AMS Asset Monitor – Speed Sensor Compatibility

With release of FW 2.0.x in June 2021, we also support the new Tachometer (Tach) CHARM for speed and key measurements from AMS Asset Monitor. This whitepaper will focus on the supported sensors compatible with the Tach CHARM, and how to decide the best sensor for new installations. Existing installations that may have included an inductive sensor for use with the Digital Input (DI) CHARM will need to replace the sensor with one of the supported types or utilize a work around that is presented in a separate document.

By design, the Tach CHARM supports eddy current, hall-effect, and magnetic pickup (MPU) sensors. **Other types of sensors are not officially supported as a Speed/Key signal into the AMS Asset Monitor.**

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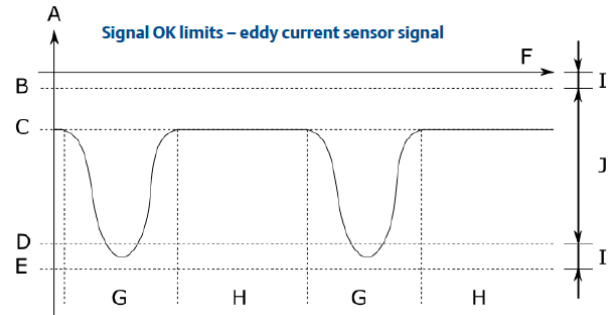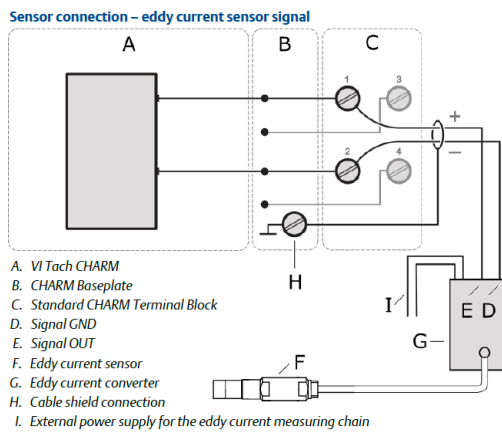
Checking for compatibility should include the comparison of the technical details of the sensor, based on the product data sheet, with the published information regarding the types of sensors supported by the AMS Asset Monitor. Additional sensors may be tested as future needs dictate. This testing may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

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

Note:
In addition to the supported sensor types listed, Inductive Sensors (like the A0485), may be used for speed measurement (pulse count) within the AMS Asset Monitor utilizing the Digital Input (DI) CHARM which is an averaged measurement and does not have a quick update rate like the Tach CHARM which is designed for the purpose of measuring and updating speed values at a high rate. This document does not address the application of Inductive Sensors with a DI CHARM for speed/key measurements.

1st: Using Eddy Current Measurement Chains

Sensor connection – eddy current sensor signal

A. VI Tach CHARM
B. CHARM Baseplate
C. Standard CHARM Terminal Block
D. Signal GND
E. Signal OUT
F. Eddy current sensor
G. Eddy current converter
H. Cable shield connection
I. External power supply for the eddy current measuring chain

Signal OK limits – eddy current sensor signal

A. Converter output voltage
B. Upper signal not OK limit
C. DC offset
(distance between
sensor and tooth surface)
D. Lower signal not OK limit
E. Maximum converter
output voltage
F. Time
G. Output voltage over a gap
H. Output voltage over a tooth
I. Signal not OK area

Apply the connections to the eddy current converter as shown above and make sure the converter is supplied power externally (typically -24Vdc @ 35mA). When measuring the Input voltage at pins 1& 2 with no sensor connected, approx. 14V -18V can be measured.

