

## Table of Contents

PRODUCT	PRODUCT CODE	TECHNICAL INSTRUCTIONS	PAGE #
<b>Temperature &amp; Relative Humidity Sensors</b>			
10K NTC/1K Platinum RTD Room Temperature Sensors	Series 1000	149-312	E-3
100K NTC and 4 to 20 mA Room Temperature Sensors	Series 1000	149-168	E-5
Standard Room Temperature Sensors	Series 2300	149-710	E-7
Room Temperature Sensors	QAA20 Series	149-912/913/914	E-9
Standard Room Relative Humidity and Room Temperature Sensors	Series 2300	149-103	E-11
Room Relative Humidity and Temperature Sensors	QFA Series 1000	149-479	E-13
Immersion Temperature Sensors	QFA Series 1000	149-479	E-15
Standard Duct Temperature Sensors	Multiple	Multiple	E-17
Flush Mount Room Temperature Sensors	Multiple	Multiple	E-19
Standard Pipe and Outdoor Air Temperature Sensors	Multiple	Multiple	E-21
Premium Duct, Outdoor Air, and Surface Temperature Sensors	QAM/QAC/QAD	149-805, 149-806, 149-808	E-23
Room/Outside Air Relative Humidity and Temperature Sensors	QFA Series	149-992	E-25
Duct Relative Humidity and Temperature Sensors	QFM Series	155-707	E-27
<b>Hygrostats</b>			
Electronic Room Hygrostats	QFA Series	155-708	E-29
Electronic Duct Hygrostats	QFM Series	155-708	E-31
<b>Specialty Sensors</b>			
Condensation Sensors	QXA	149-926	E-33
<b>CO<sub>2</sub>/VOC/Gas Sensors</b>			
Room Carbon Dioxide/VOC/Temp/RH Sensors	QPA Series	149-910	E-35
Duct Carbon Dioxide/VOC/Temp/RH Sensors	QPM Series	149-909	E-37

## Pressure Sensors / Switches

Air Differential Pressure Sensors / Switches <span style="color: #0070C0;">NEW!</span>	QBM Series	149-930/CA1N1552E-P25	E-39
Very Low Differential Pressure Transducers	590 Series	149-957	E-41
Air Velocity Sensor	QVM Series	155-006	E-43
Pitot Tube Sensor Kits	536 Series	149-455	E-45
Wet Differential Pressure Sensors <span style="color: #0070C0;">NEW!</span>	QBM Series	149-9281/149-929	E-47
Pressure Sensors for Liquid and Gas	7MF Series	7MF1564	E-49
Liquid Flow Switches	QVE Series	155-778/155-711	E-51
Solar Impact Sensor	QLS60	155-706	E-53

## Energy Meters

MD Model Power Meters <span style="color: #0070C0;">NEW!</span>	MD	149-408	E-55
Current Transformers <span style="color: #0070C0;">NEW!</span>	MD	149-408	E-57
Split-Core Current Transformers <span style="color: #0070C0;">NEW!</span>	MD	149-408	E-59

## Accessories and Service Kits

E-61

E-2

Sensors

## Sensor Compatibility Matrix

Signal Type	AET	Alerton	Anderson Cornelius	Andover	Automated Logic	Auto-Matrix	Carrier	Circon	Delta Controls	Distech Energie	Honeywell	Invensys	JCI	KMC	Reliable Controls	Schneider General	Solidyne	TAC/CSI	Teletrol	Trane	Triangle Microsystems	Walker	York	T&A
0 to 10 Vdc								•																
1K Platinum RTD (375 element)													•							•				
1K Platinum RTD (385 element)											•	•	•							•				
4 to 20 / 0 to 20 mA								•																
Ni1000 RTD (JCI)													•										•	
Ni1000 RTD (L&S)																								
NTC 10K (Type II)		•			•		•		•				•	•			•	•		•	•			
NTC 10K (Type III)	•			•		•	•		•			•		•	•				•				•	

## Room Temperature Sensors

– For Siemens APOGEE® Field Panels and Controllers



Series 1000 Room Temperature Sensor with all Available Options.

### Description

The Series 1000 Room Temperature Sensors offer a wide range of features and functionality that deliver exceptional occupant comfort in even the most demanding application environments. The product family range includes plain sensing only variants, as well as types with temperature setpoint LCD display and night set back. All sensors incorporate precision temperature sensing elements to accurately and reliably measure room temperature. Their compact design results in an attractive, inconspicuous installation. A styled ventilation ring optimizes airflow through the cover for fast measurement response and superior control.

### Features

- Platinum RTD or thermistor element
- Variety of connections
- Unpluggable termination block simplifies installation and service
- Plug in terminal for troubleshooting
- Maintenance free

### Optional

- LCD temperature display
- Setpoint adjustment
- Occupancy override button

### Applications

These sensors may be installed in all kinds of environments including schools, hospitals, universities, strip malls and commercial office buildings.

## Series 1000 Room Temperature Specifications

<b>Temperature Range</b>	
Setpoint .....	55 to 95°F (13 to 35°C)
Operating.....	55 to 95°F (13 to 35°C)
<b>Output Signals</b> ..... Changing Resistance	
<b>Accuracy</b>	
10K Ohm Thermistor	
55 to 80.6°F (13 to 27°C) .....	±0.5°F (±0.3°C)
80.6 to 95°F (27 to 35°C) .....	±1.0°F (±0.5°C)
1,000 Ohm RTD Mid-Range	
75°F (24°C) .....	±0.75°F (± 0.4°C)
<b>Calibration Adjustments</b> ..... None Required	

<b>Installation</b>	
TEC .....	100 ft. Maximum Cable Length
6C # 24 AWG, Belden 1228A or Equal, NEC Class 2	
APOGEE Field Panels .....	300 to 750 ft.
Max. Cable Length 18 to 22 AWG	
Twisted Pair, NEC Class 2	
<b>Installation Adjustments</b> ..... None Required	
<b>Cover Dimensions</b> ..... 3-11/32" H x 2-1/2" W x 1-1/2" D	
(85 mm x 63 mm x 38 mm)	
<b>Cover Color</b> ..... Desert Beige or White	

## Series 1000 Room Temperature Ordering

Description	Part No.
<b>10K NTC</b>	
Sensing Only	<b>540-660<sup>1</sup></b>
Sensing with Override, Setpoint	<b>540-670<sup>1</sup></b>
Sensing with Override, Setpoint, Temperature and Display	<b>540-680<sup>2</sup></b>
<b>1K Platinum RTD Type (375 ALPHA)</b>	
Sensing Only	<b>544-760<sup>1</sup></b>
Sensing with Override, Setpoint	<b>544-770<sup>1</sup></b>
Sensing with Override, Setpoint, Temperature Display	<b>544-780<sup>2</sup></b>

### Ordering Notes:

<sup>1</sup>Add letter suffix to indicate desired color: **A** for Desert Beige, **B** for White (Example: 540-660A).

<sup>2</sup>Add letter suffix to indicate temperature display units and color:

**F** for °F, **C** for °C, **A** for Desert Beige, **B** for White (Example: 540-680FA).

## 100K NTC and 4 to 20 mA Room Temperature Sensors



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



Siemens 4 to 20 mA and 100K Ohm  
Room Temperature Sensor.

### Description

The miscellaneous Room Temperature Sensors provide accurate 100K NTC, reliable sensing of room temperature. The sensor's resistance varies proportionally to the actual room temperature being measured.

## 100K NTC and 4 to 20 mA Room Temperature Sensors Specifications

<b>Temperature Range</b>		<b>Calibration Point Factory Setting</b> ..... 77°F (25°)
Setpoint .....	55 to 95°F (13 to 35°C)	Accuracy..... ±0.5°F (±0.3°C)
Operating .....	55 to 95°F (13 to 35°C)	Resistance Value..... 10K Ohm
<b>Output Signal</b> .....	Changing Resistance or 4 to 20 mA	<b>Calibration Adjustments</b> ..... None Required
		<b>Cover Dimensions</b> ..... 3-11/32"H x 2-1/2"W x 1-1/2"D (85 mm H x 64 mm W x 38 mm D)

## 100K NTC and 4 to 20 mA Room Temperature Sensors Product Ordering

Application	Temperature Range	Desert Beige Part No.	White Part No.
Room 100K Ohm	20°F to 120°F (-7°C to 49°C)	<b>536-983A</b>	<b>536-983B</b>
Room 4 to 20 mA	40°F to 90°F (-5°C to 32°C)	<b>536-752A</b>	<b>536-752B</b>
Room 4 to 20 mA	20°F to 120°F (-6°C to 48°C)	<b>536-753A</b>	<b>536-753B</b>

### Ordering Notes:

The controller to which the sensor is connected determines application-sensing range.

## Standard Room Temperature Systems



QAA23SS.FWNN  
Temperature Room Unit.

### Description

Series 2300 Temperature Room Units offer simple temperature sensing functionality. These devices work with most building automation systems to deliver exceptional occupant comfort. All room units incorporate precision temperature sensing elements to accurately and reliably measure room temperature. Their compact, low-profile design results in an attractive, inconspicuous installation. Strategically placed ventilation slots in the housing optimize airflow through the cover for fast measurement response and superior control.

### Features

- Resistive output signals
- Selectable voltage or current output models
- High degree of accuracy
- Analog temperature display
- Organic light emitting diode
- Analog setpoint adjustment
- Occupancy override button
- Dim or brighten display
- Show or hide OLED display elements
- Local setpoint limiting
- Numerical or graphical display of temperature setpoint

### Applications

These room units connect to the controllers input points via free wire cabling, which is landed on the controllers' terminal block connector.

E-7

Sensors

## Series 2300 Specifications

<b>Temperature Range</b>	
Setpoint and Operating.....	55F to 95°F (13C to 35°C)
<b>Output Signals</b> .....	Changing Resistance
<b>Sensing Element Type</b>	
QAA2312 Types .....	1K ohm Platinum RTD
QAA2320 Types .....	1K Ohm Nickel RTD @ 32°F
QAA2321 Types .....	1K Ohm Nickel RTD @ 70°F
QAA2330 Types .....	10K Ohm NTC Type II Thermistor
QAA2332 Types .....	10K Ohm NTC Type III Thermistor
QAA23SS Types .....	0-10V/0-5V/4-20 mA Selectable
<b>Accuracy</b>	
10K Ohm Thermistor	
55° - 80.6°F (13°C - 27°C).....	±0.5°F (±0.3°C)
80.6° - 95°F (27°C - 35°C).....	±1.0°F (±0.5°C)
1K Ohm RTD Mid-Range	
75°F (24°C) .....	±0.75°F (± 0.4°C)

<b>Installation</b>	
NTC Types.....	100 ft. Maximum Cable Length. 6C #24 AWG, Belden 1228A or Equal, NEC Class 2
RTD Types.....	300 to 750 ft. Maximum Cable Length. 18 to 22 AWG, Twisted Pair, NEC Class 2
<b>Installation Adjustments</b> .....	None Required
<b>Cover</b>	
Dimensions.....	4.5" x 2.75" x 1.18" (115 mm x 70 mm x 30 mm)
Color .....	White
<b>Regulatory Agency</b> .....	UL 916

## Series 2300 Product Ordering

Description	Part No.
<b>1K Platinum RTD Sensors (385 ALPHA)</b>	
Sensing, No Logo	QAA2312.EWNN
Sensing, Digital Display, Setpoint Adjustment, Override, No Logo	QAA2312.FWNN
<b>1K Nickel RTD Sensors @ 32°F</b>	
Sensing, No Logo	QAA2320.EWNN
Sensing, Digital Display, Setpoint Adjustment, Override, No Logo	QAA2320.FWNN
<b>1K Nickel RTD Sensors @ 70°F</b>	
Sensing, No Logo	QAA2321.EWNN
Sensing, Digital Display, Setpoint Adjustment, Override, No Logo	QAA2321.FWNN
<b>10K NTC Type II Thermistor Sensor</b>	
Sensing, No Logo	QAA2330.EWNN
Sensing, Digital Display, Setpoint Adjustment, Override, No Logo	QAA2330.FWNN
<b>10K NTC Type III Thermistor Sensor</b>	
No Logo, Sensing	QAA2332.EWNN
Sensing, Digital Display, Setpoint Adjustment, Override, No Logo	QAA2332.FWNN
<b>0-10V/0-5V/4-20 mA Selectable Temperature Sensor</b>	
Sensing, No Logo	QAA23SS.EWNN
Digital Display, Temperature Setpoint, Override, No Logo	QAA23SS.FWNN

## Series 2300 Accessories Ordering Information

Description	Part No.
Replacement Sensor Housing Base (For .E Models Only)	563-102-02
Room Sensor Wall Plate (10-Pack)	AQA2200-INTL
Room Sensor Wall Plate (Single-Pack)	AQA2200-QX4



## Room Temperature Sensors



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



QAA2072.FWNU  
Room Temperature Sensor with  
Analog Display, Setpoint and Override.



