FIERCE VEHICLE FIRE SUPPRESSION

KODIAK

FIERCE VEHICLE FIRE PROTECTION

AMEREX

Quality is Behind the Diamond®

QUALITY WITHOUT COMPROMISE & EXPERIENCED **INNOVATION**

Fire protection for landfill vehicles presents a difficult challenge. The machines collect combustible Class A materials in the engine compartment, which can absorb flammable liquids and ignite. If the fire is not detected and suppressed quickly, it can spread throughout the machine and ignite surrounding combustible materials at the landfill or transfer station. Amerex vehicle fire suppression systems automatically detect the fire and discharge our fire suppression agents extinguishing the flames in seconds. **The KODIAK Fire Suppression Systems provide Fast and Fierce Fire Protection.**

In today's rapidly changing world where technology is constantly evolving, machines and fuel loads are becoming larger. Increased engine compartment temperatures are making the risks much greater and the solutions more difficult. You need a partner who understands the changing hazards and can integrate new technologies into a solution that protects your operations. Engineered system rigorously tested and designed to be tailored for any situation—**that's quality behind the diamond.**

All Amerex Fire Extinguishers comply with the recommendations of the **National Fire Protection Association** and are tested and rated by **UL** or **FM Global** to **UL Standards**. All extinguisher nameplates contain the necessary HMIS information to comply with national and local OSHA requirements.

DESIGNED AND MANUFACTURED IN THE USA

The Z-SERIES LINE OF HIGH-PERFORMANCE FIRE EXTINGUISHERS

The top choice for the waste industry, the Amerex Z-series fire extinguishers combine legendary knock-down power with an outstanding life span and overall lower cost than anything on the market. Thanks to our zinc-enriched proprietary coating, the Z-series also boast an industry-leading 12-year warranty against corrosion.

The AMEREX Z-Series is recommended for use on sites where heavy industrial, manufacturing, mining, processing facilities, anywhere chemical- or corrosive-intensive work takes place or an elevated fire risk exists.

KEY FEATURES & BENEFITS

- 12-year warranty
- Highest achievable UL ratings
- Proprietary corrosion-resistant paint process
- Severe corrosion tested in accordance with ISO 21207
- Choice of ABC or Purple K dry chemicals
- Simple operation and maintenance
- Only UL Verified corrosion-resistant extinguisher on the market
- Compliance Flow and Fast Flow discharge available
- Improved environmental impact compared to galvanized units

BENEFITS OF STORED-PRESSURE EXTINGUISHERS

Extremely low maintenance costs make stored-pressure extinguishers an ideal choice for extended use in harsh surroundings. Stored-pressure extinguishers mean no separate nitrogen cylinder or regulator to test, no chemical contamination, no moisture seals or high-pressure hoses to replace or inspect, and fewer parts requiring replacement over time. With low maintenance costs, affordable price points, high reliability and general ease of use, stored-pressure extinguishers are an ideal choice for extended use in harsh surroundings.

The AMEREX KODIAK BENEFITS STORED PRESSURE AGENT CYLINDERS

Vehicles are different, and so are the Protection Agent Options

All vehicle hazards are not the same, so we offer two different suppression agent options to protect your vehicle.

- **Dry Agent Systems** - Provides the fastest fire knockdown available and can get into those hard-to-reach areas where fire may hide.
- **Amerex Dry-ICS Systems** - Combines the strengths of both agents and provides the best possible fire protection option by providing rapid fire knockdown with dry agent and the cooling effects of the ICS liquid agent system.

Dry Agent Cylinders

Dry-ICS Agent Cylinders

ICS Liquid Agent Cylinders

WHY STORED PRESSURE?

