**First River Theater Company, Red Bank, NJ**

**Two River Theater Company**

First Floor

38 West Street (Block 16, Lots 22, 22A, & 22B)
Red Bank, NJ 07701

---

**Fire Alarm Sequence of Operation**

The system shall identify any off-normal condition and log each condition into the system database as an event.

- Operate any alarm indication device (smoke detector, pull station, water flow detector, etc.) manually automatically.
- Update the control panel and remote display.
- Communicate any alarm indication device, including notification appliances and other device, directly.
- Transmit a signal to the central station by way of the internal digital communication (DAT) or approved telecommunication method.
- System shall sound with physically remote sites.
- System shall continue in the alarm or inactive state as it is intended.

A system failure condition will automatically:

1. Update the control panel and remote display.
2. Transmit a trouble signal to the central station, by way of the internal digital communication (DAT) or approved telecommunication method.
3. The trouble indication shall remain until condition is repaired.

**Notes:**

- All audible notification appliances are 85db.
- Confirm all Waterflow and Tamper locations with Sprinkler Contractor prior to Rough-In.

---

**Legend:**

- Area of Refuge
- Ceiling Detector
- Control Module
- Duct Detector
- Fan Module
- Fire Alarm Control Panel
- Fire Alarm Annunciator
- Fire Alarm Sequence of Operation
- Full Pull Station
- Heat Detector
- Horn/Strobe
- Horizontal Fire Sprinkler
- Hydroxide Unit
- Intelligent Fire Sprinkler System
- Monitor Module
- NAC Booster
- Notification Appliance
- Pneumatic Fire Sprinkler System
- Remote Test Switch
- Tamper Module
- Waterflow Module
- Waterflow Only
- Waterflow Only (Ceiling)
- CO Detector

**Shop Drawings**

**MOUNTED HEIGHTS:**

- A. Surface mounted detector installed between 90 and 120 inches
- B. Surface mounted detector installed between 90 and 120 inches
- C. Fire Alarm Control Panel and Annunciator installed at 80 inches
- D. Manual Pull Stations installed between 42 and 48 inches to the operable part
- E. Fire Alarm Annunciator

**Notes:**

- All audible notification appliances are 85db.
- Confirm all Waterflow and Tamper locations with Sprinkler Contractor prior to Rough-In.
Fire Alarm Sequence of Operation

The system shall identify any off-normal condition and log each condition into the system database as an event.

1. Operation of any alarm initiation device (smoke detector, pull station, water flow detector, etc.) shall automatically:
   - Update the control panel and remote display.
   - Activate all alarm signaling devices, i.e., speaker/strobes, horns, etc.
   - Transmit a trouble signal to the central station, by way of the internal digital communication (DAC/DC) or approved transmission medium (DD/DT).
   - Transmit an analog signal to the control panel.
   - Reset the alarm initiation device.
   - Present audible and/or visual alarm.
   - System will sound until physically reset.
   - System will continue to display the alarm until the system reset key is depressed.
A system trouble condition will automatically:

1. Update the control panel and remote display.
2. Transmit a trouble signal to the central station, by way of the internal digital communication (DAC/DC) or approved transmission medium (DD/DT).
3. Transmit a trouble signal to the control panel.
4. Transmit a trouble signal to the central station by way of the internal digital communication (DAC/DC) or approved transmission medium (DD/DT).
5. Transmit a trouble signal to the control panel.
6. Transmit a trouble signal to the control panel.
7. Transmit a trouble signal to the control panel.
8. Transmit a trouble signal to the control panel.
9. Transmit a trouble signal to the control panel.
10. Transmit a trouble signal to the control panel.
11. Transmit a trouble signal to the control panel.

MOUNTING HEIGHTS

FA-1.1
NAC circuits: 16/4 FPLR
Iniation Device Circuits: 18/4 FPLR

Legend

- Fire Alarm Control Panel
- Annunciator
- Horn/Strobe
- Smoke Detector
- Duct Detector
- Strobe Only
- NAC Booster
- Heat Detector
- Manual Pull Station
- Fire Alarm Sequencing
- Tamper Module
- Fire Alarm Sequence of Operation
- Waterflow Module
- Area of Refuge
- CM
- CM Booster
- Control Module
- RTS
- Monitor Module
- MM
- STAIR 3
- AOR
- AOR MASTER STATION

NOTES

- The system shall identify any off-normal condition and log each condition into the system database as an event.
- Operation of any alarm initiation device (smoke detector, pull station, water flow detector, etc.) shall automatically:
  - Update the control panel and remote display.
  - Activate all alarm signaling devices, i.e., speaker/strobes, horns, etc.
  - Transmit a trouble signal to the central station, by way of the internal digital communication (DAC/DC) or approved transmission medium (DD/DT).
  - Reset the alarm initiation device.
  - Present audible and/or visual alarm.
  - System will sound until physically reset.
  - System will continue to display the alarm until the system reset key is depressed.
- A system trouble condition will automatically:
  - Update the control panel and remote display.
  - Transmit a trouble signal to the central station, by way of the internal digital communication (DAC/DC) or approved transmission medium (DD/DT).
  - Transmit a trouble signal to the control panel.
  - Transmit a trouble signal to the central station by way of the internal digital communication (DAC/DC) or approved transmission medium (DD/DT).
  - Transmit a trouble signal to the control panel.
  - Transmit a trouble signal to the control panel.
  - Transmit a trouble signal to the control panel.
  - Transmit a trouble signal to the control panel.
  - Transmit a trouble signal to the control panel.
  - Transmit a trouble signal to the control panel.
  - Transmit a trouble signal to the control panel.

The fire detection equipment contained and/or described on this drawing and any subsequent reference material, is proposed for installation within those guidelines established by the National Fire Protection Association (NFPA), the American National Standards Institute (ANSI) and the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE). The fire detection equipment contained and/or described on this drawing and any subsequent reference material, is proposed for installation within those guidelines established by the National Fire Protection Association (NFPA) and contained in the National Electrical Code (NFPA - Chapter 72), 2016 edition and further explained in Articles(c).

JULIUS, Inc. is an approved fire alarm equipment installer.

110 VAC 20 amp dedicated, marked, and locked powersupply.

To Notification Appliances

To Initialization Devices

The fire detection equipment contained and/or described on this drawing, and any subsequent reference material, is proposed for installation within those guidelines established by the National Fire Protection Association (NFPA) and contained in the National Electrical Code (NFPA - Chapter 72), 2016 edition and further explained in Articles(c).

AS per the 2015 IBC/NJ, Section 907.1.1, the Fire Alarm Control Panel shall be connected to a dedicated, marked, and locked 110 volt AC 20 amp power supply, supplied by others.

Transmit a trouble signal to the central station, by way of the internal digital communicator (DAC/DC) or approved transmission method.

3. The trouble indication shall remain until condition is repaired.

Two River Theater Company

First Floor - Main Entrance

38 West Street (Block 16, Lots 22, 22.a1, & 22.b2)
Red Bank, NJ 07701
Shop Drawings

Legend

- Fire Alarm Control Panel
- Horn/Strobe (Ceiling)
- Horn/Strobe (Wall)
- Smoke Detector
- Duct Detector
- Strobe Only
- Tamper Module
- Waterflow Module
- Duct Detector
- NAC Booster
- NAC Circuits: 16/4 FPLR
- Initiation Device Circuits: 18/4 FPLR
- FACP
- FSA
- Annunciator
- Remote Test Switch
- Manual Pull Station
- Area of Refuge
- Control Module
- Monitor Module
- Transfer Switch
- By Supply Register
- By Gas Water Heater in Utility Room
- CO Detector
- CO Sensor
- System Trouble Sounder
- System Maintenance Sounder
- System Fire Sounder
- System Fire Annunciation
- System Maint Annunciation
- System Maint Fire Annunciation
- System Trouble Indicator
- System Fire Indicator
- System Maint Fire Indicator
- System Maint Annunciation
-tesy: All audible notifications appliances are 85db.

NOTE:

Confirm all Waterflow and Tamper locations with Sprinkler Contractor prior to Rough-In.

NOTE:
Transmit a trouble signal to the central station, by way of the internal digital communicator (DACT) or approved transmission method.

The trouble indication shall remain until condition is repaired.

The system shall identify any off normal condition and log each condition into the system database as an event.

Operation of any alarm initiation device (smoke detector, pull station, water flow detector, etc.) shall automatically:
1. Update the control panel and remote display.
2. Activate all alarm signaling devices, i.e., Speaker/strobes, Annunciators, and Horns, etc.
3. Transmit a trouble signal to the central station by way of the internal digital communication (DACT) or approved transmission method.
4. System will sound an audible warning.
5. System will continue to display the alarm only, in an effort to alert until the system reset key is depressed.

A system trouble condition will automatically:
1. Update the control panel and remote display and activate the trouble sounder.
2. Continue to display the trouble indication.

NOTE:
All audible notifications appliances are 85db.

NOTE:
Confirm all Waterflow and Tamper locations with Sprinkler Contractor prior to Rough-In.

NOTE:
All audible notifications appliances are 85db.
Two River Theater Company
38 West Street (Block 16, Lots 22, 22.01, & 22.02)
Red Bank, NJ 07701

Fire Alarm Sequence of Operation

1. The system shall identify any off-normal condition and log each condition into the system database as an event.
2. Operation of any alarm initiation device (smoke detector, pull station, water flow detector, etc.) shall automatically:
   a) Update the control panel and remote display.
   b) Activate all alarm signaling devices, i.e., Speaker/Strobes, Annunciators and sirens, etc.
   c) Transmit signals to the control station by way of the internal digital communication (DACT) or approved transmission method.
3. The fire alarm control panel shall be connected to dedicated, marked, and locked power supply, supplied by others.
4. System shall sound with physically remote sounders.
5. System will continue to display the area, zone, or section of the building in which the alarm condition originated.
6. System shall be self-contained and cannot be defeated.
7. A system trouble condition shall automatically:
   a) Update the control panel and remote display.
   b) Activate the trouble sounder.
   c) Transmit a trouble signal to the control station by way of the internal digital communication (DACT) or approved transmission method.

Legend

- FACP Fire Alarm Control Panel
- FSA Annunciator
- Duct Detector
- NAC Booster
- Heat Detector
- Manual Pull Station
- TAMPER Module
- Waterflow Module
- Smoke Detector
- Horn/Strobe
- AOR Area of Refuge
- CM Control Module
- RTS Remote Test Switch
- MM Monitor Module
- Horn/Strobe (Ceiling)
- LED Display

SHOP DRAWINGS

NOTE:

Confirm all Waterflow and Tamper locations with Sprinkler Contractor prior to Rough-In.

NOTE:

All audible notifications appliances are 85db.
Transmit a trouble signal to the central station, by way of the internal digital communicator (DACT) or approved transmission method.

The system shall identify any off normal condition and log each condition into the system database as an event.

1. Update the control panel and remote display.
2. Activate all alarm signaling devices, i.e., Speaker/strobes, horn/strobe, etc.
3. Provide an audible notification appliance, i.e., speaker/strobe, horn, etc.
4. Display any annunciator auxiliary, i.e., fan shut-off, door hold-open, etc.
5. System at sound until (SUS) reset.
6. System will continue to display the area, point, or zone of activation until the system reset key is depressed.

A system trouble condition shall automatically:

Update the control panel and remote display and activate the trouble indicator.

1. Transmitter (MM-01), the Fire Alarm Control Panel shall be connected to a dedicated, marked, and locked 110 volt AC 20 amp power supply, supplied by others.

NOTE: All audible notifications appliances are 85db.

SHOP DRAWINGS

The system shall identify any off normal condition and log each condition into the system database as an event.

A system trouble condition shall automatically:

Update the control panel and remote display and activate the trouble indicator.

1. Transmitter (MM-01), the Fire Alarm Control Panel shall be connected to a dedicated, marked, and locked 110 volt AC 20 amp power supply, supplied by others.

NOTE: All audible notifications appliances are 85db.
**Fire Alarm System Secondary Battery-set Calculation Worksheet**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>STANDBY CURRENT PER UNIT (AMPS)</th>
<th>QTY</th>
<th>TOTAL STANDBY CURRENT PER ITEM</th>
<th>ALARM CURRENT PER UNIT (AMPS)</th>
<th>QTY</th>
<th>TOTAL ALARM CURRENT PER ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACP</td>
<td>Fire Alarm Control Panel</td>
<td>0.2300</td>
<td>X</td>
<td>1 = 0.2300</td>
<td>0.2300</td>
<td>X</td>
<td>1 = 0.2300</td>
</tr>
<tr>
<td>ANN</td>
<td>Annunciator</td>
<td>0.0600</td>
<td>X</td>
<td>2 = 0.1200</td>
<td>0.1200</td>
<td>X</td>
<td>2 = 0.2400</td>
</tr>
<tr>
<td>SMOKE</td>
<td>Smoke Detector</td>
<td>0.0003</td>
<td>X</td>
<td>18 = 0.0045</td>
<td>0.0003</td>
<td>X</td>
<td>18 = 0.0045</td>
</tr>
<tr>
<td>HEAT</td>
<td>Heat Detector</td>
<td>0.0003</td>
<td>X</td>
<td>4 = 0.0010</td>
<td>0.0003</td>
<td>X</td>
<td>4 = 0.0010</td>
</tr>
<tr>
<td>PULL</td>
<td>Pull Station</td>
<td>0.0004</td>
<td>X</td>
<td>19 = 0.0070</td>
<td>0.0004</td>
<td>X</td>
<td>19 = 0.0070</td>
</tr>
<tr>
<td>BELL</td>
<td>FDC Bell</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HORN</td>
<td>Horn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STROBE</td>
<td>Strobe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DUCT</td>
<td>Duct Detector</td>
<td>0.0003</td>
<td>X</td>
<td>12 = 0.0036</td>
<td>0.0003</td>
<td>X</td>
<td>12 = 0.0036</td>
</tr>
<tr>
<td>MM</td>
<td>Modules</td>
<td>0.0003</td>
<td>X</td>
<td>23 = 0.0069</td>
<td>0.0003</td>
<td>X</td>
<td>23 = 0.0069</td>
</tr>
<tr>
<td>CO</td>
<td>CO Detector</td>
<td>0.0020</td>
<td>X</td>
<td>0 = 0.0000</td>
<td>0.0040</td>
<td>X</td>
<td>0 = 0.0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0000</td>
<td>X</td>
<td>0 = 0.0000</td>
<td>0.0000</td>
<td>X</td>
<td>0 = 0.0000</td>
</tr>
</tbody>
</table>

**SEE NAC BOOSTER SHEETS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>TOTAL SYSTEM STANDBY CURRENT (AMPS)</th>
<th>REQUIRED STANDBY TIME (HRS)</th>
<th>TOTAL SYSTEM STANDBY CURRENT (AMPS)</th>
<th>REQUIRED STANDBY CAPACITY (AMP-HOURS)</th>
<th>REQUIRED ALARM TIME (HOURS)</th>
<th>TOTAL SYSTEM ALARM CURRENT (AMPS)</th>
<th>REQUIRED ALARM CAPACITY (AMP-HOURS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACP</td>
<td></td>
<td>0.3730</td>
<td>24</td>
<td>8.9527</td>
<td>0.083</td>
<td>0.4930</td>
<td>0.0409</td>
<td></td>
</tr>
</tbody>
</table>

**Prepared by: CSS**

Prepared for: Two River Theater Company, 38 West Street (Block 36, Lots 22, 22.01, & 22.02), Red Bank, NJ 07701

<table>
<thead>
<tr>
<th>REQUIRED STANDBY CAPACITY (AMP-HOURS)</th>
<th>REQUIRED ALARM CAPACITY (AMP-HOURS)</th>
<th>TOTAL CAPACITY (AMP-HOURS)</th>
<th>TOTAL CAPACITY (AMP-HOURS)</th>
<th>SAFETY FACTOR</th>
<th>ADJUSTED BATTERY CAPACITY (AMP-HOURS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.95</td>
<td>0.0409</td>
<td>8.9936</td>
<td>8.9936</td>
<td>20%</td>
<td>11</td>
</tr>
</tbody>
</table>
## Fire Alarm System Secondary Battery-set Calculation Worksheet

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>STANDBY CURRENT PER UNIT (AMPS)</th>
<th>QTY</th>
<th>TOTAL STANDBY CURRENT PER ITEM (AMPS)</th>
<th>ALARM CURRENT PER UNIT (AMPS)</th>
<th>QTY</th>
<th>TOTAL ALARM CURRENT PER ITEM (AMPS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOOST</td>
<td>NAC Booster</td>
<td>0.2000</td>
<td>X</td>
<td>0.2000</td>
<td>0.2000</td>
<td>X</td>
<td>0.2000</td>
</tr>
<tr>
<td>BELL</td>
<td>FDC Bell</td>
<td>0.0000</td>
<td>X</td>
<td>0.0000</td>
<td>0.0500</td>
<td>X</td>
<td>0.0000</td>
</tr>
<tr>
<td>HORN</td>
<td>Horn</td>
<td>0.0000</td>
<td>X</td>
<td>0.0000</td>
<td>0.0500</td>
<td>X</td>
<td>0.0000</td>
</tr>
<tr>
<td>STROBE</td>
<td>Strobe</td>
<td>0.0000</td>
<td>X</td>
<td>0.0000</td>
<td>0.0660</td>
<td>X</td>
<td>1.1880</td>
</tr>
<tr>
<td>H/S</td>
<td>Horn/Strobe</td>
<td>0.0000</td>
<td>X</td>
<td>0.0000</td>
<td>0.2020</td>
<td>X</td>
<td>6.6660</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0.0000</td>
<td>X</td>
<td>0.0000</td>
<td>0.0000</td>
<td>X</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

**Total System Standby Current (AMPS):** 0.2000

**Total System Alarm Current (AMPS):** 8.0540

---

<table>
<thead>
<tr>
<th>REQUIRED STANDBY TIME (HRS)</th>
<th>TOTAL SYSTEM STANDBY CURRENT (AMPS)</th>
<th>REQUIRED STANDBY CAPACITY (AMP-HOURS)</th>
<th>REQUIRED ALARM TIME (HOURS)</th>
<th>TOTAL SYSTEM ALARM CURRENT (AMPS)</th>
<th>REQUIRED ALARM CAPACITY (AMP-HOURS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>0.2000</td>
<td>4.8000</td>
<td>0.083</td>
<td>8.0540</td>
<td>0.6685</td>
</tr>
</tbody>
</table>

**Total System Capacity (AMP-HOURS):** 5.4685

**Safety Factor:** 20%

**Adjusted Battery Capacity (AMP-HOURS):** 7

---

Prepared for: Two River Theater Company, 38 West Street (Block 36, Lots 22, 22.01, & 22.02), Red Bank, NJ 07701

Prepared by: CSS
This calculator provides voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).

Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Two River Theater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>8/7/2019</td>
</tr>
<tr>
<td>Circuit Number</td>
<td>B1-01</td>
</tr>
<tr>
<td>Area Covered</td>
<td>First Floor</td>
</tr>
</tbody>
</table>

**Minimum Circuit Voltage**: 19.1

**Minimum Device Voltage**: 14.0

**Total Circuit Current**: 1356.000

**Distance from source to 1st device**: 26

**Wire Gauge for balance of circuit**: 14

**End of Line Voltage**: 18.21

**Device Notes**: Wire resistance is doubled in the calculations for two wires (Positive and Negative).

The voltage calculated to the last device in any method must not be lower than the manufacturer's listed minimum operating voltage (IE: rated operating voltage 16-33 VDC).

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Current</th>
<th>Distance from previous device</th>
<th>Voltage Drop from source</th>
<th>Percent Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 1</td>
<td>162</td>
<td>26</td>
<td>18.88</td>
<td>0.216</td>
</tr>
<tr>
<td>Device 2</td>
<td>121</td>
<td>2</td>
<td>18.87</td>
<td>0.231</td>
</tr>
<tr>
<td>Device 3</td>
<td>121</td>
<td>20</td>
<td>18.74</td>
<td>0.363</td>
</tr>
<tr>
<td>Device 4</td>
<td>41</td>
<td>9</td>
<td>18.68</td>
<td>0.416</td>
</tr>
<tr>
<td>Device 5</td>
<td>41</td>
<td>18</td>
<td>18.58</td>
<td>0.516</td>
</tr>
<tr>
<td>Device 6</td>
<td>41</td>
<td>11</td>
<td>18.53</td>
<td>0.576</td>
</tr>
<tr>
<td>Device 7</td>
<td>162</td>
<td>22</td>
<td>18.41</td>
<td>0.687</td>
</tr>
<tr>
<td>Device 8</td>
<td>162</td>
<td>2</td>
<td>18.40</td>
<td>0.695</td>
</tr>
<tr>
<td>Device 9</td>
<td>74</td>
<td>28</td>
<td>18.32</td>
<td>0.782</td>
</tr>
<tr>
<td>Device 10</td>
<td>74</td>
<td>12</td>
<td>18.29</td>
<td>0.814</td>
</tr>
<tr>
<td>Device 11</td>
<td>121</td>
<td>25</td>
<td>18.23</td>
<td>0.868</td>
</tr>
<tr>
<td>Device 12</td>
<td>162</td>
<td>9</td>
<td>18.22</td>
<td>0.882</td>
</tr>
<tr>
<td>Device 13</td>
<td>74</td>
<td>8</td>
<td>18.21</td>
<td>0.885</td>
</tr>
<tr>
<td>END</td>
<td>162</td>
<td>192</td>
<td>18.21</td>
<td>0.885</td>
</tr>
<tr>
<td>END</td>
<td>18.21</td>
<td>0.885</td>
<td>4.63%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.21</td>
<td>0.885</td>
<td>4.63%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.21</td>
<td>0.885</td>
<td>4.63%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.21</td>
<td>0.885</td>
<td>4.63%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.21</td>
<td>0.885</td>
<td>4.63%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.21</td>
<td>0.885</td>
<td>4.63%</td>
<td></td>
</tr>
</tbody>
</table>

**End of Line Voltage**: 18.21

**Totals**: 1356 192

**FS 1 Zone**: 19

**FS 3 Zone**: 18.5

**FS 5 Zone**: 17.2

**FS 10 Zone**: 18.1

**QS**: 17.1

**EST/MIT2**: 19.8

**EST3**: 19.2

**BPS6(10)A**: 19.1
V2: Added Edwards panel voltages. Changed "Nominal Panel Voltage" to "Minimum Circuit Voltage".

Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Two River Theater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>8/7/2019</td>
</tr>
<tr>
<td>Circuit Number</td>
<td>B1-02</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area Covered</th>
<th>First Floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Circuit Voltage</td>
<td>19.1</td>
</tr>
<tr>
<td>Minimum Device Voltage</td>
<td>14.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Circuit Current</th>
<th>1578.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire Gauge</td>
<td>Per 1000</td>
</tr>
<tr>
<td>Distance from source to 1st device</td>
<td>54</td>
</tr>
<tr>
<td>Wire Gauge for balance of circuit</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enter current in mA</th>
<th>Distance (from 1st device)</th>
<th>Voltage @ Rated Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 mA = .150 A</td>
<td>54 14 3.07</td>
<td>End of Line Voltage</td>
</tr>
</tbody>
</table>

| Notes: Wire resistance is doubled in the calculations for two wires (Positive and Negative) |
| The voltage calculated to the last device in any method must not be less than the manufacturer's listed minimum operating voltage (IE: rated operating voltage 16-33 VDC). |

<table>
<thead>
<tr>
<th>Device Number</th>
<th>Device Current</th>
<th>Distance from previous device</th>
<th>Voltage Percent Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 1</td>
<td>162</td>
<td>54</td>
<td>18.58 0.523 2.74%</td>
</tr>
<tr>
<td>Device 2</td>
<td>121</td>
<td>3</td>
<td>18.55 0.549 2.88%</td>
</tr>
<tr>
<td>Device 3</td>
<td>74</td>
<td>36</td>
<td>18.26 0.836 4.37%</td>
</tr>
<tr>
<td>Device 4</td>
<td>121</td>
<td>30</td>
<td>18.04 1.060 5.55%</td>
</tr>
<tr>
<td>Device 5</td>
<td>41</td>
<td>8</td>
<td>17.99 1.114 5.83%</td>
</tr>
<tr>
<td>Device 6</td>
<td>54</td>
<td>40</td>
<td>17.73 1.375 7.20%</td>
</tr>
<tr>
<td>Device 7</td>
<td>162</td>
<td>29</td>
<td>17.55 1.554 8.13%</td>
</tr>
<tr>
<td>Device 8</td>
<td>121</td>
<td>27</td>
<td>17.41 1.693 8.87%</td>
</tr>
<tr>
<td>Device 9</td>
<td>74</td>
<td>18</td>
<td>17.33 1.773 9.28%</td>
</tr>
<tr>
<td>Device 10</td>
<td>162</td>
<td>8</td>
<td>17.30 1.805 9.45%</td>
</tr>
<tr>
<td>Device 11</td>
<td>162</td>
<td>42</td>
<td>17.17 1.930 10.11%</td>
</tr>
<tr>
<td>Device 12</td>
<td>162</td>
<td>40</td>
<td>17.09 2.010 10.52%</td>
</tr>
<tr>
<td>Device 13</td>
<td>162</td>
<td>34</td>
<td>17.06 2.044 10.70%</td>
</tr>
<tr>
<td>END</td>
<td>17.06 2.044 10.70%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>17.06 2.044 10.70%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>17.06 2.044 10.70%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>17.06 2.044 10.70%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device Manufacturer</th>
<th>System Sensor</th>
<th>Device Manufacturer</th>
<th>Current Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS 1 Zone</td>
<td>FS 3 Zone</td>
<td>FS 5 Zone</td>
<td>FS 10 Zone</td>
</tr>
<tr>
<td>16=7.77</td>
<td>16=4.89</td>
<td>14=3.07</td>
<td>12=1.98</td>
</tr>
<tr>
<td>10=1.24</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

End of Line and Load Centering Methods use only the wire gauge for the first device to source.

Standard Wire Resistance in Ohms per 1000 feet:

<table>
<thead>
<tr>
<th>18-14 Awg</th>
<th>16-12 Awg</th>
</tr>
</thead>
<tbody>
<tr>
<td>= Solid Conductors</td>
<td>= Stranded Conductors</td>
</tr>
</tbody>
</table>

---

**Min. Ckt Voltage per Panel:**

<table>
<thead>
<tr>
<th>Panel Voltage</th>
<th>19</th>
<th>18.5</th>
<th>17.2</th>
<th>18.1</th>
<th>17.1</th>
<th>19.8</th>
<th>19.2</th>
<th>19.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of Line</td>
<td>17.96</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---
### Project Name
Two River Theater

### Date
8/7/2019

### Circuit Number
B1-03

### Area Covered
First Floor

### Minimum Circuit Voltage
19.1

### Minimum Device Voltage
14.0

### Total Circuit Current
387.000

### Wire Gauge per 1000
- 12-10 Awg = Stranded Conductors
- 18-14 Awg = Solid Conductors

### Distance from Source to 1st Device
82

### Enter current in mA
- 150 mA = .150 A

### Current @Rated Voltage

### Model #

### Candela

### Voltage

<table>
<thead>
<tr>
<th>Device Number</th>
<th>Device Current</th>
<th>Previous Device</th>
<th>Voltage at Device</th>
<th>Voltage from Device</th>
<th>Percent Drop</th>
<th>Model #</th>
<th>Candela</th>
<th>@Rated Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Device 1</strong></td>
<td>162</td>
<td>62</td>
<td>18.91</td>
<td>0.195</td>
<td>1.02%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Device 2</strong></td>
<td>63</td>
<td>8</td>
<td>18.89</td>
<td>0.206</td>
<td>1.08%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Device 3</strong></td>
<td>121</td>
<td>16</td>
<td>18.88</td>
<td>0.222</td>
<td>1.16%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Device 4</strong></td>
<td>41</td>
<td>6</td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td>15</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td>30</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td>75</td>
<td>121</td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td>110</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td>15</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td>30</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td>75</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td>110</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>END</strong></td>
<td></td>
<td></td>
<td>18.88</td>
<td>0.223</td>
<td>1.17%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>End of Line Voltage</strong></td>
<td>18.88</td>
<td>18.88</td>
<td>18.88</td>
<td>18.88</td>
<td>18.88</td>
<td>18.88</td>
<td>18.88</td>
<td>18.88</td>
</tr>
</tbody>
</table>

### Min. Ckt Voltage per Panel:
- FS 1 Zone: 19
- FS 3 Zone: 18.5
- FS 5 Zone: 17.2
- FS 10 Zone: 18.1
- QS: 17.1
- EST/MIR2: 19.8
- EST3: 19.2
- BPS6(10)A: 19.1

---

**Notes:**
- Wire resistance is doubled in the calculations for two wires (Positive and Negative).
- The voltage calculated to the last device in any method must not be lower than the manufacturer's listed minimum operating voltage (IE: rated operating voltage 16-33 VDC).
- End of Line and Load Centering Methods use only the wire gauge for the first device to source.

---

**This calculator provides voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).**

Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction.
### Two River Theater

**Circuit Number:** B1-04
**Area Covered:** Second Floor

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Voltage</th>
<th>Voltage</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Circuit Current</td>
<td>1065.000</td>
<td>Wire Ohm's</td>
<td>Distance ft</td>
</tr>
<tr>
<td>Minimum Circuit Voltage</td>
<td>19.1</td>
<td>1065</td>
<td>167</td>
</tr>
<tr>
<td>Minimum Device Voltage</td>
<td>14.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End of Line Voltage</td>
<td>18.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End of Line Voltage</td>
<td>18.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tota</td>
<td>18.55</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Wire Gauge for balance of circuit:**

- 18-14 Awg = Solid Conductors
- 12-10 Awg = Stranded Conductors

**Device Notes:**
- Wire resistance is doubled in the calculations for two wires (Positive and Negative).
- The voltage calculated to the last device in any method must not be lower than the manufacturer's listed minimum operating voltage (IE: rated operating voltage 16-33 VDC).

**End of Line and Load Centering Methods use only the wire guage for the first device to source.**

**Standard Wire Resistance in Ohms per 1000 feet:**
- 18=7.77
- 16=4.89
- 14=3.07
- 12=1.98
- 10=1.24

**Min. Ckt Voltage per Panel:**

<table>
<thead>
<tr>
<th>FS 1 Zone</th>
<th>FS 3 Zone</th>
<th>FS 5 Zone</th>
<th>FS 10 Zone</th>
<th>Q5</th>
<th>EST/MIR2</th>
<th>EST3</th>
<th>BPS6(10)A</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>18.5</td>
<td>17.2</td>
<td>18.1</td>
<td>17.1</td>
<td>19.8</td>
<td>19.2</td>
<td>19.1</td>
</tr>
</tbody>
</table>
V2: Added Edwards panel voltages. Changed "Nominal Panel Voltage" to "Minimum Circuit Voltage".

This calculator provides voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).

Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Two River Theater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>8/7/2019</td>
</tr>
<tr>
<td>Circuit Number</td>
<td>B1-05</td>
</tr>
<tr>
<td>Area Covered</td>
<td>Second Floor</td>
</tr>
</tbody>
</table>

| Minimum Circuit Voltage | 19.1               |
| Min. Device Voltage    | 14.0               |

| Total Circuit Current  | 1063.000           |

Distance from source to 1st device: 36 14 3.07
Wire Gauge for balance of circuit: 14 3.07

