# SAVeS Smart Vibration Sensor

Modern vibration monitoring for gas compressors & other critical equipment

## Operation Manual

ALTRONIC

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FORM SAVeS OM 08-25 | 

**WARNING:** Deviation from these instructions may lead to improper operation of the monitored machine which could cause personal injury to operators or other nearby personnel.

**WARNING:** The SAVeS must be configured prior to use.

**CAUTION:** Do NOT attempt to operate, maintain, or repair the SAVeS System until the contents of this document have been read and are thoroughly understood.

# 1.0 SAVeS System Description

## 1.1 Overview

The Smart Altronic Vibration Sensor (SAVeS) System is a 32-bit microprocessor-based, non-mechanical vibration monitoring solution designed for application in both interior and exterior environments. It protects industrial engines, compressors, and associated equipment from damage caused by excessive vibration.

The SAVeS generates a signal on the 2-wire power line. Based on the generated signal, the SAVeS Detector can initiate a shutdown when conditions are reached.

The SAVeS System is shipped with factory default X, Y, and Z vibration thresholds; however, as each application is unique, configuration must be performed. Configuration is accomplished through the iOS app or the Modbus; see section **6.0 Using and Understanding the iOS App** on page 5.

**Pending** The SAVeS system is CSA certified for Class I, Division 2, Group C & D hazardous locations.

## 1.2 System Components

The SAVeS System consists of two main parts: an engine-mounted SAVeS and a Detector.

- Smart Altronic Vibration Sensor (SAVeS) System:
  - 691 816-1 – Full features, SAVeS only
  - 691 816-2 – Requires Detector and includes Modbus (Modbus leading to the SAVeS must be isolated)
  - 691 816-3 – Requires Detector
- SAVeS Detector Module:
  - 691819
- Overwatch App (iOS only[1])

# 2.0 System Setup

## 2.1 Battery Installation (Optional)

### 2.1.1 Battery Overview

The SAVeS System requires a 3V CR2032 button cell battery (not included) to power the real time clock which allows for datalogging the raw acceleration data. When the SAVeS System is disconnected from the power source, the battery keeps the real time clock running which allows the system time to be kept for the next power up.

A standard CR2032 200 mAh will last approximately 14 years. **NOTE:** If the battery runs out, the date stamp on the Event History screen in the iOS App will default to 12/31/99, 11:41:00pm upon a power cycle.

### 2.1.2 Installing and Replacing the Battery

**To access the battery compartment:** Disconnect the SAVeS System from the power source, if necessary. Remove the four flat head bolts to open the enclosure lid.

1 Android App in development.

**To install the battery:** Press the button cell battery into the battery compartment until the latch snaps into place to secure it.

**To replace the battery:** Pull the latch on the side of the battery compartment to raise the battery, then remove it.

## 2.2 Micro-SD Card Installation (Optional)

**NOTE:** It is highly recommended to install the CR2032 battery to use the real-time clock when logging data to an SD card.

### 2.2.1 Micro-SD Card (uSD) Overview

In addition to real-time data that may be viewed in the iOS App, the SAVeS can record data to a uSD card (optional) to facilitate prediction of potential failures and preventative maintenance. Data recording is off by default but may be turned on in the iOS App. In the App, the SAVeS can be set to record acceleration, velocity, or both. Acceleration and velocity log files are generated hourly, and data is saved to the uSD card in CSV format. The uSD card can fill quickly, especially when recording both acceleration and velocity data. When 90% full, the card will overwrite old data on a first-in, first-out basis.

The SAVeS system supports uSD cards up to 2TB. Altronic highly recommends SanDisk Industrial XI, MicroSDHC; FAT32 format with 32k block allocation.

### 2.2.2 Installing the Micro-SD Card and Retrieving Recorded Data

**To access the uSD card slot:** Disconnect the SAVeS System from the power source, if necessary. Remove the four flat head bolts securing the enclosure lid.

**To install the uSD card:** Insert the micro-SD card into the card slot on the PCB. Slide the uSD card slot lid away from the edge of the PCB to unlock the cage. Hinge the lid open and slide the uSD card in the lid with the gold connectors on the card facing the hinge and the gold connectors on the uSD card slot base.

**To retrieve recorded data:** Disconnect the SAVeS System from the power source. Remove the four flat head bolts securing the enclosure lid. Remove the uSD card and insert it into the card slot on the computer or SD card reader to retrieve data or reformat the card.

# 3.0 System User Interface

## 3.1 SAVeS

The SAVeS has an E-Ink display that shows the iOS App QR code and shutdown values, a diagnostic LED, and a capacitive touch sense button.