- Prevents moisture from entering the cylinder and contamination of the fire suppression agent
- Agent is fluidized and ready to go when needed; no need for delays while the cylinder is being pressurized from an outside source
- Maintenance personnel can verify readiness at a glance with the cylinder's pressure gauge
- Stored pressure cylinders can be fitted with a pressure switch which detects a low pressure condition and notifies the operator via the control panel

SINGLE RELEASE SEQUENCE OF OPERATION

- Fire starts in the machine releasing significant amounts of heat.
- The detectors sense the heat and send a signal to the control panel.
- The control panel interprets the signal and begins the discharge sequence, activating the alarm relay for shutdowns.
- The operator may choose to activate the manual release located in the cab or at ground level at any time to begin the discharge sequence.
- The linear actuator receives the signal from the control panel and opens the cylinder valve. The fire suppression agent travels through the distribution network to the nozzles which disperse the agent.
- The fire is suppressed, allowing for personnel to evacuate the machine and utilize hand held fire extinguishers or other methods, if necessary.

AMEREX VEHICLE FIRE SYSTEM FEATURES

SYSTEM CONTROL PANEL The Control Panel (CP) is the “brains” of the system. The CP interprets the signal from the detection circuit, initiates the cylinder discharge, and simultaneously operates relays which can be used to stop the flow of flammable fuels.

AUTOMATIC DETECTION 24-hour automatic sensors rapidly detect heat from a fire and signal the CP to start the discharge sequence, suppressing the fire and minimizing the damage.

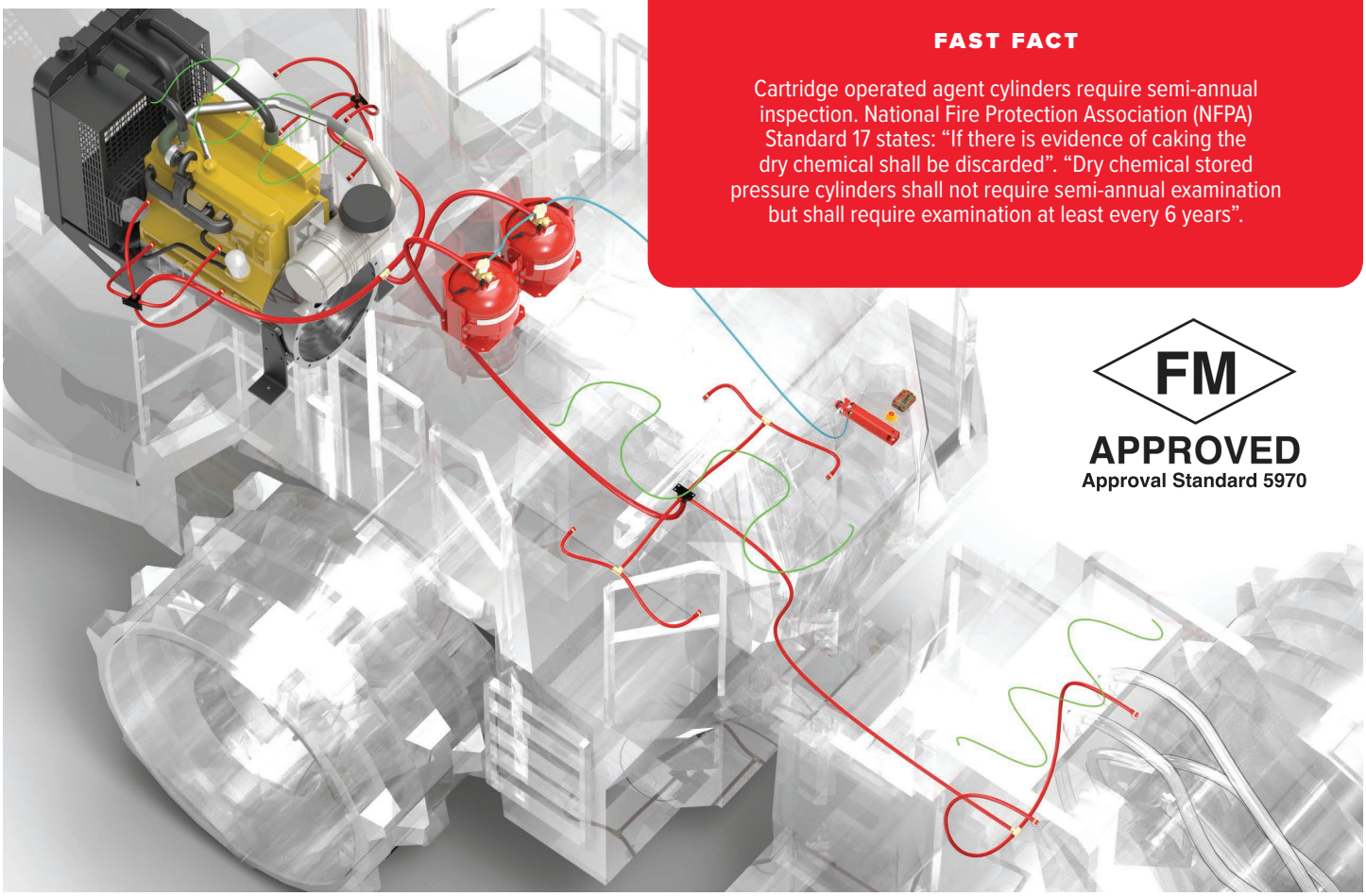
AGENT CYLINDERS Stored pressure agent cylinders hold the suppression agent in a pressurized state, preventing agent contamination and reducing maintenance costs.

