

# POWerview SUITE - POWerview EVENT RECORDER

**Progress Rail**  
A Caterpillar Company



## Locomotive Digital Video Recorder (LDVR) Locomotive Voice & Video Recorder (LVVR)

The Progress Rail PowerView Locomotive Event Recorder is built on our legacy of railroad event recorders and innovative data acquisition products and solutions.

PowerView is a combined Locomotive Event Recorder (LDARS) and Audio and Video Recorder (LDVR). All data sets are synchronously stored on the recorder and analyzed via the PowerView Connect.

Data is stored on both an internal Crash Hardened Memory (CHM) module and an optional removable Solid State Drive (SSD). The CHM offers FRA-compliant Crash Protection and the SSD provides large storage capacities up to 4TBs.

When configured with the optional 128GB CHM, PowerView can store a minimum of 48 hours of Audio/Video data in Crash-Hardened memory, thus meeting upcoming Transport Canada

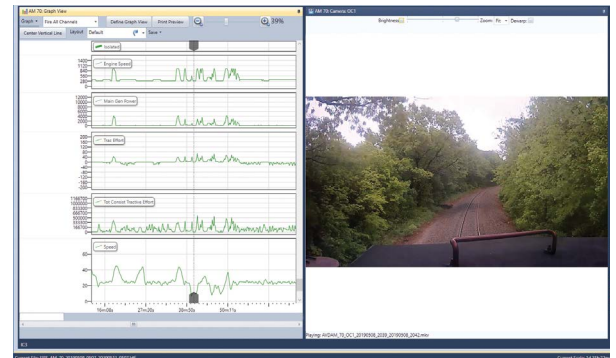
and possible FRA Transit Event Recorder requirements.

All data is synchronized via a master clock of choice (depending on availability) such as GPS, PTC & NTP.

All PowerView Event Recorder data can be downloaded via multiple paths. Local connectivity options include USB thumb drive, Ethernet, and removal of the SSD drive to mount to a PC using a USB 3.0 cable.

Remote downloads are processed via the PowerView Playback software, PowerView Connect, or other 3rd-party options. Various comm & network devices can be supported.

Multiple network camera types are supported, including Forward-facing cameras, interior dome and fish-eye



cameras. Resolution, frame rate and other camera settings can be statically configured or dynamically managed by the PowerView recorder based on locomotive operating conditions.

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# POWerview SUITE - POWerview EVENT RECORDER

## Features

### Ethernet

4x 10/100 Fast Ethernet ports,  
M12 connectors, A-coded 8-pin  
1x GbE Ethernet port, M12 connector, X-coded 8-pin

### Serial

2x RS-422/485 Full / Half Duplex  
Synchronous (up to 19200 baud)/  
Asynchronous (up to 57600 baud)

### Digital Inputs

4x 30-80 VDC Optically Isolated  
States: ON, OFF, Toggle (user  
defined)

### Audio

Dual Balanced-line audio input Supports up to two (2) dedicated microphones. Multiple camera microphones

### USB

USB download port with cover

### Clock

Internal real-time clock w/battery back-up

### GPS

GPS receiver with RP-TNC antenna connector

### User Interface

Compatible with web browsers such as Chrome, Edge, and Firefox

### Diagnostic and Health

Status Indicator LEDs on front panel  
Detailed diagnostics via Web GUI

## Progress Rail Event Playback Software

### System Requirements

Windows 10 32/64 bit  
Windows 7 32/64 bit Intel Core i3,  
4 GB Ram or higher



## Data Storage

### Internal Crash Hardened Memory Module

Meets 49 CFR Part 229  
Multiple capacities available (128GB meets  
Transport Canada requirements)

### SATA Drive Bay (SSD optional)

Accepts industry-standard 2.5 inch Solid  
State Drive (SSD)  
Monitored Key Lock  
Hot-swappable  
Up to 4TB capacities

## Options

- LDVR Capability
- IP Network Camera(s)
- Multiple Quantity and types
- Bullet cameras
- 180-degree Fish-eye cameras

Multiple Frame Rates (dynamically  
up to 60fps)  
Multiple Resolutions up to 4K Supports  
multi-streaming  
Wide-Dynamic Range  
Built-in 940nm IR LEDs for cab interior  
illumination  
Built-in microphones

## Compression Codecs

Supports H265, H264, MJPEG, AAC and  
other industry codecs

## Dimensions

LSI 5 MCU Rack Mount  
Width: 6.19 inches  
Length: 11.5 inches  
Height: 9.25 inches  
Weight: 24 lbs

