# Instruction Manual Remote Fire Extinguisher Device

## Part Number 38001

| Revision Number | Revision Date | Approved by | Signed off by | Comments |
|---|---|---|---|---|
| Rev 0 | 4th May 2016 | JMA | MAS | |
| Rev 1 | 6th Sept 2016 | JMA | MAS | Changed part number to 38001 and header |
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## 1.0 Description of AMEREX Integrated En-Gauge Fire Extinguisher unit

The AMEREX Integrated En-Gauge En-Vision Module is the central element of the En-Gauge UL Listed, multi-patented monitoring system for portable fire extinguishers. The AMEREX Integrated EVM in combination with an En-Gauge enabled fire extinguisher and AMEREX Integrated Standard 30112 module allows a hand portable fire extinguisher to become a fully supervised component of a monitored alarm system.

The AMEREX Integrated mesh enabled En-Gauge System, includes the EVM and an En-Gauge enabled fire extinguisher, monitors for the following parameters:

**The presence of the fire extinguisher.**
The En-Gauge pressure sensing circuitry, which is integral to the extinguisher's pressure gauge and aids in determining the extinguisher's presence, is connected to the EVM via a proprietary tether or cable. When the extinguisher is removed from its designated location, the tether is designed to immediately disconnect from the extinguisher pressure gauge thus producing a distinct extinguisher alert signal via the EVM. . This disconnection of the tether will be transmitted via the AMEREX Integrated mesh unit and will indicated on the AIMS pop up sensor alarm window.

**The proper pressure of the fire extinguisher.** The En-Gauge pressure sensing circuitry allows the EVM to monitor the internal stored pressure of the extinguisher by sensing the position of the pressure indicator on the gauge. When the extinguisher's pressure falls below a safe operational range, the EVM produces an extinguisher trouble signal. This loss of pressure alarm will be transmitted via the AMEREX Integrated mesh unit and will indicated on the AIMS pop up sensor alarm window.

**Fire extinguisher access obstruction**. The EVM ensures that the extinguisher is accessible through the use of ultrasonic transducer technology. By utilizing the ultrasonic technology, the EVM is able to detect an obstruction in the immediate vicinity of the extinguisher. When access to the extinguisher is continuously blocked, the EVM produces an extinguisher trouble signal. This obstruction alarm will be transmitted via the AMEREX

Integrated mesh unit and will indicated on the AIMS pop up sensor alarm window.
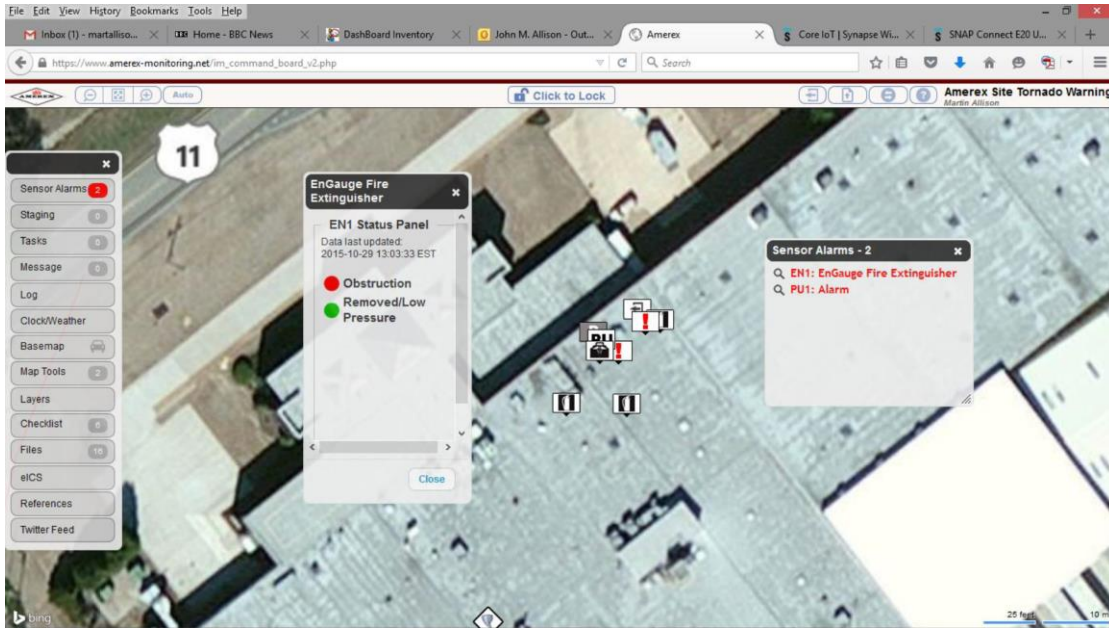