DISTRIBUTION NETWORK Hydraulic hose or stainless steel tubing distributes the fire suppression agent to the discharge nozzles which disperse the chemical throughout the hazard area.

SYSTEM ACTUATION All systems have the capability to be actuated electrically, pneumatically, or as a redundant system featuring both electric and pneumatic actuation.

FAST FACT

Cartridge operated agent cylinders require semi-annual inspection. National Fire Protection Association (NFPA) Standard 17 states: “If there is evidence of caking the dry chemical shall be discarded”. “Dry chemical stored pressure cylinders shall not require semi-annual examination but shall require examination at least every 6 years”.



FM APPROVED
Approval Standard 5970

DUAL RELEASE SEQUENCE OF OPERATION

- Fire starts in the machine releasing significant amounts of heat.
- The detectors sense the heat and send a signal to the control panel.
- The control panel interprets the signal and begins the discharge sequence activating the alarm relay for shutdowns.
- The operator may choose to operate the manual release located in the cab or at ground level at any time to signal the control panel and begin the discharge sequence.
- The release begins when the linear actuator receives the signal from the control panel and simultaneously opens the dry chemical cylinder and Liquid cylinder valves allowing the fire suppression agent to travel through the distribution network to the nozzles which disperse agent providing rapid fire knockdown with the dry chemical and suppression and cooling with the ICS liquid system.
- The dual release system can also be configured to provide a time delay between the dry chemical release and the ICS liquid release.
- The fire is suppressed allowing for personnel to evacuate the machine and utilize hand held fire extinguishers or other methods to extinguish the remaining fire if necessary.