## Relative Humidity

0% to 95% non-condensing

## Operating Temperature -40° C to +70° C

## Storage Temperature

-50° C to +85° C

## Power

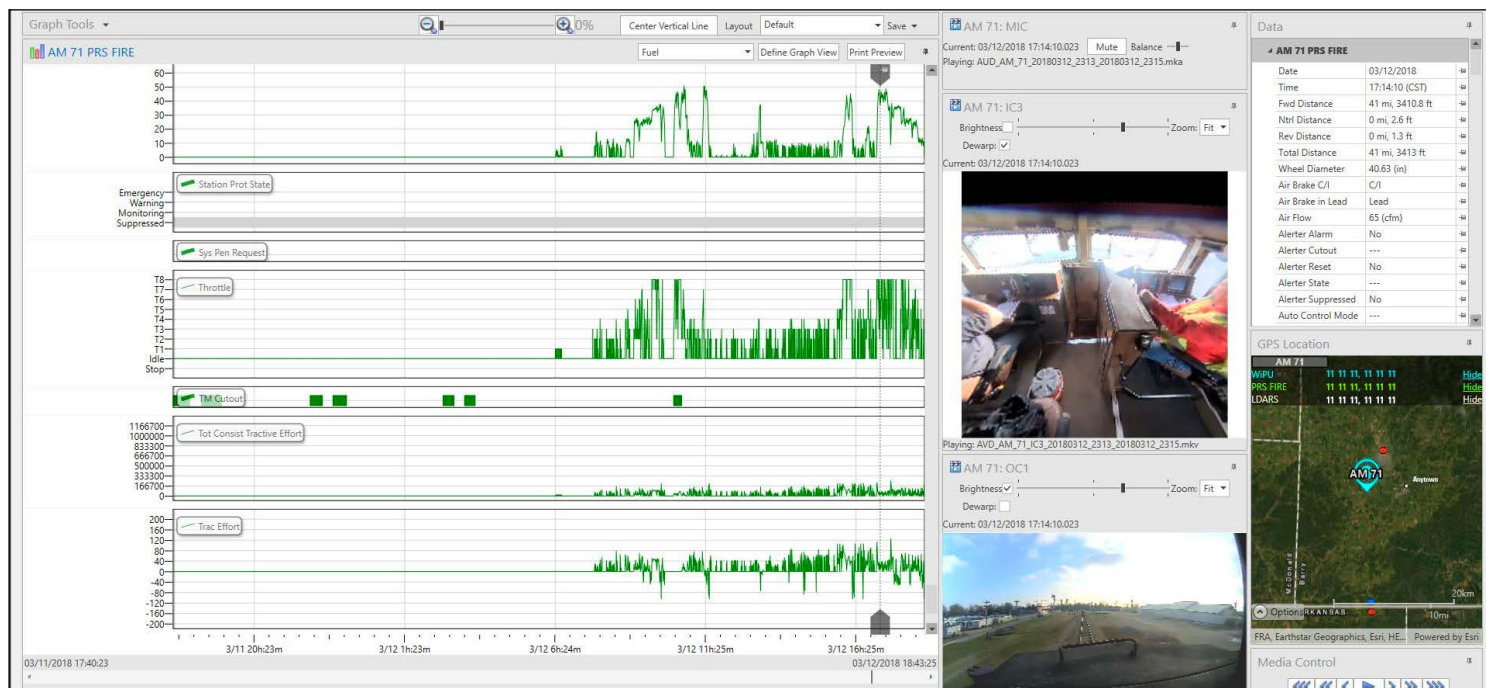
Operating Voltage 40-90 VDC Voltage Range  
20-135 VDC Current Draw 15 Watts Max  
Reverse polarity protection  
Overvoltage protection

## Meets the following specifications:

FRA 49 CFR Part 229  
AAR S-9101B  
AAR S-9401 (5702)  
IEEE 1482.1 compliant  
IP 67



# POWerview SUITE - POWerview EVENT PLAYBACK



The Progress Rail PowerView Event Playback software is the next iteration of PRS railroad event recorders and innovative data acquisition products and software.

PowerView Event Playback software is a multi-featured data video playback and data analysis tool that is compatible with several Locomotive Event Recorder file formats, including the new PRS PowerView Event Recorder.

The playback software can play back synchronized locomotive data and LDVR data, in addition to synchronized data from other sources. All data is combined in a modern, easy-to-use client application. All data sources are combined and displayed to the user in a synchronized format, including video, data, GPS mapping, etc.

A full graphical interface enables enhanced visualization of events. Detailed data analysis can be performed by utilizing a sophisticated Filter Editor to create and store data queries.

It offers industry leading Chain of Custody (CoC) features by utilizing specific proprietary file formats as well as AES encryption.