### 3.1.1 E-Ink Display

By default, the E-Ink display shows the Altronic logo. When the capacitive touch sense button is tapped, the device QR code will be displayed to facilitate connection with the iOS App. During a shutdown event, the screen shows "SHUTDOWN", and the X, Y, and Z values at shutdown. The E-Ink display is retentive, so it will show the last screen upon loss of power.

### 3.1.2 Diagnostic LED

The status indicator LED on the face of the SAVeS is multipurpose. It contains several status colors and flash frequencies:

- **Normal Status:** LED flashes green at 1 Hz (one time per second).
- **Booting:** LED breathes white at 4 Hz (four times per second).
- **Alarm Status:** LED flashes yellow at 1 Hz (one time per second).
- **Shutdown Status:** LED flashes red at 1 Hz (one time per second).
- **Wi-Fi Active:** LED flashes at 2 Hz (two times per second).
- **No Power:** LED is off.

*Figure 1*

### 3.1.3 Capacitive Touch Sense Button

A multifunctional capacitive touch sense Mode Switch button is present on the face of the SAVeS.

- Tap the button to show the device QR code on the E-Ink display.
- Press and hold the button for 4 seconds to reset the device after a shutdown event.

### 3.2 SAVeS Detector[2]

The Detector relay time adjustment wheel will blink when the SAVeS is in a shutdown state. It will be solid when the SAVeS is in alarm or normal state.

## 4.0 Description of the Output Switch and Relay

### 4.1 SAVeS

The SAVeS System contains both an alarm and shutdown output. The alarm output activates an open drain output. The shutdown output activates a solid state relay (SSR) which has form C (N/C) break-before-make contacts which are isolated from the power supply.

The open drain output is rated at 28 VDC, 100 mA. The SSR is rated at 60 VDC, 500 mA.

- **Alarm:** The alarm output is non-latching. Vibration levels that reach user-defined alarm thresholds will trigger an alarm condition. After 5 consecutive seconds with no alarm, the alarm is cleared automatically.
- **Shutdown:** The shutdown output is latching. A shutdown condition will trip the output SSR, which is a normally closed switch that opens for a shutdown condition. Vibration levels that meet user-defined shutdown thresholds will trigger a shutdown condition.

### 4.2 SAVeS Detector[2]

The SAVeS Detector only has a shutdown output. When the Detector receives the shutdown signal from the SAVeS, the relay output is switched. The signal continues until the shutdown event is cleared from the SAVeS. There is no remote shutdown clear in two-wire applications.

## 5.0 Alarm / Shutdown Conditions and Events

An alarm or shutdown is triggered when the vibration level reaches the set X, Y, or Z threshold. The threshold units are inches per second (IPS). The response time of the SAVeS to alarm or shutdown is < 0.3 seconds. The Detector adds an additional 1.5–2 seconds of delay when configured properly.

The SAVeS System is shipped with factory default vibration alarm thresholds: X = 0.2, Y = 0.2, Z = 0.2; and shutdown thresholds: X = 0.45, Y = 0.45, Z = 0.45. However, as each application is unique, configuration must be performed before using the SAVeS System. See section **6.0 Using and Understanding the iOS App** on page 5 for application-specific configuration instructions via the iOS App.

### 5.1 Alarm Events

When an alarm event is triggered, the diagnostic LED on the face of the SAVeS flashes yellow at 1 Hz. Alarm events will auto-clear when the vibration level drops below the set threshold for 5 seconds

### 5.2 Shutdown Events

SAVeS generates a signal on the 2-wire power lines. The SAVeS Detector switches a relay (N/C or N/O) when a shutdown is detected. These relays can be used to trigger a shutdown or notify the rest of the system that excessive vibration has occurred.

When a shutdown event is triggered, the diagnostic LED on the SAVeS flashes red and the timer adjust wheel on the detector will blink. Shutdown events are latching and must be cleared manually by the operator.

2 Not applicable for 691 816-1 model.

### 5.2.1 Resetting After a Shutdown Event

Shutdown events are latching and the SAVeS must be reset manually by the operator. To clear a shutdown event:

- Press and hold the **PCAP button** for 4 seconds on the SAVeS; OR
- Tap the **Reset Button** on the dashboard in the Overwatch App.

# 6.0 Using and Understanding the iOS App

## 6.1 App Overview

The Altronic Overwatch iOS App may be used to view and share real-time vibration data and alarm and shutdown event history, set event threshold levels, configure Modbus settings ,and enable and customize data recording via an onboard uSD card (not included).