AMEREX VEHICLE FIRE SYSTEM FEATURES

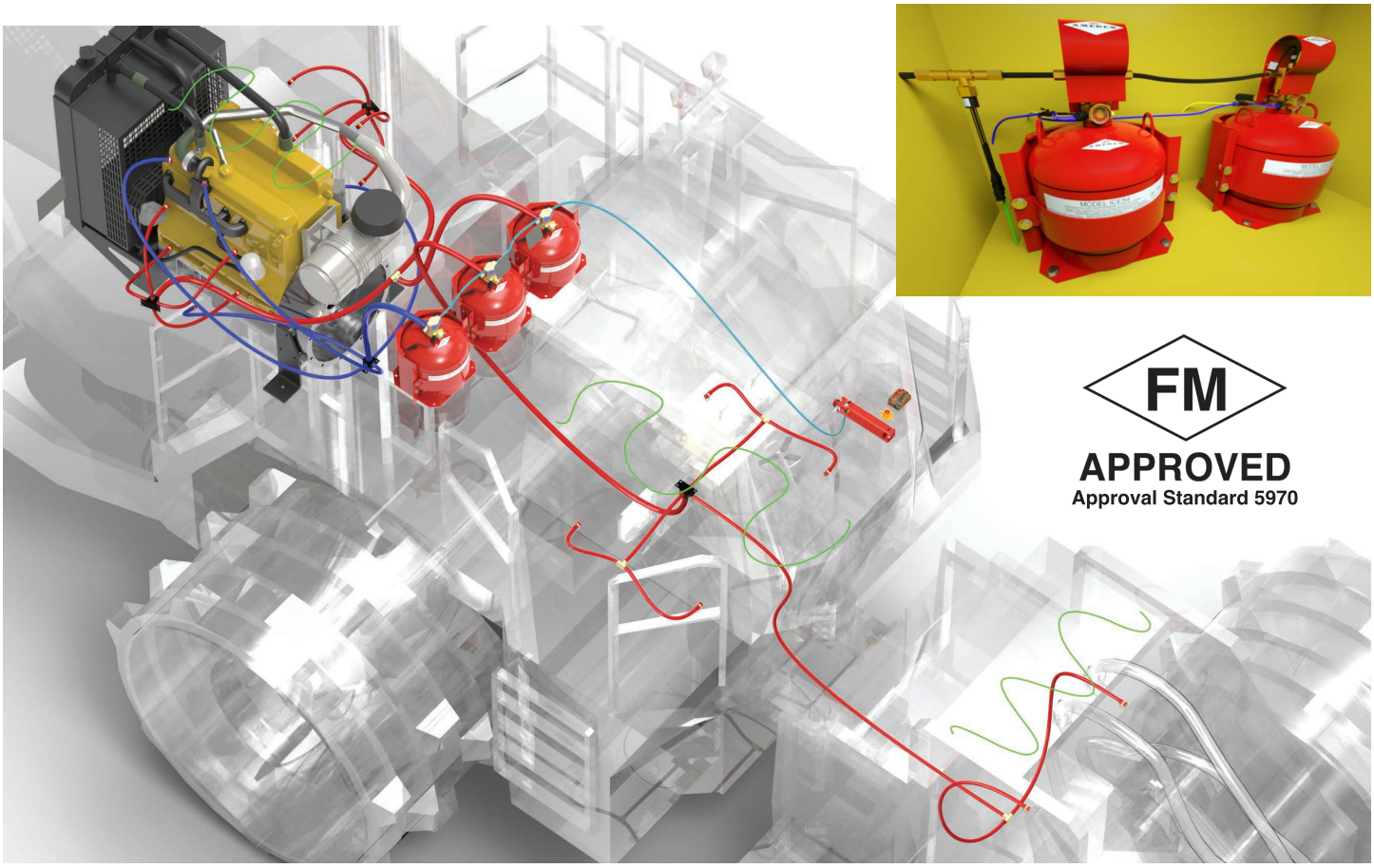
SYSTEM CONTROL PANEL The Control Panel (CP) is the “brains” of the system. The CP interprets the signal from the detection circuit and initiates two separate discharges of the dual agent cylinders. The CP controls relays which can be used to stop the flow of flammable fuels.

AUTOMATIC DETECTION 24-hour automatic heat sensors rapidly detect fire and signals the CP to start the discharge sequence suppressing the fire and minimizing the damage.

AGENT CYLINDERS Stored pressure cylinders hold the fire suppression agent in a state that prevents contamination thus reducing maintenance costs. The initial discharge of dry chemical agent provides for rapid fire knockdown. The second discharge of wet agent provides cooling of the heated surfaces to reduce the possibility of re-ignition.

DISTRIBUTION NETWORK Hydraulic hose or stainless steel tubing carries the fire suppression agent to the discharge nozzles and disperses the chemical throughout the hazard area.