**Power.** The EVM continuously monitors its power source. The EVM can be powered from a FM Approved Fire power supply or a FM Approved FACP 24VDC external power source. When the EVM senses that its power is falling below a safe operational range, an extinguisher trouble signal is produced. This low power alarm will be transmitted via the AMEREX Integrated mesh unit and will indicated on the AIMS pop up sensor alarm window.

**Other unique features of the EVM include:**

- On board red and green light emitting diodes (LEDs) which provide a local indication of extinguisher alert or trouble status.
- On board sounder which provides a local audible indication of extinguisher alert or trouble status.
- Support for both normally open and normally closed extinguisher alert and trouble outputs which provide easy connectivity to our AMEREX Integrated Standard Mesh Unit (Part Number 30112)
- On board set-up button which provides a means for easy system testing during installation, troubleshooting, and maintenance.

- Field adjustable obstruction detection timing which provides a range of obstruction confirmation from 15 to 60 hours.
- Field adjustable obstruction detection range from 18 to 36 inches.
- Works with all sizes, types, and manufacturers of portable fire extinguishers.
- Our unique pop up window support in AMIS provides early information on the status of any EVM monitored extinguisher.

By utilizing all of these unique features, the AMEREX Integrated En-Gauge System continuously meets the fire extinguisher inspection requirements dictated by local and national fire codes thus eliminating the need for the 30-day physical inspections and providing a heightened level of facility safety and security.

## 1.2    How the AMEREX Integrated en-Vision system works

The AMEREX Integrated EVM is designed to monitor a portable fire extinguisher and provide status outputs, both locally and remotely via our AIMS software suite. The AMEREX Integrated EVM will monitor a fire extinguisher for removal from its designated location, an off-normal pressure condition, and any continuous obstruction blocking access to the device. The AMEREX Integrated EVM will also monitor its power source. The EVM can be powered either externally from a FM Approved Fire power supply or a FM Approved FACP 24VDC source.

Under normal conditions, the AMEREX Integrated EVM is fully powered and connected to a fully charged and fully accessible AMEREX Integrated En-Gauge enabled fire extinguisher. An AMEREX Integrated En-Gauge enabled fire extinguisher is an extinguisher that has been fitted with an AMEREX Integrated En-Gauge pressure gauge that is the appropriate extinguishing agent type and appropriate pressure range for the specific type of fire extinguisher in use. To indicate normal fire extinguisher conditions, the AMEREX Integrated EVM will flash its green LED (LED flash timing is
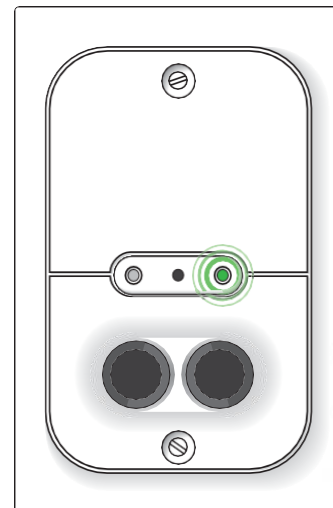
dependent on the unit's power source), its relay outputs are in the labelled state and the sounder is off.

