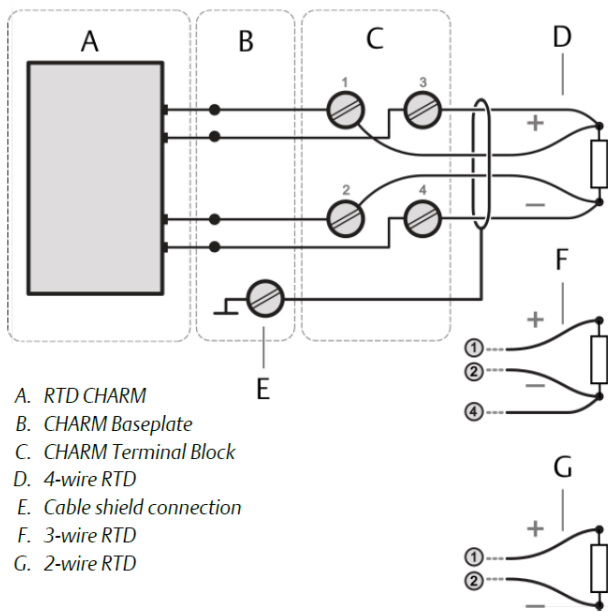


# AMS Asset Monitor – RTD & TC/mV CHARM Sensor Compatibility

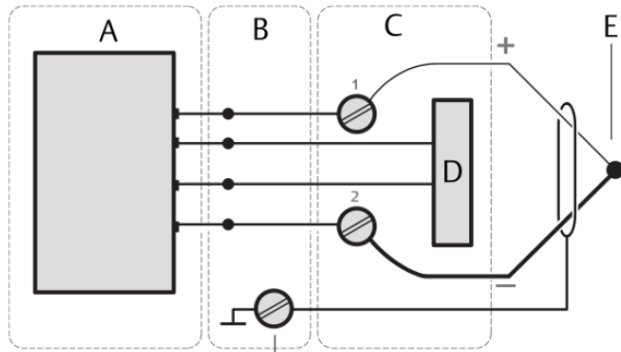
Since initial release of the AMS Asset Monitor, it does support temperature measurements by using the RTD CHARM (supporting RTD temperature sensors) or the TC/mV CHARM (supporting TC sensors and low-level voltage sources). This whitepaper will focus on supported sensors compatible to those CHARMs, and how to decide the best sensor for new installations.



By design, the RTD CHARM is a single channel measurement module for temperature using 2-wire, 3-wire, or 4-wire RTD sensors.

RTD Type	RTD Terminals	RTD CHARM Terminals
4-wire	Sensor signal	1
	Sensor signal	2
	Supply +	3
	Supply -	4
3-wire	Supply + and Sensor signal	1
	Sensor signal	2
	Supply -	4
2-wire	Supply + and Sensor signal	1
	Supply - and Sensor signal	2

By design, the Thermocouple/mV input CHARM is a single channel CHARM for temperature measurement using thermocouple sensors or low-level voltage sources. A CHARM TC/mV Terminal Block is required for the installation of the TC/mV CHARM.



A. Thermocouple CHARM  
B. CHARM Baseplate  
C. CHARM Thermocouple /mV Terminal Block  
D. Internal RTD  
E. Cable shield connection  
F. Ground connection

## Thermocouple Symbol



Ensure that the thermocouple is always connected with the right polarity. The thicker line of the thermocouple symbol indicates the minus connection where the thin line marks the plus connection. Further, Thermocouples and their polarity may be identified by colors. The different coloring of thermocouple sheaths and wires are subject to various national standards.

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 measurement functionality with no exceptions, or in some cases exceptions may be noted.

General limitations and ranges of the RTD CHARM or the Thermocouple/mV 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.

## Using RTD Sensors

When using the AMS Asset Monitor – RTD CHARM with any 2-wire, 3-wire, 4-wire RTD or equivalent type of sensors, a self-check routine build into the AMS Asset Monitor identifies if the measurement signal (provided by the sensor) is out of range and if the CHARM input is open or shorted for channel health indication.

For checking sensor connectivity and compatibility, use the table below to compare the sensor data provided from the datasheet as accurate as possible.