QAA20xx.WU  
Room Temperature Sensor.

### Description

The QAA20 Series Room Temperature Sensors monitor and transmit changes in temperature to the building control systems. QAA20 Series sensors utilize the standard Series 1000 housing, but with a totally new internal circuit design.

### Features

- 0-10V or 4-20mA output signals
- High degree of accuracy
- Analog temperature display
- Liquid Crystal Display (LCD)
- Analog setpoint adjustment
- Occupancy override button

### Applications

The QAA20 Series Room Temperature Sensors are especially suited for applications where precise, stable temperature sensing is required. An assortment of models is available – versions with sensing only or setpoint adjustment, occupancy override and display.

The QAA20 Series temperature sensors are also available in a variety of signal types. Choose from powered 4 to 20 mA or 0 to 10 Volt signal versions. Select the correct product based on the compatibility needs of your building automation system.

# QAA20 Series Specifications

## General

**Installation**..... 18 AWG Cable Length Shared in Conduit with Other Sensor Wiring 750 ft. (229 m) max.

**Connections** ..... Screw Terminals

**Voltage Requirement**..... 13.5 to 35 Vdc and 24 Vac (for Sensors with 0-10 Vdc outputs)

## Housing

Material Type..... Polycarbonate Plastic

Color ..... White

Dimensions..... 3-11/32" H x 2-1/2" W x 1-1/2" D (85 mm H x 63 mm W x 38 mm D)

## Temperature Element

**Measurement Range** ..... Controller Dependent

**Operating Temperature** ..... -40 to 240°F (-40 to 116°C)

**Operating Range, Active Signal Types** ..... 40 to 90°F

**Temperature Effect** ..... Less than 0.1% per Degree C

**Sensing Element**..... Various, See Table Below

**Output Signals** ..... 4 to 20 mA and 0 to 10 Vdc, 0-100% Linear, Proportional

**Polarity Protection**..... Yes

**Accuracy at Calibration Temperature**..... +/- 1 K

## QAA20 Series Product Ordering

Description	Part No.
<b>4 to 20 mA Sensors</b>	
40 to 90°F, Siemens Logo	QAA2072.WU
40 to 90°F, Setpoint, Night Override, Display, No Logo	QAA2072.FWNU
40 to 90°F, Setpoint, Night Override, Display, Siemens Logo	QAA2072.FWU
<b>0 to 10 Volt Sensors</b>	
40 to 90°F, Siemens Logo	QAA2062.WU
40 to 90°F, Setpoint, Night Override, Display, Siemens Logo	QAA2062.FWU

E-10

Sensors

## Standard Relative Humidity and Room Temperature Sensors



Series 2300 Room  
Relative Humidity/Temperature Sensor.

### Description

The Series 2300 Relative Humidity and Temperature Room Units offer simple temperature sensing functionality. These devices work with third party systems to deliver exceptional occupant comfort. All room units incorporate precision humidity and temperature sensing elements to accurately and reliably measure room temperature. Their compact, low-profile design results in an attractive, inconspicuous installation. Strategically placed ventilation slots in the housing optimize airflow through the cover for fast measurement response and superior control.

These room units provide accurate, reliable sensing of room humidity and temperature. Various models can be used with all equipment controllers that accept the respective NTC thermistor or RTD inputs for primary control.

### Features

- 4 to 20 mA and 0 to 10 Vdc output signals
- High degree of accuracy

### Full-featured Models

- Digital temperature setpoint adjustment in degree increments
- Occupancy override button
- Removable, replaceable humidity element
- Resistive output signals
- Selectable voltage or current output models
- High degree of accuracy
- Analog temperature display
- Organic light emitting diode
- Analog setpoint adjustment
- Occupancy override button
- Dim or brighten display
- Show or hide OLED display elements
- Local setpoint limiting
- Numerical or graphical display of temperature setpoint

### Applications

These room units connect to the controller's input points via free wire cabling, which is landed on the controllers' terminal block connector.

# Series 2300 Specifications

## Temperature Range

Setpoint and Operating .....55F to 95°F (13C to 35°C)

**Output Signals** ..... Changing Resistance

## Sensing Element Type

QFA3312 Types ..... 1K Ohm Platinum RTD

QFA3330 Types ..... 10K Ohm NTC Type II Thermistor

QFA3332 Types ..... 10K Ohm NTC Thermistor

## Accuracy

10K Ohm Thermistor

55° - 80.6°F (13°C - 27°C) ..... ±0.5°F (±0.3°C)

80.6° - 95°F (27°C - 35°C) ..... ±1.0°F (±0.5°C)

1K Ohm RTD Mid-range

75°F (24°C) ..... ±0.75°F (± 0.4°C)

## Humidity Specifications (QFA Types Only)

Humidity Range .....0% to 100% rh

Output Signal .....Select 0-5V, 0-10V, 4-20mA

Sensing Element Type .....Digital Sensor IC

Humidity Accuracy

10% - 90% rh ..... ± 2% rh

< 10% rh; > 90% rh ..... ± 4% rh

## Calibration Features

Temperature ..... Adjustable to ± 5°F

Humidity ..... Adjustable to ± 5% rh

## Installation

NTC Types .....100 ft. Maximum Cable Length.  
6C #24 AWG, Belden 1228A or Equal, NEC Class 2

RTD Types .....300 to 750 ft Maximum Cable Length.  
18 to 22 AWG, Twisted Pair, NEC Class 2

**Installation Adjustments** .....None required

## Cover

Dimensions ..... 4.5" x 2.75" x 1.18" (115 mm x 70 mm x 30 mm)

Color ..... White

**Regulatory Agency** ..... UL 916

# Series 2300 Product Ordering

Description	Part No.
<b>Humidity &amp; Temp Room Units</b>	
2%, 0-10/0-5 Volt or 4-20mA Selectable Outputs, White, No Logo	QFA33SS.EWNN
2%, 0-10/0-5 Volt or 4-20mA Selectable Outputs, Display, Setpoint, Override, White, No Logo, No Communication Port	QFA33SS.FWNN
RH: 0-10/0-5 Volt or 4-20mA Selectable, 2% T: 10K Type 3 NTC, Display, Setpoint, Override, No Logo	QFA3332.FWNN
RH: 0-10/0-5 Volt or 4-20mA selectable, 2% T: 10K Type 2 NTC, Display, Setpoint, Override, No Logo	QFA3330.FWNN
RH: 0-10/0-5 Volt or 4-20mA Selectable, 2% T: 1K Platinum (385) RTD, Display, Setpoint, Override, White, No Logo	QFA3312.FWNN
RH: 0-10/0-5 Volt or 4-20mA selectable, 2% T: 1K Platinum (385) RTD, White, No Logo	QFA3312.EWNN

# Series 2300 Accessories Ordering Information

Description	Part No.
Replacement Sensor Housing Base (For .E Models Only)	563-102-02
Room Sensor Wall Plate (10-Pack)	AQA2200-INTL
Room Sensor Wall Plate (Single-Pack)	AQA2200-QX4

## Room Relative Humidity and Relative Humidity/Temperature Sensors



Energy & Atmosphere



Indoor Environmental Quality



QFA Series Room Relative Humidity and Relative Humidity/Temperature Sensor.



QFA Series Room Relative Humidity and Relative Humidity/Temperature Sensor.

### Description

The QFA Series Room Relative Humidity and Relative Humidity/Temperature Sensors monitor and transmit changes in humidity and temperature to the building control systems.

Several models are available for humidity only or for humidity and temperature sensing. The humidity only units are available in either 4 to 20 mA or 0 to 10 Volt signal versions. Combination humidity and temperature units are available in either dual current or voltage versions, transmitting proportional signals back to the controller.

### Features

#### Standard Features

- 4 to 20 mA and 0 to 10 Vdc output signals
- High degree of accuracy

#### Full-featured Models

- Liquid Crystal Display (LCD in degrees F or C)
- Digital temperature setpoint adjustment in 0.5 degree increments
- Override button
- Removable, replaceable humidity element

### Applications

These units are especially suited for applications where precise, stable humidity sensing is required.

# QFA Series 1000 Specifications

## General

**Installation**..... 18 AWG Cable Length Shared in Conduit with Other Sensor Wiring 750 ft. (229 m) Max

**Connections** ..... Screw Terminals

**Voltage Requirement**..... 13.5 to 35 Vdc and 24 Vac (for sensors with 0-10 Vdc outputs)

**CE and UL listed** ..... UL 873 Standard for Temperature Indicating and Regulating Equipment

**Housing**

Material Type..... Polycarbonate Plastic

Color ..... Desert Beige or White

Dimensions..... 3-11/32" H x 2-1/2" W x 1-1/2" D (85 mm H x 63 mm W x 38 mm D)

**Operating Range**..... 0 to 100% RH

**Measurement Range** ..... 0 to 100% RH

**Accuracy at room temperature (73°F, 20°C)**..... ±2% 0 to 100% RH

**Operating Temperature** ..... -31 to +140°F (-35 to +60°C)

**Temperature Effect** ..... Less than 0.1% per Degree C

**Sensing Element**..... Capacitive Humidity Sensing Element

**Output Signal** ..... 4 to 20 mA or 0 to 10 Vdc, 0 to 100% Linear, Proportional

**Polarity Protection**..... Yes

## Humidity Element

**Temperature Element (for combination RH/T units only)**

**Operating Temperature** ..... 32 to 122°F (0 to 50°C)

**Time Constant at 0 to 50°C and 10-80%RH** ..... Approx. 20 Seconds in Moving Air

**Accuracy** ..... at 32 to 122°F (0 to 50°C): ±1 K  
at -31 to +95°F (-35 to +35°C): ±0.8 K  
at -31 to +140°F (-35 to +60°C): ±1 K

**Output Signal** ..... 4 to 20 mA or 0 to 10 Vdc, 0 to 100% Linear, Proportional, (Terminal U2)

**Calibration Adjustments** ..... None

# QFA Series 1000 Product Ordering

Application	Description	Part No.
Room Relative Humidity 2%	0 to 10 Vdc, No LCD, Beige	QFA3000.BU
Room Relative Humidity 2%	0 to 10 Vdc, No LCD, White	QFA3000.WU
Room Relative Humidity 2%	0 to 10 Vdc, with LCD, Beige	QFA3000.DBU
Room Relative Humidity 2%	0 to 10 Vdc, with LCD, White	QFA3000.DWU
Room Relative Humidity 2%	4 to 20 mA, No LCD, Beige	QFA3001.BU
Room Relative Humidity 2%	4 to 20 mA, No LCD, White	QFA3001.WU
Room Relative Humidity 2% & Temperature	0 to 10 Vdc, No LCD, Beige	QFA3060.BU
Room Relative Humidity 2% & Temperature	0 to 10 Vdc, No LCD, White	QFA3060.WU
Room Relative Humidity 2% & Temperature	0 to 10 Vdc, LCD, Temp Setpoint, Occupant Override, Beige	QFA3060.FBU
Room Relative Humidity 2% & Temperature	0 to 10 Vdc, LCD, Temp Setpoint, Occupant Override, White	QFA3060.FWU
Room Relative Humidity 2% & Temperature	4 to 20 mA, No LCD, Beige	QFA3071.BU
Room Relative Humidity 2% & Temperature	4 to 20 mA, No LCD, White	QFA3071.WU
Room Relative Humidity 2% & Temperature	4 to 20 mA, LCD, Temp Setpoint, Occupant Override, Beige	QFA3071.FBU
Room Relative Humidity 2% & Temperature	4 to 20 mA, LCD, Temp Setpoint, Occupant Override, White	QFA3071.FWU

E-14

Sensors

## Immersion Temperature Sensors — Various Outputs



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



Liquid Immersion Temperature  
Sensor with Well

### Description

The Immersion Temperature Sensors with Well monitor and transmit changes in temperature to the building control system. Specific devices within the range are compatible with most North American building automation systems. The sensors include a well to enable service and repair without draining the system. All sensors incorporate precision temperature sensing elements to accurately and reliably measure temperature.