## 6.2 Home Screen

The Home screen has two buttons (see *Figure 2*):

- **Tap to Connect button:** Tap to open the Scan screen to connect a SAVeS device to the iOS App.
- **Demo button:** Tap to open demo mode.


*Figure 2*


*Figure 3*

## 6.3 QR Code Scan Screen

Press the **Tap to Connect button** on the Home screen to open the QR Code Scan screen. The Scan screen has the following user interface elements (see *Figure 3*):

- **Top Menu Bar:** The menu bar at the top of the screen has one button:
  - **Back button:** Tap to return to the Home screen.
- **QR Code Scanner Frame:** Center the QR code on the SAVeS E-Ink display inside the frame to scan the code and connect the device to the App.

### 6.3.1 Connect the SAVeS Device to the iOS App

1. Press the **Mode Switch button** on the SAVeS to show the QR code on the E-Ink display.
2. Center the device QR code inside the QR code scanner frame to connect the device to the iOS App.
3. When the device is connected, the Dashboard will open automatically. A window will appear to prompt joining the device Wi-Fi network.

## 6.4 Dashboard

When first connected to a SAVeS device, the Dashboard will open automatically. Tap the **Dashboard button** in the navigation menu to return to the Dashboard from the Trends or Event History screens. The Dashboard has the following user interface elements (see *Figure 4*):

- **Top Menu Bar:** The menu bar at the top of the Dashboard screen has three buttons:
  - **Disconnect button:** Tap to return to the Scan screen to connect to a different SAVeS device.
  - **Settings button:** Tap to open the data logging settings popup. See *Figure 5*.
  - **Share button:** Tap to share a screenshot of the Dashboard.
- **Device Status:** Shows the current SAVeS status, 🟢 (Normal), 🟡 (Alarm), or 🔴 (Shutdown).
- **Device Status Refresh Button:** Tap to refresh the device status.

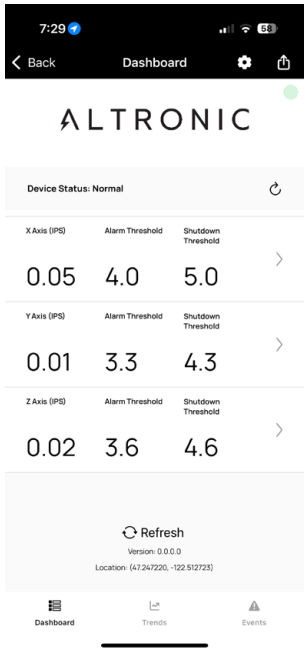



*Figure 4*

- **X Y, and Z Axis Vibration Levels:**
  - **Current Value:** Shows the real-time vibration level in IPS.
  - **Alarm Threshold:** Shows the set threshold for an alarm event.
  - **Shutdown Value:** Shows the set threshold for shutdown event.
  - **Edit > button:** Tap to open the threshold configuration popup to set the alarm and shutdown thresholds for the selected axis.
- **Refresh Button:** Syncs the SAVeS data with the App.
- **Device Information:**
  - **Version:** Shows the SAVeS device firmware version.
  - **Location:** Shows the location data for the iOS device.
- **Navigation Menu:** Has three buttons and is fixed at the bottom of the Dashboard, Trends, and Event History screens:
  - **Dashboard button:** Tap to go to the Dashboard.
  - **Trend Button:** Tap to go to the Chart screen.
  - **Events Button:** Tap to go to the Events History screen.

### 6.4.1 Configuring Alarm Thresholds and Shutdown Values

To set alarm and shutdown thresholds (see *Figure 5*):

1. On the Dashboard, tap the **Edit > button** to the right of the X, Y, or Z axis to open the alarm/shutdown configuration popup window.
2. In the popup, move the sliders to set the alarm threshold and shutdown values.
3. Tap the dropdown list at top-right to choose from the axis label options, no label (will keep the default label "X Axis," "Y Axis," or "Z Axis"), vertical, axial, or horizontal.
4. Tap the **Submit button** to save changes to the SAVeS device.

**NOTE:** Since the velocity calculations continuously run, even with no vibration, it is normal for a non-zero value to be displayed for "Primary Frequency for Velocity."

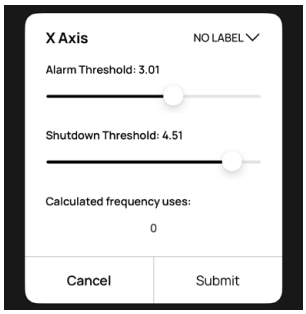



*Figure 5*

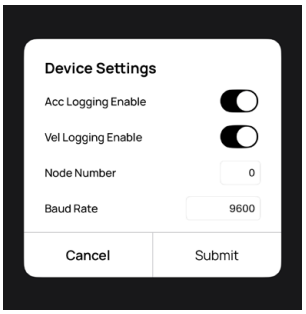



*Figure 6*

### 6.4.5 Enabling and Customizing Data Recording

By default, data recording is off. To enable it (see *Figure 6*):

1. Tap the **Settings button** at the top of the Dashboard to open the Device Settings popup.
2. Tap the toggles to enable or disable acceleration and velocity data recording.
3. Tap the **Submit button** to save changes to the SAVeS device.

