

VI Piezo CHARM Sensor compatibility

Since initial release of the AMS Asset Monitor, it does support the new VI Piezo CHARM for dynamic vibration measurements. This whitepaper will focus on the supported sensors compatible with the VI Piezo CHARM, and how to decide the best sensor for new installations.

The VI Piezo CHARM is a single channel measuring module for the connection of dynamic voltage input signals in a range of 0 - 28V where the VI Voltage CHARM converts the analog measuring data provided by the connected signal source into a digital signal.

By design, the VI Piezo CHARM is a single channel measuring module for the connection of 2-wire piezoelectric sensors according to the ICP® standard. Parameters for the processing of the measuring data are software configurable from the AMS Asset Monitor where PeakVue is also supported by the CHARM natively.

Based on this the VI Piezo CHARM natively supports the following Sensors without limitations:

- 2- wire ICP/IEPE accelerometers (current supply 1...8 mA / sensitivity 1...10000 mV/G)
 - 2- wire ICP/IEPE velocity sensors a.k.a. accelerometers w. integration (current supply 1...8 mA / sensitivity range 1-10000 mV/mm/s)
- You can find a lot of supported sensors meeting this specification from Emerson sensor portfolio. Those can be expected to be tested and recommended if they fall under the specification above. The Emerson sensor portfolio includes certified sensors for hazardous area applications as well.

Further to those sensor types listed above, the VI Piezo CHARM supports the following Sensors with limitations and extra requirements as listed with the sensor type below:

- 2- wire charge mode accelerometers (only types with external charge amplifier)
- Two wire ICP/IEPE accelerometers with temperature - RTD output

NOTE: RTD output must be connected to / evaluated by an RTD CHARM!

NOTE: Those sensors (with RTD) seem to be new to the market. We don't recommend using them without testing since we recognized some of those sensors having signal quality issues.

The other way around it means that the VI Piezo CHARM does **not** support those Sensors listed below:

- 3- wire accelerometers like BN330400 / BN330425 (negative supply, -24VDC) natively since they respond with negative output voltage. If those must be used, consider an external and galvanically separated supply for functional on-site testing. The customer must accept this finally.
- 2- wire CLD (current line drive) accelerometers
- 2- wire ICP/IEPE accelerometers with temperature - Voltage output (AMS Asset Monitor does not support temperature measurement based on voltage outputs by any CHARM).

NOTE: With those Sensors, only acceleration can be measured!

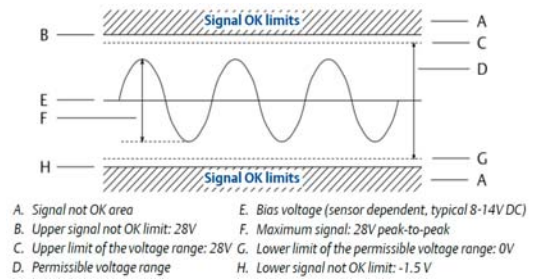
Each sensor configuration will require different input ranges and other associated parameters. Understanding the sensor specifications will aid in identifying the compatibility of the sensor to the AMS Asset Monitor. This document will provide the details necessary for this determination.

Checking for compatibility should include the comparison of the technical details of the sensor or transmitter, based on the product data sheet, with the published information regarding the types of signal sources (sensor or transmitter) supported by the AMS Asset Monitor. Additional signal sources may be tested as future needs dictate. This testing may find that the signal source performs the vibration measurement functionality with no exceptions, or in some cases exceptions may be noted.

General limitations and ranges of the VI Piezo CHARM will be provided in this document. This information is provided for the purpose of comparison and compatibility verification to select a compatible and supported sensor.