SYSTEM ACTUATION All systems have the capability to be actuated electrically, pneumatically or as a redundant system featuring both electric and pneumatic actuation.



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AMGaDS GAS DETECTION SYSTEM

- The Waste industry has taken great efforts to become more environmentally friendly and as part of that effort more and more municipal fleets are turning to alternative fueled vehicles. Protecting operators and the environment is Priority #1 which is why Amerex has developed our AMGaDS Gas Detection System.
- Developed in the early 90's more than 50,000 AMGaDS systems are in operation today.
- The AMGaDS system utilizes advanced technology for detection of propane (LPG), CNG (Compressed Natural Gas), LNG (Liquid Natural Gas), and any other hydrocarbon fuel vapors. Amerex AMGaDS Gas Detection System provides you with piece of mind.

GAS SENSOR SEQUENCE OF OPERATION

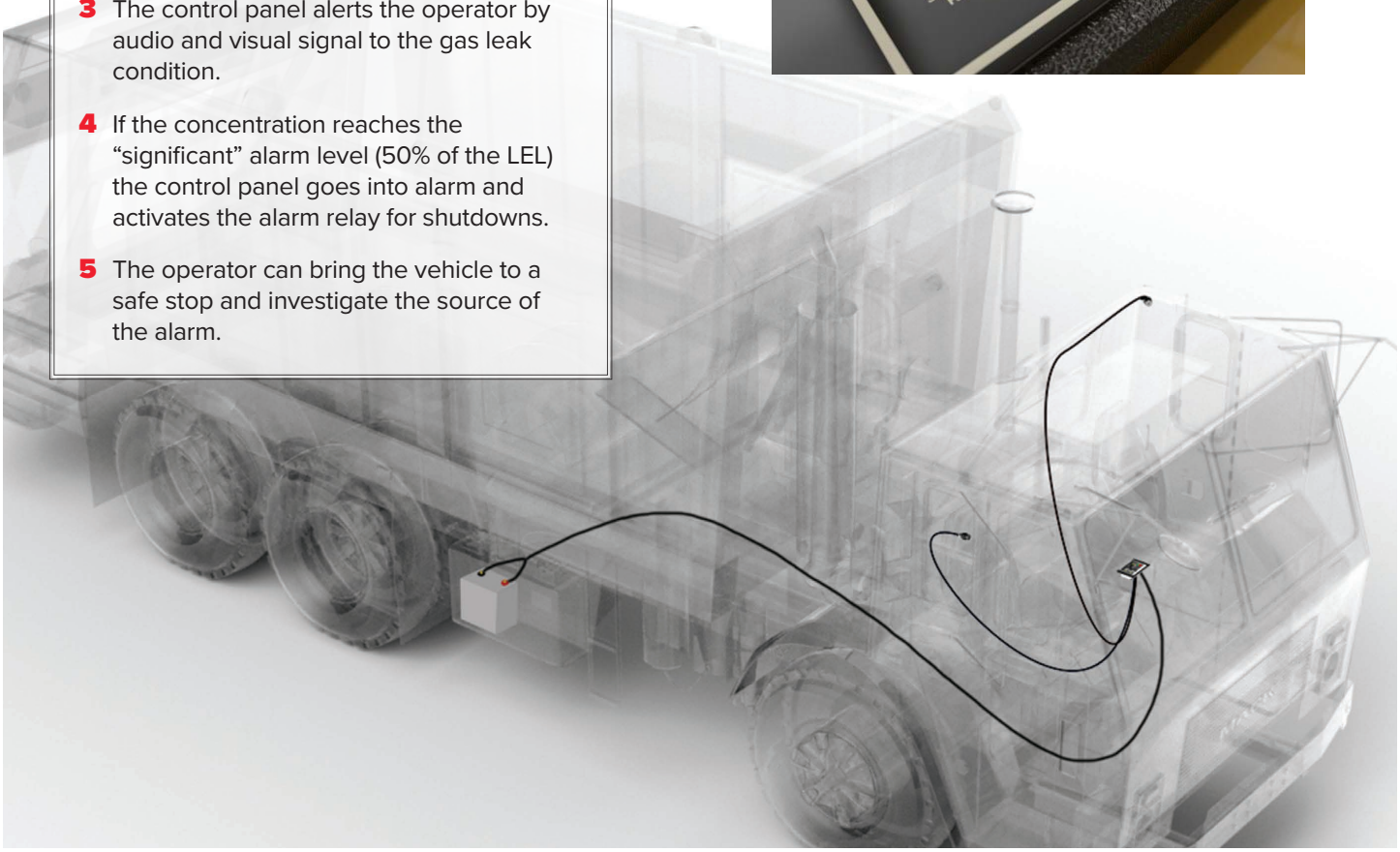
1. A combustible gas leak occurs on the vehicle.
2. The detectors sense the concentration of explosive gas and sends a signal to the control panel.
3. The control panel alerts the operator by audio and visual signal to the gas leak condition.
4. If the concentration reaches the "significant" alarm level (50% of the LEL) the control panel goes into alarm and activates the alarm relay for shutdowns.
5. The operator can bring the vehicle to a safe stop and investigate the source of the alarm.

