# POWERVIEW SUITE - POWERVIEW EVENT RECORDER

RAIL TECHNOLOGY


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

**Progress Rail**
*A Caterpillar Company*

+1 800-476-8769
progressrail.com
@progressrail
@Progress_Rail

# POWERVIEW SUITE - EVENT RECORDER SPECIFICATIONS

## HARDWARE AND SOFTWARE FEATURES

### 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 Fisheye cameras

Multiple Frame Rates (dynamically up to 60fps)
Multiple Resolutions up to 4K Supports multi-streaming
Wide-Dynamic Range
Built-in 940mm 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

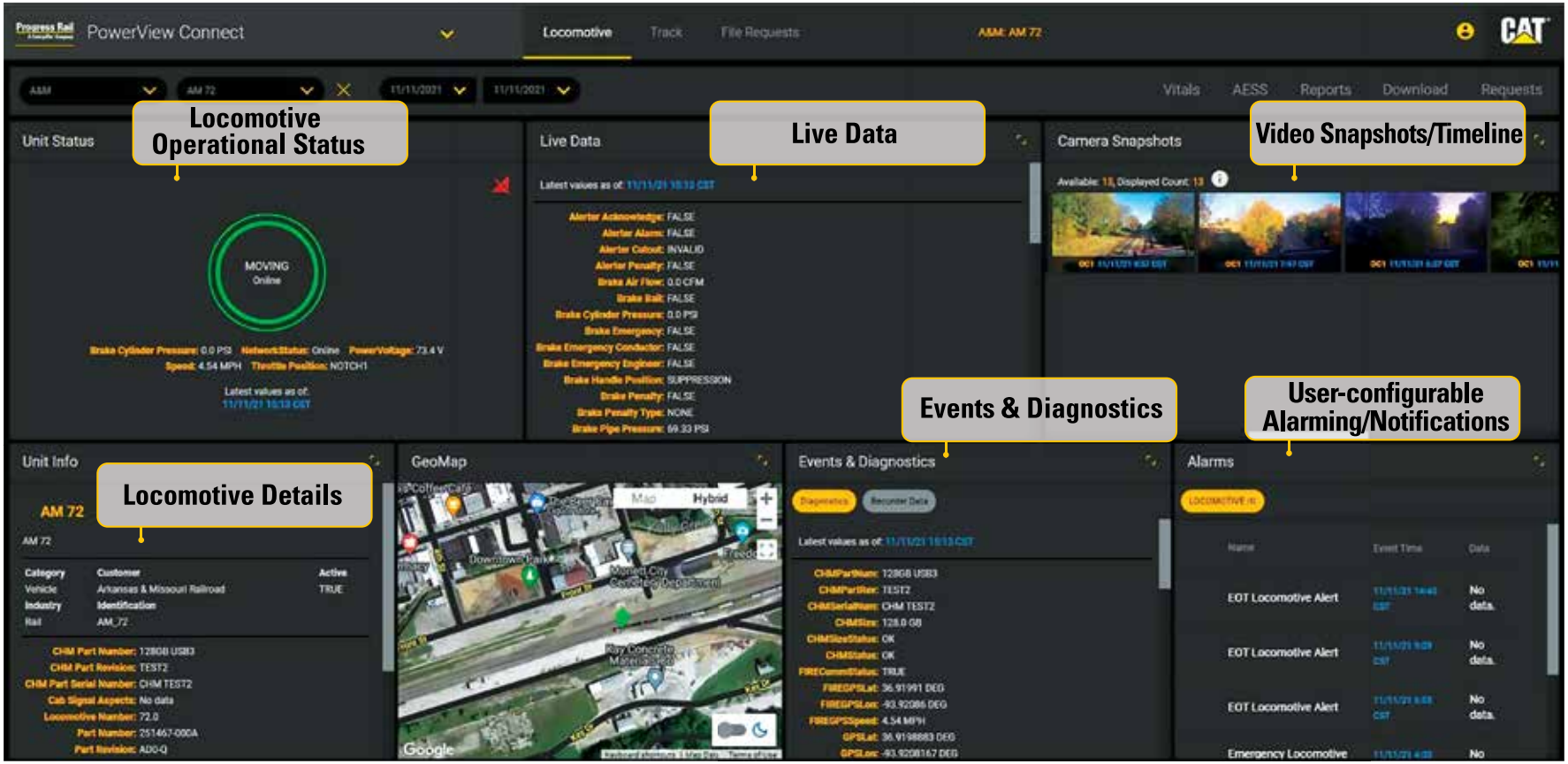
**Relative Humidity**
0% to 95% non-condensing

**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 Connect - Advanced Remote Monitoring with next-generation solutions