In an Alert condition, the AMEREX Integrated EVM senses that its monitored fire extinguisher has been removed from its designated location and an extinguisher alert signal will be produced. In an extinguisher alert condition, the AMEREX Integrated EVM will stop flashing the green LED and start flashing the red LED twice (LED flash frequency is dependent on the power source). The Alert relay will change state (normally open will close and normally closed will open) and the sounder will beep twice to indicate an extinguisher alert.

In a trouble condition, the AMEREX Integrated EVM senses one of three off-normal conditions. These off-normal conditions are either a drop in extinguisher stored pressure, access to the extinguisher is being continuously blocked, or AMEREX Integrated EVM power has fallen below a normal operating range. In a trouble condition, the LEDs will flash according to the actual trouble. The Trouble relay will change state (normally open will close and normally closed will open) and the sounder will sound according to the actual trouble.

The following sections of this instruction manual describe all the alert and trouble conditions in detail while also providing information on AMEREX Integrated EVM functionality, output capability, unit set-up, and installation instructions.

## 1.3   Modes of Operation

The AMEREX Integrated EVM has three separate modes of operation; normal mode, set-up mode, and demo mode. The AMEREX Integrated EVM is defaulted to operate in normal mode and normal mode will be the typical mode of operation in use throughout the life of the product. The following describes the differences between the three modes of operation.

### Normal Mode
In normal mode, the AMEREX Integrated EVM monitors all its system parameters and signals the appropriate alert or trouble condition status change utilizing LEDs, output relays, and the sounder (if enabled). Normal mode

shall be used when monitoring the AMEREX Integrated EVM with any other type of alarm system.

### Set-up Mode

Set-up mode is used for AMEREX Integrated EVM installation and initialization, AMEREX Integrated EVM troubleshooting, and/or fire extinguisher maintenance. Set-up mode provides a sixty second time period in which to locally check all the AMEREX Integrated EVM system parameters without generating any remote alert and/or trouble signals.

The AMEREX Integrated EVM enters set-up mode by depressing the front panel switch, SW2, for longer than 2 seconds. The front panel switch is located on the faceplate of the AMEREX Integrated EVM directly between the red and green LED. A small diameter object such as a paper clip or jeweller's screwdriver is required to depress SW2. (As shown on diagram opposite) Upon entering set-up mode, the green LED flashes 10 times and the sounder gives off numerous, rapid, low tone beeps. All system tests, LED flash patterns, and sounder alerts are then updated at one second intervals.
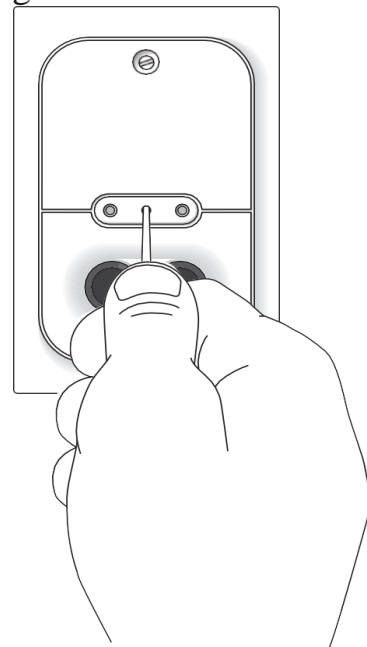
In set-up mode, the relays do not change state regardless of system status change.

All system parameters can be checked to ensure correct AMEREX Integrated EVM operation while in set-up mode. For example, in set-up mode an obstruction can be placed in front of the AMEREX Integrated EVM and the LEDs and sounder will operate to indicate that an obstruction has been detected. Another helpful function of set-up mode is in regards to extinguisher maintenance. In set-up mode, an extinguisher can be swapped out for maintenance without generating any external extinguisher alert signals

If any abnormal conditions are still present after the sixty second set-up mode time frame has expired, the AMEREX Integrated EVM will enter normal mode and produce an extinguisher alert and/or trouble condition. The relays, LEDs, and sounder will act according to the descriptions detailed in the next sections.