AMGaDS SYSTEM FEATURES

SYSTEM CONTROL PANEL The Control Panel (CP) is the "brains" of the system. The CP interprets the signal from the Gas Sensors, initiates Trace or Significant gas alarm conditions to notify the operator and simultaneously operates relays which can be used to stop the flow of explosive fuels.

GAS SENSORS 24 hour automatic sensors rapidly detect the presence of combustible gases and sends a "Trace Fault" signal to the control panel when the concentration of gas reaches 20% of the LEL (Lower Explosive Limit) and sends a "Significant Alarm" signal when the concentration reaches 50% of the LEL.

WIRING HARNESS All wiring harness connectors for the AMGaDS system are terminated at the factory for quality assurance and ease of installation. The "plug and play" cables are available in a wide range of sizes to meet your specific need.



The AMEREX BENEFITS CONTROL PANEL OPTIONS

FEATURES OF THE SAFETYNET EV/SAFETYNET PANEL

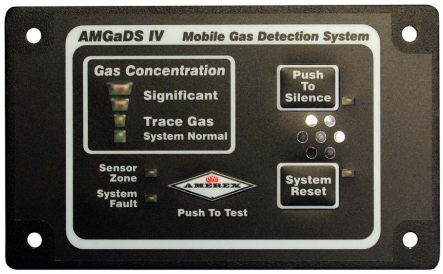
- Full network ability to add additional detection and releasing zones
- 4000 event log—time and date stamped, down-loadable log for easy troubleshooting and incident investigation
- Automatic Maintenance Testing (AMT) mode to significantly reduce maintenance time
- Supports Lithium battery and natural gas detection systems and Combination fire suppression and gas detection systems
- 24-hour battery backup protection

FEATURES OF THE 17 SERIES PANEL

- Two detection zones and one releasing zone
- 24-hour battery backup protection
- Diagnostic flash code for easy troubleshooting
- Programmable discharge and alarm relays

FEATURES OF THE AMGaDS IV PANEL

- From 1 to 4 gas detection zones
- Easy installation and service
- Low power consumption
- Auxiliary LED dimmer input
- Factory calibrated gas sensors



FAST FACT

Multiple types of detectors can be used on the same vehicle to provide faster response in high risk areas.

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FAST FACT

Event logs can be downloaded and provided to the vehicle owner to verify testing has been completed and kept as part of that units permanent record.