### Features

- Variety of output signals / probe lengths
- Suitable for hot or chilled fluids
- Responsive to temperature change
- Accurate and reliable indication of temperature
- Simple installation requires no special tools

### Applications

Immersion temperature sensors are used throughout HVAC and processing systems to monitor fluid temperatures in piping and vessels.

E-15

Sensors

# Immersion Temperature Sensor Specifications

## Output Signals

Active.....	4-20mA
Passive.....	Pt 1k Ω (375 alpha)
	Pt 1k Ω (385 alpha)
	Ni 1k Ω @32F
	Ni 1k Ω @70F
	NTC 100k Ω
	NTC 10k Ω Type II
	NTC 10k Ω Type III

## Accuracy

NTC Thermistors, mid-range.....	±1.0°F (±0.5°C)
Pt RTD and Ni RTD, mid-range.....	±0.75°F (±0.4°C)

**External Installation Threads** ..... 1/2-inch – 14 NPT

**Conduit Connection Threads** ..... 1/2-inch – 14 NPSMI

**Housing Material**..... Cast zinc

**Immersion Well Material**.....300 Series Stainless Steel

## Immersion Temperature Sensors Product Ordering

Application	Description	Output Signal	Part Number	Range	Data Sheet	
Liquid Immersion	2.5" Immersion Temp Sensor With Well	Platinum 1k Ω 375 alpha	<b>544-577-25</b>	Controller Dependent	149-261P25	
	4" Immersion Temp Sensor With Well		<b>544-577-40</b>		149-261P25	
	6" Immersion Temp Sensor With Well		<b>544-577-60</b>		149-261P25	
	2.5" Immersion Temp Sensor With Well	4-20 mA	<b>536-767-25</b>	30 to 250F	149-263P25	
	2.5" Immersion Temp Sensor With Well		<b>536-774-25</b>	20 to 70F	149-263P25	
	2.5" Immersion Temp Sensor With Well		<b>544-562-25</b>	32 to 212F	149-263P25	
	4" Immersion Temp Sensor With Well		<b>536-767-40</b>	30 to 250F	149-263P25	
	4" Immersion Temp Sensor With Well		<b>536-774-40</b>	20 to 70F	149-263P25	
	4" Immersion Temp Sensor With Well		<b>544-562-40</b>	32 to 212F	149-263P25	
	6" Immersion Temp Sensor With Well		<b>536-767-60</b>	30 to 250F	149-263P25	
	6" Immersion Temp Sensor With Well		<b>536-774-60</b>	20 to 70F	149-263P25	
	6" Immersion Temp Sensor With Well		<b>544-562-60</b>	32 to 212F	149-263P25	
	2.5" Immersion Temp Sensor With Well		Nickel 1k Ω @ 32F	<b>QAE2020.005</b>	Controller Dependent	149-919
	4" Immersion Temp Sensor With Well			<b>QAE2020.010</b>		149-919
	6" Immersion Temp Sensor With Well			<b>QAE2020.015</b>		149-919
	2.5" Immersion Temp Sensor With Well	Nickel 1k Ω @ 70F	<b>QAE2021.005</b>	Controller Dependent	149-919	
	4" Immersion Temp Sensor With Well		<b>QAE2021.010</b>		149-919	
	6" Immersion Temp Sensor With Well		<b>QAE2021.015</b>		149-919	
	2.5" Immersion Temp Sensor With Well	NTC 100k Ω Type 2	<b>536-777-25</b>	Controller Dependent	149-262P25	
	4" Immersion Temp Sensor With Well		<b>536-777-40</b>		149-262P25	
	6" Immersion Temp Sensor With Well		<b>536-777-60</b>		149-262P25	
	2.5" Immersion Temp Sensor With Well	NTC 10k Ω Type 2	<b>QAE2030.005</b>	Controller Dependent	149-919	
	4" Immersion Temp Sensor With Well		<b>QAE2030.010</b>		149-919	
	6" Immersion Temp Sensor With Well		<b>QAE2030.015</b>		149-919	
	2.5" Immersion Temp Sensor With Well	NTC 10k Ω Type 3	<b>QAE2032.005</b>	Controller Dependent	149-919	
	4" Immersion Temp Sensor With Well		<b>QAE2032.010</b>		149-919	
	6" Immersion Temp Sensor With Well		<b>QAE2032.015</b>		149-919	
	2.5" Immersion Temp Sensor With Well	Platinum 1k Ω 385 alpha	<b>QAE2012.005</b>	Controller Dependent	149-919	
	4" Immersion Temp Sensor With Well		<b>QAE2012.010</b>		149-919	
	6" Immersion Temp Sensor With Well		<b>QAE2012.015</b>		149-919	



## Duct Temperature Sensors — Various Outputs



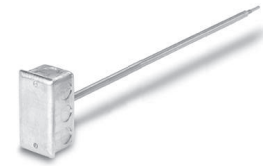
Energy & Atmosphere



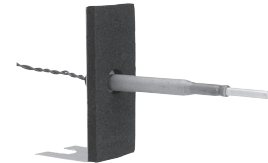
Indoor Environmental Quality



Duct Sensor with Flexible Probe



Duct Sensor with Rigid Probe



536-811 Bracket Mounted Duct Sensor

### Description

The Duct Temperature Sensors monitor and transmit changes in temperature to the building control system. Specific devices within the range are compatible with most North American building automation systems. They install directly into the duct and are equipped with necessary mounting hardware. All sensors incorporate precision temperature sensing elements to accurately and reliably measure temperature.

### Features

- Variety of sensing elements
- Responsive to temperature change
- Accurate and reliable indication of duct temperature
- Simple installation requires no special tools

### Applications

Duct temperature sensors are used throughout forced air HVAC systems to monitor air temperature within the ductwork. Single point sensors include one sensing element. Averaging sensors incorporate multiple sensing elements and are typically used in larger ducts where some temperature stratification may occur.

### Specifications

#### Output Signals

Active.....	4-20mA
Passive.....	Pt 1k Ω (375 alpha)
	Pt 1k Ω (385 alpha)
	Ni 1k Ω @32F
	Ni 1k Ω @70F
	NTC 100k Ω
	NTC 10k Ω Type II
	NTC 10k Ω Type III

#### Accuracy

NTC Thermistors, mid-range.....	±1.0°F (±0.5°C)
Pt RTD and Ni RTD, mid-range.....	±0.75°F (±0.4°C)

**Conduit Connection Threads** ..... 1/2-inch – 14 NPSMI

**Housing** ..... Standard NEC approved 2 x 4 inch (5 x 10 cm) utility box with 1/2 inch (13 mm) knockouts

**Probe Material** ..... 0.028 Wall SAE J526 ZTEW or Galvan steel tubing

# Standard Duct Temperature Sensor Ordering

Application	Description	Output Signal	Part Number	Range	Data Sheet		
Duct Averaging	Duct Averaging Sensor with 16 ft. Probe	Platinum 1k $\Omega$ 375 alpha	544-342-16	Controller Dependent	149-261P25		
	Duct Averaging Sensor with 18 in. Probe		544-343-18		149-261P25		
	Duct Averaging Sensor with 24 ft. Probe		544-342-24		149-261P25		
	Duct Averaging Sensor with 24 in. Probe		544-343-24		149-261P25		
	Duct Averaging Sensor with 36 in. Probe		544-343-36		149-261P25		
	Duct Averaging Sensor with 48 in. Probe		544-343-48		149-261P25		
	Duct Averaging Sensor with 8 ft. Probe		544-342-8		149-261P25		
	Duct Averaging Sensor with 16 ft. Probe	4-20 mA	533-380-16	20 to 120F	149-263P25		
	Duct Averaging Sensor with 18 in. Probe		535-490-18		149-263P25		
	Duct Averaging Sensor with 24 ft. Probe		533-380-24		149-263P25		
	Duct Averaging Sensor with 24 in. Probe		535-490-24		149-263P25		
	Duct Averaging Sensor with 36 in. Probe		535-490-36		149-263P25		
	Duct Averaging Sensor with 48 in. Probe		535-490-48		149-263P25		
	Duct Averaging Sensor with 8 ft. Probe		533-380-8		149-263P25		
	Duct Averaging Sensor with 16 ft. Probe	Nickel 1k $\Omega$ @ 32F	QAM2020.500	Controller Dependent	149-916		
	Duct Averaging Sensor with 24 ft. Probe		QAM2020.750		149-916		
	Duct Averaging Sensor with 24 ft. Probe	Nickel 1k $\Omega$ @ 70F	QAM2021.750		149-916		
	Duct Averaging Sensor with 18 in. Probe	NTC 100k $\Omega$ Type 2	540-244-18		149-916		
	Duct Averaging Sensor with 36 in. Probe		540-245-36		149-916		
	Duct Averaging Sensor with 72 in. Probe		540-246-72		149-916		
	Duct Averaging Sensor with 16 ft. Probe	NTC 10k $\Omega$ Type 2	QAM2030.500		149-916		
	Duct Averaging Sensor with 16 ft. Probe	NTC 10k $\Omega$ Type 3	QAM2032.500		149-916		
	Duct Averaging Sensor with 24 ft. Probe	NTC 10k $\Omega$ Type 2	QAM2030.750		149-916		
	Duct Averaging Sensor with 24 ft. Probe	NTC 10k $\Omega$ Type 3	QAM2032.750		149-916		
	Duct Averaging Sensor with 8 ft. Probe	NTC 10k $\Omega$ Type 2	QAM2030.250		149-916		
	Duct Averaging Sensor with 8 ft. Probe	NTC 10k $\Omega$ Type 3	QAM2032.250		149-916		
	Duct Averaging Sensor with 16 ft. Probe	Platinum 1k $\Omega$ 385 alpha	QAM2012.500		149-916		
	Duct Averaging Sensor with 24 ft. Probe		QAM2012.750		149-916		
Duct Averaging Sensor with 8 ft. Probe	QAM2012.250		149-916				
Duct Point	Duct Temp Sensor with 18" Probe	Platinum 1k $\Omega$ 375 alpha	544-339-18		Controller Dependent	149-916	
	Duct Temp Sensor with 4" Probe		544-339-4			149-916	
	Duct Temp Sensor with 8" Probe		544-339-8			149-916	
	Duct Temp Sensor with 18" Probe	4-20 mA	533-376-18			20 to 120F	149-263P25
	Duct Temp Sensor with 18" Probe		533-377-18			70 to 220F	149-263P25
	Duct Temp Sensor with 18" Probe		544-560-18			4 to 122F	149-263P25
	Duct Temp Sensor with 4" Probe		533-376-4			20 to 120F	149-263P25
	Duct Temp Sensor with 4" Probe		533-377-4			70 to 220F	149-263P25
	Duct Temp Sensor with 4" Probe		544-560-4			4 to 122F	149-263P25
	Duct Temp Sensor with 8" Probe		533-376-8			20 to 120F	149-263P25
	Duct Temp Sensor with 8" Probe		533-377-8			70 to 220F	149-263P25
	Duct Temp Sensor with 8" Probe		544-560-8			4 to 122F	149-263P25
	Duct Temp Sensor with 18" Probe		Nickel 1k $\Omega$ @ 32F			QAM2020.045	Controller Dependent
	Duct Temp Sensor with 4" Probe	QAM2020.010		149-915			
	Duct Temp Sensor with 8" Probe	QAM2020.020		149-915			
	Duct Temp Sensor with 18" Probe	Nickel 1k $\Omega$ @ 70F	QAM2021.045	149-915			
	Duct Temp Sensor with 8" Probe		QAM2021.020	149-915			
	Duct Temp Sensor with 18" Probe		NTC 100k $\Omega$ Type2	535-741-18		149-262P25	
	Duct Temp Sensor with 4" Probe (2" x 4" box)	535-741-4		149-262P25			
	Duct Temp Sensor with 4" Probe (bracket mount)	536-811		149-134P25			
	Duct Temp Sensor with 8" Probe	535-741-8		149-262P25			
	Duct Temp Sensor with 18" Probe	NTC 10k $\Omega$ Type 2	QAM2030.045	149-915			
	Duct Temp Sensor with 18" Probe	NTC 10k $\Omega$ Type 3	QAM2032.045	149-915			
	Duct Temp Sensor with 4" Probe	NTC 10k $\Omega$ Type 2	QAM2030.010	149-915			
	Duct Temp Sensor with 4" Probe	NTC 10k $\Omega$ Type 3	QAM2032.010	149-915			
	Duct Temp Sensor with 8" Probe	NTC 10k $\Omega$ Type 2	QAM2030.020	149-915			
	Duct Temp Sensor with 8" Probe	NTC 10k $\Omega$ Type 3	QAM2032.020	149-915			
	Duct Temp Sensor with 18" Probe	Platinum 1k $\Omega$ 385 alpha	QAM2012.045	Controller Dependent		149-915	
Duct Temp Sensor with 4" Probe	QAM2012.010		149-915				
Duct Temp Sensor with 8" Probe	QAM2012.020		149-915				

## Flush Mount Room Temperature Sensors — Various Outputs



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



Plastic Flush Mount Sensor



Metal Flush Mount Sensor



Button Sensor with Wall Plate



Button Sensor without Wall Plate

### Description

Flush Mount Room Temperature Sensors provide a resistance signal to the controller that varies proportionally with temperature. The sensors are available with Platinum 1k  $\Omega$  375, NTC 100k  $\Omega$  Type 2, or NTC 10k  $\Omega$  Type 2 passive output signals.

