

T H E R M O M E T R I C S  
A C O M M I T M E N T T O E X C E L L E N C E

# Combination Sensor

## Relative Humidity, Temperature and Barometric Pressure



Thermometrics Combination Sensor is a smart combination of pressure, temperature and humidity sensors. It is designed for applications that demand highly accurate and reliable measurements with a typical application for battery thermal runaway. Our unique technology and proven expertise is designed into the sensor to provide unsurpassed accuracy in the marketplace.

### Applications

- Automotive:
  - Thermal runaway
  - On/off road
- Generator sets

### Features

- High accuracy temperature, pressure and humidity sensing elements
- CAN2.0 Communication per J1939
- Rugged design incorporates sensing elements with demonstrated reliability
- Customizable connector and mounting

**Amphenol**  
Advanced Sensors

# Performance Specifications

## Maximum Range

Ratings	Min	Max	Unit
Storage Temperature	-55	105	°C
Operating Temperature	-40	125	°C
Pressure	0	30	psi
Relative Humidity	0	100	%

## Electrical Performance

Characteristic	Min	Typical	Max	Unit
Supply Voltage	8	12 or 24	32	Volts
Current Consumption		14	60 <sup>1</sup>	mA

1. Environmental recovery mode.

## CAN Bus

Characteristic	Min	Typical	Max	Unit
Differential Output Voltage – Dominant <sup>1</sup>	1.5		3	V
Differential Output Voltage – Recessive <sup>1</sup>	-0.012		0.012	V
Voltage Range – CANH/CANL	-27		40	V
Voltage Input, Transient Pulse – CANH/CANL <sup>2</sup>	-200		200	V
Unique Source Address <sup>3</sup>		0xEB		
Bit Rate		500		Kbps
Update Rate (Repetition Rate)		100		ms

1. RL=60Ω

2. Tested in accordance with ISO 7637, test pulses 1, 2, 3a, 3b, 5, 6 and 7.

3. Custom values are available.

## Humidity Performance

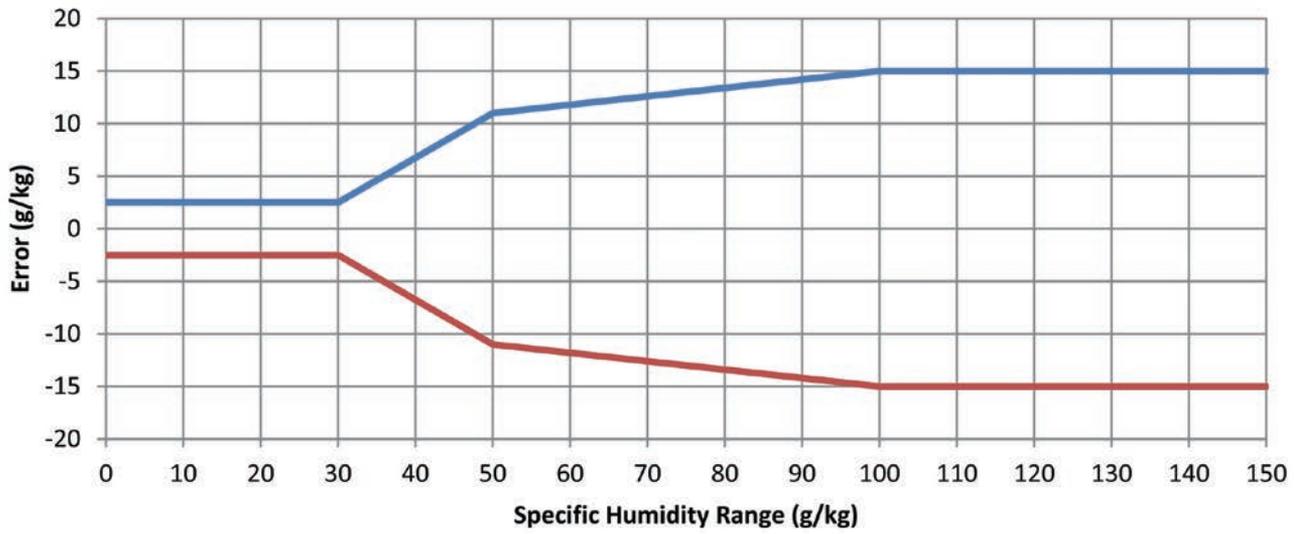
Characteristic	Min	Typical	Max	Units
Relative Humidity Accuracy <sup>1</sup>		±2	±4	%
Relative Humidity Response Time ( 63%) <sup>2</sup>		7	20	sec
Long Term Drift			0.5	%RH/YR
Specific Humidity Accuracy 100 to 150g/kg <sup>1</sup>			±15	g/kg
Specific Humidity Accuracy 30 to 100g/kg <sup>1</sup>		±11		g/kg
Specific Humidity Accuracy 0 to 30g/kg <sup>1</sup>			±2.5	g/kg