**Demo Mode**

Demo mode is used for AMEREX Integrated EVM product demonstration purposes. The AMEREX Integrated EVM can only be put in demo mode at the factory. Demo mode works similarly to normal mode with the exception that all system parameters are checked and system status is reported instantaneously. For example, in demo mode the AMEREX Integrated EVM will sense an obstruction and generate an extinguisher trouble as soon as the obstruction is placed in front of the unit instead of waiting for the predetermined obstruction detection timing as dictated by the obstruction detection timing switches. In demo mode the extinguisher alert and trouble output relays are active.

## 1.4    AMEREX Integrated EVM Operation in Normal Conditions

The AMEREX Integrated EVM provides local indication of system status for installers, maintenance, and security personnel through the red and green LEDs located on the faceplate and through the on-board sounder. The EVM provides a means of remote indication of system status through the extinguisher alert and trouble relay which is displayed in our unique pop windows in AIMS.

The green LED flashes once every 10 seconds when externally powered and every 30 seconds when battery powered if all of the following conditions are met:

- Extinguisher is present
- Extinguisher has normal pressure
- Extinguisher is not continuously obstructed
- External FM Approved Fire power supply or a FM Approved FACP 24 VDC power source

The AMEREX Integrated EVM checks all the system parameters at predetermined intervals as shown in the following table:

| For this parameter… | The verification frequency is… |
| --- | --- |
| Extinguisher presence | Once per second |
| Off-normal pressure | Once per second |
| Obstruction | Once every 15 hours (then verified every 5 hours after initial obstruction is detected) |

While operating in normal condition, the EVM status is as follows:

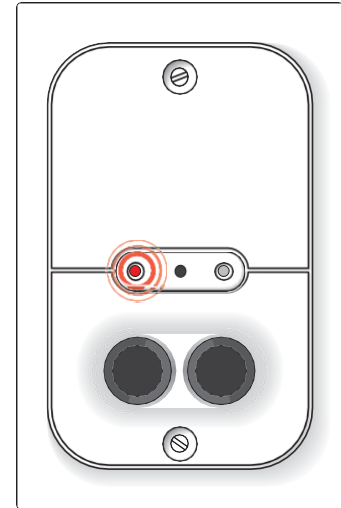| Indicator | Normal Status |
| --- | --- |
| Green LED | Flash 1x every 10 seconds when externally powered Flash 1x every 30 seconds when battery powered |
| Red LED | Off |
| Alert Relay | Normally Open is open, Normally Closed is closed |
| Trouble Relay | Normally Open is open, Normally Closed is closed |
| Sounder | Off |
| AIMS Sensor Window | AIMS sensor window gives information on the removal of the extinguisher and a flashing red alarm shall appear on the Command Board – The pop up window will show the extinguisher having alarm or trouble. |

## 1.5 AMEREX Integrated EVM Operation in an extinguisher alert condition – Extinguisher Removed

The AMEREX Integrated EVM monitors a fire extinguisher to ensure that it is in its designated location. Once the fire extinguisher is removed from its designated location, the unit immediately senses the removal and generates an extinguisher alert condition.

When the tether connection attaching the fire extinguisher pressure gauge to the AMEREX Integrated EVM is disconnected, the extinguisher alert condition is immediately set. In an Alert condition, the red LED shows 2 quick flashes, the sounder gives off 2 quick beeps, and the Alert relay changes state (i.e. normally open closes).