Enter current in mA: 150 mA = .150 A
Enter Voltage: Voltage

<table>
<thead>
<tr>
<th>Device Number</th>
<th>Device Current</th>
<th>Device Source Distance</th>
<th>Device Previous Distance</th>
<th>Voltage Drop</th>
<th>Percent Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 1</td>
<td>121</td>
<td>36</td>
<td>18.87</td>
<td>0.235</td>
<td>1.23%</td>
</tr>
<tr>
<td>Device 2</td>
<td>111</td>
<td>27</td>
<td>18.71</td>
<td>0.391</td>
<td>2.05%</td>
</tr>
<tr>
<td>Device 3</td>
<td>63</td>
<td>2</td>
<td>18.70</td>
<td>0.401</td>
<td>2.10%</td>
</tr>
<tr>
<td>Device 4</td>
<td>121</td>
<td>11</td>
<td>18.65</td>
<td>0.453</td>
<td>2.37%</td>
</tr>
<tr>
<td>Device 5</td>
<td>63</td>
<td>4</td>
<td>18.63</td>
<td>0.469</td>
<td>2.46%</td>
</tr>
<tr>
<td>Device 6</td>
<td>121</td>
<td>19</td>
<td>18.56</td>
<td>0.537</td>
<td>2.81%</td>
</tr>
<tr>
<td>Device 7</td>
<td>63</td>
<td>2</td>
<td>18.50</td>
<td>0.600</td>
<td>3.14%</td>
</tr>
<tr>
<td>Device 8</td>
<td>74</td>
<td>6</td>
<td>18.49</td>
<td>0.615</td>
<td>3.22%</td>
</tr>
<tr>
<td>Device 9</td>
<td>74</td>
<td>16</td>
<td>18.45</td>
<td>0.647</td>
<td>3.38%</td>
</tr>
<tr>
<td>Device 10</td>
<td>63</td>
<td>12</td>
<td>18.43</td>
<td>0.665</td>
<td>3.48%</td>
</tr>
<tr>
<td>Device 11</td>
<td>63</td>
<td>9</td>
<td>18.42</td>
<td>0.676</td>
<td>3.54%</td>
</tr>
<tr>
<td>Device 12</td>
<td>63</td>
<td>9</td>
<td>18.42</td>
<td>0.683</td>
<td>3.57%</td>
</tr>
<tr>
<td>Device 13</td>
<td>63</td>
<td>15</td>
<td>18.41</td>
<td>0.688</td>
<td>3.60%</td>
</tr>
<tr>
<td>END</td>
<td>18.41</td>
<td>688</td>
<td>3.60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.41</td>
<td>688</td>
<td>3.60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.41</td>
<td>688</td>
<td>3.60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.41</td>
<td>688</td>
<td>3.60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.41</td>
<td>688</td>
<td>3.60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>1063</td>
<td>188</td>
<td>18.41</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Min. Ckt Voltage per Panel: 19 18.5 17.2 18.1 17.1 19.8 19.2 19.1
<table>
<thead>
<tr>
<th>Device Number</th>
<th>Device Current</th>
<th>Previous Device Current</th>
<th>Device Voltage</th>
<th>Device Drop</th>
<th>Percent Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 1</td>
<td>121</td>
<td>28</td>
<td>18.87</td>
<td>0.234</td>
<td>1.23%</td>
</tr>
<tr>
<td>Device 2</td>
<td>63</td>
<td>20</td>
<td>18.71</td>
<td>0.387</td>
<td>2.03%</td>
</tr>
<tr>
<td>Device 3</td>
<td>74</td>
<td>11</td>
<td>18.63</td>
<td>0.466</td>
<td>2.44%</td>
</tr>
<tr>
<td>Device 4</td>
<td>121</td>
<td>9</td>
<td>18.57</td>
<td>0.528</td>
<td>2.76%</td>
</tr>
<tr>
<td>Device 5</td>
<td>121</td>
<td>6</td>
<td>18.54</td>
<td>0.564</td>
<td>2.95%</td>
</tr>
<tr>
<td>Device 6</td>
<td>121</td>
<td>21</td>
<td>18.42</td>
<td>0.675</td>
<td>3.53%</td>
</tr>
<tr>
<td>Device 7</td>
<td>121</td>
<td>28</td>
<td>18.30</td>
<td>0.803</td>
<td>4.20%</td>
</tr>
<tr>
<td>Device 8</td>
<td>121</td>
<td>10</td>
<td>18.26</td>
<td>0.841</td>
<td>4.40%</td>
</tr>
<tr>
<td>Device 9</td>
<td>121</td>
<td>18</td>
<td>18.20</td>
<td>0.896</td>
<td>4.69%</td>
</tr>
<tr>
<td>Device 10</td>
<td>121</td>
<td>44</td>
<td>18.10</td>
<td>0.998</td>
<td>5.23%</td>
</tr>
<tr>
<td>Device 11</td>
<td>121</td>
<td>18</td>
<td>18.07</td>
<td>1.027</td>
<td>5.38%</td>
</tr>
<tr>
<td>Device 12</td>
<td>63</td>
<td>20</td>
<td>18.06</td>
<td>1.044</td>
<td>5.46%</td>
</tr>
<tr>
<td>Device 13</td>
<td>74</td>
<td>12</td>
<td>18.05</td>
<td>1.049</td>
<td>5.49%</td>
</tr>
<tr>
<td>END</td>
<td></td>
<td></td>
<td>18.05</td>
<td>1.049</td>
<td>5.49%</td>
</tr>
<tr>
<td>END</td>
<td></td>
<td></td>
<td>18.05</td>
<td>1.049</td>
<td>5.49%</td>
</tr>
<tr>
<td>END</td>
<td></td>
<td></td>
<td>18.05</td>
<td>1.049</td>
<td>5.49%</td>
</tr>
<tr>
<td>END</td>
<td></td>
<td></td>
<td>18.05</td>
<td>1.049</td>
<td>5.49%</td>
</tr>
<tr>
<td>END</td>
<td></td>
<td></td>
<td>18.05</td>
<td>1.049</td>
<td>5.49%</td>
</tr>
<tr>
<td>END</td>
<td></td>
<td></td>
<td>18.05</td>
<td>1.049</td>
<td>5.49%</td>
</tr>
<tr>
<td>END</td>
<td></td>
<td></td>
<td>18.05</td>
<td>1.049</td>
<td>5.49%</td>
</tr>
<tr>
<td>END</td>
<td></td>
<td></td>
<td>18.05</td>
<td>1.049</td>
<td>5.49%</td>
</tr>
<tr>
<td>Total Voltages</td>
<td>1363</td>
<td>245</td>
<td>18.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Wire resistance is doubled in the calculations for two wires (Positive and Negative). The voltage calculated to the last device in any method must not be lower than the manufacturer's listed minimum operating voltage (IE: rated operating voltage 16-33 VDC).
Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction.

This calculator provides voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Two River Theater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>8/7/2019</td>
</tr>
<tr>
<td>Circuit Number</td>
<td>B2-01</td>
</tr>
<tr>
<td>Area Covered</td>
<td>Third Floor</td>
</tr>
</tbody>
</table>

| Minimum Circuit Voltage | 19.1  |
| Minimum Device Voltage | 14.0  |

| Total Circuit Current | 1729.000 |

<table>
<thead>
<tr>
<th>Current mA</th>
<th>Distance ft</th>
<th>Drop</th>
<th>Current mA</th>
<th>Distance ft</th>
<th>Drop</th>
<th>Current mA</th>
<th>Distance ft</th>
<th>Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1729</td>
<td>330</td>
<td>1.92</td>
<td>1729</td>
<td>330</td>
<td>2.503</td>
<td>1729</td>
<td>330</td>
<td>1.752</td>
</tr>
</tbody>
</table>

End of Line Voltage:
- **Device 1**: 17.18
- **Device 2**: 15.60
- **Device 3**: 17.35

Wire Ohm's Per 1000:
- 18-14 Awg = Solid Conductors
- 12-10 Awg = Stranded Conductors

- **Distance from source to 1st device**: 28 ft
- **Wire Gauge for balance of circuit**: 14 or 18 ft

**Enter current in mA @ Rated Voltage**

- **Device 1**: 121 mA 18.80 V 0.297 A 1.56% Device Manufacturer
- **Device 2**: 121 mA 18.72 V 0.376 A 1.97% Device Manufacturer
- **Device 3**: 41 mA 18.63 V 0.468 A 2.45% Device Manufacturer
- **Device 4**: 41 mA 18.51 V 0.592 A 3.10% Device Manufacturer
- **Device 5**: 121 mA 18.45 V 0.652 A 3.41% Device Manufacturer
- **Device 6**: 121 mA 18.15 V 0.952 A 4.98% Device Manufacturer
- **Device 7**: 111 mA 17.98 V 1.123 A 5.88% Device Manufacturer
- **Device 8**: 121 mA 17.77 V 1.330 A 6.96% Device Manufacturer
- **Device 9**: 121 mA 17.66 V 1.444 A 7.56% Device Manufacturer
- **Device 10**: 121 mA 17.45 V 1.652 A 8.65% Device Manufacturer

**Min. Ckt Voltage per Panel**:
- **FS 1 Zone**: 19 V
- **FS 3 Zone**: 18.5 V
- **FS 5 Zone**: 17.2 V
- **FS 10 Zone**: 18.1 V
- **QS**: 17.1 V
- **EST/MIR2**: 19.8 V
- **EST3**: 19.2 V
- **BPS6(10)A**: 19.1 V
**Distance from source to 1st device**

<table>
<thead>
<tr>
<th>Device</th>
<th>Device Current</th>
<th>Distance from previous device</th>
<th>Voltage</th>
<th>Percent Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 1</td>
<td>121</td>
<td>32</td>
<td>18.89</td>
<td>0.214</td>
</tr>
<tr>
<td>Device 2</td>
<td>121</td>
<td>35</td>
<td>18.68</td>
<td>0.423</td>
</tr>
<tr>
<td>Device 3</td>
<td>121</td>
<td>8</td>
<td>18.64</td>
<td>0.465</td>
</tr>
<tr>
<td>Device 4</td>
<td>121</td>
<td>17</td>
<td>18.56</td>
<td>0.541</td>
</tr>
<tr>
<td>Device 5</td>
<td>121</td>
<td>10</td>
<td>18.52</td>
<td>0.578</td>
</tr>
<tr>
<td>Device 6</td>
<td>162</td>
<td>49</td>
<td>18.38</td>
<td>0.724</td>
</tr>
<tr>
<td>Device 7</td>
<td>162</td>
<td>56</td>
<td>18.26</td>
<td>0.835</td>
</tr>
<tr>
<td>Device 8</td>
<td>162</td>
<td>2</td>
<td>18.26</td>
<td>0.837</td>
</tr>
<tr>
<td>END</td>
<td>18.26</td>
<td>0.837</td>
<td>4.38%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.26</td>
<td>0.837</td>
<td>4.38%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.26</td>
<td>0.837</td>
<td>4.38%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.26</td>
<td>0.837</td>
<td>4.38%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.26</td>
<td>0.837</td>
<td>4.38%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.26</td>
<td>0.837</td>
<td>4.38%</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.26</td>
<td>0.837</td>
<td>4.38%</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

- Wire resistance is doubled in the calculations for two wires (Positive and Negative).
- The voltage calculated to the last device in any method must not be lower than the manufacturer's listed minimum operating voltage (IE: rated operating voltage 16-33 VDC).

**Device Manufacturer**

**System Sensor**

**Device Manufacturer**

**Current @ Rated Voltage**

<table>
<thead>
<tr>
<th>Model #</th>
<th>Candela</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>121</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>110</td>
<td></td>
</tr>
</tbody>
</table>

**End of Line and Load Centering Methods use only the wire gauge for the first device to source.**

**Minimum Circuit Voltage per Panel:**

- FS 1 Zone: 19
- FS 3 Zone: 18.5
- FS 5 Zone: 17.2
- FS 10 Zone: 18.1
- QS: 17.1
- EST/MIR2: 19.8
- EST3: 19.2
- BPS6(10A): 19.1
V2: Added Edwards panel voltages. Changed "Nominal Panel Voltage" to "Minimum Circuit Voltage".

Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction for this calculator provides voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).

This calculator provides voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering). Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction.

### Project Information

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Two River Theater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>8/7/2019</td>
</tr>
</tbody>
</table>

### Circuit Information

<table>
<thead>
<tr>
<th>Circuit Number</th>
<th>Area Covered</th>
<th>Area Covered</th>
<th>Voltage Voltage Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2-03</td>
<td>Third Floor</td>
<td>19.1</td>
<td>Total Circuit Current</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.0</td>
<td>1089.00</td>
</tr>
</tbody>
</table>

### Device Information

#### End of Line Voltage

<table>
<thead>
<tr>
<th>Device Number</th>
<th>Device Current</th>
<th>Device Current</th>
<th>Voltage Drop from source</th>
<th>Voltage Drop</th>
<th>Percent Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device 1</td>
<td>63</td>
<td>32</td>
<td>18.89</td>
<td>0.214</td>
<td>1.12%</td>
</tr>
<tr>
<td>Device 2</td>
<td>63</td>
<td>14</td>
<td>18.80</td>
<td>0.302</td>
<td>1.58%</td>
</tr>
<tr>
<td>Device 3</td>
<td>63</td>
<td>12</td>
<td>18.73</td>
<td>0.373</td>
<td>1.95%</td>
</tr>
<tr>
<td>Device 4</td>
<td>121</td>
<td>3</td>
<td>18.71</td>
<td>0.390</td>
<td>2.04%</td>
</tr>
<tr>
<td>Device 5</td>
<td>41</td>
<td>17</td>
<td>18.63</td>
<td>0.471</td>
<td>2.47%</td>
</tr>
<tr>
<td>Device 6</td>
<td>162</td>
<td>32</td>
<td>18.48</td>
<td>0.616</td>
<td>3.23%</td>
</tr>
<tr>
<td>Device 7</td>
<td>63</td>
<td>24</td>
<td>18.40</td>
<td>0.701</td>
<td>3.67%</td>
</tr>
<tr>
<td>Device 8</td>
<td>162</td>
<td>44</td>
<td>18.26</td>
<td>0.839</td>
<td>4.40%</td>
</tr>
<tr>
<td>Device 9</td>
<td>162</td>
<td>58</td>
<td>18.14</td>
<td>0.964</td>
<td>5.05%</td>
</tr>
<tr>
<td>Device 10</td>
<td>63</td>
<td>16</td>
<td>18.12</td>
<td>0.983</td>
<td>5.15%</td>
</tr>
<tr>
<td>Device 11</td>
<td>63</td>
<td>16</td>
<td>18.10</td>
<td>0.995</td>
<td>5.21%</td>
</tr>
<tr>
<td>Device 12</td>
<td>63</td>
<td>5</td>
<td>18.10</td>
<td>0.997</td>
<td>5.22%</td>
</tr>
<tr>
<td>END</td>
<td>18.10</td>
<td>0.997</td>
<td>5.22%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.10</td>
<td>0.997</td>
<td>5.22%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.10</td>
<td>0.997</td>
<td>5.22%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.10</td>
<td>0.997</td>
<td>5.22%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>18.10</td>
<td>0.997</td>
<td>5.22%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Total Circuits

<table>
<thead>
<tr>
<th>Total Current</th>
<th>Voltage Drop</th>
<th>Percent Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1089</td>
<td>18.10</td>
<td>5.22%</td>
</tr>
</tbody>
</table>

### Wire Gauge for balance of circuit

<table>
<thead>
<tr>
<th>Distance from source to 1st device</th>
<th>Wire Gauge for balance of circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>14</td>
</tr>
<tr>
<td>14</td>
<td>3.07</td>
</tr>
</tbody>
</table>

### Current at Rated Voltage

<table>
<thead>
<tr>
<th>Model #</th>
<th>Candela</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>54</td>
</tr>
<tr>
<td>30</td>
<td>74</td>
</tr>
<tr>
<td>75</td>
<td>121</td>
</tr>
<tr>
<td>110</td>
<td>162</td>
</tr>
<tr>
<td>15</td>
<td>41</td>
</tr>
<tr>
<td>30</td>
<td>63</td>
</tr>
<tr>
<td>75</td>
<td>111</td>
</tr>
<tr>
<td>110</td>
<td>148</td>
</tr>
</tbody>
</table>

### Device Manufacturer

<table>
<thead>
<tr>
<th>Device Manufacturer</th>
<th>System Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Standards

- Standard Wire Resistance in Ohms per 1000 feet:
  - 18=7.77
  - 16=4.89
  - 14=3.07
  - 12=1.98
  - 10=1.24

- 18-14 Awg = Solid Conductors
- 12-10 Awg = Stranded Conductors

### Notes

- Wire resistance is doubled in the calculations for two wires (Positive and Negative).
- The voltage calculated to the last device in any method must not be lower than the manufacturer's listed minimum operating voltage (IE: rated operating voltage 16-33 VDC).
GENERAL
The FDU-80 is a compact, cost-effective, 80 character, backlit LCD Fire Annunciator for use with the NOTIFIER AFP-300, AFP-400, AFC-600, and NFS-640 Fire Alarm Control Panels (FACPs). The FDU-80 mimics the display of the control panel and displays complete status information. Up to 32 FDU-80s may be connected onto the EIA-485 Terminal Mode port of each control panel. The FDU-80 requires no programming, which saves time during system commissioning.

NOTES:
1) The FDU-80 is compatible with the NOTIFIER AFP-300/400 Rev. 3.62 or higher, AFC-600 (all revisions), and NFS-640 Rev. 2.01 or higher.
2) The FDU-80 can be used on the same data loop as the LCD-80/LCD-80TM annunciators revision 1.6 software or higher.

FEATURES
- 80-character Liquid Crystal Display.
- Mimics all display information from the host panel.
- Control switches for System Acknowledge, Signal Silence, Drill and Reset with enable key.
- System status LEDs for Power, Alarm, Trouble, Supervisory, and Alarm Silenced.
- No programming necessary — FDU-80 connects to the terminal mode port.
- Displays device type identifiers, individual point alarm, trouble or supervisory, zone and custom alarm labels.
- Time and date display field.
- Aesthetically pleasing design.
- May be powered by 24 VDC from the host FACP or by remote power supplies (requires 24 VDC).
- Up to 32 FDU-80 annunciators per FACP.
- Plug-in terminal blocks for ease of installation and service.
- Can be remotely located up to 6,000 feet (1828.8 m) from host control panel.
- Local piezo sounder with alarm and trouble resound.
- Semi-flush-mounts to 2.188"/5.556 cm (minimum) deep, three-gang electrical box (NOTIFIER P/N 10103) or three-gangable electrical switchbox.
- Surface-mounts to NOTIFIER SBB-3 surface backbox.

OPERATION
The FDU-80 annunciator provides the FACP with point annunciator with full display text on an 80-character LCD display. The FDU-80 also provides an array of LEDs to indicate system status, and also includes control switches for remote control of critical system functions.

The FDU-80 provides the FACP with up to 32 remote serially connected annunciators. All field-wiring terminations on the FDU-80 use removable, compression-type terminal blocks for ease of wiring and circuit testing. Communication between the FACP and the annunciator is accomplished over an EIA-485 serial interface, which greatly reduces wire and installation cost over traditional systems. Six wires total are required: four for the EIA-485 communications (two in and two return); and two for the 24 VDC regulated power. Dip switches control local functions such as: piezo disable, control switches/key switch disable, transmit/receive mode.