1. All operating conditions.

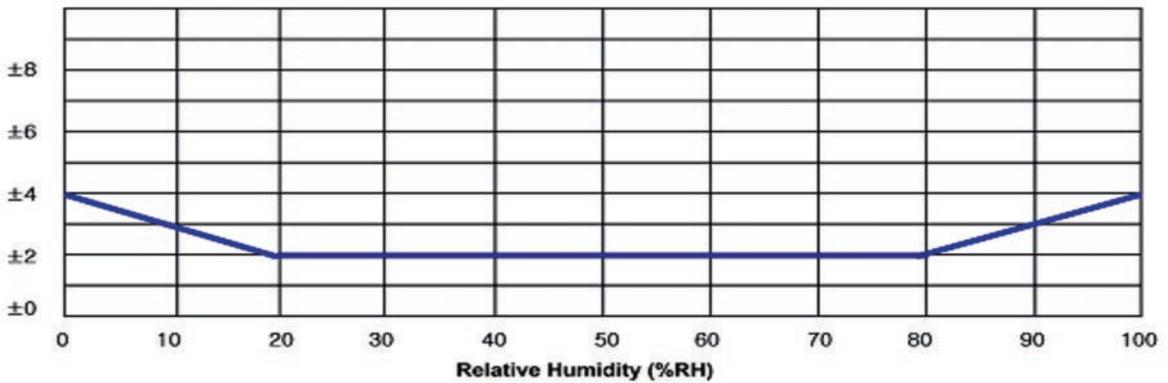
2. Measured at 25°C 1m/sec airflow from 33%RH to 90%RH.

# Performance Specifications (Cont.)

**Specific Humidity Limit**



**ΔRH (%RH)**



## Pressure Performance

Characteristic	Min	Typical	Max	Unit
Barometric Pressure Accuracy – Ambient/Connector <sup>1 &amp; 2</sup>			±1.5	%
Pressure Response Time ( 63%)		0.5	0.8	sec

1. 15kPa to 120kPa Calibration Range. Custom ranges are available.