The wall plate version is designed to mount to a 2-inch  $\times$  4-inch electrical box. The tamper-proof screws used to install the sensor to the utility box protects the sensor from removal by unauthorized personnel. The sensors may be painted after installation.

### Features

- Tamper-proof screws
- Can be painted after installation
- Designed for mounting to a 2  $\times$  4 electrical box
- Option of brushed stainless steel finish or beige or white plastic (except for button sensor)

### Applications

Flush mount temperature sensors are used to monitor air temperature throughout the facility. Flush mounted sensors are ideally suited to high traffic areas and in facilities where vandalism / tampering is a concern.

# Flush Mount Temperature Sensor Specifications

**Output Signals** ..... Changing Resistance

**10K Ohm Thermistor**  
 Calibration Point Factory Setting..... 77°F (25°)  
 Accuracy..... ±0.5°F (±0.3°C)  
 Resistance Value @ Cal. Temp..... 10k

**100K Ohm Thermistor**  
 Calibration Point..... 77°F (25°)  
 Accuracy..... ±0.5°F (±0.3°C)  
 Resistance Value @ Cal. Temp..... 100k Ohm

**1K Ohm RTD (375 alpha)**  
 Calibration Point..... 32°F (0°)  
 Accuracy..... ±0.54°F (±0.3°C)  
 Resistance Value @ Cal. Temp..... 1K Ohm

## Flush Mount Temperature Sensor Product Ordering

Application	Description	Output Signal	Part Number	Range	Data Sheet
Room Temp	Button Style Room Temp Sensor without Wall Plate	Platinum 1k Ω 375 alpha	<b>QAA1011.AASU</b>	Controller Dependent	149-471
	Button Style Room Temp Sensor with Wall Plate		<b>QAA1011.AATU</b>		149-471
	Flush Mount Room Temp Sensor Beige Plastic		<b>544-374A</b>		149-956
	Flush Mount Room Temp Sensor White Plastic		<b>544-374B</b>		149-956
	Flush Mount Room Temp Sensor Metal		<b>544-973</b>		149-956
	Flush Mount Room Temp Sensor Beige Plastic	NTC 100k Ω Type 2	<b>536-784A</b>		149-956
	Flush Mount Room Temp Sensor White Plastic		<b>536-784B</b>		149-956
	Flush Mount Room Temp Sensor Metal		<b>536-984</b>		149-956
	Flush Mount Room Temp Sensor Beige Plastic	NTC 10k Ω Type 2	<b>536-994A</b>		149-956
	Flush Mount Room Temp Sensor White Plastic		<b>536-994B</b>		149-956
	Flush Mount Room Temp Sensor Metal		<b>540-984</b>		149-956

E-20

Sensors

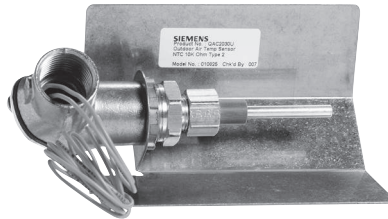
## Outdoor and Surface Temperature Sensors — Various Outputs



Energy & Atmosphere



Indoor Environmental Quality



Outdoor Temperature Sensor



Pipe Surface Temperature Sensor

### Description

Standard temperature Sensors monitor and transmit changes in temperature to the building control system. Specific devices within the range are compatible with most North American building automation systems. All sensors incorporate precision temperature sensing elements to accurately and reliably measure temperature.

### Features

- Variety of output signals available
- Outdoor sensors are ruggedly constructed for use in all climates
- Responsive to temperature change
- Accurate and reliable indication of temperature
- Simple installation requires no special tools

### Applications

Outdoor temperature sensors are used to monitor the temperature of outdoor air. This variable is often used in a variety of HVAC control strategies, including outdoor reset and building ventilation.

Pipe surface temperature sensors are often used in place on immersion type sensors, particularly in cases where sensor installation occurs after the system is filled.

E-21

Sensors

## Standard Outdoor Temperature Sensor Specifications

### Output Signals

Active.....	4-20mA
Passive.....	Pt 1k $\Omega$ (375 alpha)
	Pt 1k $\Omega$ (385 alpha)
	Ni 1k $\Omega$ @32F
	Ni 1k $\Omega$ @70F
	NTC 100k $\Omega$
	NTC 10k $\Omega$ Type II
	NTC 10k $\Omega$ Type III

### Accuracy

NTC Thermistors, mid-range.....	$\pm 1.0^{\circ}\text{F}$ ( $\pm 0.5^{\circ}\text{C}$ )
Pt RTD and Ni RTD, mid-range.....	$\pm 0.75^{\circ}\text{F}$ ( $\pm 0.4^{\circ}\text{C}$ )

## Standard Outdoor Temperature Sensor Product Ordering

Application	Output Signal	Part Number	Range	Data Sheet
Outdoor Air Temp Sensor	Platinum 1k $\Omega$ 375 alpha	<b>544-578</b>	Controller Dependent	149-261P25
	4-20 mA	<b>536-768</b>	-58 to 122F	149-263P25
	Nickel 1k $\Omega$ @ 32F	<b>QAC2020U</b>	Controller Dependent	149-920
	Nickel 1k $\Omega$ @ 70F	<b>QAC2021U</b>		149-920
	NTC 100k $\Omega$ Type 2	<b>536-778</b>		149-262P25
	NTC 10k $\Omega$ Type 2	<b>QAC2030U</b>		149-920
	NTC 10k $\Omega$ Type 3	<b>QAC2032U</b>		149-920
	Platinum 1k $\Omega$ 385 alpha	<b>QAC2012U</b>		149-920
Surface Mount Pipe Temp	Platinum 1k $\Omega$ 375 alpha	<b>544-089</b>	Controller Dependent	149-261P25
	4-20 mA	<b>536-780</b>	30 to 250F	149-263P25
	Nickel 1k $\Omega$ @ 32F	<b>QAD2020U</b>	Controller Dependent	149-918
	Nickel 1k $\Omega$ @ 70F	<b>QAD2021U</b>		149-918
	NTC 10k $\Omega$ Type 2	<b>QAD2030U</b>		149-918
	NTC 10k $\Omega$ Type 3	<b>QAD2032U</b>		149-918
	Platinum 1k $\Omega$ 385 alpha	<b>QAD2012U</b>		149-918

E-22

Sensors

## Outdoor, Surface, Duct Temperature Sensors — Various Outputs



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



QAM21 Series Duct Sensor



QAC31xx Series Outdoor Sensor



QAC2xxx Series Outdoor Sensor



QAD20xx Series Surface Sensor

### Description

Our premium line of temperature sensors are designed to install easily and to bring a sleek modern look to the finished project. These sensors are available with active or passive output signals. The duct sensors with active outputs can be quickly adapted to the application using a number of different, easily-adjustable measurement ranges.

### Features

- Wide choice of products covering all common measurement ranges and output signals
- Precise engineering delivers balanced measurement weighting, short reaction times, and high measuring accuracy
- Innovative housing designs enable simple installation and provide a professional finished appearance

### Applications

Siemens offers a complete line of temperature sensors that are employed throughout the HVAC system to ensure occupant comfort and maximum system efficiency.

E-23

Sensors

# Premium Temperature Sensor Specifications

## Output Signals

Active..... 4-20mA  
 0-10VAC  
 Passive..... Platinum and Nickel 1k Ω (385 alpha)  
 Ni 1k Ω @32F  
 NTC 10k Ω Type II

Refer to Technical Specification Sheets for additional details

## Premium Temperature Sensor Product Ordering

Application	Description	Output Signal	Part Number	Range	Data Sheet
Duct Averaging	Duct Averaging Sensor with 19.5 ft. Probe	Nickel 1k Ω @ 32F	<b>QAM2120.600</b>	Controller Dependent	149-805
	Duct Averaging Sensor with 6.5 ft. Probe		<b>QAM2120.200</b>		149-805
	Duct Averaging Sensor with 6.5 ft. Probe	Platinum 1k Ω 385 alpha	<b>QAM2112.200</b>		149-805
Duct Point	Duct Temp Sensor with 16" Probe	0-10V	<b>QAM2161.040</b>	58 to 122F -31 to 95F 32 to 122F (selectable)	149-805
	Duct Temp Sensor with 16" Probe	4-20 mA	<b>QAM2171.040</b>		149-805
	Duct Temp Sensor with 16" Probe	Nickel 1k Ω @ 32F	<b>QAM2120.040</b>	Controller Dependent	149-805
	Duct Temp Sensor with 16" Probe	NTC 10k Ω Type 2	<b>QAM2130.040</b>		149-805
	Duct Temp Sensor with 16" Probe	Platinum 1k Ω 375 alpha	<b>QAM2112.040</b>		149-805
Outdoor Air Temp		0-10V	<b>QAC3161</b>	-58 to 122F	149-808
		4-20 mA	<b>QAC3171</b>		149-808
		NTC 10k Ω Type 2	<b>QAC2030</b>	Controller Dependent	149-808
		Platinum 1k Ω 375 alpha	<b>QAC2012</b>		149-808
		Nickel 1k Ω @ 32F	<b>QAC22</b>		149-808
Surface Mount Pipe Temp	Pipe Temp Sensor	NTC 10k Ω Type 2	<b>QAD2030</b>		149-806
	Pipe Temp Sensor	Platinum 1k Ω 375 alpha	<b>QAD2012</b>		149-806

E-24

Sensors



## Room/Outdoor Relative Humidity and Relative Humidity/Temperature Sensors



Energy & Atmosphere



Indoor Environmental Quality



AQY2010  
Remote Sensing Cable  
Shown with QFA3100.



QFA3100 Series  
Outdoor Air Relative Humidity and  
Relative Humidity/Temperature Sensor.



AQF3100  
Sunshield for Sensor.  
Sold Separately.

### Description

The QFA Series Outdoor Air Relative Humidity and Relative Humidity/Temperature Sensors monitor and transmit changes in humidity and temperature to the building control systems. Standard models available are 2% and 2% certified, for both humidity only and combination humidity with temperature sensing. Sensors are offered with either 4 to 20 mA or 0 to 10 Volt output signals.

### Features

- 4 to 20 mA or 0 to 10 Vdc output signals
- High degree of accuracy
- Removable, replaceable sensing tip sold separately on B-39
- "D" suffix models include LCD Display\*

\* Units with display are not intended for outdoor use.

### Applications

The QFA Series Relative Humidity and Relative Humidity/Temperature Sensors are especially suited for applications where precise, stable humidity sensing is required.