INSTALLATION
The FDU-80 can be semi-flush mounted to a 2.188"/5.556 cm (minimum) deep, three-gang electrical box (NOTIFIER P/N 10103) or three-gangable electrical switchboxes. Alternately, an SBB-3 surface backbox is available for surface-mount applications.
ORDERING INFORMATION

FDU-80 80 character, backlit, LCD Fire Annunciator with control switches for remote control of system functions, and key-switch lock.

10103 Three-gang electrical box, minimum 2.188" (5.556 cm) deep, for semi-flush-mount applications.

SBB-3 Three-gang surface backbox for surface-mount applications.

---

FDU-80 TERMINAL MODE WIRING EXAMPLE

Notes:
1) EIA-485: Maximum of 6,000 feet (1828.8 m) cable length from FACP to FDU-80 annunciators and back to FACP (6,000 feet [1828.8 m] total). Circuit is power-limited.
2) Up to 32 FDU-80 annunciators may be used on the EIA-485 circuit. When multiple FDU-80s are used, certain panels will require additional power supplies (refer to panel documentation).
3) Between each FDU-80 annunciator are four wires: a twisted-shielded pair for data communications and a pair for 24 VDC power. The return circuit only requires two wires for data communication supervision, wired from the last FDU-80 annunciator on the loop.
4) On the AFP-300/400, software revision 3.62 or higher is required.

---

MOUNTING TO BACKBOX(ES)

The FDU-80 annunciators can be semi-flush-mounted in a three-gang electrical box with a minimum depth of 2.188" (5.556 cm) (NOTIFIER P/N 10103).

The FDU-80 annunciators can be mounted in three gangable electrical switch boxes connected together.

NOTE: Alternately, FDU-80 annunciators can be mounted to the SBB-3 surface backbox for surface-mount applications.

5.813" (14.764 cm) wide x 4" (10.16 cm) high x minimum 2.188" (5.556 cm) deep, three-gang electrical box (NOTIFIER P/N 10103, shown at right).
PSN SERIES
POWER SUPPLY

UL, cUL, CSFM Listed
- PSN-64 has 6 amps regulated with 4 Outputs
- PSN-106 has 10 amps regulated with 6 Outputs
- Outputs Rated at 3 amps maximum each
- May be configured as up to three class “A” Style “Z” notification circuits
- 3 amp, 24 VDC programmable output power
- Supervised Battery Charger: 27.3 @ 1A (supports 7-55 AH batteries)
- Easy to install cabinet with leveling mounts and key lock
- Wiring knockouts provided on sides and top of cabinet
- Two Trouble Relays (5A at 30VDC)
  General System Trouble (programmable for AC delay)
  Low AC Trouble with optional delay settings
- Diagnostic LED’s
  Status LED’s for Active NAC and NAC trouble conditions
  Status LED’s for Earth Fault (Amber), AC (Green), Battery Fault (Amber)
- Trouble Memory feature captures troubles which have previously restored
- Synchronized notification appliance circuits
  Potter/AMSECO®, Wheelock®, Gentex®, System Sensor®
- Configurable output circuits (DIP switch sets options for each circuit)
- 15 mA at 8-33 VDC input trigger
- Reference EOL allows 2K – 27K EOL value to be used
- Quadrasync provides panel wide synchronization of same or multiple brands
- PassThru mode allows the Outputs to match the Input Signal

Electrical Specs:
- 120/240 VAC 50-60 Hz input
- 5.1 Amps @ 120 VAC or 2.5 Amps @ 240 VAC
- Battery Standby Current 75 mA
- Alarm Standby Current 75 mA (no external load)
- Terminals support 12 - 18 AWG wire.

Description
The PSN series of notification power supplies offers reliable notification power with unprecedented versatility. The power supplies offer either 6 or 10 amps of continuous power through 4 or 6 outputs respectively. Each output is rated at 3 amps and it may be used continuously without any derating.

The power supply operates on either 120 VAC or 220 VAC power input and has a regulated 24 VDC output. In addition, the panel can charge up to 55 AH batteries and leads the industry in housing up to 18 AH batteries. The cabinet is constructed out of 18 gauge cold rolled steel and has a durable red powder coat finish. In addition, a key lock is provided for securing the door. Ample electrical knockouts are provided on the sides and the top, allowing the installer options for running wires and maintaining the correct separations.

The power supply offers an industry leading Quadrasync function that allows for multiple strobe circuits of different brands to be synchronized to flash at the same time. The panel can have four different brands each connected to its own circuit and all of the strobes flash together.

Each output can independently be configured to provide one of four synchronizations or steady power. This provides unequivocal flexibility in new and retrofit installations. The panel can be configured to synchronize Potter/AMSECO®, Wheelock®, Gentex® and System Sensor® strobe devices. Each output can be configured the same sync protocol or set independently.

In addition, the panel has an input PassThru mode allows the outputs to follow the input signal and sync up the input flash. The panel will recognize the type of input being supplied and pass this through to the outputs with the same pattern. This input pass through can be selected on each output independently.

The power supply contains simple dipswitch programming and LED indications providing the installer indications of the operation and the ability to correct any faults. A Trouble Memory is provided to allow an installer to review past troubles and make the necessary repairs. Each output has an LED to pin point the exact circuit where a problem may have occurred. Relays are provided for monitoring the general system and AC failure.

Each output and be independently configured for various applications and installations. Each output can be independently configured for Class A or Class B operation, constant power, ANSI Temporal Code 3, Single, Multiple or Combo Inputs or Door Holder Power.

Potter Electric Signal Co., LLC • St. Louis, MO • Cust Service: 866-240-1870 • Tech Support: 866-956-1211 • Canada 888-882-1833 • www.pottersignal.com

PRINTED IN USA  MKT. 08910013 - REV D  1/18  PAGE 1 OF 2
PSN-106 Wiring Diagram

120/240 VAC Jumper Position

120VAC 50Hz~60Hz
240VAC 50Hz~60Hz
Connect to separate unswitched AC circuit

Black White Ground

Factory Installed Interconnect.
AC Power
Low Battery
Gnd Fault
Common

Battery connection (non-power limited).
Use two (2) 12V batteries connected in series.

Common relays are non-power limited.

GND FAULT DETECT ENABLE
ON [ ] OFF

Status LED's

Note: PSN-64 and PSN-106 draw 15 mA when polarity reverses and the power supply is triggered. There is no current draw in Standby Mode.

Engineering Specification

The contractor shall supply and install the Potter PSN power supply. The power supply shall operate on either 120 or 240 VAC input. The panel shall be capable of continuous load power without any degradation to the main supply or the distribution board. The cabinet shall be capable of housing up to 18 AH batteries and the panel shall be capable of charging up to 55 AH batteries in an external cabinet.

The panel shall have dip switches for simplistic configuration of the system and LEDs to provide visual indication to the installer of the status of the system. The dip switches shall allow for AC power delay selection, Class A/B operation per output, Door Holder Power options, constant auxiliary power, trigger input type, ANSI Code 3 Temporal Code, Pass Thru (input tracking), Potter/AMSECO* sync, Gentex* Sync, System Sensor* Sync or Wheelock* sync. The LEDs shall provide indication of communication between the power supply and distribution circuit assemblies. The LEDs shall have distinct flash patterns to provide further indication of the troubles present. The panel shall have selectable Trouble Memory to provide the installer an indication that a past trouble existed on a circuit for diagnostic purposes.

Each output of the power supply shall be capable of 3 amps of continuous power without degradation over time. The power supply shall provide for multiple circuits of strobe appliances. The power supply shall synchronize the flashes of any of the above listed strobe appliances on a per circuit basis. Up to four different strobe circuits may be connected and all of the strobes shall flash in unison as required by UL 864. In addition to this Quadrasync feature, the panel shall allow any of the four above mentioned sync patterns as an input and pass this signal through and synchronize the outputs to match the input flash pattern.
GENERAL

The NOTIFIER NBG-12LX is a state-of-the-art, dual-action (i.e., requires two motions to activate the station) pull station that includes an addressable interface for any NOTIFIER intelligent control panel. Because the NBG-12LX is addressable, the control panel can display the exact location of the activated manual station. This leads fire personnel quickly to the location of the alarm.

FEATURES

- Maintenance personnel can open station without causing an alarm condition.
- Built-in bicolor LED, which is visible through the handle of the station, flashes in normal operation and latches steady red when in alarm.
- Handle latches in down position and the word “ACTIVATED” appears to clearly indicate the station has been operated.
- Captive screw terminals wire-ready for easy connection to SLC loop (accepts up to 12 AWG/3.1 mm² wire).
- Semi-flush, mounts to a standard single-gang (2.125” [5.3975 cm] minimum depth), double-gang, or 4” (10.16 cm) square electrical box.
- Smooth dual-action design.
- Within ADA 5 lb. pull force.
- Highly visible.
- Attractive shape and textured finish.
- Key reset.
- Includes Braille text on station handle.
- Optional trim ring (BG-TR).
- Meets UL 38, Standard for Manually Actuated Signaling Boxes.
- Up to 99 NBG-12LX stations per loop on classic protocol systems.
- Up to 159 NBG-12LX stations per loop on FlashScan® protocol systems.
- Dual-colored LED blinks green to indicate normal on FlashScan® systems.

CONSTRUCTION

Shell, door, and handle are molded of durable LEXAN® (or polycarbonate equivalent) with a textured finish.

OPERATION

Pushing in, then pulling down on the handle causes it to latch in the down/activated position. Once latched, the word “ACTIVATED” (in bright yellow) appears at the top of the handle, while a portion of the handle protrudes from the bottom of the station. To reset the station, simply unlock the station with the key and pull the door open. This action resets the handle; closing the door automatically resets the switch.

Each manual station, on command from the control panel, sends data to the panel representing the state of the manual switch. Two rotary decimal switches allow address settings (1 – 159 on FlashScan® systems, 1 – 99 on CLIP systems).

FlashScan® and NOTIFIER® are registered trademarks of Honeywell International INC. LEXAN® is a registered trademark of GE Plastics, a subsidiary of General Electric Company.
PRODUCT LINE INFORMATION
NBG-12LX Dual-action addressable pull station.
   Includes key locking feature.
SB-10   Surface backbox.
SB-I/O  Indoor/outdoor surface backbox.
BG-TR   Optional trim ring.

INSTALLATION
The NBG-12LX will mount semi-flush into a single-gang, double-gang, or standard 4" (10.16 cm) square electrical outlet box, or will surface mount to the model SB-10 or SB-I/O surface backbox. If the NBG-12LX is being semi-flush mounted, then the optional trim ring (BG-TR) may be used. The BG-TR is usually needed for semi-flush mounting with 4" (10.16 cm) or double-gang boxes (not with single-gang boxes).

ELECTRICAL SPECIFICATIONS
Normal operating voltage: 24 VDC.
Maximum SLC loop voltage: 28.0 VDC.
Maximum SLC loop current: 375 μA.

ARCHITECTURAL/ENGINEERING SPECIFICATIONS
Manual Fire Alarm Stations shall be non-coded, with a key-operated reset lock in order that they may be tested, and so designed that after actual Emergency Operation, they cannot be restored to normal except by use of a key.
An operated station shall automatically condition itself so as to be visually detected as activated. Manual stations shall be constructed of red-colored LEXAN® (or polycarbonate equivalent) with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in white letters, 1.00 inches (2.54 cm) or larger. Stations shall be suitable for surface mounting on matching backbox SB-10; or semi-flush mounting on a standard single-gang, double-gang, or 4" (10.16 cm) square electrical box, and shall be installed within the limits defined by the Americans with Disabilities Act (ADA) or per national/local requirements. Manual Stations shall be Underwriters Laboratories listed.
Manual stations shall connect with two wires to one of the control panel SLC loops. The manual station shall, on command from the control panel, send data to the panel representing the state of the manual switch. Manual stations shall provide address setting by use of rotary decimal switches.
The loop poll LED shall be clearly visible through the front of the station. The LED shall flash while in the normal condition, and stay steadily illuminated when in alarm.

Back of station without door.

Terminal Connections
1  SLC (-)
2  SLC (+)

Detail of BREAKAWAY TAB*

Cover open to show easy access to miniature monitor module, rotary switch, and UL label.
FSP-851 and FSP-851T
Intelligent Plug-In Photoelectric Smoke Detectors with FlashScan®

General
Notifier 851 Series intelligent plug-in smoke detectors with integral communication provide features that surpass conventional detectors. Detector sensitivity can be programmed in the control panel software. Sensitivity is continuously monitored and reported to the panel. Point ID capability allows each detector’s address to be set with decade address switches, providing exact detector location for selective maintenance when chamber contamination reaches an unacceptable level. The FSP-851 photoelectric detector’s unique optical sensing chamber is engineered to sense smoke produced by a wide range of combustion sources. Dual electronic thermistors add 135°F (67°C) fixed-temperature thermal sensing on the FSP-851T. FSP-851 and FSP-851T detectors are compatible with all Notifier intelligent Fire Alarm Control Panels (FACP).

FlashScan® (U.S. Patent 5,539,389) is a communication protocol developed by Notifier engineering that greatly enhances the speed of communication between analog intelligent devices. Intelligent devices communicate in a grouped fashion. If one of the devices in the group has new information, the panel’s CPU stops the group poll and concentrates on single points. The net effect is response speed greater than five times that of earlier designs.

Features
• Sleek, low-profile design.
• Addressable-analog communication.
• Stable communication technique with noise immunity.
• Low standby current.
• Two-wire SLC connection.
• FlashScan (NFS-640, NFS-3030) and classic CLIP systems (AFP-100, AFP-200, AFP-300, AFP-400, NFS-640, AM2020/AM1010, NFS-3030) compatible.
• Rotary, decimal addressing (1-99 on current classic systems, 1-159 on FlashScan systems).
• Optional remote, single-gang LED accessory (RA400Z).
• Dual LED design provides 360° viewing angle.
• Visible bi-color LEDs blink green every time the detector is addressed, and illuminate steady red on alarm.
• Remote test feature from the panel.
• Walk test with address display (an address on 121 will blink the detector LED: 12-[pause]-1 [FlashScan systems only]).
• Built-in functional test switch activated by external magnet.
• Built-in tamper-resistant feature.
• Sealed against back pressure.
• Constructed of off-white Bayblend®, designed to commercial standards, and offers an attractive appearance.
• 94-5V plastic flammability rating.
• SEMS screws for wiring of the separate base.
• Optional relay, isolator, and sounder bases.
• Backward compatible.

Specification
Size: 2.1” (5.3cm) high x 4.1” (10.4cm) diameter installed in B501 base, 6.1” (15.5cm) diameter installed in B710LP base.
Shipping Weight: 5.2oz. (147g).
Operating Temperature: FSP-851, 0°C to 49°C (32°F to 120°F); FSP-851T, 0°C to 38°C (32°F to 100°F). Low temperature signal for FSP-851T at 45°F +/- 10°F (7.22°C +/- 5.54°C).
UL Listed Velocity Range: 0-4000 ft/min. (1219.2 m/min.), suitable for installation in ducts.
Relative Humidity: 10%-93% noncondensing.

DETECTOR SPACING AND APPLICATIONS
Notifier recommends spacing detectors in compliance with NFPA 72. In low airflow applications with smooth ceiling, space detectors 30 feet (9.144m) for ceiling heights 10 feet (3.148m) and higher. For specific information regarding detector spacing, placement, and special applications refer to NFPA 72. System Smoke Detector Application Guide, document A05-1003, is available at systemsensor.com
FSP-851 and FSP-851T are listed for use in ducts, but they are NOT listed for use inside duct smoke detector housings. See Duct Application Smoke Detectors Guide, document A05-1004, available at systemsensor.com, for details on pendant mount applications.
ELECTRICAL SPECIFICATIONS

Voltage Range: 15-32 volts DC peak.

Standby Current (max. avg.): 250μA @ 24VDC (with no communication enabled); 360μA @ 24VDC (one communication every five minutes with LED enabled).

LED Current (max.): 6.5mA @ 24VDC ('ON').

BASES AVAILABLE

B710LP: 6.1" (15.5cm) diameter.

B501: 4.1" (10.4cm) diameter.

B501BH or B501BHT: Sounder base assembly. Includes B501 base.

B224RB Relay Base: Screw Terminals, up to 14AWG (2.0mm²); Relay Type, Form-C; Rating, 2.0A @ 30VDC resistive, 0.3A @ 110VDC inductive, 1.0A @ 30VDC inductive; Dimensions, 6.2" (15.748cm) x 1.2" (3.049cm) x 1.2" (3.048cm).

B224BI Isolator Base: Dimensions, 6.2" (15.748cm) x 1.2" (3.048cm) x 1.2" (3.048cm); Maximum, 25 devices between isolator bases.

Installation

FSP-851 plug-in detectors use a separate base to simplify installation, service, and maintenance. A special tool allows maintenance personnel to plug in and remove detectors without using a ladder.