### 6.4.4 Configuring the Modbus[3]

To adjust the Modbus settings (see *Figure 7*):

1. Tap the **Settings button** at the top of the Dashboard to open the Device Settings popup.
2. Tap the **Baud Rate field** to select options from the drop down.
3. Tap the **Node Number field** to enter a node number (1–255).
4. Tap the **Submit button** to save.

### 6.4.5 Sharing the Dashboard

Tap the **Share button** at the top of the Dashboard to share a screenshot of the dashboard.

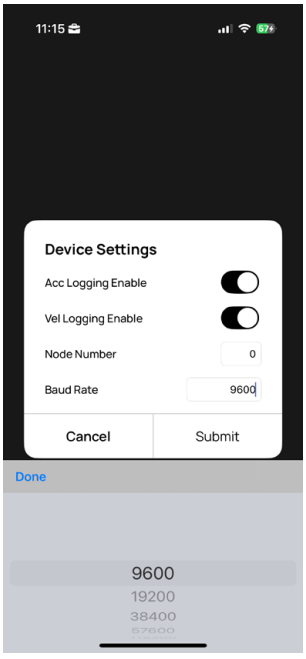



*Figure 7*

3 Not applicable for 691 816-3 model.

## 6.5 Trend Screen

When connected to a SAVeS device, tap the **Trend button** in the navigation menu to open the Trends screen. The Trends screen has the following user interface elements (see *Figure 8* and *Figure 9*):

- **Top Menu Bar:** The menu bar at the top of the Trends screen has three buttons:
  - **Disconnect button:** Tap to go to the Scan screen to connect to a different SAVeS device.
  - **Orientation button:** Tap to toggle the screen orientation between portrait and landscape.
  - **Share button:** Tap to share a screenshot of the chart.
- **Real-time Chart:** Shows the real-time vibration data and/or thresholds according to the selected filters.
  - **Solid red line:** Current X Axis vibration level.
  - **Solid green line:** Current Y Axis vibration level.
  - **Solid blue line:** Current Z Axis vibration level.
  - **Dashed red lines:** Shutdown threshold for each axis.
  - **Dashed yellow lines:** Alarm threshold for each axis.
  - **Filter:** Tap the Edit button to open the filter popup. Select from the available options (current vibration by axis, alarm threshold by axis, and shutoff threshold by axis) to populate the chart.
  - **Autoscroll toggle:** Tap to enable or disable autoscroll. When autoscroll is enabled, the chart will scroll, updating in real-time to show changing vibration levels for the selected axes. When disabled, the chart will show a snapshot of the current vibration values.

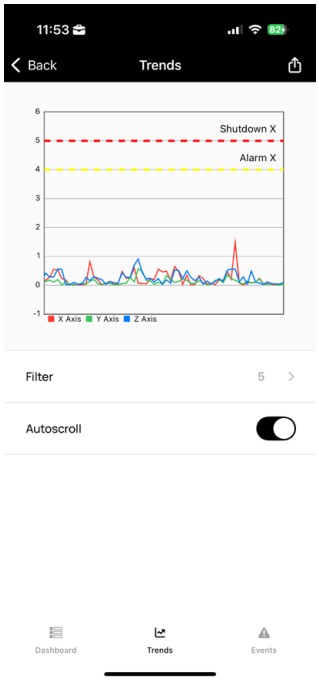



*Figure 8*

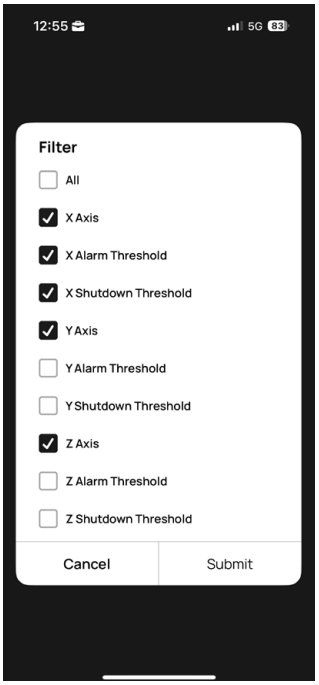



*Figure 9*

## 6.6 Event History Screen

When connected to a SAVeS device, tap the **Events button** to open the Event History screen. The Event History screen has the following user interface elements (see *Figure 10* and *Figure 11*):