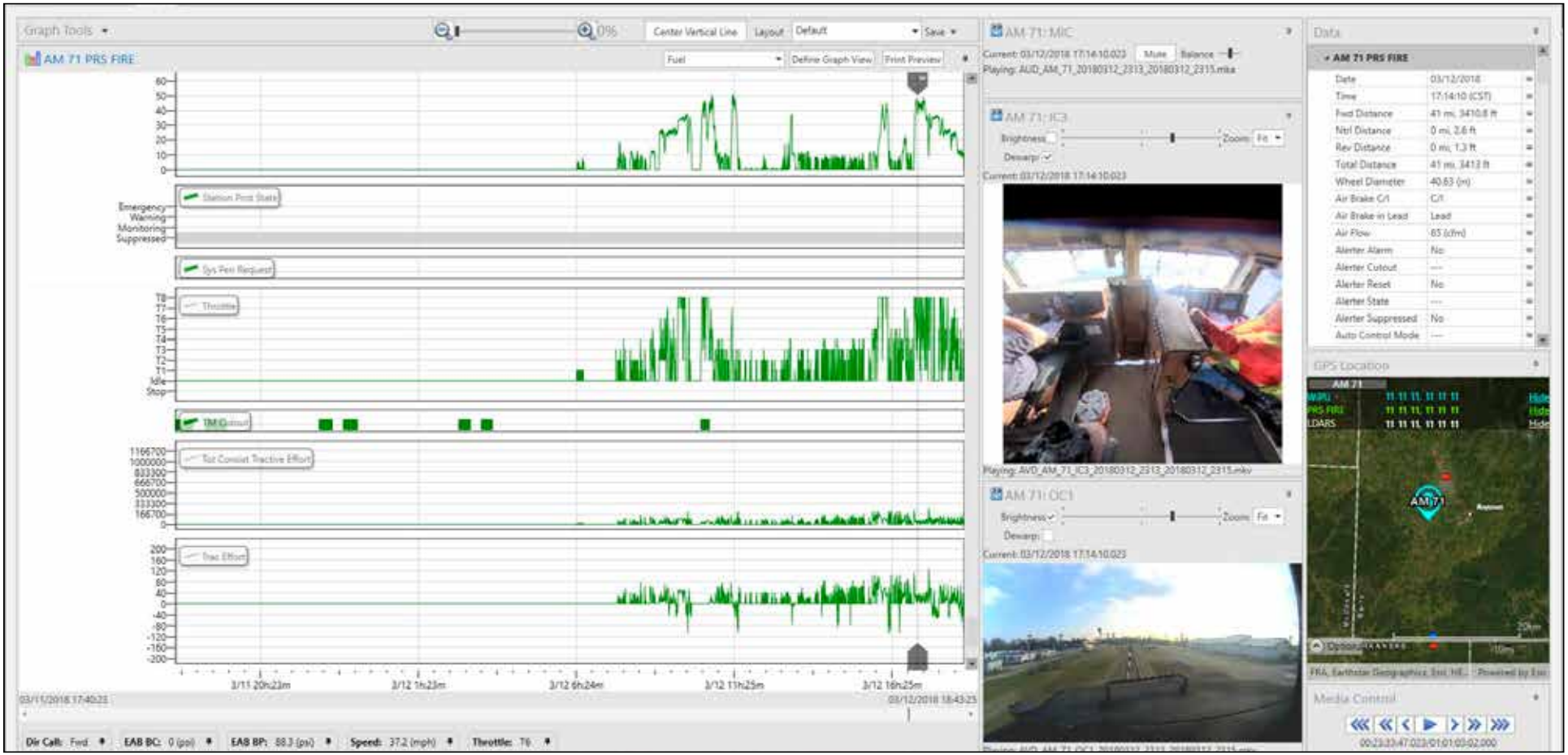
The Progress Rail PowerView Connect Office System is built on our legacy of event recorders and innovative data acquisition and asset protection products and solutions.

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.




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.

## 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**
-40º C to +70º C
**Storage Temperature**
-50º C to +85º 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)


## 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, ±200g,
12bit,
16TFLGA

3-axis MEMS GYRO,
SPI/I2C,
±245dps, 16LGA

**Certification**
AAR S-9401

## SPECIFICATIONS

**Dimensions**
Width: 7 inches
Height: 4.25 inches
Depth: 3 inches
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)

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.

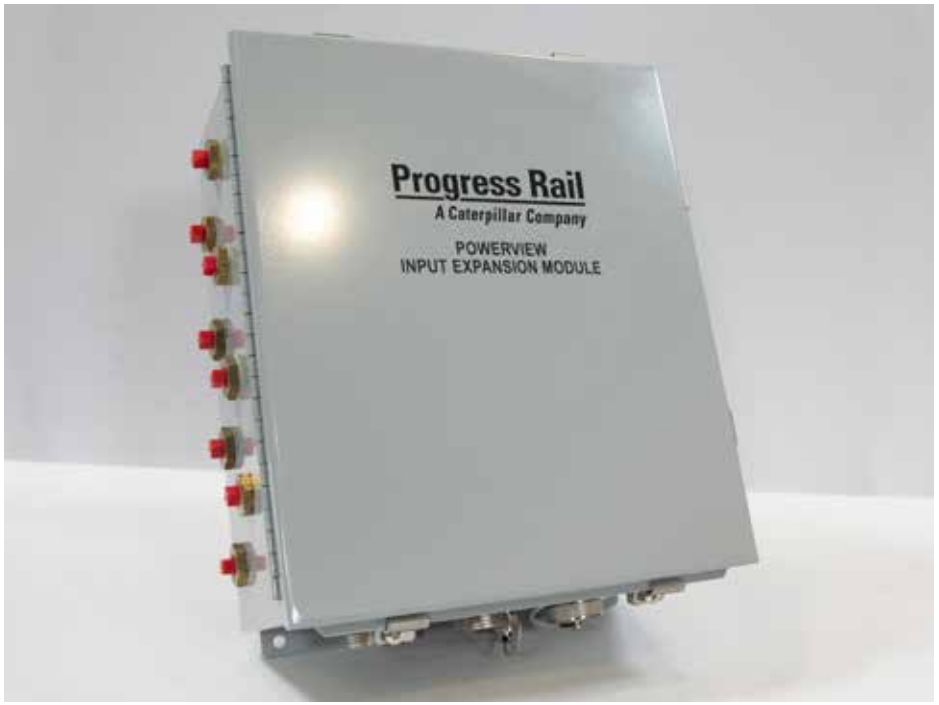
The PV Sense module is designed with a small and rugged modular design for flexible and standardized mounting orientations across dissimilar locomotive fleets. For example, PV Sense can always be on the forward cab bulkhead of any locomotive type, ensuring similar sensor calibration across an entire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





## 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 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.