2. All operating conditions.

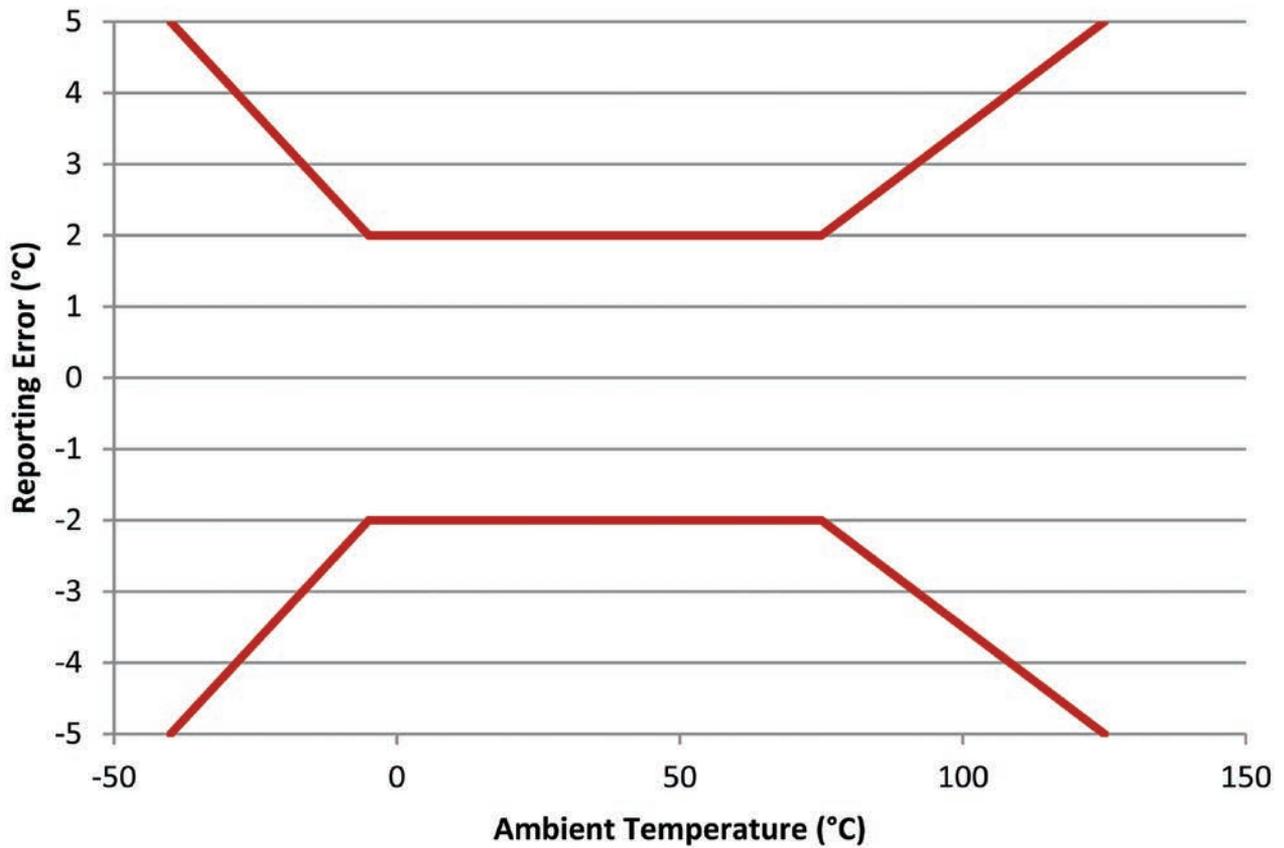
# Performance Specifications (Cont.)

## Temperature Performance

Characteristic	Min	Typical	Max	Unit
Temperature Accuracy – Tip		<±2	±5	°C
Temperature Response Time – Tip ( 63%) <sup>1</sup>		30	40	sec

1. 5m/s Airflow

### Temperature Accuracy



# CAN Communication

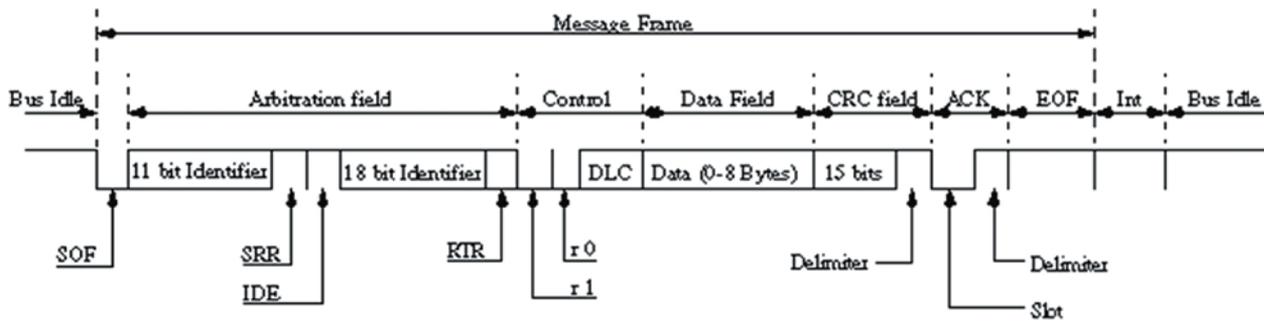
The Combination Sensor's 4-pin connection provides a CAN 2.0B and J1939 compliant interface. The standard bit rate and update rate may be customized per customer requirements. Sensor measurements are communicated using the following CAN messages:

SPN	Parameter	Details
MESSAGE #1		
354	Relative Humidity	Data Length: 1 byte Resolution: 0.4 %/bit, 0 offset Data Range: 0 to 100 %
1172	Engine Turbocharger1 Compressor Intake Temperature	Data Length: 2 bytes Resolution: 0.03125 °C/bit, -273 °C offset Data Range: -273 to 1734.96875 °C
1176	Engine Turbocharger1 Compressor Intake Pressure	Data Length: 2 bytes Resolution: 1/128 kPa/bit, -250kPa offset Data Range: -250 kPa to 251.99 kPa
4490	Specific Humidity	Data Length: 2 bytes Resolution: 0.01 g/kg per bit, 0 offset Data Range: 0 to 642.55 g/kg
NA	Status Message	Data Length: 1 byte 8 internal diagnostic flags*

\*Status messages used for self-diagnostic are available upon request.

# CAN 2.0B Message Structure

Data is transmitted and received using Message Frames, which carry data from a transmitting node to one, or more, receiving nodes. The CAN protocol supports the Extended CAN (Version 2.0B) Message Frame format.



**CAN 2.0B Format Message Frame**

The CAN 2.0B format provides a twenty nine (29) bit identifier.

## Mechanical Specifications

Connector Type	TE DTM04-4P
Mating Connector	TE DTM06-4S
Housing Material	PA GF Gray
Mass of Sensor	56 grams

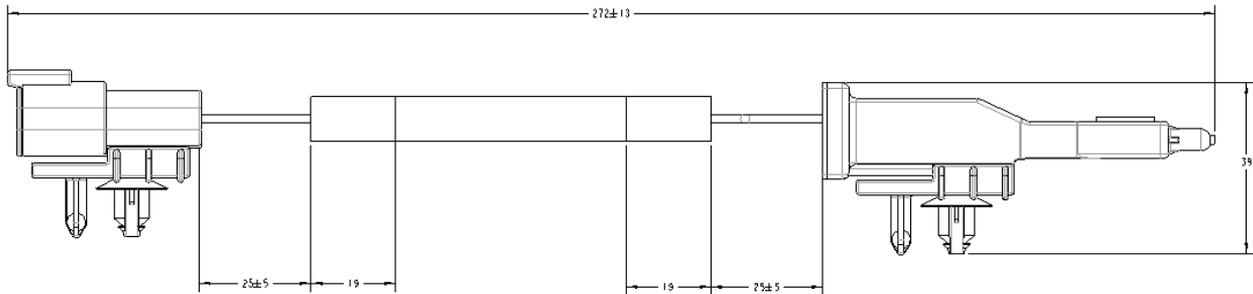
# CAN 2.0B Mechanical Specifications

## Connector Pin Out:

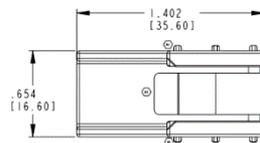
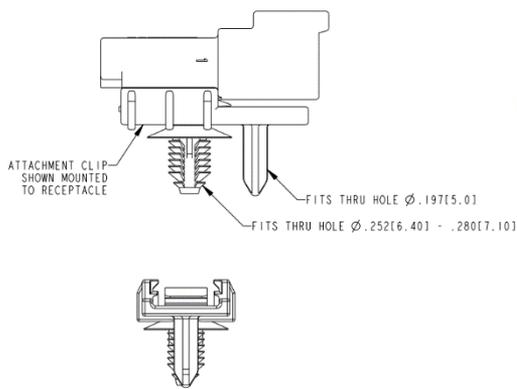
Pin	Description	Wire Color
1	PWR	RD
2	GND	BK
3	CAN_H	YW
4	CAN_L	GN



## Housing Detail:



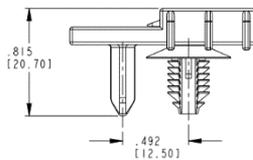
## Mating Geometry:



Recommended Panel Thickness:  
.028 [0.70] - .201 [5.10]

This clip mates with TE DTM Series Connection System.

Color: Black



Tolerances unless otherwise specified:  
± .025 [0.63]