- **Top Menu Bar:** The menu bar at the top of the Event History screen has two buttons:
  - **Disconnect button:** Tap to go to the Scan screen to connect to a different SAVeS device.
  - **Share button:** Tap to share a screenshot of the event history screen.
- **Toggles:** Tap to adjust the events shown onscreen. Both alarm and shutdown events are shown by default.
  - **Alarm Toggle:** Tap to show/hide alarm events.
  - **Shutdown Toggle:** Tap to show/hide shutdown events.
- **Event History:**
  - Alarm or shutdown event icon
  - Local date/time
  - Values for X, Y, and Z
  - Thresholds for X, Y, and Z

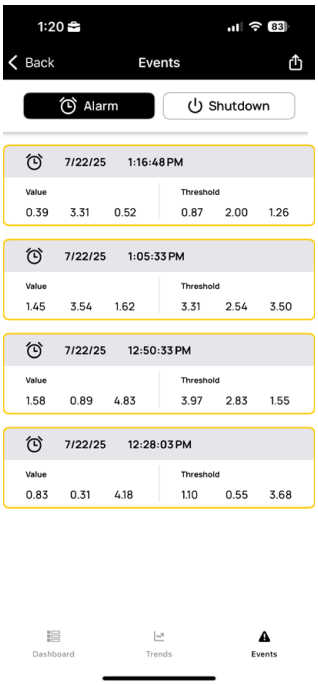



*Figure 10*

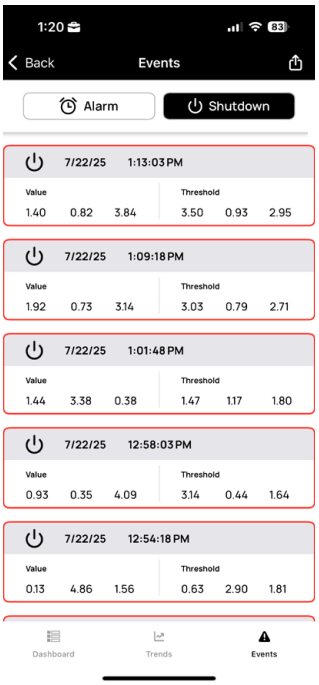



*Figure 11*

### 6.6.1 Populating the Event History Screen

Both alarm and shutdown events are shown by default. Tap the **alarm** or **shutdown toggle** to add or remove events from the event history.

## 7.0 Troubleshooting Guide

| Issue | Possible Solution |
|---|---|
| SAVeS is powered and in normal operation, but the detector is showing a shutdown condition. | Verify wiring is correct and 47 Ohm resistor is inserted in the appropriate terminal block. |
| Detector relay is switching on and off constantly. | Adjust the orange timer relay toward the "+". |
| SD card data log time stamp is not accurate. | Verify CR2032 battery is installed and then connect with the Overwatch App. |

## 8.0 System Maintenance

**WARNING:** Do not attempt to repair the SAVeS. The SAVeS must be returned to Altronic for repair and service.

The SAVeS System requires no regular maintenance or recalibration.

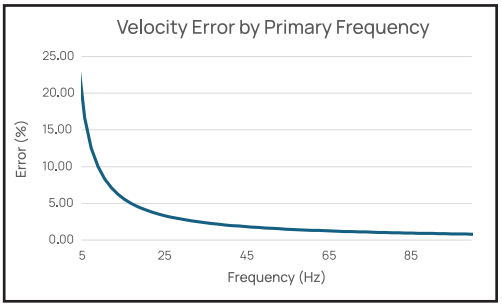
## 9.0 Updating Firmware and Software

Firmware upgrades are announced via Product Change Notice (PCN).

To upgrade: Power down the SAVeS and remove the micro-SD card. Download the latest (or desired) .bin version from the Altronic Github. Save the .bin file to the root directory of the SAVeS uSD card. Reinstall the uSD card, and then power on the SAVeS. After 1 minute the SAVeS will be updated to the new firmware.