The AMEREX BENEFITS FIRE DETECTION OPTIONS

LINEAR HEAT DETECTION cables have long been the industry standard and provide a continuous heat detection cable that runs inside the hazard area. The Amerex Benefit has amped up the traditional cable with a more robust abrasion resistant outer jacket and factory-installed connectors for reliability and ease of service. The cable is also available with a stainless steel wire protective covering for extreme environments.

SPOT HEAT DETECTORS are available in three different preset temperature settings for flexibility and provide rapid heat detection and system activation. Spot Heat Detectors have factory installed connectors for reliability and ease of installation and service.

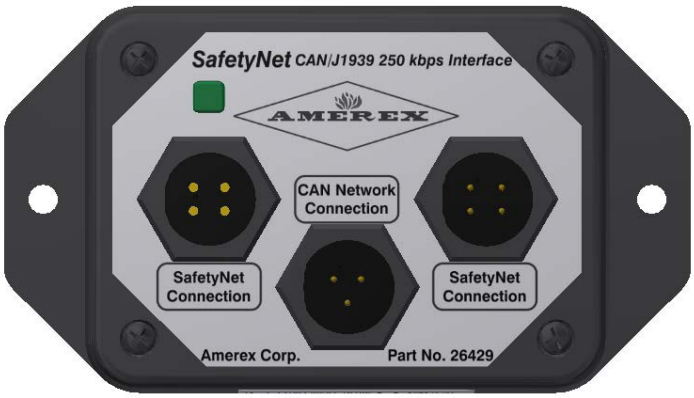
When you need the flexibility to provide Linear Heat Detection cable for harsh environments and Spot Heat Detection for critical areas needing fast response, the **Amerex control panels have the ability to combine detection methods.**

CAN/J1939 INTERFACE MODULE

The **SafetyNet CAN/J1939 Interface Module (CAN Module)** interfaces with Amerex Fire Suppression and Gas Detection electronics to transmit diagnostic messages to the vehicle network, operating at either 250k or 500k baud rate. Integration with telematics reporting software provides the user with a live system status. If desired or needed, a detailed troubleshooting of the SafetyNet system status can be achieved via the reporting platform. The device is installed as a module residing in the SafetyNet communication cable network. The proprietary SafetyNet codes are regularly transmitted on the network of SafetyNet modules and sensors. The CAN Module reads, sorts and translates SafetyNet messages into a SAE CAN/J1939 DM1 format. Sensor and module specific messages such as system Fire and Trouble conditions are recorded and transmitted to the CAN/J1939 network where they can be viewed and reported via the telematics system.

FEATURES

- Compatible with all previous version SafetyNet systems
- Provides SafetyNet diagnostic messages to vehicle CAN/J1939 network
- May be used for system maintenance and safety system diagnostic review
- RoHS, Reach & WEEE compliant construction
- Two separate part numbers for 250k and 500k baud rate vehicle CAN networks
- Coordinates SafetyNet internal clock with vehicle CAN controller



SafetyNet CAN Module

BENEFITS

- Connects to vehicle CAN/J1939 AVM network and allows for simplified diagnostics and maintenance
- Provides SafetyNet diagnostic messages which may be included with all other telematics reports
- Translates and transmits SafetyNet proprietary messages to the CAN/J1939 network
- Automatic synchronization of SafetyNet internal clock which allows for coordinated event tracking

SAFETYNET CAN/J1939 COMPONENTS

- P/N 26429 Module, 250k Baud
- P/N 27203 Module, 500k Baud
- P/N 26430 Interface Cable, 1 meter (required for either Module)

CAN/J1939 WITH SAFETYNET EV GAS MONITORING

The waste industry continues to shift higher percentages of their fleets to battery electric power. This new technology brings with it new fire hazards. Amerex has developed the new **SafetyNet-EV Gas Detection System** to protect people against these risks.

COMPONENT OVERVIEW

Gas Sensors are calibrated for use in electric vehicle battery compartments to monitor volatile combustible gases produced as a result of overheat, overcharge or other conditions.