In the Extinguisher Alert condition, the AMEREX Integrated EVM status is as follows:
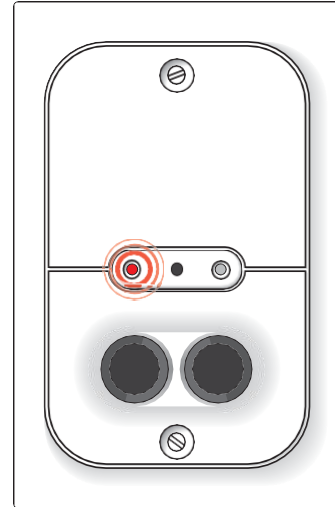
| Indicator | Extinguisher Removed |
|---|---|
| Green LED | Off |
| Red LED | Flash 2x every 10 seconds (external power) |
| Alert Relay | Normally Open is closed, Normally Closed is open |
| Trouble Relay | Normally Open is open, Normally Closed is closed |
| Sounder | Beep 2x every 10 seconds for first 2 minutes (external power) Then beep 2x every 30 minutes |
| AIMS Sensor Window | AIMS sensor window gives information on the removal of the extinguisher and a flashing red alarm shall appear on the Command Board – The pop up window will show the extinguisher has been removed by a red LED against the 'Extinguisher Removed' legend |

The AMEREX Integrated EVM sounder can be silenced in the event that an Extinguisher Alert cannot be reset in a timely manner. To silence the sounder momentarily push the front panel switch, SW2. (As shown on diagram). When the tether connection is reattached to the extinguisher pressure gauge, the AMEREX Integrated EVM returns to normal mode provided that no other off-normal conditions exist. For example, if a fire extinguisher is removed and used (extinguisher contents are expelled), upon reconnection of the tether, the AMEREX Integrated EVM will produce an off-normal pressure trouble which will be indicated by a different LED flash and sounder pattern.
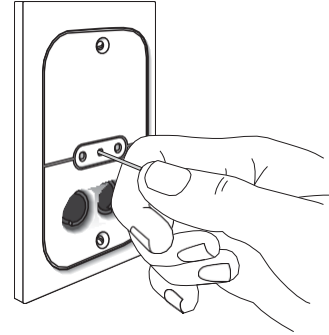
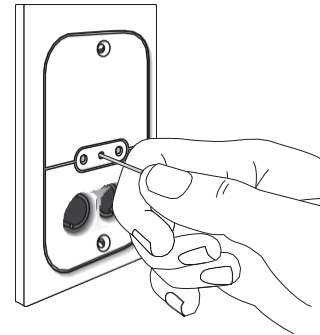## 1.6 AMEREX Integrated EVM Operation in an extinguisher trouble condition – Off normal pressure

The AMEREX Integrated EVM monitors a fire extinguisher to ensure that the internal stored pressure of the extinguisher stays within a safe operational range. The AMEREX Integrated EVM checks the extinguisher pressure once per second to detect any type of discharge, including slow leaks, or pressure increases due to excessive heat.
If the off-normal pressure condition is detected by the sensor, the extinguisher pressure trouble condition is immediately set. In an extinguisher pressure trouble condition, the red LED shows 3 quick flashes, the sounder gives off 3 quick beeps, and the extinguisher trouble relay changes state.
In an Extinguisher Pressure Trouble condition, the AMEREX Integrated EVM status is as follows:

| Indicator | Off Normal Pressure |
| --- | --- |
| Green LED | Off |
| Red LED | Flash 3x every 10 seconds (external power) |
| Alert Relay | Normally Open is open, Normally Closed is closed |
| Trouble Relay | Normally Open is closed, Normally Closed is open |
| Sounder | Beep 3x every 10 seconds for first 2 minutes (external power) <br> Then beep 3x every 30 minutes |
| AIMS Sensor Window | AIMS sensor window gives information on the low pressure of the extinguisher and a flashing red alarm shall appear on the Command Board – The pop up window will show the extinguisher has been removed by a red LED against the 'Low Pressure' legend |

The EVM sounder can be silenced in the event that an Extinguisher Pressure Trouble cannot be reset in a timely manner. To silence the EVM sounder momentarily push the front panel switch, SW2. (As shown on diagram). When the extinguisher is replaced or reconnected, the EVM returns to normal mode provided that no other off-normal conditions exist.