## 10.0 Specifications

Frequency Range ..... 5–500 Hz
Velocity Tolerance[4] ..... ±2% at 40 Hz
Acceleration Tolerance ..... ±4 mG
Maximum Peak Acceleration ..... 64 G max
Power Required[5] ..... 9-32 VDC, 0.1 A nominal, 0.7 A peak
Ambient Operating Temperatures[6] ..... –40 °C to +85 °C (–40 °F to +185 °F)




## 11.0 Modbus

The SAVeS is equipped with a Modbus RS-485 interface. The settings are configured through the iOS app. See section **6.4.4 Configuring the Modbus** on page 6.

| Register | Label | Key | ReadOnly / ReadWrite | Type |
|---|---|---|---|---|
| 1 | Reserved | Reserved 0001 | ReadWrite | BOOL |
| 2 | Reserved | Reserved 0002 | ReadWrite | BOOL |
| 3 | Reserved | Reserved 0003 | ReadWrite | BOOL |
| 4 | Reserved | Reserved 0004 | ReadWrite | BOOL |

4 Velocity accuracy is dependent on both quality and location of mounting. See Velocity Error by Primary Frequency chart.
5 When used with the 691819 Detector Module, input voltage is 18-32 VDC.
6 E-Ink will not work properly at extents of operating temperature, but will recover when temperature is back in its acceptable range.

| | | | | |
|---|---|---|---|---|
| 5 | Reserved | Reserved 0005 | ReadWrite | BOOL |
| 6 | Reserved | Reserved 0006 | ReadWrite | BOOL |
| 7 | Reserved | Reserved 0007 | ReadWrite | BOOL |
| 8 | Reserved | Reserved 0008 | ReadWrite | BOOL |
| 9 | Reserved | Reserved 0009 | ReadWrite | BOOL |
| 10 | Reserved | Reserved 0010 | ReadWrite | BOOL |
| 11 | Reserved | Reserved 0011 | ReadWrite | BOOL |
| 12 | Reserved | Reserved 0012 | ReadWrite | BOOL |
| 13 | Reserved | Reserved 0013 | ReadWrite | BOOL |
| 14 | Reserved | Reserved 0014 | ReadWrite | BOOL |
| 15 | Set RTC | SET_RTC | ReadWrite | BOOL |
| 16 | Get RTC | GET_RTC | ReadWrite | BOOL |
| 17 | Reserved | Reserved 00017 | ReadWrite | BOOL |
| 18 | Reserved | Reserved 00018 | ReadWrite | BOOL |
| 19 | Log Accelerometer Data | LOG_ACC_DATA | ReadWrite | BOOL |
| 20 | Log Velocity Data | LOG_VEL_DATA | ReadWrite | BOOL |
| 21 | Clear Shutdown | CLEAR_SHUTDOWN | ReadWrite | BOOL |
| 22 | Alarm Event 1 Status | ALARM_EVENT_1_STATUS | ReadWrite | BOOL |
| 23 | Alarm Event 2 Status | ALARM_EVENT_2_STATUS | ReadWrite | BOOL |
| 24 | Alarm Event 3 Status | ALARM_EVENT_3_STATUS | ReadWrite | BOOL |
| 25 | Alarm Event 4 Status | ALARM_EVENT_4_STATUS | ReadWrite | BOOL |
| 26 | Alarm Event 5 Status | ALARM_EVENT_5_STATUS | ReadWrite | BOOL |
| 27 | Alarm Event 6 Status | ALARM_EVENT_6_STATUS | ReadWrite | BOOL |
| 28 | Alarm Event 7 Status | ALARM_EVENT_7_STATUS | ReadWrite | BOOL |
| 29 | Alarm Event 8 Status | ALARM_EVENT_8_STATUS | ReadWrite | BOOL |
| 30 | Alarm Event 9 Status | ALARM_EVENT_9_STATUS | ReadWrite | BOOL |
| 31 | Alarm Event 10 Status | ALARM_EVENT_10_STATUS | ReadWrite | BOOL |
| 32 | Alarm Event 11 Status | ALARM_EVENT_11_STATUS | ReadWrite | BOOL |
| 33 | Alarm Event 12 Status | ALARM_EVENT_12_STATUS | ReadWrite | BOOL |
| 34 | Alarm Event 13 Status | ALARM_EVENT_13_STATUS | ReadWrite | BOOL |
| 35 | Alarm Event 14 Status | ALARM_EVENT_14_STATUS | ReadWrite | BOOL |
| 36 | Alarm Event 15 Status | ALARM_EVENT_15_STATUS | ReadWrite | BOOL |
| 37 | Alarm Event 16 Status | ALARM_EVENT_16_STATUS | ReadWrite | BOOL |
| 38 | Alarm Event 17 Status | ALARM_EVENT_17_STATUS | ReadWrite | BOOL |
| 39 | Alarm Event 18 Status | ALARM_EVENT_18_STATUS | ReadWrite | BOOL |
| 40 | Alarm Event 19 Status | ALARM_EVENT_19_STATUS | ReadWrite | BOOL |
| 41 | Alarm Event 20 Status | ALARM_EVENT_20_STATUS | ReadWrite | BOOL |
| 42 | ShutDn Event 1 Status | SHUTDN_EVENT_1_STATUS | ReadWrite | BOOL |
| 43 | ShutDn Event 2 Status | SHUTDN_EVENT_2_STATUS | ReadWrite | BOOL |
| 44 | ShutDn Event 3 Status | SHUTDN_EVENT_3_STATUS | ReadWrite | BOOL |
| 45 | ShutDn Event 4 Status | SHUTDN_EVENT_4_STATUS | ReadWrite | BOOL |