The Event Playback software also focuses on ease of use. All window panes can float, dock, or be hidden, and moved and displayed on various monitors. Cross-tab navigation is supported, as is multiple file export features.

The Progress Rail PowerView Event Playback is compatible with Windows 7, 8.1, and Windows 10.

# POWerview SUITE - POWerview EVENT PLAYBACK

## Features

### Ethernet

1x 10/100 Fast Ethernet ports, M12 connectors, A-coded 8-pin TCP/IP  
AAR Class C/D output messages

### Serial

1x RS-485 Half Duplex  
Asynchronous Isolated  
External Sensors via Modbus  
1x RS-232 Full Duplex (EOT Systems, Diagnostics)  
Asynchronous Isolated

### Digital Inputs

33 x 30-80 VDC General Purpose (Speed, Train Line Signals, Aux)  
1 30-80 VDC Generator Field input  
10 x 12-32V Cab Signal Inputs (ATP, Radio Signals)

### Analog Inputs

7 x 0-80V .1V resolution (Battery Level, Dynamic Brake Control)  
1 x 0-16V .1V Resolution (Aux sensors)  
6 x 0 to +- 10V .1V Resolution (Aux sensors)

### Tachometer Input

Configurable pulses per revolution,  
Pulse or sine wave input

### Pressure Inputs

- 8 x analog or digital
  - 4 x 0-160 psi
  - 1 x 0-250 psi
  - 1 x 25 psi switch
  - 2 x 15 psi switch
- Configurable (at ordering).

### 4-20 ma Inputs

7 x Connect to remote sensors  
Traction motor currents  
Main Generator Voltage  
A combination of external sensors can be applied for various purposes:

- Single current sensor to monitor traction motor current
- Multiple current sensors with a Voltage sensor to monitor traction motor current, horsepower, tractive effort, etc.

### Configuration

Configurable inputs by file upload  
Input Scaling, Debounce,  
Report Frequency, IP Address  
Generates programmable AAR Class C Format Tag Data

### Options

#### Progress Rail PowerView System

#### Event Recorder

Crash Hardened Memory (CHM)  
IP Cameras, Microphones

#### Alerter/Vigilance Module

Mag Valve Output  
Audio Warning  
Display Module - LED Warning

## SPECIFICATIONS

### Dimensions

Width: 12.98 inches  
Length: 15.52 inches  
Height: 6.29 inches  
Weight: 10 lbs.  
Relative Humidity  
0% to 95% non-condensing