For outdoor applications, an AQF 3100 sunshield is required (sold separately).

# QFAx1 Specifications

## General

**Installation**..... 18 AWG cable length shared in conduit with other sensor wiring 750 ft. (229 m) max

**Connections** ..... Screw Terminals

**Dimensions**

Outdoor Air Probe..... 6" O.D. x 3.3" L (15 mm O.D. x 84 mm L)  
 Outdoor Air Housing..... 3.1" L x 2.3" W x 1.5" D  
 (80 mm L x 60 mm W x 40 mm D)

Shield (mounted)..... 3.43" H x 3.5" W x 4.1" D  
 (87 mm L x 89 mm W x 104 mm D)

**Voltage Requirement**..... 13.5 to 35 Vdc and 24 Vac ( for sensors with 0-10 Vdc outputs)

**Material Type**..... Polycarbonate plastic

**CE and UL listed**.....UL 873 standard for Temperature Indicating and Regulating Equipment

## Humidity Element

**Operating Range**..... 0 to 100% RH

**Measurement Range** ..... 0 to 95% RH

**Accuracy at Room Temperature (73°F, 20°C)**.....±2% RH, 0-95% RH

**Operating Temperature** .....-31 to +140°F (-35 to +60°C)

**Temperature Effect**.....Less than 0.1% per degree C

**Sensing Element**..... Capacitive humidity sensing element

**Output Signal**  
 RH only units... 4 to 20 mA or 0 to 10 Vdc, 0 -100% Linear, Proportional  
 RH & T units... 4 to 20 mA or 0 to 10 Vdc, 0 -100% Linear, Proportional

**Polarity Protection**..... Yes

## Temperature Element (for Combination RH/T Units Only)

Application	Temperature
Operating Temperature Jumper Selectable	32 to 122°F (0 to 50°C) or -31 to +95°F (-35 to +35°C) 32 to 122°F (0 to 50°C) or -31 to +140°F (-35 to +60°C)
Time Constant at 0 to 50°C and 10 to 80% RH	Approx. 20 seconds in moving air
Accuracy	at 59 to 95°F (15 to 35°C): ±0.8 K
	at 31 to 122°F (-35 to +50°C): ±1 K
	at 31 to 140°F (-35 to +60°C): ±1 K
Output Signal	4 to 20 mA or 0 to 10 Vdc, 0 -100% linear, proportional, (terminal U2)
Calibration Adjustments	None

## QFAx1 Series Product Ordering

Application	RH	Description	Part No.
Room/Outdoor Air Humidity	2%	0 to 10 Vdc	QFA3100
Room/Outdoor Air Humidity	2%	4 to 20 mA	QFA3101
Room/Outdoor Air Humidity & Temperature	2%	0 to 10 Vdc / Temp 0 to 10 Vdc	QFA3160
Room Air Humidity & Temperature	2%	0 to 10 Vdc / Temp 0 to 10 Vdc with Display	QFA3160D
Room/Outdoor Air Humidity & Temperature	2%	4 to 20 mA / Temp 4 to 20 mA	QFA3171
Room Air Humidity & Temperature	2%	4 to 20 mA / Temp 4 to 20 mA with Display	QFA3171D
Room/Outdoor Air Humidity & Temperature	2%	4 to 20 mA / Temp 4 to 20 mA (Certified)	QFA4171
Room Air Humidity & Temperature	2%	4 to 20 mA / Temp 4 to 20 mA (Certified) with Display	QFA4171D
Room Outdoor Air Humidity & Temperature	2%	0 to 10 Vdc, Temp 0 to 10 Vdc (Certified)	QFA4160
Room Air Humidity & Temperature	2%	0 to 10 Vdc, Temp 0 to 10 Vdc (Certified) with Display	QFA4160D

## QFAx1 Series Accessories

Description	Part No.
Outdoor Air Sunshield	AQF3100
Remote Sensing Cable, 10 Foot	AQY2010
Remote Sensing Cable, 30 Foot	AQY2030

## Duct Relative Humidity/Temperature Sensors



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



QFM Series Duct Relative Humidity Sensor.



QFM Series Duct Relative Humidity and Relative Humidity/Temperature Sensor.

### Description

The QFM Series Duct Relative Humidity and Relative Humidity/Temperature Sensors monitor and transmit changes in humidity and temperature to the building control systems. Several models are available for humidity only (in 5%, 2% and 2% certified) or for humidity and temperature sensing (also in 5%, 2% and 2% certified versions). The humidity only units are available in either 4 to 20 mA or 0 to 10 Volt signal versions. Combination humidity and temperature units are also available in either dual current or voltage versions, transmitting proportional signals back to the controller. Nickel 1000 Ohm (Siemens type) or Platinum 1000 Ohm RTD (385 ALPHA type) temperature outputs on combination versions are also offered.

### Features

- 4 to 20 mA or 0 to 10 Vdc output signals
- High degree of accuracy
- Removable, replaceable sensing tip (2% and 2% certified models)
- Versions with LCD display also available

### Applications

The QFM Series Duct Relative Humidity and Relative Humidity/Temperature Sensors are especially suited for applications where precise, stable humidity sensing is required.

E-27

Sensors

# QFM Series Specifications

## General

**Installation**..... 18 AWG cable length shared in conduit with other sensor wiring 750 ft. (229 m) max

**Connections** ..... Screw Terminals

**Dimensions**  
 Probe..... 0.6" O.D. x 7.2"L (15 mm O.D. x 183 mm L)  
 Housing ..3.1" L x 2.3" W x 1.5" O.D. (80 mm L x 60 mm W x 40 mm D)

**Voltage Requirement**..... 13.5 to 35 Vdc and 24 Vac (for sensors with 0-10 Vdc outputs)

**Input Impedance** (4 to 20 mA versions only) ..... Less than 500 Ohms

**Housing Material Type** .....Polycarbonate plastic, UL 94-5VB rated, suitable for plenum installations

**Housing Protection Class**..... IP 65 (QFM3xxx, QFM4xxx types), IP54 (QFM2xxx types), NEMA 1 (all types)

**Filter Material and Specification** ..... Teflon, 10 micron filter

**Agency Certification**..... UL listed to UL 873 for Temperature Indicating and Regulating Equipment

**CE Conformance** ..... EC Directive on electromagnetic compatibility: 89/336/EEC

## Humidity Element

**Operating Range**..... 0 to 100% RH

**Measurement Range** ..... 0 to 95% RH

**Accuracy at Room Temperature  $\approx$  73°F (20°C):**  
 All types:.....  $\pm$ 5% RH, 0-95% RH ( $\pm$ 3% RH, 30-70% RH)  
 $\pm$ 2% RH, 0-95% RH

**Operating Temperature Jumper Selectable**..... 32 to 122°F (0 to 50°C) or -31 to 95°F (-35 to 35°C) or -31 to 140°F (-35 to 60°C)

**Temperature Effect**..... Less than 0.1% per degree C

**Sensing Element**..... Capacitive humidity sensing element

**Output Signal**  
 RH only units ..... 4 to 20 mA and 0 to 10 Vdc, 0-100% Linear, Proportional  
 RH/T units ..... 0 to 10 Vdc, 0-100% Linear, Proportional

**Polarity Protection**..... Yes

## Temperature Element Specifications (for Combination RH/T Units Only)

	QFM2110 (Platinum) QFM2120 (Nickel)	QFM2160 QFM2171	QFM31xx QFM41xx
<b>Operating Temperature</b>	-31 to +140°F (-35 to +60°C)	-31 to +122°F (-35 to +50°C)	-31 to +158°F (-35 to +70°C)
<b>Time Constant</b>	Approximately 20 seconds in moving air		
<b>Accuracy</b>			
+/-0.6K	—	—	59 to 95° F (15 to 35°C)
+/-0.8K	59 to 95°F (15 to 35°C)	59 to 95°F (15 to 35°C)	31 to 158°F (-35 to +70°C)
+/-1.0K	31 to 140°F (-35 to +60°C)	-31 to +122°F (-35 to +50°C)	—
<b>Output Signal</b>	Platinum 1K Ohm RTD (385) Nickel 1K Ohm RTD (Siemens)	0 to 10 Vdc (QFMx160) 4 to 20 mA (QFMx171)	
<b>Calibration</b>	None		

## QFM Series Product Ordering

Application	Description	Part No.
Duct Humidity 5%	0 to 10 Vdc	QFM2100
Duct Humidity 5%	4 to 20 mA	QFM2101
Duct Humidity 5% & Temperature	0 to 10 Vdc / Temp 1K Ohm Platinum RTD (385 alpha)	QFM2110
Duct Humidity 5% & Temperature	0 to 10 Vdc / Temp 1K Ohm Nickel RTD (L&S Type)	QFM2120
Duct Humidity 5% & Temperature	0 to 10 Vdc / Temp 0 to 10 Vdc	QFM2160U
Duct Humidity 5% & Temperature	4 to 20 mA / Temp 4 to 20 mA	QFM2171
Duct Humidity 2%	0 to 10 Vdc	QFM3100
Duct Humidity 2%	4 to 20 mA	QFM3101
Duct Humidity 2% & Temperature	0-10 Vdc / Temp 1K Ohm Platinum RTD (385 alpha)	QFM3110
Duct Humidity 2% & Temperature	0 to 10 Vdc, Temp 0 to 10 Vdc	QFM3160
Duct Humidity 2% & Temperature	0 to 10 Vdc, Temp 0 to 10 Vdc, w/Display	QFM3160D
Duct Humidity 2% & Temperature	4 to 20 mA / Temp 4 to 20 mA	QFM3171
Duct Humidity 2% & Temperature	4 to 20 mA / Temp 4 to 20 mA, w/Display	QFM3171D
Duct Humidity	4 to 20 mA (Certified)	QFM4101
Duct Humidity & Temperature	0 to 10 Vdc, Temp 0 to 10 Vdc (Certified)	QFM4160
Duct Humidity & Temperature	4 to 20 mA / Temp 4 to 20 mA (Certified)	QFM4171

## Electronic Room Hygrostats



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



QFA1000 Electronic Room Hygrostat  
with Concealed Setpoint.



QFA1001 Electronic Room  
Hygrostat with Exposed Setpoint.

### Description

The room hygrostats are used for controlling and monitoring relative humidity in ventilation or air conditioning facilities. They ensure room humidity control within the selectable range of 30 to 90% relative humidity by controlling humidification or dehumidification equipment. They can also be used for monitoring minimum or maximum humidity levels.

### Features

- Hygrostat with single-pole microswitch
- Humidity measuring element made of stabilized plastic
- Setpoint knob for the upper switching point
- Mounts directly on the wall or on a recessed conduit box

### Applications

For controlling humidification and dehumidification equipment.

E-29

Sensors

## QFA Series Electronic Room Hygrostats Specifications

**Setpoint Range** ..... 30 to 90% rh  
**Temperature**  
 Operating Range ..... 32°F to 122°F (0°C to 50°C)  
**Humidity Measuring Element** ..... Stabilized Plastic Band  
**Control Mode** ..... Two-position  
**Time Constant** ( $v = 0.2 \text{ m/s}$ ) ..... Approx. 5 minutes  
**Setting Accuracy** ..... + 5% rh (can be improved by calibrating on site)  
**Temperature Influence** ..... + 0.5% rh/K  
**Humidity Calibration** ..... at 55% rh, 73°F (23°C)  
**Long-term Stability** ..... Approximately -1.5% rh/a  
**Type of Switch** ..... Potential-free Microswitch (SPDT)  
**Contact Rating**  
 Maximum ..... 5 (3) A, 24 Vac/Vdc  
 Minimum ..... 100 mA, 24 Vac/Vdc

**Degree of Housing Protection** ..... IP 20 to EN 60 529  
**Safety Class** ..... II to EN 60 730  
**Electrical Connection**  
 Screw Terminals ..... For Maximum 2 x 16 AWG  
**Materials and Colors**  
 Base ..... PPS, Fortron, Fiberglass Reinforced, Black  
 Cover ..... PC Lexan 940, Pure White  
 Humidity Measuring Element ..... Plastic  
**Agency Approvals** ..... UL listed for UL873  
 cUL Canadian Standard C22.2 No. 24-93  
 CE conformity  
 EMC directive 89/336/EEC  
**Weight** ..... 3.17 ounces (0.090 kg)

## QFA Series Electronic Room Hygrostats Product Ordering

Description	Control Range	Type of Control	Part No.
Room	30 to 90% RH	Humidity Switch with Concealed Setpoint	<b>QFA1000</b>
Room	30 to 90% RH	Humidity Switch with Exposed Setpoint	<b>QFA1001</b>

### Accessories & Service Kits

E-51

E-30

Sensors

## Electronic Duct Hygrostats



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



QFM81.21 Electronic Duct Hygrostat  
with Internal Setpoint.