Upon correcting any off-normal condition, an underlying lower priority condition may be uncovered and indicated by a different LED flash and sounder pattern. The off-normal condition priority sequence is as follows:

**PRESENCE > PRESSURE > OBSTRUCTION> LOW POWER.**

## 1.7 AMEREX Integrated EVM Operation in an extinguisher trouble condition – Obstruction detected.

The AMEREX Integrated EVM monitors the space directly in front of a fire extinguishers location to ensure that the extinguisher is accessible. The AMEREX Integrated EVM is capable of detecting large obstructions that may be blocking access to the fire extinguisher. The unit can detect obstructions up to 36 inches away from the openings in the faceplate.

During normal operations, the AMEREX Integrated EVM checks for obstructions every 15 hours. If an obstruction is detected during the 15 hour cycle, the unit enters obstruction verification mode. In obstruction verification mode, the AMEREX Integrated EVM continues to check for an obstruction every 5 hours. After 4 consecutive positive checks, including the initial obstruction detection, the extinguisher obstruction trouble condition is set.

In an extinguisher obstruction trouble condition, the red LED shows 1 quick flash, the sounder gives off 1 quick beep, and the extinguisher trouble relay changes state.
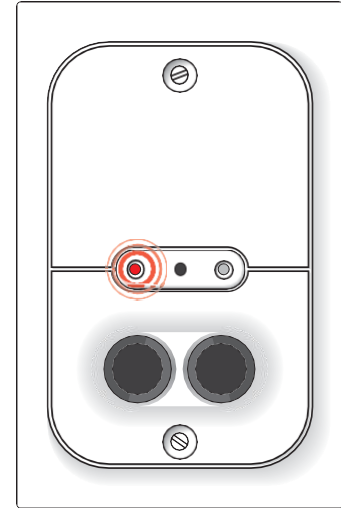
*Note: The AMEREX Integrated EVM comes factory defaulted to indicate an obstruction condition after an obstruction has been present for 15-30 hours (4 consecutive obstruction tests). If this time threshold is not appropriate for your application, the timing can easily be increased or decreased by adjusting the dipswitches. – see installation manual*
*There are 4 settings that can be applied to the timing of the obstruction detection. The shortest setting provides an immediate extinguisher obstruction trouble condition after an obstruction is detected (0- 15 hours). The next setting provides an extinguisher obstruction trouble condition after 2 consecutive obstruction tests (5-20 hours). The factory default setting provides a trouble condition after 4 consecutive obstruction tests (15-30 hours). The final setting provides an extinguisher obstruction trouble condition after 11 consecutive tests (50-65 hours).*

In an extinguisher obstruction trouble condition, the EVM status is as follows:

| Indicator | Obstruction Detected |
|---|---|
| Green LED | Off |
| Red LED | Flash 1x every 10 seconds (external power) |
| Alert Relay | Normally Open is open, Normally Closed is closed |
| Trouble Relay | Normally Open is closed, Normally Closed is open |
| Sounder | Beep 1x every 10 seconds for first 2 minutes (external power) Then beep 1x every 30 minutes |
| AIMS Sensor Window | AIMS sensor window gives information on the low pressure of the extinguisher and a flashing red alarm shall appear on the Command Board – The pop up window will show the extinguisher has been removed by a red LED against the 'Obstruction detected' legend |

## 1.8   AMEREX Integrated EVM Operation in an extinguisher trouble condition – Low power detected

The AMEREX Integrated EVM can be powered from one of two means, either from a 12-24VDC external power supply or internally from two 3V batteries. In either case, the unit monitors its power source's voltage and will generate an extinguisher low power trouble condition when the voltage drops below a safe operating level. The AMEREX Integrated EVM checks the voltage level once every 60 seconds. When using an external 24 VDC power supply, the maximum current draw is 6mA.