### Operating Temperature

-40° C to +70° C

### Storage Temperature

-50° C to +85° C

### Power

Operating Voltage 40-90 VDC

Voltage Range 20-135 VDC  
Reverse polarity protection  
Overvoltage protection

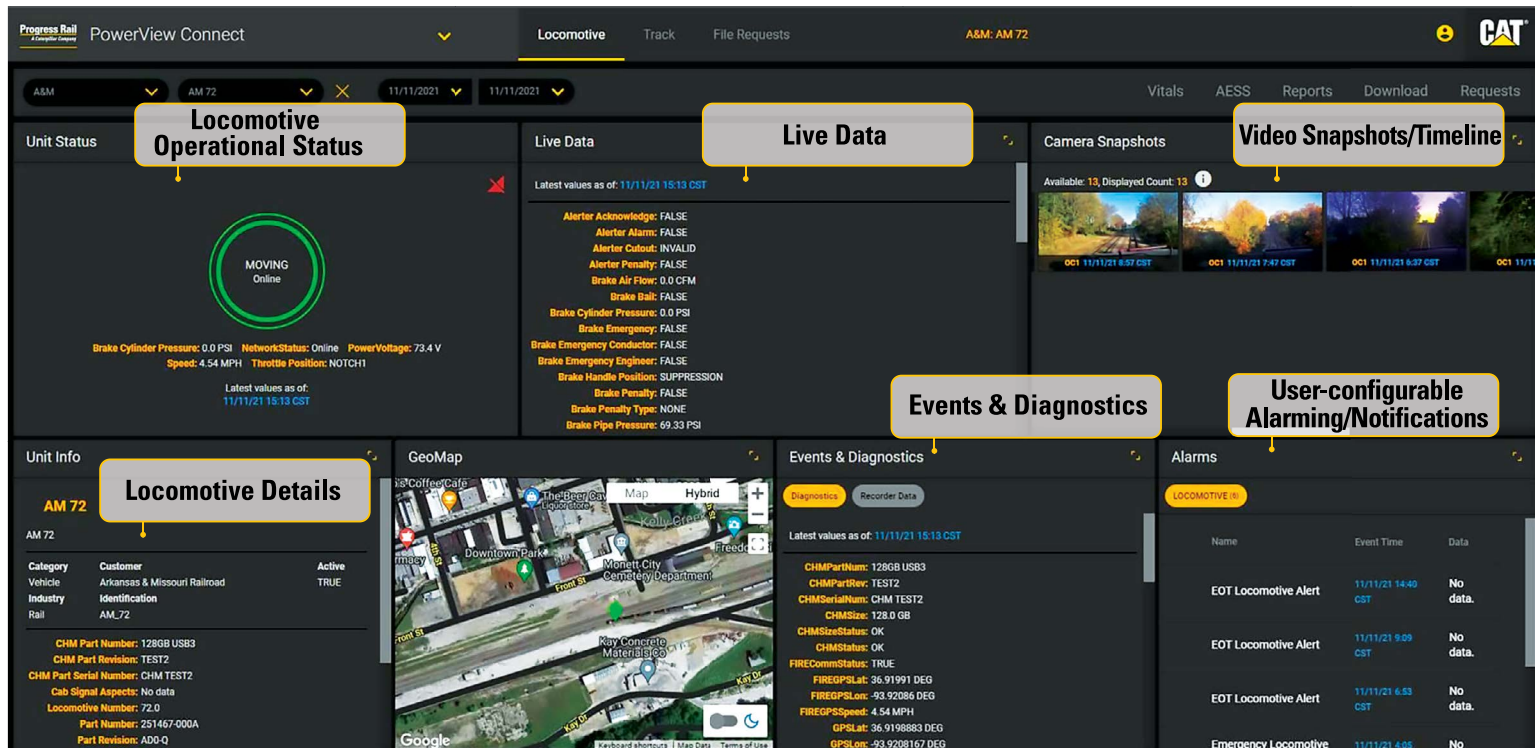
### Isolation

Inputs isolated in banks  
80 V Digital/Analog  
32 V Digital  
16 V Analog  
+-10 V Analog  
Tachometer  
Pressure  
4-20 ma

### Meets the following specifications:

AAR S-9401 (5702)

# POWerview SUITE - POWerview CONNECT



## PowerView Connect - Advanced Remote Monitoring with next-generation solutions

The Progress Rail PowerView Connect Office System is built on our legacy of event recorders and innovative data acquisition and asset protection products and solutions.

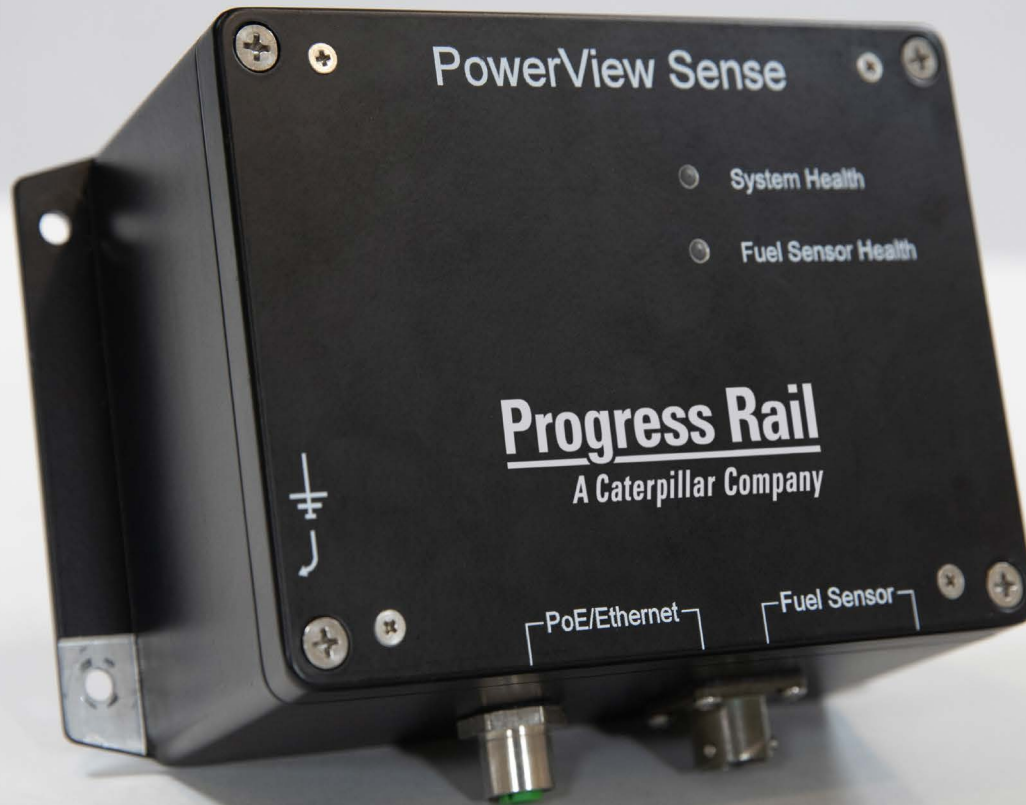
PowerView is both an **On-Premise** and **Cloud hosted** back office solution that uses data from the PowerView product line to provide near realtime locomotive operational status and conditions as well as wayside asset protection information. The On-Premise solution enable users to host on their secure network infrastructure.