QFM81.2 Electronic Duct Hygrostat  
with External Setpoint.

### Description

On/off hygrostat with microswitch, and temperature-compensated humidity sensor for temperature-independent humidity measurements.

### Features

- Stabilized sensing strip  
(good linearity, very stable even at high humidity,  
insensitive to dust and contaminated air)
- Can be mounted in ventilating ducts or rooms

### Applications

For controlling humidification and dehumidification equipment.

E-31

Sensors

## QFM81 Electronic Duct Hygrostats Specifications

**Setpoint Range** ..... 30 to 90% rh

**Control Mode** ..... On/off

**Type of Switch** ..... Potential-free Microswitch (SPDT)

**Contact Rating**

Maximum ..... 5 (3) A, 24 Vac/Vdc

Minimum ..... 100 mA, 24 Vac/Vdc

**Temperature Influence** ..... Compensated

**Long-term Stability** ..... Approximately -1.5% rh/a

**Balancing** ..... At 55% rh, 73°F (23°C)

**Time Constant** ( $v = 0.2$  m/s)..... Approx. 3 minutes

**Permissible Air Velocity** ..... 10 m/s

**Permissible Ambient Temperature**

Operation ..... 32°F to 158°F (0°C to 70°C)

Storage/transport ..... -22°F to 158°F (-30 to 70°C)

**Degree of Housing Protection**

FM81.2 ..... IP 30 to EN 60 529

QFM81.21 ..... IP 55 to EN 60 529

**Safety Class** ..... II to EN 60 730

**Electrical Connection**

Screw Terminals ..... 20 AWG Minimum  
2 x 16 AWG Maximum

**Materials and Colors**

Sensing Element ..... Polymer

Casing with Stem ..... PPS, Fortron 1140L6, Fiberglass Reinforced

Cover ..... PC Lexan 940

Transparent Cover (QFM81.21) ..... PC Makrolon 2014R

**Agency Approvals** ..... UL listed for UL873  
cUL Canadian Standard C22.2 No. 24-93

**Weight** ..... Approx. 12 ounces (0.34 kg)

## QFM81 Electronic Duct Hygrostats Product Ordering

Description	Control Range	Type of Control	Part No.
Duct	15 to 95% RH	Humidity Switch with External Setpoint	<b>QFM81.2</b>
Duct	15 to 95% RH	Humidity Switch with Internal Setpoint	<b>QFM81.21</b>

**NOTE:** Includes a mounting flange (for duct or wall mounting) and a sealing ring (for duct mounting).

### Accessories & Service Kits

E-51

E-32

Sensors



## Condensation Sensor



QXA2601 Condensation Sensor.

### Description

The QXA2601 Condensation Sensor is used to avoid damage due to condensation on chilled ceilings and in HVAC installations.

It operates on AC/DC 24V and has a NO/NC changeover dry contact relay output.

- 1 Amp @ 24 Vac
- 0.5 Amp @ 24 Vdc

### Features

- Comes complete with a strap-on band for pipe diameters from 0.5 to 4 inches (12.7 to 102 mm), and thermal conductive paste
- LED status indicator

### Applications

For monitoring condensation in buildings that are running chilled beam or chilled ceilings or in heating, ventilation, or air conditioning installations.

The condensation sensor is used

- to prevent condensation on chilled ceilings
- to prevent condensation at critical spots of HVAC installations or buildings (in air ducts, near fans, and so on)
- as a condensation switch

In general, the condensation sensor is for use on all kinds of surfaces where condensation must be avoided.

# QXA2601 Condensation Sensor Specifications

## Power Supply G (G+), G0 (G-)

Operating Voltage..... AC/DC 24V + 20%  
 Frequency ..... 50/60 Hz  
 Power consumption..... Maximum 1 VA

**Switching Point on Humidity Increase** ..... 95% +/- 4% rh

**Switching Differential (Fixed)** ..... Approximately 5% rh

## Response Time in Static Air

From 80 to 99% rh ..... Maximum 3 minutes  
 From 99 to 80% rh ..... Maximum 3 minutes

**Condensation** ..... Maximum 30 minutes

## Output Q11, Q12, Q14

Relay Output ..... NO/NC Changeover Dry Contact  
 Current Range at AC/DC 24V ..... 0.02 to 1 (1) A  
 Starting Current at AC/DC 24V..... < /- 10 A for </- 20 ms  
 Switching Capacity..... Minimum AC/DC 1V, 1 mA  
 Maximum A/DC, 48V, 0.5 A

**Degree of Protection of Housing** ..... IP 40 to EN 60529

**Safety Class** ..... III to EN 60 730

## Connections

Mechanical ..... Strap-on Band for Pipe Diameter  
 0.39 to 3.94 inches (10 to 100 mm)

Electrical  
 Screw Terminals for ..... (2) 16 AWG or (1) 14 AWG  
 (max 2 x 1.5 mm<sup>2</sup> or 1 x 2.5 mm<sup>2</sup>)

## Environmental Conditions

Operation to ..... IEC 60721-3-3  
 Climatic Conditions ..... Class 3K5  
 Temperature (Housing & Electronics)... -23 to 122°F (-5 to 50°C)  
 Humidity..... 5 to 95% rh (Non-condensing)  
 Mechanical Conditions ..... Class 3M2

Transport to ..... IEC 60721-3-2  
 Climatic Conditions ..... Class 2K2  
 Temperature (Housing & Electronics)..... -13 to 150°F (-25 to 60°C)  
 Humidity ..... <95% rh  
 Mechanical Conditions ..... Class 2M2

**Housing Materials and Colors** ..... Thermoplastics, pure-white

## Product Safety

Automatic Electrical Controls for  
 Domestic Use and Similar Applications..... EN 60730-1

## Electromagnetic Compatibility

Immunity ..... EN 61000-6-2  
 Emissions..... EN 61000 6-3

## CE Conformity

Electromagnetic Compatibility ..... 2004/108/EC  
 Low-voltage Directive ..... 2006/95/EC

**Weight** ..... 4.4 ounces (0.126 kg) w/Packaging

## QXA2601 Product Ordering

Description	Part No.
Condensation Sensor	QXA2601

## Room CO<sub>2</sub>/VOC/Temperature/RH



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



QPA2060D Q Series  
Room Carbon Dioxide & Temperature Sensor.

### Description

The QPA Series Room Carbon Dioxide Sensors monitor and transmit changes in CO<sub>2</sub> to the building control systems. No calibration of the CO<sub>2</sub> sensor is necessary — these microprocessor-based units consist of a non-dispersive infrared CO<sub>2</sub> sensor that experiences less than 1% drift per year for the first two years of operation and negligible drift thereafter. All variants for CO<sub>2</sub> and combination versions with Temperature or VOC deliver 0 to 10 Volt or 0 to 5 Volt (field selectable) proportional signals to the controller.

### Features

- LCD display option
- Various models:  
CO<sub>2</sub>  
CO<sub>2</sub>/VOC  
CO<sub>2</sub>/Temp  
CO<sub>2</sub>/Temp/RH
- Built-in test function for troubleshooting
- Jumper selectable °C/°F units for temp models w/display
- **No Logo** versions available
- QPA2080 and QPA2080D include multiple resistance temperature elements

### Applications

These units are especially suited for applications where precise, stable CO<sub>2</sub> sensing is required.

E-35

Sensors

## QPA Series Specifications

### General

**Installation**..... 18 AWG cable length shared in conduit with other sensor wiring 750 ft. (229 m) max

**Connections** ..... Screw terminals

**Dimensions** ..... 3.94" H x 3.54" W x 1.65" D  
(100 mm x 90 mm x 42 mm)

**Voltage Requirement**..... 13.5 to 35 Vdc

**Housing Protection Class**..... NEMA 1 (all types)

### CO<sub>2</sub> Element

**Operating Range**..... 0 - 2000 ppm

**Accuracy at Room Temperature ≈ 73°F (20°C)** ..... +2% mV

**Operating Temperature** ..... -23 to +113°F (-5 to +45°C)

**Temperature Effect**..... Less than 0.1% per degree C

**Sensing Element**..... NDIR CO<sub>2</sub> sensing module

**Output Signal** ..... 0 to 10 Vdc, 0-100% Linear, Proportional

**Polarity Protection**..... Yes

**Permissible Air Velocity in the Room** ..... <26.2 ft./s

### Temperature Element (for Combination CO<sub>2</sub>/T unit only)

**Operating Temperature** ..... 23 to 113°F (-5 to 45°C)

**Time Constant** ..... <1 minute

**Accuracy** ..... ±0.8K

**Output Signal** ..... 0-10 volts

**Calibration** ..... None Required

### Humidity Element

**Measuring Range**..... 0 to 100% RH

**Accuracy** ..... ±5% RH

## QPA Series Product Ordering

Application	Description	Part No.
CO2	0 to 5 V or 0 to 10 V	QPA2000
CO2 and VOC	0 to 5 V or 0 to 10 V	QPA2002
CO2 and VOC	0 to 5 V or 0 to 10 V, with Display	QPA2002D
CO2 and Temp (Active)	0 to 5 V or 0 to 10 V	QPA2060
CO2 and Temp (Active)	0 to 5 V or 0 to 10 V, with Display	QPA2060D
CO2, Temp and RH (Active)	0 to 5 V or 0 to 10 V	QPA2062
CO2, Temp and RH (Active)	0 to 5 V or 0 to 10 V, with Display	QPA2062D
CO2 and Temp (Passive)*	0 to 5 V or 0 to 10 V T (Selectable R)	QPA2080
CO2 and Temp (Passive)*	0 to 5 V or 0 to 10 V, T (Selectable R) with Display	QPA2080D

\*Units include interchangeable resistance elements for LG-Ni1000, Pt1000, Pt100, and NTC 10K Ohm.

E-36

Sensors

Accessories & Service Kits

E-51

## Duct CO<sub>2</sub>/VOC/Temperature/RH



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



QPM 2100 CO<sub>2</sub> only Sensor.

### Description

The QPM Series Duct CO<sub>2</sub> Sensors monitor and transmit changes in CO<sub>2</sub> to the building control systems. Several models are available for CO<sub>2</sub> only, CO<sub>2</sub>/Temp, CO<sub>2</sub>/Temp/RH and CO<sub>2</sub>/VOC. All variants for CO<sub>2</sub> and combination versions with Temperature or VOC deliver 0 to 10 Volt to 5 Volt (field selectable) proportional signals to the controller.

No calibration of the CO<sub>2</sub> sensor is necessary — these microprocessor-based units consist of an NDIR sensor that experiences less than 1% drift per year for the first two years of operation and negligible drift thereafter.

### Features

- LCD display option
- Various models:
  - CO<sub>2</sub>
  - CO<sub>2</sub>/VOC
  - CO<sub>2</sub>/Temp
  - CO<sub>2</sub>/Temp/RH
- Jumper selectable °C/°F units for temp models w/display
- **No Logo** versions available
- QPM2080 include multiple resistance temperature elements

### Applications

These units are especially suited for applications where precise, stable CO<sub>2</sub> sensing is required.