Mount base on an electrical backbox which is at least 1.5" (3.81cm) deep. Suitable mounting base boxes include:

- 4.0" (10.16cm) square box.
- 3.5" (8.89cm) or 4.0" (10.16cm) octagonal box.
- Single-gang box (except relay or isolator base).
- With B501BH or B501BHT base, use a 4.0" (10.16cm) square box.
- With B224RB or B224BI base, use a 3.5" (8.89cm) octagonal box, or a 4.0" (10.16cm) octagonal or square box.

NOTE: 1) Because of inherent supervision provided by the SLC loop, end-of-line resistors are not required. Wiring "T-taps" or branches are permitted for style 4 (Class "B") wiring. 2) When using relay or sounder bases, consult data sheet DN-2243 (ISO-X) for device limitations between isolator modules and isolator bases.

Agency Listings and Approvals

These listings and approvals apply to the modules specified in this document. In some cases, certain modules or applications may not be listed by certain approval agencies, or listing may be in process. Consult factory for latest listing status.

- UL Listed: S1115
- ULC Listed: CS915 (FSP-962A, FSP-851TA)
- MEA Listed: 225-02-E
- FM Approved
- CSFM: 7272-0028:206
- Maryland State Fire Marshal: Permit # 2122
- BSMI: CI313066760036
- CCCF: Certif. # 2004081801000007 (FSP-851T)
  Certif. # 2004081801000016 (FSP-851)
- Lloyd's Register: 03/60011
**Product Line Information**

**NOTE:** "A" suffix indicates ULC listed model.

**FSP-851:** Low-profile intelligent photoelectric sensor. Must be mounted to one of the bases listed below.

**FSP-851A:** Same as FSP-851 but with ULC listing.

**FSP-851T:** Same as FSP-851 but includes a built-in 135°F (57°C) fixed-temperature thermal device.

**FSP-851TA:** Same as FSP-851T but with ULC listing.

**BASES**

**B710LPB:** Standard U.S. low-profile base, pkg. of 10.

**B710LPA:** Standard U.S. low-profile base, ULC listing.

**B501BP:** Standard European flangeless base, pkg. of 10.

**B501A:** Standard European flangeless base, ULC listing.

**B501BH(A):** Sounder base, includes B501(A) base.

**B501BHT(A):** Same as B501BH(A), but includes temporal sounder.

**B224RB(A):** Intelligent relay base.

**B224BI(A):** Intelligent isolator base. Isolates SLC from loop shorts.

**ACCESSORIES**

**F110:** Retrofit replacement flange for older style bases. Converts old high profile base for use with FlashScan detectors.

**RA400Z(A):** Remote LED annunciator. 3-32VDC. Fits U.S. single-gang electrical box. Supported by B710LP(A) and B501(A) bases only.

**SMK400:** Surface mounting kit provides for entry of surface wiring conduit. For use with B501(A) base only.

**RMK400:** Recessed mounting kit. For use with B501(A) base only.

**SMB600:** Surface mounting kit for use with B710LP(A).

**BCK-200B:** Black detector covers, box of 10. For use with FSP-851 only.

**M02-04-01:** Test magnet.

**M02-09-00:** Test magnet with telescope stick.

**XR2B:** Detector removal tool. Allows installation and/or removal of FlashScan Series detector heads from base in high ceiling installations.

**T55-127-000:** Detector removal tool without pole.

**XP-4:** Extension pole for XR2B. Comes in three 5-ft. sections.

**DETECTOR GUARDS**

**NOTE:** Some guards listed below may not be applicable to FPS models.

**SDG-773:** Smoke detector guard; cover is 7.0" (17.78cm) square x 3.0" (7.62cm) deep. This guard is mechanically compatible with FSP-751. It is UL-compatibility listed with the FSP-851 (file UL 5515).

**STI 9601:** Low-profile, flush-mount smoke detector guard, wire.*

**STI 9602:** Low-profile, surface-mount, smoke detector guard, wire.*

**STI 9609:** High-profile, flush-mount, smoke detector guard, wire.*

**STI 9605:** High Profile, surface-mount, smoke detector guard, wire.*

**STI 9604:** Flush-mount, heat detector guard, wire.*

**STI 9610:** Surface-mount, heat detector guard, wire.*

**STI-8200-SS:** Flush-mount stainless steel smoke detector guard (compatibility pending).

**STI-8230-SS:** Surface mount stainless steel smoke detector guard (compatibility pending).

* For dimensions and additional information on STI Steel Web Stoppers, see data sheet DN-4936.

Notifier® and FlashScan® are registered trademarks of Honeywell International Inc. Bayblend® is a registered trademark of Bayer Corporation. ©2007 by Honeywell International Inc. All rights reserved. Unauthorized use of this document is strictly prohibited.

ISO 9001
CERTIFIED
MANUFACTURING
QUALITY SYSTEMS

This document is not intended to be used for installation purposes. We try to keep our product information up-to-date and accurate. We cannot cover all specific applications or anticipate all requirements. All specifications are subject to change without notice.

For more information, contact Notifier. Phone: (203) 484-7161, FAX: (203) 484-7118. www.notifier.com

Made in the U.S.A.
FST-851 Series
Intelligent Thermal (Heat) Detectors with FlashScan®

General
Notifier FST-851 Series intelligent plug-in smoke detectors with integral communication provide features that surpass conventional detectors. Detector sensitivity can be programmed in the control panel software. Sensitivity is continuously monitored and reported to the panel. Point ID capability allows each detector’s address to be set with decade address switches, providing exact detector locations for selective maintenance when chamber contamination reaches an unacceptable level. FST-851 Series thermal detectors use an innovative thermistor sensing circuit to produce 135°F/57°C fixed-temperature (FST-851) and rate-of-rise thermal detection (FST-851R) in a low-profile package. FST-851H provides fixed high-temperature detection at 190°F/88°C. These thermal detectors provide cost effective, intelligent property protection in a variety of applications. FST-851 Series detectors are compatible with all Notifier intelligent Fire Alarm Control Panels (FACP).

FlashScan® (U.S. Patent 5,539,389) is a communication protocol developed by Notifier Engineering that greatly enhances the speed of communication between analog intelligent devices and certain NOTIFIER systems. Intelligent devices communicate in a grouped fashion. If one of the devices within the group has new information, the panel’s CPU stops the group poll and concentrates on single points. The net effect is response speed greater than five times that of earlier designs.

Features
- Sleek, low-profile, stylish design.
- State-of-the-art thermistor technology for fast response.
- Rate-of-rise model (FST-851R), 15°F (8.3°C) per minute.
- Factory preset at 135°F (57°C); high-temperature model at 190°F (88°C).
- Addressable by device.
- FlashScan® (NFS-640, NFS-3030) and classic CLIP system (AFP-100, AFP-200, AFP-300, AFP-400, NFS-640, AFP1010, AM2020, NFS-3030, NFS2-3030) compatible.
- Rotary, decimal addressing (1 – 99 on current systems, 1 – 159 on FlashScan® systems).
- Two-wire SLC connection.
- Visible LEDs “blinks” every time the unit is addressed.
- 360°-field viewing angle of the visual alarm indicators (two bi-color LEDs). LEDs blink green in Normal condition and turn on steady red in Alarm.
- Integral communications and built-in device-type identification.
- Remote test feature from the panel.
- Built-in functional test switch activated by external magnet.
- Walk test with address display (an address of 121 will blink the detector LED 12-(pause)-1).
- Low standby current.
- Listed to UL 521.
- Backward-compatible.
- Built-in tamper-resistant feature.
- Designed for direct-surface or electrical-box mounting.
- Sealed against back pressure.

Specifications
- Size: 2.1" (5.3 cm) high x 4.1" (10.4 cm) diameter installed in B501 base, 6.1" (15.5 cm) diameter installed in B710LP base.
- Weight: 4.8 oz. (137 g).
- Operating temperature range: FST-851 Series, FST-851R: –20°C to 38°C (–4°F to 100°F); FST-851H: –20°C to 66°C (–4°F to 150°F).
- Detector spacing: UL approved for 50 ft. (15.24 m) center to center, FM approved for 25 x 25 ft. (7.62 x 7.62 m) spacing.
- Relative humidity: 10% – 93% noncondensing.
- Electrical ratings: fixed-temperature setpoint 135°F (57°C), rate-of-rise detection 15°F (8.3°C) per minute, high temperature heat 190°F (88°C).
- ELECTRICAL SPECIFICATIONS:
  Voltage range: 15 - 32 volts DC peak.
  Standby current (max. avg.): 200 µA @ 24 VDC (without communication); 300 µA @ 24 VDC (one communication every 5 seconds with LED enabled).
  LED current (max.): 6.5 mA @ 24 VDC ("ON").
  Bases available:
  B710LP: 6.1" (15.5 cm) diameter.
  B501: 4.1" (10.4 cm) diameter.
  B501BH or B501BHT: Sounder base assembly. Includes B501 base.
  B224RB Relay Base: Screw terminals: up to 14 AWG (2.0 mm²). Relay type: Form-C. Rating: 2.0 A @ 30 VDC resistive; 0.3 A @ 110 VDC inductive; 1.0 A @ 30 VDC inductive. Dimensions: 6.2" (15.748 cm) x 1.2" (3.048 cm).
B224Bl Isolator Base: Dimensions: 6.2" (15.748 cm) x 1.2" (15.748 cm). Maximum: 25 devices between isolator bases. See Note 2 under Installation.

Applications
Use thermal detectors for protection of property. For further information, go to systemsensor.com for manual i56-407-00, Applications Manual for System Smoke Detectors, which provides detailed information on detector spacing, placement, zoning, wiring, and special applications.

Installation
The FST Series plug-in intelligent thermal detector uses a separate base to simplify installation, service, and maintenance. Installation instructions are shipped with each detector.

Mount base (all base types) on an electrical backbox which is at least 1.5" (3.81 cm) deep. Suitable boxes include:
- 4.0" (10.16 cm) square box.
- 3.5" (8.89 cm) or 4.0" (10.16 cm) octagonal box.
- Single-gang box (except relay or isolator base).
- With B501BH or B501BHT base, use a 4.0" (10.16 cm) square box.
- With B224RB or B224Bl base, use a 3.5" (8.89 cm) or 4.0" (10.16 cm) octagonal box, or a 4.0" (10.16 cm) square box.

NOTE: 1) Because of the inherent supervision provided by the SLC loop, end-of-line resistors are not required. Wiring "T-taps" or branches are permitted for Style 4 (Class "B") wiring. 2) When using relay or sounder bases, consult data sheet D5-2243 (ISO-X) for device limitations between isolator modules and isolator bases.

Agency Listings and Approvals
These listings and approvals apply to the modules specified in this document. In some cases, certain modules or applications may not be listed by certain approval agencies, or listing may be in process. Consult factory for latest listing status.
- UL Listed: S747
- ULc Listed: CS630 (ML255)(FST-851A, FST-851HA, FST-851RA)
- MEA Listed: 383-02-E
- FM Approved
- CSFM: 7270-0028:196
- BSMI: CI313066760025
- CCCF: Certif. # 2004081801000016
- U.S. Coast Guard: 161.002/23/3 (AFP-200); 161.002/27/3 (AFP1010/AM2020); 161.002/42/1 (NFS-640)
- Lloyd's Register: 03/60011
Product Line Information

"A" suffix indicates ULC Listed model.

FST-851 Series: Intelligent thermal detector. Must be mounted to one of the bases listed below.

FST-851 SeriesA: Same as FST-851 Series but with ULC Listing.

FST-851R: Intelligent thermal detector with rate-of-rise feature.

FST-851RA: Same as FST-851R but with ULC Listing.

FST-851H: Intelligent high-temperature thermal detector.

FST-851HA: Same as FST-851H but with ULC Listing.

BASES:


B501A: Standard European flangeless base, ULC Listing.

B501BH(A): Sounder base, includes B501(A) base.

B501BHT(A): Same as B501BH(A), but includes temporal sounder.

B224RB(A): Intelligent relay base.

B224BII(A): Intelligent isolator base. Isolates SLC from loop shorts.

ACCESSORIES:

F110: Retrofit replacement flange for older style high profile bases. Converts bases for use with FlashScan® detectors.

RA400Z(A): Remote LED annunciator. 3 – 32 VDC. Fits U.S. single-gang electrical box. Supported by B710LBP(A) and B501(A) bases only.

SMK400: Surface mounting kit provides for entry of surface wiring conduit. For use with B501(A) base only.

RMK400: Recessed mounting kit. For use with B501(A) base only.

SMB600: Surface mounting kit for use with B710LBP(A).

BCK-200B: Black detector covers, box of 10.

M02-04-01: Test magnet.

M02-09-00: Test magnet with telescope stick.

XR2B: Detector removal tool. Allows installation and/or removal of FlashScan® Series detector heads from base in high ceiling installations.

T55-127-000: Detector removal tool without pole.

XP-4: Extension pole for XR2B. Comes in three 5-ft. sections.

DETECTOR GUARDS:

NOTE: Some guards listed below may not be applicable to FST Series.

STI9601: Low-profile, flush-mount smoke detector guard, wire.

STI9602: Low-profile, surface-mount, smoke detector guard, wire.

STI9609: High-profile, flush-mount, smoke detector guard, wire.

STI9605: High-profile, surface-mount, smoke detector guard, wire.

STI 9604: Flush-mount heat detector guard, wire.

STI 9610: Surface-mount heat detector guard, wire.

*For dimensions and additional information on STI Steel Web Stoppers, see data sheet DN-4936.

STI8200-SS: Flush-mount stainless steel smoke detector guard (compatibility pending).

STI8230-SS: Surface-mount stainless steel smoke detector guard (compatibility pending).
GENERAL
Four different monitor modules are available for NOTIFIER intelligent controls to suit a variety of applications. Monitor modules are used to supervise a circuit of dry-contact input devices, such as conventional heat detectors and pull stations, or monitor and power a circuit of two-wire smoke detectors (FZM-1).

FMM-1 — is a standard-sized module (typically mounts to a 4" [10.16 cm] square box) that supervises either a Class A (Style D) or Class B (Style B) circuit of dry-contact input devices.

FMM-101 — is a miniature monitor module (a mere 1.3" [3.302 cm] H x 2.75" [6.985 cm] W x 0.5" [1.270 cm] D) used to supervise a Class B (Style B) circuit. Its compact design allows the FMM-101 to often be mounted in a single-gang box behind the device it’s monitoring.

FZM-1 — is a standard-sized module used to monitor and supervise two-wire, 24 volt, smoke detectors on a Class A (Style D) or Class B (Style B) circuit.

FDM-1 — is a standard-sized dual monitor module used to monitor and supervise two independent two-wire initiating device circuits (IDCs) at two separate, consecutive addresses in intelligent, two-wire systems.

FlashScan® (U.S. Patent 5,539,389) is a new communication protocol developed by NOTIFIER Engineering that greatly enhances the speed of communication between analog intelligent devices. Intelligent devices communicate in a grouped fashion. If one of the devices within the group has new information, the panel CPU stops the group poll and concentrates on single points. The net effect is response speed greater than five times that of other designs. FlashScan® is a registered trademark of NOTIFIER.

FMM-1 MONITOR MODULE
- Built-in type identification automatically identifies this device as a monitor module to the control panel.
- Powered directly by two-wire SLC loop. No additional power required.
- High noise (EMF/RFI) immunity.
- SEMS screws with clamping plates for ease of wiring.
- Direct-dial entry of address: 01 – 159 on FlashScan® systems, 01 – 99 on CLIP systems.
- LED flashes green during normal operation (this is a programmable option) and latches on steady red to indicate alarm.

The FMM-1 Monitor Module is intended for use in intelligent, two-wire systems, where the individual address of each module is selected using the built-in rotary switches. It provides either a two-wire or four-wire fault-tolerant Initiating Device Circuit (IDC) for normally-open-contact fire alarm and supervisory devices. The module has a panel-controlled LED indicator. The FMM-1 can be used to replace MMX-1 modules in existing systems.

FMM-1 Applications — Use to monitor a zone of four-wire smoke detectors, manual fire alarm pull stations, waterflow devices, or other normally-open dry-contact alarm activation devices. May also be used to monitor normally-open supervisory devices with special supervisory indication at the control panel. Monitored circuit may be wired as an NFPA Style B (Class B) or Style D (Class A) Initiating Device Circuit. A 47K ohm End-of-Line Resistor (provided) terminates the Style B circuit. No resistor is required for supervision of the Style D circuit. Maximum IDC loop length is 2,500 ft./762 m (20 ohms maximum).
FMM-1 Operation — Each FMM-1 uses one of 159 available module addresses on an SLC loop. It responds to regular polls from the control panel and reports its type and the status (open/normal/short) of its Initiating Device Circuit (IDC). A flashing LED indicates that the module is in communication with the control panel. The LED latches steady on alarm (subject to current limitations on the loop).

FMM-1 Specifications

Nominal operating voltage: 15 to 32 VDC.
Maximum current draw: 5.1 mA (LED on).
Maximum operating current: 375 µA (LED flashing).
EOL resistance: 47K ohms.
Temperature range: 32°F to 120°F (0°C to 49°C).
Humidity range: 10% to 93% noncondensing.
Dimensions: 4.5” (11.43 cm) high x 4” (10.16 cm) wide x 1.25” (3.175 cm) deep. Mounts to a 4” (10.16 cm) square x 2.125” (5.398 cm) deep box.