| | | | | |
|---|---|---|---|---|
| 46 | ShutDn Event 5 Status | SHUTDN_EVENT_5_STATUS | ReadWrite | BOOL |
| 47 | ShutDn Event 6 Status | SHUTDN_EVENT_6_STATUS | ReadWrite | BOOL |
| 48 | ShutDn Event 7 Status | SHUTDN_EVENT_7_STATUS | ReadWrite | BOOL |
| 49 | ShutDn Event 8 Status | SHUTDN_EVENT_8_STATUS | ReadWrite | BOOL |
| 50 | ShutDn Event 9 Status | SHUTDN_EVENT_9_STATUS | ReadWrite | BOOL |
| 51 | ShutDn Event 10 Status | SHUTDN_EVENT_10_STATUS | ReadWrite | BOOL |
| 52 | ShutDn Event 11 Status | SHUTDN_EVENT_11_STATUS | ReadWrite | BOOL |
| 53 | ShutDn Event 12 Status | SHUTDN_EVENT_12_STATUS | ReadWrite | BOOL |
| 54 | ShutDn Event 13 Status | SHUTDN_EVENT_13_STATUS | ReadWrite | BOOL |
| 55 | ShutDn Event 14 Status | SHUTDN_EVENT_14_STATUS | ReadWrite | BOOL |
| 56 | ShutDn Event 15 Status | SHUTDN_EVENT_15_STATUS | ReadWrite | BOOL |
| 57 | ShutDn Event 16 Status | SHUTDN_EVENT_16_STATUS | ReadWrite | BOOL |
| 58 | ShutDn Event 17 Status | SHUTDN_EVENT_17_STATUS | ReadWrite | BOOL |
| 59 | ShutDn Event 18 Status | SHUTDN_EVENT_18_STATUS | ReadWrite | BOOL |
| 60 | ShutDn Event 19 Status | SHUTDN_EVENT_19_STATUS | ReadWrite | BOOL |
| 61 | ShutDn Event 20 Status | SHUTDN_EVENT_20_STATUS | ReadWrite | BOOL |
| 62 | Reserved | Reserved 0062 | ReadWrite | BOOL |
| 63 | Reserved | Reserved 0063 | ReadWrite | BOOL |
| 64 | Reserved | Reserved 0064 | ReadWrite | BOOL |
| 65 | Alarm Event 1 Acc Status | ALARM_EVENT_1_ACC_STATUS | ReadWrite | BOOL |
| 66 | Alarm Event 2 Acc Status | ALARM_EVENT_2_ACC_STATUS | ReadWrite | BOOL |
| 67 | Alarm Event 3 Acc Status | ALARM_EVENT_3_ACC_STATUS | ReadWrite | BOOL |
| 68 | Alarm Event 4 Acc Status | ALARM_EVENT_4_ACC_STATUS | ReadWrite | BOOL |
| 69 | Alarm Event 5 Acc Status | ALARM_EVENT_5_ACC_STATUS | ReadWrite | BOOL |
| 70 | Alarm Event 6 Acc Status | ALARM_EVENT_6_ACC_STATUS | ReadWrite | BOOL |
| 71 | Alarm Event 7 Acc Status | ALARM_EVENT_7_ACC_STATUS | ReadWrite | BOOL |
| 72 | Alarm Event 8 Acc Status | ALARM_EVENT_8_ACC_STATUS | ReadWrite | BOOL |
| 73 | Alarm Event 9 Acc Status | ALARM_EVENT_9_ACC_STATUS | ReadWrite | BOOL |
| 74 | Alarm Event 10 Acc Status | ALARM_EVENT_10_ACC_STATUS | ReadWrite | BOOL |
| 75 | Alarm Event 11 Acc Status | ALARM_EVENT_11_ACC_STATUS | ReadWrite | BOOL |
| 76 | Alarm Event 12 Acc Status | ALARM_EVENT_12_ACC_STATUS | ReadWrite | BOOL |
| 77 | Alarm Event 13 Acc Status | ALARM_EVENT_13_ACC_STATUS | ReadWrite | BOOL |
| 78 | Alarm Event 14 Acc Status | ALARM_EVENT_14_ACC_STATUS | ReadWrite | BOOL |
| 79 | Alarm Event 15 Acc Status | ALARM_EVENT_15_ACC_STATUS | ReadWrite | BOOL |
| 80 | Alarm Event 16 Acc Status | ALARM_EVENT_16_ACC_STATUS | ReadWrite | BOOL |
| 81 | Alarm Event 17 Acc Status | ALARM_EVENT_17_ACC_STATUS | ReadWrite | BOOL |
| 82 | Alarm Event 18 Acc Status | ALARM_EVENT_18_ACC_STATUS | ReadWrite | BOOL |
| 83 | Alarm Event 19 Acc Status | ALARM_EVENT_19_ACC_STATUS | ReadWrite | BOOL |
| 84 | Alarm Event 20 Acc Status | ALARM_EVENT_20_ACC_STATUS | ReadWrite | BOOL |
| 85 | Shutdn Event 1 Acc Status | SHUTDN_EVENT_1_ACC_STATUS | ReadWrite | BOOL |
| 86 | Shutdn Event 2 Acc Status | SHUTDN_EVENT_2_ACC_STATUS | ReadWrite | BOOL |