RTD, ohms Sensor Type Specifications				
Sensor Type	Operating Range	25° Reference Accuracy	Temperature Drift	Resolution
Pt100	-200 to 850°C	± 0.25°C	± 0.02°C/°C	~0.02°C
Pt200	-200 to 850°C	± 0.25°C	± 0.02°C/°C	~0.02°C
Pt500	-200 to 850°C	± 0.25°C	± 0.02°C/°C	~0.02°C
Pt1000	-200 to 260°C	± 0.25°C	± 0.02°C/°C	~0.01°C
Ni120	-80 to 260°C	± 0.15°C	± 0.01°C/°C	~0.01°C
Ni100	-80 to 260°C	± 0.20°C	± 0.01°C/°C	~0.01°C
Ni200	-80 to 260°C	± 0.20°C	± 0.01°C/°C	~0.01°C
Ni500	-80 to 260°C	± 0.20°C	± 0.01°C/°C	~0.01°C
Ni1000	-80 to 140°C	± 0.20°C	± 0.01°C/°C	~0.01°C
Cu10	-200 to 260°C	± 0.25°C	± 0.02°C/°C	~0.01°C
Resistance/User Defined	0 to 2,000 Ω	± 0.25 Ω	± 0.03 Ω/°C	~0.031 Ω

If the RTD Sensor specifications match up with the ranges of the AMS Asset Monitor RTD CHARM, the expectation is that the sensor is compatible; however, keep in mind that we do not provide a guarantee that a 3rd party (Resistance / User defined) sensor is compatible without officially testing the sensor.

## Using Thermocouple Sensors

When using the AMS Asset Monitor – Thermocouple/mV CHARM with any Thermocouple sensor, a self-check routine build into the AMS Asset Monitor identifies if the measurement signal (provided by the sensor) is out of range, if the CHARM input is open and if the CJC (Cold Junction Compensation) is invalid or unhealthy.

For checking sensor connectivity, compatibility, and troubleshooting, use the table below to compare the sensor data provided from sensor datasheet as accurate as possible.

Sensor Type Specifications					
Sensor Type	25° Reference Accuracy	Temperature Drift	Nominal Resolution	Full Scale	Operating Range
B	± 0.8°C	± 0.06°C/°C	~0.024°C	0 to 1820°C	250 to 1820°C
E	± 0.4°C	± 0.03°C/°C	~0.018°C	-270 to 1000°C	- 200 to 1000°C
J	± 0.6°C	± 0.04°C/°C	~0.022°C	-210 to 1200°C	- 210 to 1200°C
K	± 0.4°C	± 0.03°C/°C	~0.025°C	-270 to 1372°C	- 200 to 1372°C
N	± 0.6°C	± 0.04°C/°C	~0.024°C	-270 to 1300°C	- 200 to 1300°C
R	± 0.8°C	± 0.05°C/°C	~0.028°C	-50 to 1768°C	- 50 to 1768°C
S	± 0.8°C	± 0.05°C/°C	~0.028°C	-50 to 1768°C	- 50 to 1768°C
T	± 0.5°C	± 0.02°C/°C	~0.01°C	-270 to 400°C	-250 to 400°C

If the Thermocouple Sensor specifications match up with the ranges of the AMS Asset Monitor Thermocouple/mV CHARM, the expectation is that the sensor is compatible; however, keep in mind that we do not provide a guarantee that a different TC sensor is compatible without officially testing the sensor.

## Using low-level voltage source Sensors

When using the AMS Asset Monitor – Thermocouple/mV CHARM with any low-level voltage sensor, a self-check routine build into the AMS Asset Monitor identifies if the measurement signal (provided by the sensor) is out of range, if the CHARM input is open and if the CJC (Cold Junction Compensation) is invalid or unhealthy.

For checking sensor connectivity, compatibility, and troubleshooting, use the table below to compare the sensor data provided from the sensor datasheet as accurate as possible.

Sensor Type Specifications					
Sensor Type	25° Reference Accuracy	Temperature Drift	Nominal Resolution	Full Scale	Operating Range
± 100 mV	0.025 mV	± 0.002 mV/°C	~0.0031mV	-100 to 100mV	-100 to 100mV
± 50 mV	0.020 mV	± 0.001 mV/°C	~0.0015mV	-50 to 50mV	-50 to 50mV
± 20 mV	0.010 mV	± 0.0005 mV/°C	~0.0006mV	-20 to 20mV	-20 to 20mV

If the low-level voltage source sensor specifications match up with the ranges of the AMS Asset Monitor Thermocouple/mV CHARM, the expectation is that the sensor is compatible; however, keep in mind that we do not provide a guarantee that a different low-level voltage source sensor is compatible without officially testing the sensor.

## Using AI CHARM for temperature readings

Additionally, to the opportunity of using the RTD CHARM (supporting RTD temperature sensors) or the TC/mV CHARM (supporting TC sensors and low-level voltage sources), AMS Asset Monitor also supports temperature measurements managed by external transmitters. Those 0/4 ... 20mA signals must be provided the AI CHARM for providing the measurement to the Assets finally.

## Using External Data Points for providing temperature information to AMS Asset Monitor

Additionally, to the options for temperature measurements to the AMS Asset Monitor described before in this document, the AMS Asset Monitor also allows to import temperature readings by using External Data Points (through Modbus or OPC) to be provided from external devices like a DCS, PLC, etc. to the Assets where required.

## 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](mailto: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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