When using eddy current measurement chains, the AMS Asset Monitor - Tach CHARM checks if the output voltage is in range of the configured voltage levels (typically -2V … -18/-30V). Short circuit, open loop as well as the permissible voltage range is checked against signal overload.
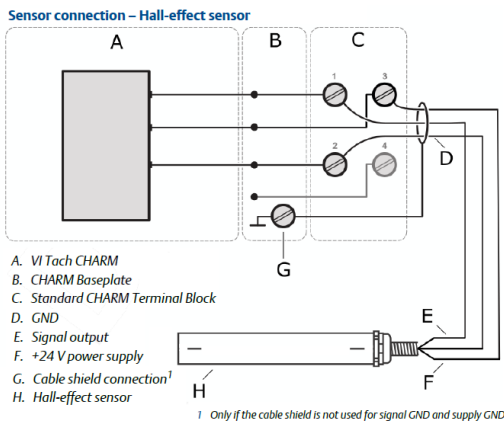
For checking the AMS Asset Monitor – Tach CHARM connectivity and compatibility to any eddy current measurement chain, like AMS EZ 1000 or 3rd party sensors, use the table below to compare the sensor data provided from the datasheet as accurate as possible. Also, consider the use case and application from the signal perspective and ensure that the signal frequency range provided by the sensor meets the AMS Asset Monitor Tach CHARM specification.

Speed Measurement with Eddy current measurement chain		Sensor Data	OK (Y/N)	Note
Sensor Voltage Supply	Must be external, Not provided by AMS Asset Monitor – Tach CHARM			Sensor supply (typically -24Vdc) to be provided externally
Sensor Current supply (max)	External supply must provide			External sensor supply must meet the max. converter current
Signal voltage range DC (max)	0 V … -24 V (typically -2 V … -18 V)			Check if the Sensor voltage is within range
CHARM Input Frequency Range	1 Hz … 40 kHz			Check that signal Frequency is below 40kHz
Min pulse Amplitude	2 VPP			Make sure Pulse amplitude provides min 2V pp
Max. CHARM Input load	0.5 mA			Typical current value driven to the CHARM Input

If the Eddy current sensor specifications match up with the ranges of the AMS Asset Monitor Tach 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.

2nd: Using Hall Effect Sensors

Sensor connection – Hall-effect sensor

A. VI Tach CHARM
B. CHARM Baseplate
C. Standard CHARM Terminal Block
D. GND
E. Signal output
F. +24 V power supply
G. Cable shield connection[1]
H. Hall-effect sensor

1 Only if the cable shield is not used for signal GND and supply GND.

Signal – Hall-effect sensor

A. Output voltage
B. Maximum output voltage (approximately 24 V)
C. 0 V
D. Time
E. Output voltage over a tooth
F. Output voltage over a gap

Apply the connections to the Hall Sensor as shown above with providing the +24V supply from the CHARM directly. When measuring the Input voltage at pins 1 & 2 with no sensor connected, approx. 14V - 18V can be measured.
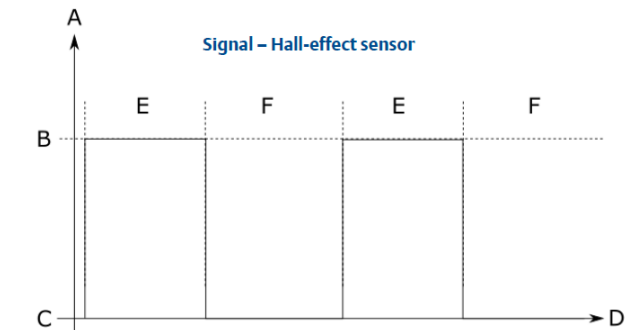
When using Hall Sensors, the AMS Asset Monitor - Tach CHARM checks against short circuit & open loop for the voltage supply (voltage & current) as well as the measurement input.
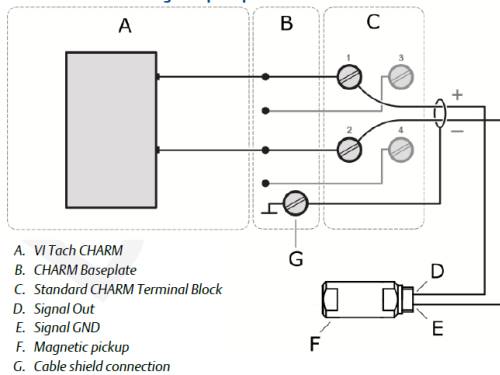
For checking the AMS Asset Monitor Tach CHARM connectivity and compatibility to any Hall Effect sensor, like Emerson part# PR 9376 or 3rd party, use the table below and try to compare the sensor data provided from the datasheet as accurate as possible. Also, consider the use case and application from the signal perspective and ensure that the signal frequency range provided by the sensor meets the AMS Asset Monitor Tach CHARM specification.