| | | | | |
|---|---|---|---|---|
| 87 | Shutdn Event 3 Acc Status | SHUTDN_EVENT_3_ACC_STATUS | ReadWrite | BOOL |
| 88 | Shutdn Event 4 Acc Status | SHUTDN_EVENT_4_ACC_STATUS | ReadWrite | BOOL |
| 89 | Shutdn Event 5 Acc Status | SHUTDN_EVENT_5_ACC_STATUS | ReadWrite | BOOL |
| 90 | Shutdn Event 6 Acc Status | SHUTDN_EVENT_6_ACC_STATUS | ReadWrite | BOOL |
| 91 | Shutdn Event 7 Acc Status | SHUTDN_EVENT_7_ACC_STATUS | ReadWrite | BOOL |
| 92 | Shutdn Event 8 Acc Status | SHUTDN_EVENT_8_ACC_STATUS | ReadWrite | BOOL |
| 93 | Shutdn Event 9 Acc Status | SHUTDN_EVENT_9_ACC_STATUS | ReadWrite | BOOL |
| 94 | Shutdn Event 10 Acc Status | SHUTDN_EVENT_10_ACC_STATUS | ReadWrite | BOOL |
| 95 | Shutdn Event 11 Acc Status | SHUTDN_EVENT_11_ACC_STATUS | ReadWrite | BOOL |
| 96 | Shutdn Event 12 Acc Status | SHUTDN_EVENT_12_ACC_STATUS | ReadWrite | BOOL |
| 97 | Shutdn Event 13 Acc Status | SHUTDN_EVENT_13_ACC_STATUS | ReadWrite | BOOL |
| 98 | Shutdn Event 14 Acc Status | SHUTDN_EVENT_14_ACC_STATUS | ReadWrite | BOOL |
| 99 | Shutdn Event 15 Acc Status | SHUTDN_EVENT_15_ACC_STATUS | ReadWrite | BOOL |
| 100 | Shutdn Event 16 Acc Status | SHUTDN_EVENT_16_ACC_STATUS | ReadWrite | BOOL |
| 101 | Shutdn Event 17 Acc Status | SHUTDN_EVENT_17_ACC_STATUS | ReadWrite | BOOL |
| 102 | Shutdn Event 18 Acc Status | SHUTDN_EVENT_18_ACC_STATUS | ReadWrite | BOOL |
| 103 | Shutdn Event 19 Acc Status | SHUTDN_EVENT_19_ACC_STATUS | ReadWrite | BOOL |
| 104 | Shutdn Event 20 Acc Status | SHUTDN_EVENT_20_ACC_STATUS | ReadWrite | BOOL |
| 105 | Spare | SPARE_00105 | ReadWrite | BOOL |
| 106 | Spare | SPARE_00106 | ReadWrite | BOOL |
| 107 | Spare | SPARE_00107 | ReadWrite | BOOL |
| 108 | Spare | SPARE_00108 | ReadWrite | BOOL |
| 109 | Spare | SPARE_00109 | ReadWrite | BOOL |
| 110 | Spare | SPARE_00110 | ReadWrite | BOOL |
| 111 | Spare | SPARE_00111 | ReadWrite | BOOL |
| 112 | Spare | SPARE_00112 | ReadWrite | BOOL |

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