The PowerView system is communications agnostic and can support multiple communications options such as cellular networks as well as leveraging existing network communications (such as PTC comms).

The system easily enables file downloads and live data streaming from the PowerView as well as live video streaming. PowerView Connect includes a Customizable Alarm Generator, where users can establish alarming criteria and logic and generate realtime alarms across an entire fleet or sub-fleet of locomotives.

When supported with additional sensors, the system also includes powerful Fuel Monitoring solutions. IoT edge device applications enable flexibility to monitor additional applications. PowerView Connect offers industry leading edge and cloud processing capability and secure, storage capacity, and leverages robust Caterpillar global infrastructure.

## POWerview SUITE -



The Progress Rail PowerView Sense module is one of several optional upgrades that expands the monitoring capabilities of the PowerView Event Recorder system.

PowerView Sense (PV Sense) contains an accelerometer and gyro module that easily interfaces with the PowerView Event Recorder system via a simple to install, single-cable Ethernet connection.

The PV Sense module is designed with a small and rugged modular design for flexible and standardized mounting orientations across dissimilar locomotive fleets. For example, PV Sense can always be on the forward cab bulkhead of any locomotive type, ensuring similar sensor calibration across an entire fleet of various locomotive types.

The 3-axis accelerometers and gyroscope produce IMU information that reports X, Y and Z-axis acceleration data, as well as locomotive pitch and roll data.

PV Sense is IP 67 rated and contains both an Isolated 10;/100 Base-T PoE Ethernet Port (802.3af/at), AAR standard M12-8 pin,

A coded female connector. The sensor also contains an isolated RS 485 Serial Port for use with an option Ultrasonic Fuel Tank sensor. PV Sense supplies power to the Ultrasonic sensor.

External LED indicators visually convey system health, as well as optional Fuel

Sensor health. The system also supports remote firmware updates via the locomotive Ethernet network and interfaces.

### FEATURES

#### Connectors

RS 485 Serial Port (for Fuel Sensor)  
MIL-DTL-26482 connector  
M12 Female 8 Pin A-Code (POE)

#### LED Status

System and Fuel Sensor Health Indicators

#### Sensors

High Precision Accelerometer 2/4/8G, 14CLCC  
Accelerometer,  $\pm 200g$ , 12bit, 16TFLGA  
3-axis MEMS GYRO, SPI/I2C,  $\pm 245dps$ , 16LGA

#### Certification

AAR S-9401

### SPECIFICATIONS

#### Dimensions (w x h x d)

7" x 4.25" x 3"  
Wall-mountable

#### Relative Humidity

0% to 95% non-condensing

#### Operating Temperature

-40° C to +70° C

#### Storage Temperature

-50° C to +85° C

#### Power

15 watts Power-Over-Ethernet (PoE network switch with available power budget required)



# POWerview SUITE - POWerview EXPANSION MODULE (IEM)



## PowerView Input Expansion Module (IEM) - Advanced event recorder with advanced solutions

The Progress Rail PowerView Input Expansion Module (IEM) is a signal interface/collector which enables nonintegrated locomotives to send data to the Progress Rail PowerView product line as well as EMD and other systems.

The IEM module collects data from various analog, digital, and airbrake pressure signal sources on the locomotive and aggregates this data and sends via Ethernet to the Progress Rail PowerView system and other systems.

The IEM module has an expansive array of analog, digital, cab signal, airbrake, axle tachometer, and current monitoring inputs. It can optionally include a Sil-2 level Alerter module with crew display.

Data communications is via an M12 Ethernet port, and supports multiple industry protocols such as Class C/D messaging.

Additional Traction Motor Current and Generator Voltage modules are available. These modules enable monitoring of locomotive Traction Motor and Generator current and voltage in a module that can be positioned in a variety of locations. Connection to the IEM is via 4-20ma current loop.

When combined with the PowerView Event Recorder and Event Playback software, the Progress Rail PowerView system provides a complete next-generation Locomotive Event Recorder system for non-integrated locomotives.