The **SafetyNet-EV Panel** is specifically designed to work with new gas sensors, alarm levels and programming. Tested and calibrated for EV Lithium ion gas characteristics.

SafetyNet CAN Module see details on opposite page.

FEATURES

- Advanced technology adapted for today's cleaner electric vehicles
- Sensors strategically placed around the vehicle register a warning before an event occurs
- System sounds an alert, allowing the operator to safely evacuate the vehicle
- CAN Module telematics can be configured to alert the operations control center for faster on-scene response

BENEFITS

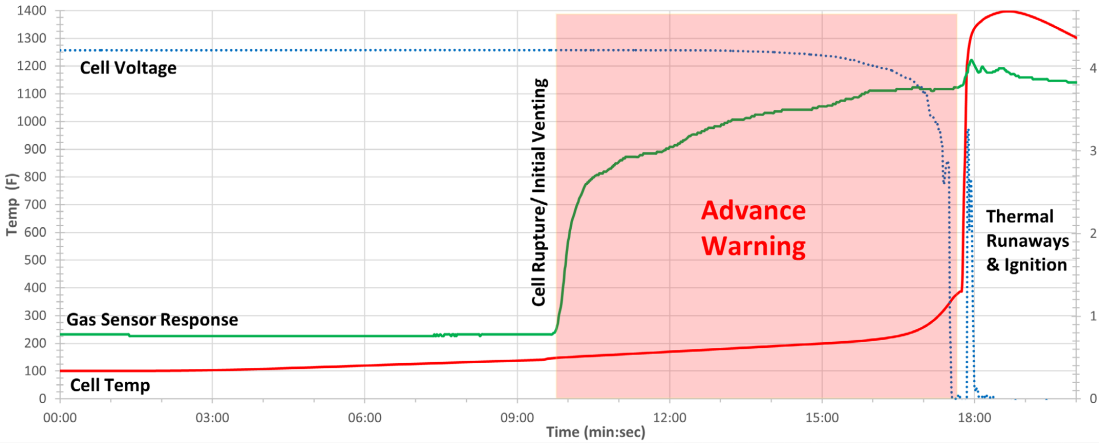
- Saves lives and property
- Early warning—rapid response
- Provides advance notice of a thermal runaway event

Multi-Cell Lithium Ion Array Heated Until Thermal Runaway Event

The graph at right highlights the early response from the Amerex gas sensor as compared to traditional monitoring methods including cell temperature and cell voltage. This advance warning, highlighted by the pink section, represents valuable time, well in advance of an eventual thermal runaway.

In this example, cell surface temperature (red) and cell voltage (blue) of the first cell are measured, which are traditional monitoring methods used in lithium ion battery packs. Also included in the graph is the Amerex gas sensor response (green), where the sensor is located adjacent to the cells.

As the first cell is heated, the first measurable event is a cell rupture and off-gassing event (around 10 min), where the cell begins to vent a volatile combustible gas, measured with an immediate gas sensor response. As the test progresses, a thermal runaway event eventually occurs (around 18 min). At this catastrophic event, a noticeable spike in temperature is measured where the cell surface temperature reaches almost 1400°F. Also, just prior to the thermal runaway, a drop in cell voltage is measured.



why AMEREX?

QUALITY
Amerex didn't become a global market leader overnight. Our business has grown year after year based on our products' reputation for performance and durability in even the most rugged environments.

INNOVATION
Because Amerex is independently owned and forward thinking, we are continuously innovating and investing for the benefit of our customers and those they serve.

SERVICE
Amerex was founded on a mutual appreciation for premium quality in products and customer service and the importance of interpersonal relations.

AMEREX®

Quality is Behind the Diamond®

Note: The illustrations shown within are conceptual only and not intended for system design. A complete hazard analysis and risk assessment should be performed on the vehicle to determine the most probable ignition sources; along with the fire characteristics and quantity of the various fuels exposed to those ignition sources. Final placement of the fire suppression components should be based on the hazard analysis and in coordination with the end user.

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