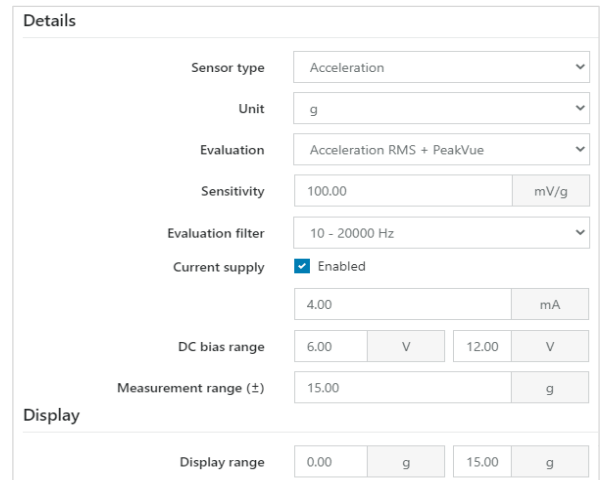
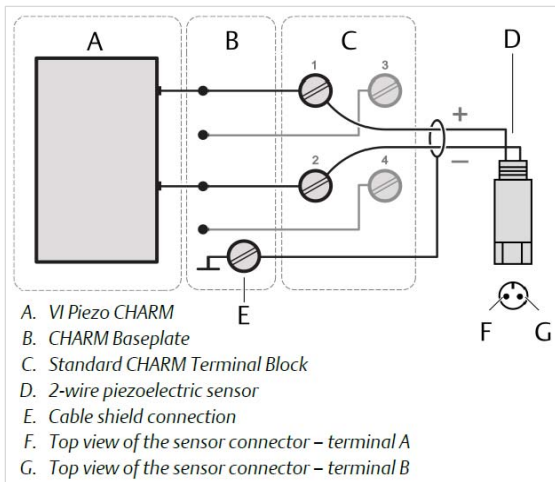
Channel OK recognition (in general):

The Signal OK limits result from the configuration of the DC bias range for the CHARM which results from the sensor type connected to the CHARM. The upper- / lower bias voltage (DC bias range) is freely configurable for all supported types of signal sources in range -1.5V ... +28V.



Using 2-wire piezo ICP® Accelerometer Sensors

For checking the AMS Asset Monitor – VI Piezo CHARM connectivity and compatibility to any 2-wire piezoelectric ICP® Accelerometer Sensor, like the Emerson PR 9270-Ex or 3rd party sensors, use the table below to compare the sensor data provided from the datasheet as accurate as possible. Also, consider the use case and application from the signal perspective and ensure that the ranges provided by the sensor meet the measurement requirements especially where those differ from the AMS Asset Monitor - VI Piezo CHARM specification.



Apply the connections to the 2-wire piezoelectric ICP® Accelerometer Sensor as shown above and make sure the current supply is either provided by the VI Piezo CHARM directly or externally (where required).

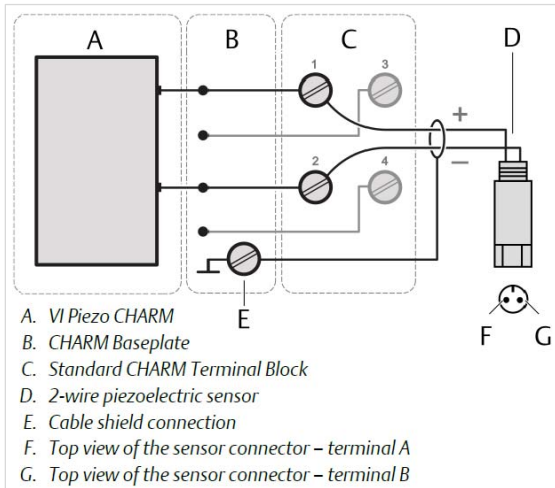
From picture above you can find a typical configuration example of the VI Piezo CHARM for a 2-wire piezoelectric ICP® Accelerometer Sensor being connected.