E-37

Sensors

## QPM Series Specifications

### General

**Installation**..... 18 AWG cable length shared in conduit with other sensor wiring 750 ft. (229 m) max.

**Connections** ..... Screw terminals

**Voltage Requirement**..... 13.5 to 35 Vdc  
Q Series sensors with 0-10 Vdc outputs can also operate on 24 Vac

**Input Impedance (4 to 20 mA versions only)** ..... Less than 500 Ohms

### CO<sub>2</sub> Element

**Operating Range**..... 0 - 2000 ppm

**Accuracy at Room Temperature ≈ 73°F (20°C)** .....+2% mean value

**Operating Temperature** ..... -31 to +113°F (-35 to +45°C)

**Temperature Effect** .....Less than 0.1% per degree C

**Sensing Element**..... NDIR CO<sub>2</sub> sensing module

**Output Signal** ..... 0 to 10 Vdc, 0-100% linear, proportional

**Polarity Protection**.....Yes

**Permissible Air Velocity in the Duct** .....<26.2 ft./s

### Temperature Element (for Combination CO<sub>2</sub>/T unit only)

**Operating Temperature** ..... -31 to +113°F (-35 to +45°C)

**Time Constant** .....<1 min

**Accuracy** ..... ±1K

**Output Signal** .....0 to 10 Volt

**Calibration** ..... None Required

## QPM Series Product Ordering

Application	Description	Part No.
Duct Sensor, CO <sub>2</sub>	0 to 5 or 0 to 10 Vdc	QPM2100
Duct Sensor, CO <sub>2</sub>	0 to 5 or 0 to 10 Vdc, No Logo	QPM2100N
Duct Sensor, CO <sub>2</sub> and VOC	0 to 5 or 0 to 10 Vdc	QPM2102
Duct Sensor, CO <sub>2</sub> and VOC	0 to 5 or 0 to 10 Vdc with Display	QPM2102D
Duct Sensor, CO <sub>2</sub> and Temp. (Active)	0 to 5 or 0 to 10 Vdc	QPM2160
Duct Sensor, CO <sub>2</sub> and Temp. (Passive*)	0 to 5 or 0 to 10 Vdc (Selectable Resistance)	QPM2180
Duct Sensor, CO <sub>2</sub> and Temp. (Active)	0 to 5 or 0 to 10 Vdc with Display	QPM2160D
Duct Sensor, CO <sub>2</sub> , RH and Temp. (Active)	0 to 5 or 0 to 10 Vdc	QPM2162
Duct Sensor, CO <sub>2</sub> , RH and Temp. (Active)	0 to 5 or 0 to 10 Vdc with Display	QPM2162D
Duct Sensor, VOC	0 to 5 or 0 to 10 Vdc	QPM1100

\*Units include interchangeable resistance elements for LG-Ni1000, Pt1000, Pt100, and NTC 10K Ohm.

## Accessories & Service Kits

E-51

E-38

Sensors

## Air Differential Pressure Sensors / Switches

**NEW!**



QBM3100 Series



QBM81 Series

### Description

The Siemens QBM Series Air Differential Pressure Devices use a proven sensing technology to deliver accurate and repeatable data in applications that require monitoring of differential pressure.

### Features

- Loop powered 4 to 20 mA output signal (QBE3100)
- SPDT contact output (QBM81)
- Compact construction
- Integral mounting bracket and snap-on cover with a single screw for fast and easy installation
- Resettable zero point for different mounting positions (QBM3100)
- Ultra-low susceptibility to temperature
- No mechanical aging

### Applications

QBM Series Differential Pressure Devices can be used in a wide range of HVAC and general building management applications where differential air pressure monitoring is required.

Typical applications for the QBE3100 include control of variable speed fans in VAV systems and monitoring of pressure differentials in clean room applications.

The QBM81 can be wired NO or NC and provide a digital output with adjustable differential pressure trip point. Common applications include monitoring of air filters and general indication of high/low differential pressure situations.

## QBM Series Air Differential Pressure Specifications

### QBM3100 Series Sensors (4-20mA Output)

Input Power	8 to 33 Vdc
Accuracy	+/-1% Full Scale
Maximum Pressure	TBD
Permitted Media	Air and other non-corrosive gases
Process/Ambient Operating Temp	32°F to 160°F (0°C to 71°C)
Ambient Humidity	Non-condensing
Enclosure	Polycarbonate
Diaphragm	Silicone
Measuring Element	Ceramic

### QBM81 Series Switches (SPDT Relay Output)

Contact Rating	AC 250V, 5A max (3A inductive)*
Maximum Pressure	20" WC
Ambient Operating Temp	-22F to +185F
Humidity (Max)	.90% rh, non-condensing
Permitted Media	Air and other non-corrosive gases
Mounting Orientation	Any
Housing/Cover	Polycarbonate
Diaphragm	Emission free silicone
Bracket	Galvanized Steel

\*Consult local codes for voltages over 24V

## QBM Series Air Differential Pressure Devices Product Ordering

Description	Output Signal	Differential Pressure Range	Part Number
Air DP Sensor	4-20mA	-0.25 to +0.25 inches	<b>QBM3100U025U</b>
	4-20mA	0 to 1 inch	<b>QBM3100U1</b>
	4-20mA	0 to 2.5 inches	<b>QBM3100U2.5</b>
	4-20mA	0 to 5 inches	<b>QBM3100U5</b>
	4-20mA	0 to 10 inches	<b>QBM3100U10</b>
Air DP Switch	SPDT	0.08 to 1.2 inches	<b>QBM81-3</b>
	SPDT	0.2 to 2 inches	<b>QBM81-5</b>
	SPDT	0.4 to 4 inches	<b>QBM81-10</b>

E-40

Sensors



## Very Low Differential Pressure Transducers



Very Low Differential Pressure Transducers.

### Description

The Very Low Differential Pressure Transducers sense differential or gauge (static) pressures and convert pressure difference to a proportional electrical output. The 590 Series is offered with a 0 to 10 Vdc output.

Used in Building Energy Management Systems, these transducers are capable of measuring pressures with the accuracy necessary for proper building pressurization and air-flow control.

The 590 Series Transducers are available in five different air pressure ranges. Static accuracy is  $\pm 1\%$  full scale in normal ambient temperature environments. The units are temperature compensated to less than  $\pm 0.033\%$  FS/ $^{\circ}$ F of thermal error over the temperature range of  $0^{\circ}$ F to  $+150^{\circ}$ F.

### Features

- 10 psi proof pressure on all ranges
- 24 Vac
- 0 to 10 Vdc analog output is compatible with all energy management systems
- Fully protected against reverse wiring
- Internal regulation permits use with unregulated DC power supplies
- 1% accuracy, or better, improves variable air volume system performance
- Meet CE conformance standards
- No field calibration or adjustment necessary

### Applications

The Very Low Differential Pressure Transducers are used for the following applications:

- Heating, Ventilation and Air Conditioning (HVAC)
- Energy Management Systems
- Variable Air Volume (VAV) and Fan Control
- Environmental pollution control
- Static duct and clean room pressures

# 590 Series Specifications

## Temperature

Operating\* ..... 0 to +150°F (-18 to +65°C)  
 Storage..... -40 to +185°F (-40 to +85°C)

\* Operating Temperature limits of the electronics only.  
 Pressure media temperatures may be considerably higher or lower.

## Physical Description

### Case Fire Retardant Glass Filled Polyester

Electrical Connection.....Screw Terminal Strip  
 Pressure Fitting ..... 1/4" Fitting  
 Weight .....3 ounces

## Electrical Data (Voltage)

**Circuit** .....3-wire (Com, Out, Exc)

**Excitation/Output\*\***..... 12 to 30 Vac/0 to 10 Vdc  
 \*\*Zero output factory-set to within ±50 mV (±25 mV for optional accuracies).

**Bi-directional Output at Zero Pressure** .....2.5 Vdc (±50 mV)

**Output Impedance\*\*\*** ..... 100 Ohms  
 \*\*\*Calibrated into a 50K ohm load, operable into a 5000-ohm load or greater.

**Pressure Media**.....Typically air or similar non-conducting gases

# 590 Series Product Ordering

Description	Accuracy	Part No.
Differential Pressure Sensor, 5" WC, 10 Vdc Signal	1%	590-501
Differential Pressure Sensor, 2" WC, 24 Vac, 10 Vdc Signal	1%	590-502
Differential Pressure Sensor, 1" WC, 24 Vac, 10 Vdc Signal	1%	590-503
Differential Pressure Sensor, ±0.25" WC, 24 Vac, 10 Vdc Signal	1%	590-505
Differential Pressure Sensor In Conduit Box, 5" WC, 24 Vac, 10 Vdc Signal	1%	590-506
Differential Pressure Sensor In Conduit Box, 2" WC, 24 Vac, 10 Vdc Signal	1%	590-507
Differential Pressure Sensor In Conduit Box, 1" WC, 24 Vac, 10 Vdc Signal	1%	590-508
Differential Pressure Sensor In Conduit Box, ±0.25" WC, 24 Vac, 10 Vdc Signal	1%	590-510
Differential Pressure Transmitter, 1.0", 0.4%, 4 to 20 mA, Conduit Cover, 24 Vac	0.4%	590-780
Differential Pressure Transmitter, .65", 0.4%, 4 to 20 mA, Conduit Cover, 24 Vac	0.4%	590-781
Differential Pressure Transmitter, 0.5", 0.4%, 4 to 20 mA, Conduit Cover, 24 Vac	0.4%	590-782

E-42

Sensors

## Air Velocity Sensor



Energy &  
Atmosphere



Indoor  
Environmental  
Quality



QVM62.1 Air Velocity Sensor.

### Description

This sensor is used to control the air velocity to a constant value, balance out pressure fluctuations (supply or exhaust air control), or to monitor the flow in air ducts. It is designed with a thin film sensing element and its unique, sleek housing guarantees product recognition. This unit is compatible with all Siemens systems and controllers.

### Features

- Mounting flange allows the installer to vary the probe insertion length into the duct space for best control
- Mounting flange dampening gasket minimizes vibration
- Graduated probe ensures maximum flow accuracy
- Flow directional arrow provides for the most accurate reading
- Connection cable provides mounting flexibility
- Three jumper selectable flow measuring ranges accommodate any application or environment
- Field selectable output (4-20 mA or 0-10V)

### Applications

This sensor is primarily used to set the basic volumetric flow rate for modulating fan control.

## QVM62.1 Sensor Specifications

### Power Supply

Operating Voltage.....	24 Vac +/- 20%
Frequency .....	50/60 Hz
Power Consumption .....	≤ 5 VA (maximum 200 mA)
Output Impedance.....	<20 ohm

### Measuring Data

Measuring Ranges, Adjustable.....	0 to 16 ft/s (0 to 5 m/s) 0 to 33 ft/s (0 to 10 m/s) (factory setting) 0 to 49 ft/s (0 to 15 m/s)
Measuring Accuracy at 68°F (20°C), 45% rh, .....	± 0.7 ft/s 1013 hPa ..... (0.2 m/s + 3% of measured value)
Permissible Air Velocity .....	66 ft/s (20 m/s)
Direction Dependence.....	< 0.3% of measured value at ≤ + 10°
Time Constant $t_{90}$ at 10 m/s.....	4 seconds

### Signal Output U1

Voltage .....	4-20 mA or 0 to 10 Vdc
Current .....	± 1 mA

### Line Length

Permissible Length to Controller at:

20 AWG Copper Cable.....	164 ft (50 m)
18 AWG Copper Cable.....	492 ft (150 m)
16 AWG Copper Cable.....	984 ft (300 m)
Line Length to the Sensor Head .....	3 ft (1 m) (prewired)

### Connections

Mechanical .....	Screw Connection
Electric.....	Screw Terminal, Maximum 2 x 18 AWG

### Degree of Protection

Degree of Protection Provided by Enclosures as per EN 60 529

Transducer .....	IP 42
Sensor head .....	IP 20
Degree of protection as per EN 60 730.....	III

### Climatic Conditions

Temperature .....	23°F to 113°F (-5°C to 45°C)
Humidity (non-condensing) .....	<95% rh
Mechanical Conditions .....	Class 3M2
Chemical Conditions .....	Class 3C2

### Storage (Transducer and Immersion Stem)

Temperature .....	23°F to 113°F (-5°C to 45°C)
Humidity (Non-condensing).....	<95% rh
Mechanical Conditions .....	Class 1M2

**Weight with Packaging** .....12 oz (0.352 kg)

E-44

## QVM62.1 Sensor Product Ordering

Application	Description	Part No.
Air Velocity Sensor	0 to 3000 FPM	QVM62.1

Sensors

Accessories & Service Kits

E-51

## Pitot Tube Sensor Kits



536 Pitot Tube Sensor Kit.

### Description

The Pitot Tube Sensor Kit is used with either static or differential air pressure sensing devices, to measure average static or differential pressure across a duct.

