-wire only.
RS14	Replacement insect screen for 1451.
RS24	Replacement insect screen for 2451.
RS24T	Replacement insect screen for 2451TH.
DUST45	Replacement protective dust cover for plug-in 400 Series.
CRT400	Cover removal tool for 1451.
M02-04-01	Test magnet.
M02-09-00	Test magnet with 32 inch telescoping handle.
XR5	Detector removal tool. Allows installation and/or removal of ion, photo, and thermal detector heads from base in high ceiling installations.
XP-4	Extension pole for XR5. Comes in three 5 ft. sections.
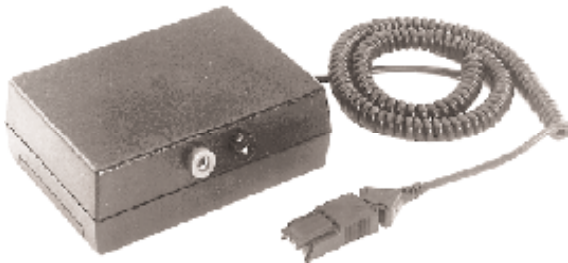
The MOD400R Field Sensitivity Test Module can be used with any standard DC voltmeter or multimeter to check the sensitivity range of System Sensor's detectors (satisfies NFPA 72 requirement for sensitivity testing).
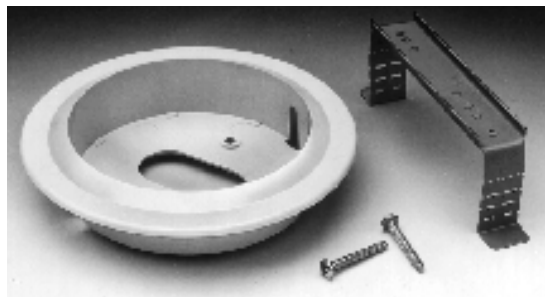
System Sensor's Recessed Mounting Kit, RMK400, provides a simple installation solution where applications demand a lower profile smoke detector and reduces the depth of any 400 Series plug-in detector by almost an inch. A special metal mounting bracket secures the kit and the base to the junction box and ceiling panel. (For use with B401 and B401R bases only.)

System Sensor Sales and Service

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