FMM-101 MINI MONITOR MODULE

• Built-in type identification automatically identifies this device as a monitor module to the panel.
• Powered directly by two-wire FACP. No additional power required.
• High noise (EMF/RFI) immunity.
• Tinned, stripped leads for ease of wiring.
• Direct-dial entry of address: 01 – 159 on FlashScan® systems, 01 – 99 on CLIP systems.

The FMM-101 Mini Monitor Module can be installed in a single-gang junction directly behind the monitored unit. Its small size and light weight allow it to be installed without rigid mounting. The FMM-101 is intended for use in intelligent, two-wire systems where the individual address of each module is selected using rotary switches. It provides a two-wire initiating device circuit for normally-open-contact fire alarm and security devices. The FMM-101 can be used to replace MMX-101 modules in existing systems.

FMM-101 Applications — Use to monitor a single device or a zone of four-wire smoke detectors, manual fire alarm pull stations, waterflow devices, or other normally-open dry-contact devices. May also be used to monitor normally-open supervisory devices with special supervisory indication at the control panel. Monitored circuit/device is wired as an NFPA Style B (Class B) Initiating Device Circuit. A 47K ohm End-of-Line Resistor (provided) terminates the circuit.

FMM-101 Operation — Each FMM-101 uses one of 159 available module addresses on an SLC loop. It responds to regular polls from the control panel and reports its type and the status (open/normal/short) of its Initiating Device Circuit (IDC).

FMM-101 Specifications

Nominal operating voltage: 15 to 32 VDC.
Maximum operating current: 375 µA.
EOL resistance: 47K ohms.
Temperature range: 32°F to 120°F (0°C to 49°C).
Humidity range: 10% to 93% noncondensing.
Dimensions: 1.3” (3.302 cm) high x 2.75” (6.985 cm) wide x 0.5” (1.270 cm) deep.
Wire length: 6” (15.24 cm) minimum.

FZM-1 INTERFACE MODULE

• Supports compatible two-wire smoke detectors.
• Supervises IDC wiring and connection of external power source.
• High noise (EMF/RFI) immunity.
• SEMS screws with clamping plates for ease of wiring.
• Direct-dial entry of address: 01 – 159 on FlashScan® systems, 01 – 99 on CLIP systems.
• LED flashes during normal operation (this is a programable option).
• LED latches steady to indicate alarm on command from control panel.

The FZM-1 Interface Module is intended for use in intelligent, addressable systems, where the individual address of each module is selected using built-in rotary switches. This module allows intelligent panels to interface and monitor two-wire conventional smoke detectors. It transmits the status (normal, open, or alarm) of one full zone of conventional detectors back to the control panel. All two-wire detectors being monitored must be UL compatible with the module. The FZM-1 has a panel-controlled LED indicator and can be used to replace MMX-2 modules in existing systems.

FZM-1 Applications — Use the FZM-1 to monitor a zone of two-wire smoke detectors. The monitored circuit may be wired as an NFPA Style B (Class B) or Style D (Class A) Initiating Device Circuit. A 3.9K ohm End-of-Line Resistor (provided) terminates the end of the Style B or D (Class B or A) circuit (maximum IDC loop resistance is 25 ohms). Install ELR across terminals 8 and 9 for Style D application.

FZM-1 Operation — Each FZM-1 uses one of 159 available module addresses on an SLC loop. It responds to regular polls from the control panel and reports its type and the status (open/normal/short) of its Initiating Device Circuit (IDC). A flashing LED indicates that the module is in communication with the control panel. The LED latches steady on alarm (subject to current limitations on the loop).

FZM-1 Specifications

Nominal operating voltage: 15 to 32 VDC.
Maximum current draw: 5.1 mA (LED on).
Maximum operating current: 255 µA (LED flashing).
EOL resistance: 3.9K ohms.
External supply voltage (between Terminals T3 and T4): DC voltage: 18 to 28 volts power limited. Ripple voltage: 0.1 V peaks maximum. Current: 90 mA per module maximum.
Temperature range: 32°F to 120°F (0°C to 49°C).
Humidity range: 10% to 93% noncondensing.
Dimensions: 4.5” (11.43 cm) high x 4” (10.16 cm) wide x 1.25” (3.175 cm) deep. Mounts to a 4” (10.16 cm) square x 2.125” (5.398 cm) deep box.
FDM-1 DUAL MONITOR MODULE

The FDM-1 Dual Monitor Module is intended for use in intelligent, two-wire systems. It provides two independent two-wire initiating device circuits (IDCs) at two separate, consecutive addresses. It is capable of monitoring normally open contact fire alarm and supervisory devices; or either normally open or normally closed security devices. The module has a single panel-controlled LED. **NOTE:** The FDM-1 provides two Class B (Style Y) IDC circuits ONLY. Class A (Style Z) IDC circuits are NOT supported in any application.

**FDM-1 Specifications**

- Normal operating voltage range: 15 to 32 VDC.
- Maximum current draw: 5.7 mA (LED on).
- Maximum operating current: 750 µA (LED flashing).
- EOL resistance: 47K ohms.
- Maximum IDC wiring resistance: 1,500 ohms.
- Temperature range: 32° to 120°F (0° to 49°C).
- Humidity range: 10% to 93% (non-condensing).
- Dimensions: 4.5" (11.43 cm) high x 4" (10.16 cm) wide x 2.125" (5.398 cm) deep.

**FDM-1 Automatic Addressing** — The FDM-1 automatically assigns itself to two addressable points, starting with the original address. For example, if the FDM-1 is set to address “56”, then it will automatically assign itself to addresses “56” and “57”. **NOTE:** *“ones” addresses on the FDM-1 are 0, 2, 4, 6, or 8 only.* Terminals 6 and 7 use the first address, and terminals 8 and 9 use the second address.

⚠️ **CAUTION!**

Avoid duplicating addresses on the system.

---

**INSTALLATION**

FMM-1, FDM-1, and FZM-1 modules mount directly to a standard 4" (10.16 cm) square, 2.125" (5.398 cm) deep, electrical box. They may also be mounted to the SMB500 surface-mount box. Mounting hardware and installation instructions are provided with each module. All wiring must conform to applicable local codes, ordinances, and regulations. These modules are intended for power-limited wiring only.

The FMM-101 module is intended to be wired and mounted without rigid connections inside a standard electrical box. All wiring must conform to applicable local codes, ordinances, and regulations.

**PRODUCT LINE INFORMATION**

- **FMM-1** Monitor module.
- **FMM-101** Monitor module, miniature.
- **FZM-1** Monitor module, two-wire detectors.
- **FDM-1** Monitor module, dual, two independent Class B circuits.
- **SMB500** Optional surface-mount backbox.

**ARCHITECTS'/ENGINEERS' SPECIFICATIONS**

Specifications of these and all NOTIFIER products are available from NOTIFIER.
WIRING DIAGRAMS

The following wiring diagrams are included:

1) **FDM-1**, typical dual two-wire Style B initiating device circuit configuration.
2) **FMM-101**, typical two-wire Style B initiating device circuit configuration.
3) **FMM-1**, typical two-wire initiating circuit configuration, NFPA Style B.
4) **FMM-1**, typical four-wire fault-tolerant initiating circuit configuration, NFPA Style D.
5) **FMM-1**, typical two-wire initiating circuit configuration for security systems (with alarm versus short capability).
6) **FZM-1**, interface two-wire conventional detectors, NFPA Style B.
7) **FZM-1**, interface two-wire conventional detectors, NFPA Style D.
8) **FRM-1**, relay control module used to disconnect a power supply.

WIRING DIAGRAM: FDM-1

**Fig. 1** FDM-1: Typical dual two-wire Style B initiating device circuit configuration.

Two Initiating Device Circuits
(L & H)
each power-limited to
230 μA max. @ 12 VDC max.

TO Next Device

(-)
(+)

FROM Panel or Previous Device

(-)
(+)

Communication Line
32 VDC maximum. Twisted-pair is recommended.

*ANY NUMBER* of UL Listed contact closure devices may be used.

*DO NOT MIX* fire alarm initiating, supervisory, or security devices on the same circuit.

Install contact closure devices per manufacturer’s installation instructions.

WIRING DIAGRAM: FMM-101

**Fig. 2** FMM-101: Typical two-wire Style B initiating device circuit configuration.

UL LISTED Compatible Control Panel
WIRING DIAGRAMS THIS PAGE: FMM-1

- Connect modules to listed compatible NOTIFIER control panels only.
- All wiring shown is supervised and power limited.
- Install contact closure devices per manufacturers' installation instructions.
- Any number of UL-listed contact closure devices may be used.
- **DO NOT MIX** fire alarm initiating, supervisory, or security devices on the same circuit.

Fig. 3 FMM-1: Typical two-wire initiating device circuit configuration, NFPA Style B.

Fig. 4 FMM-1: Typical four-wire fault-tolerant initiating circuit configuration, NFPA Style D.

Fig. 5 FMM-1: Typical two-wire initiating circuit configuration for security systems
(with alarm versus short capability).
• Connect modules to listed compatible control panels only.
• Terminal wiring must be power limited.
• **DO NOT MIX** fire alarm initiating, supervisory, or security devices on the same circuit.
• **DO NOT LOOP** wire under terminals. Break wire run to provide supervision of connections.
• Detectors must be UL listed compatible with module.
• Install detectors per manufacturers’ installation instructions.
• Power to the interface module must be externally switched to reset the detectors. An FRM-1 relay control module can be used to switch power from a standard power supply; see Fig. 7 below.

**Fig. 6** FZM-1: Interface two-wire conventional detectors, NFPA Style B.

**Fig. 7** FZM-1: Interface two-wire conventional detectors, NFPA Style D.

**Fig. 8** FRM-1: Relay control module used to disconnect a power supply.
Macurco™
Carbon Monoxide Detector
CM-6

Detector, Controller and Transducer

Carbon Monoxide Detection and Control
The Macurco CM-6 is a low voltage, dual relay Carbon Monoxide (CO) detector, controller and transducer. The CM-6 has selectable 4-20 mA output, buzzer and digital display options. It is an electronic detection system used to measure the concentration of CO and provide feedback and automatic exhaust fan or valve control to help reduce CO concentrations in parking garages, maintenance facilities or other commercial applications. The CM-6 is a low level meter capable of displaying from 0-200 ppm of Carbon monoxide.

Selectable options include:
• Fan relay actuation: selectable at 15, 25, 35 (default), 50 or 100 ppm CO
• Output: Fan relay, Alarm relay and 4-20mA current loop
• Controls: Digital display (0-200 ppm), buzzer, fan delay, fan minimum runtime

Installation
• Mounts on a standard 4” x 4” electrical box
• 5 A SPDT fan relay controls valves, louvers or exhaust fans
• 0.5 A N.O. or N.C alarm relay connects to warning devices or control panels
• 4-20mA current loop - compatible with the Macurco DVP-120 Control Panel
• Factory calibrated

Other Features
• Supervised system design: detector problem will cause the fan & alarm relay to activate
• Optional calibration kit allows the CM-6 to be field tested and calibrated
• ETL Listed to UL 61010-1, CAN/CSA C22.2 No 61010-1, LADBS Approved

Manufactured by Aeronics, Inc. Sioux Falls, SD – Phone: 1-877-367-7891 – Email: info@aeronicsinc.com – www.macurco.com
CM-6 Specifications

- Power: 3 W (max) from 12 to 24 VAC or 12 to 32 VDC
- Current @ 24 VDC: 75 mA in alarm, 50 mA fan relay on and 23 mA stand by
- Shipping Weight: 1 pound (0.45 kg)
- Size: 4 1/2 x 4 x 2 1/8 in. (11.4 X 10.2 X 5.4 cm)
- Color: Dark gray
- Connections: plugs/terminals
- Mounting Box: (not included) 4x4 electrical
- Fan Relay: 5 A, 240 VAC, pilot duty, SPDT, latching or non-latching
- Fan Relay Actuation: selectable at "diS" (disabled), 15 ppm, 25 ppm, 35 ppm (default), 50 ppm or 100 ppm
- Fan Delay Settings: 0, 1, 3 (default), 5 and 10 minutes
- Fan Relay Minimum Runtime Settings: 0 (default), 3, 5, 10 or 15 minutes
- Alarm Relay: 0.5A 120 V, 60 VA
- Alarm Relay Actuation: selectable N.O. default or N.C.
- Alarm Relay Settings: diS, 50 ppm, 100 ppm, 150 ppm and 200 ppm (default)
- Current Loop: 4-20 mA for 0-200 ppm
- Operating Environment: 0°F to 125° F (-18°C to 52°C), 10 to 90% RH non-condensing

Location

The unit typically covers about 5,000 sq.ft. (465 square meters) in a parking garage or similar application and 900 sq.ft. (84 square meters) in a residential or office type application. The coverage depends on air movement within the room or facility. Do not mount the CM-6 in a corner. The detector may be installed on either a ceiling or a wall. If installed on a peaked, gabled, or sloped ceiling, it should be located about 3 feet (1 meter) from the highest point. Normally, the unit is mounted about 5 feet (1.5m) above the floor (normal breathing zone), in a central area where air movement is generally good. Additional detectors may be needed near any areas where people work or where the air is stagnant.

TYPICAL CONNECTION OF CM-6

TYPICAL COVERAGE 5,000 SQUARE FEET
Field-Selectable Emergency Communications Devices

System Sensor L-Series emergency communications devices and accessories combine application versatility with all the time- and money-saving benefits of the L-Series line.

Emergency Communications Features:

- Plain or ALERT-printed white housings
- Clear or Amber lens strobes and speaker strobes
- Color lens attachments for use with clear lens wall or ceiling strobes
- Meets DoD specification requirements

L-Series Features:

- Plug-in design for simplified installation and troubleshooting
- Mounting plate shorting spring easily tests wiring continuity
- Automatic selection of 12- or 24-volt operation at 15 and 30 candela
- Field-selectable candela settings of:
  - Wall: 15, 30, 75, 95, 110, 135, 185
  - Ceiling: 15, 30, 75, 95, 115, 150, 177
- Rated from 32°F to 120°F (indoor devices)
- Optional tamper-resistant Torx head screw
- Compatible with System Sensor synchronization protocol

System Sensor L-Series, the broadest and most versatile line of notification devices available, includes a wide range of devices to meet emergency communications application requirements.

ALERT-printed on white housings amber lens strobes and speaker strobes provide visual signaling for emergency communications in compliance with ANSI/UL 1638 — Standard for General Signaling Visible Appliances. Other Plain or ALERT-printed models provide clear lenses for use with color lens strobe attachments (amber, blue, green, and red) that easily attach to strobe and speaker strobe devices without a candela derating.

In addition, L-Series emergency communications devices include plain (non-printed) strobes, horn strobes, and speaker strobes. These devices, along with ALERT-printed devices and L-Series accessories, can meet a wide range of requirements for indoor applications, including emergency communications, general signaling, severe weather, and emergency response.

All L-Series emergency communications and general signaling devices are compatible with the entire L-Series line and include all the same time- and money-saving innovations. For example, plug in design simplifies installation and reduces costly ground faults, universal mounting plates with onboard shorting springs test wiring continuity to speed installation and protect devices from damage, and field-selectable settings provide versatility and enable installers to quickly set each device to meet application requirements.

Agency Listings

UL Listed
FM Approved
SIGNALLING

FM approved except for:
ALERT models and printed lenses
Horn Strobes: 395/320, 395/420
Speaker Strobes: 395/425

Strobes: 175, 195, 250
Horn/Flash Strobes: 175, 195/225
Speaker Strobes: 175/195/225
L-Series Specifications

Architectural/Engineering Specifications

General
System Sensor L-Series strobes and horn strobes shall mount to a standard 4 x 4 x 1½-inch back box, 4-inch octagon back box, or double-gang back box. L-Series compact devices shall mount to a single-gang 2 x 4 x 1½-inch back box. L-Series speaker strobes shall mount to a 4 x 4 x 2½-inch back box. A universal mounting plate shall be used for mounting ceiling and wall products. The notification appliance circuit wiring and amplifier wiring shall terminate at the universal mounting plate. Also, L-Series products, when used with the Sync-Circuit" Module accessory, shall be powered from a non-coded notification appliance circuit output and shall operate on a nominal 12 or 24 volts. When used with the Sync-Circuit Module, 12-volt-rated notification appliance circuit outputs shall operate between 6.5 and 17.5 volts; 24-volt-rated notification appliance circuit outputs shall operate between 16.5 and 33 volts. Indoor L-Series products shall operate between 32 and 120 degrees Fahrenheit from a regulated DC or full-wave rectified unfiltered power supply. Strobes, horn strobes, and speaker strobes shall have field-selectable candela settings, including 15, 30, 75, 95, 110, 115, 135, 150, 177, and 185.