| Speed Measurement with Hall Effect Sensors		Sensor Data	OK (Y/N)	Note
Sensor Voltage Supply	+24 VDC			Check sensor supply voltage (typically -24Vdc)
Sensor Current supply (max)	35 mA			Check sensor supply must be < 35 mA
Signal voltage range DC (max)	0 V … +24 V			Check signal voltage is within this range
CHARM Input Frequency Range	1 Hz … 40 kHz			Check that signal Frequency is below 40kHz
Min pulse Amplitude	2 VPP			Make sure Pulse amplitude provides min 2V pp
Max. CHARM Input load	0.5 mA			Typical current value driven to the CHARM Input and through the Sensor, Sensor must allow this

If the sensor specifications match up with the ranges of the AMS Asset Monitor Tach CHARM, the expectation is that the Hall Effect 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.

3rd: Using MPU (Magnetic Pickup) Sensors

Sensor connection – magnetic pickup

A. VI Tach CHARM
B. CHARM Baseplate
C. Standard CHARM Terminal Block
D. Signal Out
E. Signal GND
F. Magnetic pickup
G. Cable shield connection

Apply the connections to the MPU Sensor as shown above. MPUs do not require any power supply from the CHARM. When measuring the Input voltage at pins 1& 2 with no sensor connected, approx. 14V - 18V can be measured.
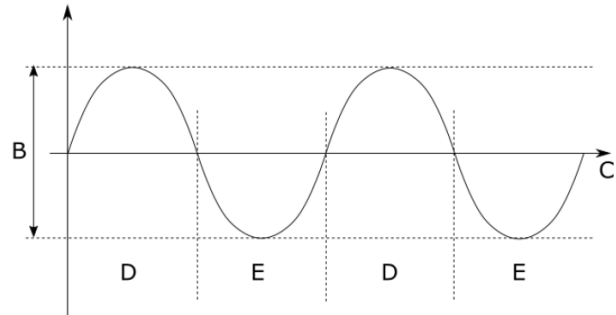
When using MPU Sensors, the AMS Asset Monitor - Tach CHARM sends a small sensing current (250µA) to the sensor for open loop and short circuit detection.

A. Output voltage
B. Maximum permissible peak-to-peak voltage
C. Time
D. Output voltage over a tooth
E. Output voltage over a gap

For checking the AMS Asset Monitor Tach CHARM connectivity and compatibility to any MPU sensor, like Emerson part# V425 or 3rd party, use the table below and try 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 signal frequency range provided by the sensor meets the AMS Asset Monitor Tach CHARM specification.

Speed Measurement with MPU		Sensor Data	OK (Y/N)	Note
Sensor Voltage Supply	Not required			No supply required
Sensor Current supply (max)	Not required			No supply required
Signal voltage range DC (max)	85 VPP			Make sure this is met for the signal driven to the CHARM*
Signal voltage range AC (max)	30.3 V			Make sure this is met for the signal driven to the CHARM*
CHARM Input Frequency range	1 Hz … 40 kHz			Check that signal Frequency is below 40kHz
Min pulse Amplitude	2 VPP			Make sure Pulse amplitude provides min 2V pp
Sensor impedance range	110 Ω … 160 kΩ			Make sure sensor Impedance is within range
Max. CHARM Input load	0.5 mA			Typical current value driven to the CHARM Input and through the Sensor, Sensor must allow this

* Keep in mind that sensors may be able to provide higher Voltage amplitudes than allowed by the CHARM. In those cases, the installation must be made in a way that the max. permissible voltage range is met by adjustment of the distance from the shaft / target to the sensor!

If the sensor specifications match up with the ranges of the AMS Asset Monitor Tach 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.

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. and Canada)
	+1 512 832 3774 (Latin America)
	+ 63 2702 1111 (Asia Pacific, Europe, and Middle East)
Email	**Guardian.GSC@Emerson.com**
Web	**http://www.emerson.com/en-us/contact-us**

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