Vibration Measurement 2-wire ICP® Accelerometer Sensor		Sensor Data	OK (Y/N)	Note
Sensor Current supply (range)	1 ... 8 mA or deactivated			Sensor current requirement must be deactivated or in range 1 ... 8 mA
Min. Sensor current supply excitation voltage	20V			Current supply can cause excitation voltage of 20V or higher
Signal voltage DC range (nominal)	0 ... 28 V			Check if the Sensor voltage is within 0 ... 28V range
Signal voltage range (AC)	DC range - Bias dependent → Check Sensor (DC) Bias, sensitivity & range			Example: Bias = 10V, Sensitivity = 100mV/g, Sensor Range = 50g CHARM: Upper AC = 28V - 10V = 18V / Lower AC = 10V - 0V = 10V Sensor: AC range = 50g / 100mV/g = 5V → use smallest AC value! Resulting Measurement range = 5V / 100mV/g = 50g 0-P
CHARM Input Frequency Range	1 Hz ... 20 kHz			Check that the CHARM meets the required signal frequency

If the 2-wire piezoelectric ICP® Accelerometer Sensor specifications match up with the ranges of the AMS Asset Monitor Voltage CHARM, the expectation is that the sensor is compatible; however, keep in mind that we do not provide a guarantee that a 3rd party sensor is compatible without officially testing the sensor.

Using 2-wire piezoelectric ICP® Velocity Sensors

For checking the AMS Asset Monitor – VI Piezo CHARM connectivity and compatibility to any 2-wire piezoelectric ICP® Velocity Sensor, like Emerson PR 9270V-Ex or 3rd party sensors, use the table below to compare the sensor data provided from the datasheet as accurate as possible. Also, consider the use case and application from the signal perspective and ensure that the ranges provided by the sensor meet the measurement requirements especially where those differ from the AMS Asset Monitor - VI Piezo CHARM specification.



Details	
Sensor type	Velocity
Unit	mm/s
Evaluation	Velocity 0-P
Sensitivity	100.00 mV/mm/s
Evaluation filter	10 - 20000 Hz
Current supply	<input checked="" type="checkbox"/> Enabled
	4.00 mA
DC bias range	6.00 V 12.00 V
Measurement range (±)	15.00 mm/s
Display	
Display range	0.00 mm/s 15.00 mm/s

Apply the connections to the 2-wire piezoelectric ICP® Velocity Sensor as shown above and make sure the current supply is either provided by the VI Piezo CHARM, directly or externally (where required).

From the picture above you can find a typical configuration example of the VI Piezo CHARM for a 2-wire piezoelectric ICP® Accelerometer Sensor being connected.

Vibration Measurement 2-wire ICP® Velocity Sensor		Sensor Data	OK (Y/N)	Note
Sensor Current supply (range)	(deactivated) or 1 ... 8 mA			Sensor current requirement must be deactivated or in range 1 ... 8 mA
Min. Sensor current supply excitation voltage	20V			Current supply can cause excitation voltage of 20V or higher
Signal voltage DC range (nominal)	0 ... 28 V			Check if the Sensor voltage is within 0 ... 28V range
Signal voltage range (AC)	DC range - Bias dependent → Check Sensor (DC) Bias, sensitivity & range			Example: Bias = 10V, Sensitivity = 100mV/in/s, Sensor Range = 50in/s CHARM: Upper AC = 28V - 10V = 18V / Lower AC = 10V - 0V = 10V Sensor: AC range = 50in/s / 100mV/in/s = 5V → use smallest AC value Resulting Measurement range = 5V / 100mV/in/s = 50in/s 0-P
CHARM Input Frequency Range	1 Hz ... 20 kHz			Check that the CHARM meets the required signal frequency

If the 2-wire piezoelectric ICP® Velocity Sensor specifications match up with the ranges of the AMS Asset Monitor Voltage CHARM, the expectation is that the sensor is compatible; however, keep in mind that we do not provide a guarantee that a 3rd party sensor is compatible without officially testing the sensor.

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Technical Support

Emerson provides a variety of ways to reach your Product Support team to get the answers you need when you need them:

Phone Toll free 800.833.8314 (U.S. Canada)
+1.512.832.3774 (Latin America)
+63.2702.1111 (Asia Pacific, Europe, Middle East)

Email Guardian.GSC@Emerson.com

Web <http://www.emerson.com/en-us/contact-us>

To search for documentation, visit <http://www.emerson.com>

To view toll free numbers for specific countries, visit <http://www.emersonprocess.com/technicalsupport>

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