*Note: The AMEREX Integrated EVM can be powered from either an external power supply or internal batteries but not both sources simultaneously. If the unit senses both external power and battery power at power up, the unit will change the state of the extinguisher trouble relay, alternately flash the red and green LEDs, then shut down. The unit will not operate properly, perform any system tests or perform any extinguisher monitoring in this state.*

## 12-24VDC External Power

While powered from an external a FM Approved Fire power supply or a FM Approved FACP 24VDC power source.

| Indicator | Low Power Detected |
|---|---|
| Green LED | Flash 1x every 10 seconds (external power) (simultaneously with red LED) |
| Red LED | Flash 1x every 10 seconds (external power) (simultaneously with green LED) |
| Alert Relay | Normally open is open, Normally Closed is closed |
| Trouble Relay | Normally Open is closed, Normally closed is open |
| Sounder | Beep 1x every 10 seconds for first 2 minutes (external power) Then beep 1x every 30 minutes |
| AIMS Sensor Window | AIMS sensor window gives information on the low pressure of the extinguisher and a flashing red alarm shall appear on the Command Board – The pop up window will show the extinguisher has been removed by a red LED against the 'Low power detected' legend |

The AMEREX Integrated EVM sounder can be silenced in the event that an extinguisher trouble cannot be reset in a timely manner. To silence the unit sounder, momentarily push the front panel switch SW2. (As shown in the diagram opposite).
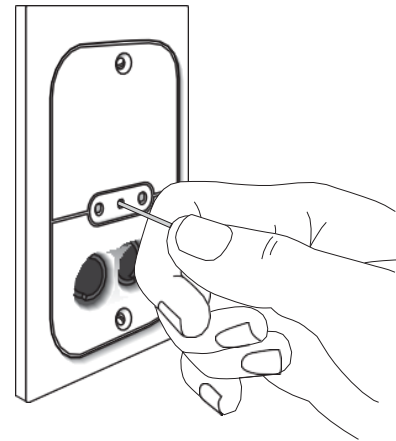
## 2.0 Specifications

### Mesh network Node specifications

**P/N 30112**

| | |
|---|---|
| Operating System | Ubuntu 14.04 LTS, Linux kernel 3.10.17 |
| CPU | ARM Cortex A9, 800MHz (Freescale iMX6-S) |
| Network | SNAP |
| Environmental | -10$^O$C to 70$^O$C |
| Power Supply | 24v d.c. at 250mA - FM Approved Fire power supply or a FM Approved FACP |
| Encryption | 2.4GHz RF Frequency |
| Antenna | External antenna connection and on-board compact F antenna |
| Encryption | AES 128-bit encryption |
| Transmit Power | Transmit power output up to +20dBm |
| SNAP Network | SNAP mesh enabled (2.4GHz IEEE 802.15.4) |
| RF Data | RF Data rate up to 2Mbs |
| Digital inputs | 3 x Digital inputs |
| Relay outputs | 1 x Relay driver output (Rated 100mA) |
| LED output | 1 x LED output (if required) |

### En-Gauge extinguisher unit

| | |
|---|---|
| Operating Temperature Range | 32 to 120 Degrees F |
| Installation Height | Approximately 18 inches on centre from floor |
| Extinguisher Gauge Tether Length | 48 inches |
| Dimensions Externally Powered | 4.65 x 2.91 x 1.56 inches |
| External Power Supply Voltage | 12-24VDC |
| External Power Supply Current | 4mA Normal State<br>6mA Alert or Trouble State |
| Output Relay Contact Rating | 1 Amp @ 30VDC |
| Obstruction Detection Range | 36 inches (default setting)<br>18 inches (optional setting) |
| Obstruction Detection Timing | 0-15 Hours (optional setting)<br>5-20 Hours (optional setting)<br>15-30 Hours (default setting)<br>50-65 Hours (optional setting) |
| Shipping Weight | 1 LB |
| Warranty | 1 Year |
| Listings | UL 864 |

Note – AMEREX Integrated node described above must be ordered separately from the En-Gauge unit. Part numbers are shown below.

| Description | Part Number |
|---|---|
| AMEREX Integrated En-Gauge Unit | 38001 |
| AMEREX Integrated Node | 30112 |