Strobe
The clear strobe shall be a System Sensor L-Series Model ______ listed to UL 1971 and shall be approved for fire protective service. Colored lens strobes shall be listed to ANSI/UL 1638 and shall be approved for Private Mode Emergency. The strobe shall be wired as a primary-signaling notification appliance and comply with the Americans with Disabilities Act requirements for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range. The strobe light shall consist of a xenon flash tube and associated lens/irreflector system.

Horn Strobe Combination
The horn strobe shall be a System Sensor L-Series Model ______ listed to UL 1971 and UL 464 and shall be approved for fire protective service. The horn strobe shall be wired as a primary-signaling notification appliance and comply with the Americans with Disabilities Act requirements for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range. The strobe light shall consist of a xenon flash tube and associated lens/irreflector system. The horn shall have three audibility options and an option to switch between a temporal three-pattern and a non-temporal (continuous) pattern. These options shall be set by a multiple position switch. The horn and horn strobe models shall operate on a coded or non-coded power supply.

Speaker Strobe Combination
The speaker strobe shall be a System Sensor L-Series Model ______ listed to UL 1480 and UL 1971 and be approved for fire protective signaling systems. Speaker shall be capable of operating at 25.0 or 70.7 nominal Vrms selected via rotary switch, and shall have a frequency range of 400 to 4,000 Hz. Speaker shall have power taps that are selected by rotary switch. The strobe shall comply with the NFPA 72 requirements for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range. The strobe light shall consist of a xenon flash tube and associated lens/irreflector system.

Synchronization Module
The module shall be a System Sensor Sync-Circuit model MDL3 listed to UL 464 and shall be approved for fire protective service. The module shall synchronize L-Series strobes at 1 Hz and horns at temporal three. Also, while operating the strobes, the module shall silence the horns on horn strobe models over a single pair of wires. The module shall mount to a 411/16 x 411/16 x 21/8-inch back box. The module shall also control two Style Y (class B) circuits or one Style Z (class A) circuit. The module shall synchronize multiple zones. Daisy chaining two or more synchronization modules together will synchronize all the zones they control. The module shall not operate on a coded power supply.

Color Lens Strobe Attachment
The System Sensor L-Series color lens attachments shall be approved for fire protective service as listed in UL 1638. The lens attachments shall only be used with (plain non-fire-printed) System Sensor strobe devices. They shall mount to any wall or ceiling strobe and be rated from minus 35 degrees to 151 degrees Fahrenheit. The effective light loss for wall units shall be as follows: Amber = 0%, Blue = 30%, Green = 55%, Red = 85%.

Physical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Operating Temperature</td>
<td>32°F to 120°F (0°C to 49°C)</td>
</tr>
<tr>
<td>Humidity Range</td>
<td>10 to 93% non-condensing</td>
</tr>
<tr>
<td>Dimensions Wall-Mount Strobe and Horn Strobe (including lens)</td>
<td>5.6&quot; L x 4.7&quot; W x 1.91&quot; D (143 mm L x 119 mm W x 49 mm D)</td>
</tr>
<tr>
<td>SPS Speaker Strobe (including lens)</td>
<td>6.5&quot; L x 5.0&quot; W x 2.3&quot; D (165 mm L x 127 mm W x 58 mm D)</td>
</tr>
<tr>
<td>Dimensions Ceiling-Mount Strobe (including lens)</td>
<td>6.8&quot; diameter x 2.6&quot; D</td>
</tr>
</tbody>
</table>

Electrical/Operating Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Voltage (strobes and horn strobes)</td>
<td>Regulated 12 VDC or regulated 24 DC/FWR</td>
</tr>
<tr>
<td>Nominal Voltage (speakers)</td>
<td>25 V or 70.7 V (nominal)</td>
</tr>
<tr>
<td>Maximum Supervisory Voltage (speakers)</td>
<td>50 VDC</td>
</tr>
<tr>
<td>Operating Voltage Range</td>
<td>8 to 17.5 V (12 V nominal) or 17 to 33 V (24 V nominal)</td>
</tr>
<tr>
<td>Operating Voltage Range with MDL3</td>
<td>8.5 to 17.5 (12V nominal) or 16.5 to 33V (24V nominal)</td>
</tr>
<tr>
<td>Strobe Flash Rate</td>
<td>1 flash per second</td>
</tr>
<tr>
<td>Speaker Frequency Range</td>
<td>400 to 4,000 Hz</td>
</tr>
<tr>
<td>Speaker Power</td>
<td>1/4, 1/2, 1, 2 watts</td>
</tr>
</tbody>
</table>

Speaker Sound Output

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL Reverberant (dBA @ 10 ft.)</td>
<td>2 W 1 W 1/2 W 1/4 W</td>
</tr>
<tr>
<td>Wall-Mount SPS Series</td>
<td>88 85 82 79</td>
</tr>
<tr>
<td>Ceiling-Mount SPC Series</td>
<td>88 85 82 79</td>
</tr>
</tbody>
</table>
## UL Current Draw Data

### UL Max Strobe Current Draw (mA RMS)

<table>
<thead>
<tr>
<th>Candela</th>
<th>8–17.5 Volts</th>
<th>16–33 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DC</td>
<td>DC</td>
</tr>
<tr>
<td>15</td>
<td>87</td>
<td>41</td>
</tr>
<tr>
<td>30</td>
<td>153</td>
<td>63</td>
</tr>
<tr>
<td>75</td>
<td>N/A</td>
<td>111</td>
</tr>
<tr>
<td>95</td>
<td>N/A</td>
<td>134</td>
</tr>
<tr>
<td>110</td>
<td>N/A</td>
<td>148</td>
</tr>
<tr>
<td>115</td>
<td>N/A</td>
<td>158</td>
</tr>
<tr>
<td>135</td>
<td>N/A</td>
<td>172</td>
</tr>
<tr>
<td>150</td>
<td>N/A</td>
<td>189</td>
</tr>
<tr>
<td>177</td>
<td>N/A</td>
<td>226</td>
</tr>
<tr>
<td>185</td>
<td>N/A</td>
<td>222</td>
</tr>
</tbody>
</table>

Wall Candela Settings: 15, 30, 75, 95, 110, 135, 185

Ceiling Candela Settings: 15, 30, 75, 95, 115, 150, 177

### UL Max. Current Draw (mA RMS), 2-Wire Horn Strobe

<table>
<thead>
<tr>
<th>DC Input</th>
<th>8VDC</th>
<th>16VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporal High</td>
<td>98</td>
<td>158</td>
</tr>
<tr>
<td>Temporal Low</td>
<td>93</td>
<td>154</td>
</tr>
<tr>
<td>Non-Temporal High</td>
<td>106</td>
<td>166</td>
</tr>
<tr>
<td>Non-Temporal Low</td>
<td>93</td>
<td>156</td>
</tr>
<tr>
<td>3.1K Temporal High</td>
<td>93</td>
<td>156</td>
</tr>
<tr>
<td>3.1K Temporal Low</td>
<td>91</td>
<td>154</td>
</tr>
<tr>
<td>3.1K Non-Temporal High</td>
<td>99</td>
<td>162</td>
</tr>
<tr>
<td>3.1K Non-Temporal Low</td>
<td>93</td>
<td>156</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FWR Input</th>
<th>16VFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporal High</td>
<td>83</td>
</tr>
<tr>
<td>Temporal Low</td>
<td>68</td>
</tr>
<tr>
<td>Non-Temporal High</td>
<td>108</td>
</tr>
<tr>
<td>Non-Temporal Low</td>
<td>79</td>
</tr>
<tr>
<td>3.1K Temporal High</td>
<td>81</td>
</tr>
<tr>
<td>3.1K Temporal Low</td>
<td>68</td>
</tr>
<tr>
<td>3.1K Non-Temporal High</td>
<td>101</td>
</tr>
<tr>
<td>3.1K Non-Temporal Low</td>
<td>77</td>
</tr>
</tbody>
</table>

Wall Candela Settings: 15, 30, 75, 95, 110, 135, 185

Ceiling Candela Settings: 15, 30, 75, 95, 115, 150, 177

## Horn Tones and Sound Output Data

### Horn and Horn Strobe Output (dBA)

<table>
<thead>
<tr>
<th>Switch Position</th>
<th>Sound Pattern</th>
<th>dB</th>
<th>8–17.5 Volts</th>
<th>16–33 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temporal</td>
<td>High</td>
<td>84</td>
<td>89</td>
</tr>
<tr>
<td>2</td>
<td>Temporal</td>
<td>Low</td>
<td>75</td>
<td>83</td>
</tr>
<tr>
<td>3</td>
<td>Non-Temporal</td>
<td>High</td>
<td>85</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>Non-Temporal</td>
<td>Low</td>
<td>76</td>
<td>84</td>
</tr>
<tr>
<td>5</td>
<td>3.1 kHz Temporal</td>
<td>High</td>
<td>83</td>
<td>88</td>
</tr>
<tr>
<td>6</td>
<td>3.1 kHz Temporal</td>
<td>Low</td>
<td>76</td>
<td>82</td>
</tr>
<tr>
<td>7</td>
<td>3.1 kHz Non-Temporal</td>
<td>High</td>
<td>84</td>
<td>89</td>
</tr>
<tr>
<td>8</td>
<td>3.1 kHz Non-Temporal</td>
<td>Low</td>
<td>77</td>
<td>83</td>
</tr>
<tr>
<td>9</td>
<td>Coded</td>
<td>High</td>
<td>85</td>
<td>90</td>
</tr>
<tr>
<td>10</td>
<td>3.1 kHz Coded</td>
<td>High</td>
<td>84</td>
<td>89</td>
</tr>
</tbody>
</table>

* Settings 9 and 10 are not available on the 2-wire horn strobes.
## L-Series Ordering Information

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alert Devices</strong></td>
<td></td>
</tr>
<tr>
<td>SWL-CLR-ALERT</td>
<td>Strobe, White, Wall, Clear Lens, Alert</td>
</tr>
<tr>
<td>SWL-ALERT</td>
<td>Strobe, White, Wall, Amber Lens, Alert</td>
</tr>
<tr>
<td>SCWL-CLR-ALERT</td>
<td>Strobe, White, Ceiling, Clear Lens, Alert</td>
</tr>
<tr>
<td>SPSWL-ALERT</td>
<td>Speaker Strobe, White, Wall, Amber Lens, Alert</td>
</tr>
<tr>
<td>SPSWL-CLR-ALERT</td>
<td>Speaker Strobe, White, Wall, Clear Lens, Alert</td>
</tr>
<tr>
<td>SPSCWLN-CLR-ALERT</td>
<td>Speaker Strobe, White, Ceiling, Clear Lens, Alert</td>
</tr>
<tr>
<td><strong>Plain Wall Strobes</strong></td>
<td></td>
</tr>
<tr>
<td>SRL-P</td>
<td>Strobe, Red, Wall, Plain</td>
</tr>
<tr>
<td>SWL-P</td>
<td>Strobe, White, Wall, Plain</td>
</tr>
<tr>
<td><strong>Plain Wall Horn Strobes</strong></td>
<td></td>
</tr>
<tr>
<td>P2RL-P</td>
<td>Horn Strobe, Red, Wall, Plain</td>
</tr>
<tr>
<td>P2WL-P</td>
<td>Horn Strobe, White, Wall, Plain</td>
</tr>
<tr>
<td><strong>Plain Wall Speaker Strobes</strong></td>
<td></td>
</tr>
<tr>
<td>SPSRL-P</td>
<td>Speaker Strobe, Red, Wall, Plain</td>
</tr>
<tr>
<td>SPSWL-P</td>
<td>Speaker Strobe, White, Wall, Plain</td>
</tr>
<tr>
<td><strong>Plain Ceiling Speaker Strobes</strong></td>
<td></td>
</tr>
<tr>
<td>SPSCWL-P</td>
<td>Speaker Strobe, White, Ceiling, Plain</td>
</tr>
</tbody>
</table>

**Notes:**
All -P models have a plain housing (no “FIRE” marking on cover).

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colored Lenses</strong></td>
<td></td>
</tr>
<tr>
<td>LENS-A2</td>
<td>Wall-Mount Lens Attachment, Amber</td>
</tr>
<tr>
<td>LENS-B2</td>
<td>Wall-Mount Lens Attachment, Blue</td>
</tr>
<tr>
<td>LENS-G2</td>
<td>Wall-Mount Lens Attachment, Green</td>
</tr>
<tr>
<td>LENS-R2</td>
<td>Wall-Mount Lens Attachment, Red</td>
</tr>
<tr>
<td>LENS-AC2</td>
<td>Ceiling-Mount Lens Attachment, Amber</td>
</tr>
<tr>
<td>LENS-BC2</td>
<td>Ceiling-Mount Lens Attachment, Blue</td>
</tr>
<tr>
<td>LENS-GC2</td>
<td>Ceiling-Mount Lens Attachment, Green</td>
</tr>
<tr>
<td>LENS-RC2</td>
<td>Ceiling-Mount Lens Attachment, Red</td>
</tr>
<tr>
<td><strong>Bezel Kits</strong></td>
<td></td>
</tr>
<tr>
<td>BZR</td>
<td>Wall Red Bezel Kit</td>
</tr>
<tr>
<td>BZW</td>
<td>Wall White Bezel Kit</td>
</tr>
<tr>
<td>BZGR</td>
<td>Compact Wall Red Bezel Kit</td>
</tr>
<tr>
<td>BZGW</td>
<td>Compact Wall White Bezel Kit</td>
</tr>
<tr>
<td>BZRC</td>
<td>Horn/Strobe Ceiling Red Bezel Kit</td>
</tr>
<tr>
<td>BZWC</td>
<td>Horn/Strobe Ceiling White Bezel Kit</td>
</tr>
<tr>
<td>BZSPR</td>
<td>Speaker Wall Red Bezel Kit</td>
</tr>
<tr>
<td>BZSPW</td>
<td>Speaker Wall White Bezel Kit</td>
</tr>
<tr>
<td>BZSPRC</td>
<td>Speaker Ceiling Red Bezel Kit</td>
</tr>
<tr>
<td>BZSPWC</td>
<td>Speaker Ceiling White Bezel Kit</td>
</tr>
</tbody>
</table>

*Each bezel pack ships in a package of 5. For bezel option add -F (FIRE), -AL (ALERT), -EV (EVAC), -AG (AGENT), -P (Plain), -SP (FUEGO), -PG (FOGO) for desired printing.
FCM & FRM Series
Control and Relay Modules
with FlashScan®

General
FCM-1 Control Module: The FCM-1 Addressable Control Module provides Notifier intelligent control panels a circuit for Notification Appliances (horns, strobes, speakers, etc.) or to monitor a telephone circuit. Addressability allows the FCM-1 to be activated, either manually or through panel programming, on a select (zone or area of coverage) basis.

FRM-1 Relay Module: The FRM-1 Addressable Relay Module provides the system with a dry-contact output for activating a variety of auxiliary devices, such as fans, dampers, control equipment, etc. Addressability allows the dry contact to be activated, either manually or through panel programming, on a select basis.

FlashScan® (U.S. Patent 5,539,389) is a communication protocol developed by NOTIFIER Engineering that greatly enhances the speed of communication between analog intelligent devices. Intelligent devices communicate in a grouped fashion. If one of the devices within the group has new information, the panel CPU stops the group poll and concentrates on single points. The net effect is response speed greater than five times that of other designs.

Features
• Built-in type identification automatically identifies these devices to the control panel.
• Internal circuitry and relay powered directly by two-wire SLC loop. The FCM-1 module requires power (for horns, strobes, etc.), audio (for speakers), or a telephone riser (for handsets). Internal relay feature available on FlashScan systems only.
• Integral LED “blinks” green each time a communication is received from the control panel and turns on in steady red when activated.
• LED blink may be deselected globally (affects all devices).
• High noise immunity (EMF/RFI).
• The FCM-1 may be used to switch 24-volt NAC power, audio (up to 70.7 Vrms) or telephone.
• Wide viewing angle of LED.
• SEMS screws with clamping plates for wiring ease.
• Direct-dial entry of address 01–159 for FlashScan, 01 – 99 on traditional systems.
• Speaker, audible/visual, and telephone applications may be wired for Class B or A (Style Y or Z).

Applications
The FCM-1 is used to switch 24 VDC audible/visual power, high-level audio (speakers), or control telephone devices. The FRM-1 may be programmed to operate dry contacts for door holders, Air Handling Unit shutdown, etc., and to reset four-wire smoke detector power.

Construction
• The face plate is made of off-white Noryl®.
• Controls include two rotary switches for direct-dial entry of address (01-159).

Specifications for FCM-1
Normal operating voltage: 15 to 32 VDC.
Maximum current draw: 6.5 mA (LED on).
Average operating current: 350 µA direct poll (CLIP mode), 375 µA group poll (FlashScan® mode) with LED flashing.
External supply voltage (between Terminals T3 and T4): maximum 80 volts (RMS or DC).

**Drain on external supply:** 2 mA maximum (using internal EOL relay).

**EOL resistance:** 47K ohms.

**Temperature range:** 32°F to 120°F (0°C to 49°C).

**Humidity range:** 10% to 93% non-condensing.

**Dimensions:** 4.5" (114.3 mm) high x 4" (101.6 mm) wide x 1.25" (31.75 mm) deep. Mounts to a 4" (101.6 mm) square x 2.125" (53.975 mm) deep box.

### Specifications for FRM-1

**Normal operating voltage:** 15 to 32 VDC.

**Maximum current draw:** 6.5 mA (LED on).

**Average operating current:** 230 μA direct poll (CLIP mode), 255 μA group poll (FlashScan® mode) with LED flashing.

**EOL resistance:** not used.

**Temperature range:** 32°F to 120°F (0°C to 49°C).

**Humidity range:** 10% to 93% non-condensing.

**Dimensions:** 4.5" (114.3 mm) high x 4" (101.6 mm) wide x 1.25" (31.75 mm) deep. Mounts to a 4" (101.6 mm) square x 2.125" (53.975 mm) deep box.

### RELAY CONTACT RATINGS

**FOR BOTH FCM-1 AND FRM-1 MODELS**

<table>
<thead>
<tr>
<th>Load Description</th>
<th>Application</th>
<th>Maximum Voltage</th>
<th>Current Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistive</td>
<td>Non-Coded</td>
<td>30 VDC</td>
<td>3.0 A</td>
</tr>
<tr>
<td>Resistive</td>
<td>Coded</td>
<td>30 VDC</td>
<td>2.0 A</td>
</tr>
<tr>
<td>Resistive</td>
<td>Non-Coded</td>
<td>110 VDC</td>
<td>0.9 A</td>
</tr>
<tr>
<td>Resistive</td>
<td>Non-Coded</td>
<td>125 VAC</td>
<td>0.9 A</td>
</tr>
<tr>
<td>Inductive</td>
<td>(L/R=5ms)</td>
<td>Coded</td>
<td>30 VDC</td>
</tr>
<tr>
<td>Inductive</td>
<td>(L/R=2ms)</td>
<td>Coded</td>
<td>30 VDC</td>
</tr>
<tr>
<td>Inductive</td>
<td>(PF=0.35)</td>
<td>Non-Coded</td>
<td>125 VAC</td>
</tr>
</tbody>
</table>

### Agency Listings and Approvals

In some cases, certain modules may not be listed by certain approval agencies, or listing may be in process. Consult factory for latest listing status.

- **UL:** S3705
- **ULC:** CS669
- **FM Approved**
- **CSFM:** 7300-0028:202
- **MEA:** 457-99-E
- **Maryland State Fire Marshal:** Permit # 2020

### PRODUCT LINE INFORMATION

**NOTE:** "A" suffix indicates ULC Listed model.

**FCM-1(A):** Intelligent Addressable Control Module.

**FRM-1(A):** Intelligent Addressable Relay Module.

**A2143-20:** Capacitor, required for Class A (Style 2) operation of speakers.

**SMB500:** Optional Surface-Mount Backbox.

**CB500:** Control Module Barrier — required by UL for separating power-limited and non-power limited wiring in the same junction box as FCM-1.

---

Mounting Diagrams

Note CB500 Module Barrier, which creates isolated quadrant.

---

CAUTION

DE-ENERGIZE UNIT PRIOR TO SERVICING
Wiring Diagrams

The following wiring diagrams are provided:

1. FCM-1: Typical notification appliance circuit configuration, NFPA Style Y.
2. FCM-1: Typical fault-tolerant notification appliance circuit configuration, NFPA Style Z.
3. FCM-1: Typical wiring for speaker supervision and switching, NFPA Style Y.
4. FCM-1: Typical fault-tolerant wiring for speaker supervision and switching, NFPA Style Z.
5. FRM-1: Relay module wiring diagram.

Figure 1 FCM-1

Typical notification appliance circuit configuration, NFPA Style Y.

- Connect modules to Listed compatible Notifier control panels only.
- All wiring shown is supervised and power limited.
- Module polarities are shown in alarm.

Figure 2 FCM-1

Typical fault-tolerant notification appliance circuit configuration, NFPA Style Z.

- Connect modules to Listed compatible Notifier control panels only.
- All wiring shown is supervised and power limited.
- Module polarities are shown in alarm.
Figure 3 FCM-1

Typical wiring for speaker supervision and switching, NFPA Style Y.

- Connect modules to Listed compatible Notifier control panels only.
- All wiring shown is supervised and power limited.
- Wires must be supervised per NFPA.
- Module polarities are shown in alarm.

Speaker Switching Circuit: NFPA STYLE W
Speakers must be listed for fire protection. Refer to the Relay Contact Rating table for maximum load.

Figure 4 FCM-1

Typical fault-tolerant wiring for speaker supervision and switching, NFPA Style Z.

- Connect modules to Listed compatible Notifier control panels only.
- All wiring shown is supervised and power limited.
- Wires must be supervised per NFPA.
- Module polarities are shown in alarm.

Speaker Switching Circuit: NFPA STYLE X
Speakers must be listed for fire protection. Refer to the Relay Contact Rating table for maximum load.

NOTE: Regarding audio amplifier in Figures 3 and 4 above. Audio circuit wiring must be twisted-pair as a minimum. See Notifier installation manual for detailed information.

Figure 5 FRM-1

 Relay module wiring diagram.

- Connect modules to Listed compatible Notifier control panels only.
- Module does NOT supervise controlled circuits.

---

Notifier® and FlashScan® are registered trademarks of Honeywell International Inc. Noryl® is a registered trademark of GE Plastics, a subsidiary of General Electric Company.

©2007 by Honeywell International Inc. All rights reserved. Unauthorized use of this document is strictly prohibited.
InnovairFlex
Intelligent Non-Relay Photoelectric Duct Smoke Detector

General
The Notifier InnovairFlex DNR intelligent non-relay photoelectric duct smoke detector and DNRW watertight non-relay photoelectric duct smoke detector feature a pivoting housing that fits both square and rectangular footprints capable of mounting to a round or rectangular duct.

DNRW duct smoke detector, with its NEMA-4 rating, is listed as a watertight enclosure providing protection against falling dirt, rain, and windblown dust, splashing and hose directed water, allowing operators to use the detector in the most extreme environments.

These units sense smoke in the most challenging conditions, operating in airflow speeds of 100 to 4,000 feet per minute, temperatures of -4 degrees F to 158 degrees F, and a humidity range of 0 to 95 percent (non-condensing.)

An improved cover design isolates the sensor head, which allows for ease of maintenance. A cover tamper feature indicates a trouble signal for a removed or improperly installed sensor cover. The Notifier InnovairFlex housing provides a 3/4-inch conduit knockout and ample space to facilitate easy wiring and mounting of a relay module.

The Notifier InnovairFlex duct smoke detector can be customized to meet local codes and specifications without additional wiring. The new InnovairFlex product line is compatible with all previous Innovair models, including remote test accessories.

Features
- Photoelectric, integrated low-flow technology
- Air velocity rating from 100 ft/min to 4,000 ft/min (0.5 m/s to 20.32 m/s)
- Versatile mounting options: square or rectangular configuration
- Broad ranges for operating temperature (-4F to 158F) and humidity (0% to 95% non-condensing)
- Patented sampling tube installs from front or back of the detector with no tools required
- Cover tamper signal
- Increased wiring space with a newly added 3/4" conduit knockout
- Available space within housing to accommodate mounting of a relay module
- Easily accessible code wheels on FSP-851 sensor head (sold separately)
- Clear cover for convenient visual inspection
- Remote testing capability
- Requires com line power only
- Accommodates the installation of an addressable relay module, sold separately. (FRM-1) for applications requiring a form-C relay

Specifications
Size: (Rectangle) 14.38 in (37 cm) Length; 5 in (12.7 cm) Width, 2.5 in (6.6 cm) Depth
Size: (Square) 7.75 in (19.7 cm) Length; 9 in (22.9 cm) Width; 2.5 in (6.35 cm) Depth
Weight: 1.6 lb (0.73 kg)
Environmental Rating: NEMA-4 (DNRW) only
Operating Temperature Range: -4 degrees F to 158 degrees F (-20 degrees C to 70 degrees C)
Storage Temperature Range: -22 degrees F to 158 degrees F (-30 degrees C to 70 degrees C)
Operating Humidity Range: 0% to 95% relative humidity (non-condensing)
Air Duct Velocity: 100 to 4,000 ft/min (0.5 to 20.32 m/s)

Accessories
Notifier provides system flexibility with a variety of accessories, including two remote test stations and different means of visible and audible system annunciation. As with our duct smoke detectors, all duct smoke detectors accessories are UL listed.

ACCESSORY CURRENT LOADS AT 24 VDC

<table>
<thead>
<tr>
<th>Device</th>
<th>Standby</th>
<th>Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA400Z</td>
<td>0mA</td>
<td>12 mA Max</td>
</tr>
<tr>
<td>RTS451/</td>
<td>0mA</td>
<td>12mA Max</td>
</tr>
<tr>
<td>RTS451KEY</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Agency Listings and Approvals
Consult product manual for lists of compatible UL-Listed devices. In some cases, certain modules may not be listed by certain approval agencies, or listing may be in process. Consult factory for latest listing status.
- UL Listed: 2668A
Product Line Information

DNR: Intelligent non-relay photoelectric low flow smoke detector housing. Requires FSP-851 photoelectric smoke detector (sold separately).

DNRW: Watertight intelligent non-relay photoelectric low flow duct smoke detector housing. Requires FSP-851 photoelectric smoke detector (sold separately).

FSP-851: Addressable low-profile photoelectric smoke detector

DCOIL: Remote test coil required with RTS451/RTS451KEY

DST1: Metal sampling tube duct width up to 1 ft (0.3m)

DST1.5: Metal sampling tube duct widths up to 1 ft to 2 ft (0.3 to 0.6 m)

DST3: Metal sampling tube duct widths up to 2 ft to 4 ft (0.6 to 1.2 m)

DST5: Metal sampling tube duct widths up to 4 ft to 8 ft (1.2 to 2.4 m)

DST10: Metal sampling tube duct widths up to 8 ft to 12 ft (2.4 to 3.7 m)

DH400OE-1: Weatherproof enclosure

ETX: Metal exhaust tube duct, width 1 ft (0.3 m)

M02-04-00: Test magnet

P48-21-00: End cap for metal sampling tubes

RA400Z: Remote annunciator alarm LED

RTS451: Remote test station

RTS451KEY: Remote test station with key lock

Important Notes

- The use of either RTS451 or RTS451KEY requires the installation of an accessory coil, DCOIL, sold separately. Please refer to the DNR or DNRW installation manual for more information.
- The RTS451 / RTS451KEY test coil circuit requires an external 24VDC power supply which must be UL listed.

ONYX® and NOTIFIER® are registered trademarks and NOTI-FIRE-NET™ is a trademark of Honeywell International Inc. ©2009 by Honeywell International Inc. All rights reserved. Unauthorized use of this document is strictly prohibited.
Duct Smoke Detector Accessories

Expand the versatility of the InnovairFlex™ line of duct smoke detectors with System Sensor notification and test accessories.

Available Accessories

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APA151</td>
<td>Piezo Annunciator</td>
</tr>
<tr>
<td>MHR</td>
<td>Mini-Horn, Red</td>
</tr>
<tr>
<td>MHW</td>
<td>Mini-Horn, White</td>
</tr>
<tr>
<td>RA100Z/RA100ZA</td>
<td>Remote Annunciator</td>
</tr>
<tr>
<td>RTS151</td>
<td>Remote Test Station</td>
</tr>
<tr>
<td>RTS151KEY</td>
<td>Remote Test Station with Key</td>
</tr>
<tr>
<td>RTS2</td>
<td>Multi-Signaling Accessory</td>
</tr>
<tr>
<td>AOS</td>
<td>Add-On Strobe</td>
</tr>
<tr>
<td>RTS2-AOS</td>
<td>Multi-Signaling Accessory</td>
</tr>
</tbody>
</table>

Duct smoke detector accessories add functionality to the duct smoke detection system by allowing quick, convenient inspections at eye level and effective audible and visible notification options. All System Sensor duct smoke detectors and accessories are UL listed.

The APA151 piezo annunciator, which replaces the APA451 with a new, improved look, provides an audible alarm signal, a red LED to indicate alarm status, and a green LED to indicate power status. It is intended for use with System Sensor 4-wire conventional duct smoke detector applications without a system control panel, to comply with NFPA 90A.

The MHR and MHW SpectraAlert® Advance mini-horns feature temporal or continuous tones at high and low volume settings. Their small footprint allows mounting to single-gang back boxes for applications where a small device is desired.

The RA100Z and RA100ZA remote annunciators are designed for both conventional and intelligent applications. Their red LED provides visual indication of an alarm condition.

The RTS151 and RTS151KEY remote test stations are automatic fire detector accessories designed to test duct smoke detectors from a convenient location. For 4-wire detectors, the RTS151KEY test station features a multi-colored LED that alternates between steady green and red. For 2-wire detectors, the LED illuminates red for alarm.

The RTS2 and RTS2-AOS multi-signaling accessories are designed to work with InnovairFlex 4-wire conventional duct smoke detectors. These accessories include a key switch that can be used to select one of two connected sensors to be tested, reset, or both by a push button switch. They also enable sensitivity measurements using the SENS-FDR sensitivity reader (sold separately). The AOS (Add-On Strobe) is an optional accessory included with the RTS2-AOS model.

Agency Listings

UL LISTED  FM APPROVED  System Sensor
### Specifications, Duct Smoke Detector Accessories

#### APA151 Piezo Annunciator
- **Voltage**: Regulated 24 VDC
- **Operating Voltage**: 16 to 33 VDC
- **Maximum Alarm Current**: 30 mA
- **Temperature Range**: 0°C to 49°C (32°F to 120°F)
- **Relative Humidity**: 10 to 93% non-condensing
- **Wire Gauge**: 12 to 18 AWG
- **Dimensions**: 4.6" H x 2.9" W x 1.45" D

#### MHR/MHW SpectrAlert Advance Mini-Horns
- **Voltage**: Regulated 12 DC or FWR (Full Wave Rectified) or Regulated 24 VDC or FWR
- **Operating Voltage**: 8 to 33 VDC (9 to 33 VDC with Sync-Circuit Module)
- **Sounder Current Draw**: 22 mA RMS max. at 8 to 17.5 Volts DC, 17 mA RMS max. at 8 to 17.5 Volts FWR, 29 mA RMS max. at 16 to 33 Volts DC, 25 mA RMS max. at 16 to 33 Volts FWR
- **Temperature Range**: 0°C to 49°C (32°F to 120°F)
- **Humidity Range**: 10 to 93% non-condensing
- **Nominal Sounder Frequency**: 3 kHz
- **Wire Gauge**: 12 to 18 AWG
- **Dimensions**: 4.6" H x 2.9" W x 0.45" D

#### RA100Z/RA100ZA Remote Annunciator
- **Voltage Range**: Conventional System: 3.1 to 32 VDC, Intelligent System: 18 to 32 VDC
- **Maximum Alarm Current**: 12 mA
- **Dimensions**: 4.6 "H x 2.8" W x 1.3" D

#### RTS151 Remote Test Station
- **Power Requirements**: Alarm LED: 2.8 to 32 VDC, 12 mA max., Total Current: 105 mA max.
- **Test Switch**: 10 VA @ 32 VDC
- **Reset Switch**: 10 VA @ 32 VDC
- **Alarm Response Time**: 40 seconds max.
- **Temperature Range**: -10°C to 60°C (14°F to 140°F)
- **Relative Humidity**: 95% non-condensing
- **Wire Gauge**: 14 to 18 AWG
- **Dimensions**: 4.8" H x 2.9" W x 1.4" D

#### RTS151KEY Remote Test Station with Key
- **Power Requirements**: Power LED (Green): 14 to 35 VDC, 12 mA max., Alarm LED (Red): 2.8 to 32 VDC, 12 mA max., Total Current: 105 mA max.
- **Alarm Response Time**: 40 seconds max.
- **Temperature Range**: -10°C to 60°C (14°F to 140°F)
- **Relative Humidity**: 95% non-condensing
- **Wire Gauge**: 14 to 18 AWG
- **Dimensions**: 4.6" H x 2.75" W x 1.8" D

#### RTS2 and RTS2-AOS Multi-signaling Accessory
- **Voltage**: 20 to 29 VDC
- **Power Requirements**: Standby: 3.0 mA max., Trouble: 16.0 mA max., Alarm without strobe: 30 mA max., Alarm with strobe: 55 mA max.
- **Sounder**: 85 dBA at ten feet
- **Temperature Range**: -10°C to 60°C (14°F to 140°F)
- **Relative Humidity**: 95% non-condensing
- **Wire Gauge**: 14 to 22 AWG
- **Dimensions**: 4.8" W x 5.3" H x 1.6" D

For the very latest product specifications and listing information, please visit the System Sensor Web site at www.systemsensor.com.

---

©2010 System Sensor
Product specifications subject to change without notice. Visit systemsensor.com for current product information, including the latest version of this data sheet.

3825 Ohio Avenue • St. Charles, IL 60174
Phone: 800-SENSOR2 • Fax: 630-377-6495