### Features

- Thin steel construction
- Mounting flange is easily bent to conform to round or oval ducts

### Applications

This kit is used in situations where a terminal box manufacturer-supplied sensor (flow pick-up) is not available, or where the existing flow pick-up has been damaged.

E-45

Sensors

## Pitot Tube Sensor Kits Specifications

### Material

Probe.....6061 aluminum  
 Gasket.....1/4-in (6 mm) closed-cell neoprene  
 Tubing .....FR polyethylene  
 Mounting Flange.....26 GA galvanized sheet steel

### Mounting

Screws.....#8 self-tapping  
 1/4-in (6 mm) hex washer head  
 Flange hub .....#10 pan head, slotted

**Dimensions** ..... 1.50" x 3.75"  
 (38 mm x 95 mm)

## Pitot Tube Sensor Kits Product Ordering

Duct Size	Maximum Probe Length	Part No.
6" (152 mm)	5.75" (146 mm)	<b>536-376</b>
8" (203 mm)	7.75" (197 mm)	<b>536-378</b>
10" (254 mm)	9.75" (248 mm)	<b>536-380</b>
12" (305 mm)	11.75" (298 mm)	<b>536-382</b>
14" (356 mm)	13.75" (349 mm)	<b>536-384</b>

E-46

Sensors

## Wet Differential Pressure Sensors **NEW!**



Indoor  
Environmental  
Quality



Energy &  
Atmosphere



QBE3100 Series



QBE3190 Series  
(includes manifold)

### Description

QBE Series Wet Differential Pressure Sensors utilize a well-proven ceramic technology making them an ideal choice across a broad spectrum of applications. These sensors can be ordered individually or pre-assembled with an optional three-valve manifold

### Features

- Loop powered 4 to 20 mA output signal
- Compatible with water and water/glycol mixtures
- Ultra-low susceptibility to temperature
- Maintenance free

### Applications

The QBE Sensor is particularly suitable for use in HVAC systems where continuous monitoring of flow rate or differential pressure across a control valve is required.

## QBE Series Wet Differential Pressure Specifications

**Input Power** ..... 7.5V to 33 Vdc  
**Output Signal** ..... 4 to 20 mA  
**Long-Term Stability** ..... ±0.5% Full Scale  
**Resolution** ..... 0.1% Full Scale  
**Sum of Linearity, Hysteresis and Repeatability** .....  
**Manifold** ..... Aluminum (6061-T6511)  
**Tubing** ..... Copper (UNS C12200)  
**Fitting** ..... Brass (C36000)  
**Valve Stem** ..... High-performance thermoplastic polymer  
**O-rings** ..... Ethylene Propylene Rubber (EPS, EPDM)

**Suitable Process Media** ..... Air, water, water and glycol mixtures  
**Process Temperature (Sensor)** ..... 5°F to 185°F (-15°C to 85°C)  
**Process Temperature (Manifold)** ..... 40°F to 185°F (5°C to 85°C)  
**Ambient Operating Temperature** ..... 5°F to 185°F (-15°C to 85°C)  
**Enclosure** ..... IP65/NEMA 4  
**Electrical Connections** ..... 1/2" FNPT conduit (kit included for non-conduit installations)  
**Process Connections** ..... 1/4" FNPT  
**Mounting Orientation** ..... Any orientation is allowable (avoid orientations that may be susceptible to air pockets)  
**Maximum Working Pressure (Sensor)** ..... 540 PSIG  
**Maximum Working Pressure (Manifold)** ..... 250 PSIG

## QBE Series Wet Differential Pressure Sensor Product Ordering

Description	Output Signal	Differential Pressure Range	Part Number
Wet DP Sensor	4-20mA	0-25 PSID	<b>QBE3100UD25</b>
	4-20mA	0-50 PSID	<b>QBE3100UD50</b>
	4-20mA	0-100 PSID	<b>QBE3100UD100</b>
Wet DP Sensor with 3-Valve Manifold	4-20mA	0-25 PSID	<b>QBE3190UD25</b>
	4-20mA	0-50 PSID	<b>QBE3190UD50</b>
	4-20mA	0-100 PSID	<b>QBE3190UD100</b>

E-48

Sensors



## Pressure Sensors for Liquid and Gas



Sustainable  
Sites



Indoor  
Environmental  
Quality



Energy &  
Atmosphere



Pressure Sensor.

### Description

The 7MF Series Pressure Sensors are suitable for the measurement of static and dynamic positive pressure in HVAC facilities, particularly in hydraulic and pneumatic systems using liquid or gaseous media (steam applications).

The 7MF Series Pressure Sensors are available in several different pressure ranges, from 0-15 psid to 0-300 psid.

### Features

- Piezo-resistive measuring system
- 0 to 10 Vdc and 4 to 20 mA output signals
- Measurement unaffected by changes in temperature
- High temperature stability
- No mechanical aging or creepage
- Excellent EMC characteristics

### Applications

The 7MF Series Pressure Sensors are used for the following applications:

- Heating, Ventilation and Air Conditioning (HVAC)
- Energy Management Systems
- Chiller, Boiler and Steam Applications

# 7MF Specifications

### Power Supply

Supply Voltage ..... DC 16...33 V  
 Max. Voltage Tolerance ..... ±15 % at AC 24 V  
 Current Consumption ..... <4 mA

### Output Signal

4 to 20 mA ..... two-wire connection; power supply DC 10 to 36V  
 0 to 10 V ..... three-wire connection; power supply DC 15 to 36V

### Application Range

..... 0 to 40 bar, refer to table below.

### Accuracy

..... (FS = Full Scale)  
 Total of linearity, hysteresis and reproducibility ..... <±0.3 % FS  
 Zero point offset voltage ..... <30 Mv

### Temperature Drift

TC zero point ..... <±0.015 % FS/K (typically)  
 TC sensitivity ..... <±0.015 % FS/K (typically)

### Response Time

..... <2 ms

### Nominal Pressure

..... Relative pressure as in "Ordering Information" (measurement of difference from ambient pressure)

### Max. Admissible Pressure and Rupture Pressure

..... 3 x scale end value of measuring range (FS) <4 bar  
 ..... 2.5 x scale end value of measuring range (FS) >4 bar

**Media** ..... Neutral and slightly corrosive liquids and gases

Admissible temperature of medium ..... -40 to +239°F (-40 to +125°C)

**Maintenance** ..... Maintenance-free

**Mounting Position** ..... Optional

**Connecting Cable** ..... PVC, length 5 ft., 3 x 0.25 mm<sup>2</sup> stranded wires

**Screwed Fitting** ..... External thread G1/2"

### Operation to Climatic Conditions

Temperature ..... -40 to +85°C  
 Humidity ..... <95% RH

### Storage/transport Climatic Conditions

Temperature ..... -40 to +85°C  
 Humidity ..... <95% RH

### CE conformity to EMC Directive

..... 89/336/EEC

### N474 Conformity to

Australian EMC Framework ..... Radio Communication Act 1992  
 Radio Interference Emission Standard ..... AS/NZS 3548

**Base** ..... Stainless Steel (1.4305)

**Measuring Element** ..... Ceramics diaphragm

**Cover** ..... Stainless Steel (1.4305)

**Sealant** ..... FPM (Viton) spec.

**Shipping Weight** ..... 0.53 lb. (0.24 kg)

E-50

Sensors

## 7MF Series Product Ordering

Pressure Range (psi)	Output Signal	Part No.
0 - 15 PSI	4-20ma	7MF156544BB005EA1
	0-10 V	7MF156544BB105EA1
0 - 30 PSI	4-20ma	7MF156544BE005EA1
	0-10 V	7MF156544BE105EA1
0 - 60 PSI	4-20ma	7MF156544BF005EA1
	0-10 V	7MF156544BF105EA1
0 - 100 PSI	4-20ma	7MF156544BG005EA1
	0-10 V	7MF156544BG105EA1
0 - 150 PSI	4-20ma	7MF156544CA005EA1
	0-10 V	7MF156544CA105EA1
0 - 200 PSI	4-20ma	7MF156544CB005EA1
	0-10 V	7MF156544CB105EA1
0 - 300 PSI	4-20ma	7MF156544CD005EA1
	0-10 V	7MF156544CD105EA1

## Liquid Flow Switches



QVE1900U Liquid Flow Switch.



QVE1901U Liquid Flow Switch.

### Description

The QVE1900U Flow Switch is for liquids in piping 1-1/4-inch to 8-inch (20 mm to 200 mm) diameter. The QVE1901U Flow Switch is for liquids in piping 3/4-inch to 8-inch (20 mm to 200 mm) diameter.

These two units have the same general principle of operation, although their switching mechanisms are different. Both detect the flow of the medium to be monitored by means of a paddle. If the flow velocity in the piping falls below the adjusted switch-off value, the paddle in the QVE1900U model actuates a micro-switch with a dry contact (S.P.D.T.), which closes the contact. When the flow velocity reaches the switch-on value again, the opposite contact closes. In the QVE1901U model, the switching is achieved through a system of two opposite magnets and a reed contact. The switching point is adjustable on both devices.

### Features

- Compatible with any device capable of receiving and NO/NC input
- Trimmable paddles provide correct flow measurement based on pipe diameter
- Can be wired NO or NC
- Maintenance-free
- Suitable for all common HVAC applications (not for use with ammonia)
- QVE1901U is a direct replacement for common flow switches from McDonnell & Miller, Taco, and others

### Applications

Flow switches are used to monitor the flow of fluids in hydraulic systems, especially in refrigeration and heat pumps, and are for use with condensers, boilers, and heat exchangers.

## QVE Series Specifications

### Piping Diameter

QVE1900U	1.25" (32) to 8.00" (200)
QVE1901U	.75" (20) to 8.00" (200)

### Type of Switch

QVE1900U	Micro Switch with Single-Pole Changeover, Potential Free
QVE1901U	Reed Contact

### Contact Rating

QVE1900U	24 Vac, 15 (8) A
QVE1901U	24 Vac, 1 A/24 Vdc, 1 A

### Adjustment of Switching Point

Manual, Supplied with Minimum  
Switch On/Off Values

### Permissible Medium Temperature

-4F to 248°F (-20C to 120°C)  
(Medium must be Antifreeze)

### Degree of Protection

Housing	IP 65 per EN 60 529
---------	---------------------

### Safety Class

QVE1900U	I per EN 60 730
QVE1901U	III per EN 60 730

### Operation and Storage

QVE1900U	-4F to 158°F (-20C to 85°C)
QVE1901U	-4F to 176°F (-20C to 80°C)

### Ambient Humidity (QVE1901U)

<95% rh

### Agency Listings

UL Listed for UL 873 XAPX  
cUL C22.2 No. 24-93 XAPX7

### Housing Base

QVE1900U	Bayblend T85/Color RAL 7015
QVE1901U	Polyamide, Black

### Materials

QVE1900U	Screw-in body Brass
QVE1901U	Screw-in body Brass

### Paddle

QVE1900U Only	High-grade Steel (V2A)
---------------	------------------------

### Flow Switch, Overall (QVE1900U)

Silicone-free

### System Connections

QVE1900U	1" MNPT
QVE1901U	3/4" NNPT

### Housing Base

QVE1900U	150 PSIG
QVE1901U	365 PSIG

E-52

## Flow Switch Product Ordering

Description	Part No.
SPDT, 15A, 1-1/4" to 8" pipe	QVE1900U
SPST, 1A, 3/4" to 8" pipe	QVE1901U

Sensors

## Accessories & Service Kits

E-51

# Solar Impact Sensor



Water Efficiency



Indoor Environmental Quality



Innovation in Design/Operations



QLS60 Solar Impact Sensor.

## Description

The outdoor wall-mounted Solar Impact Sensor (QLS60) is used as a demand sensor for heating, ventilation and air-conditioning in facilities where compensation of solar radiation is required or desired. Solar compensation is necessary where buildings or building sections with large window areas are subjected to strong solar radiation, especially in installations where thermostatic radiator valves cannot be used.

To determine the impact of solar radiation, the sensor uses a solar cell that acquires the level of radiation. That cell generates an electrical current depending on the extent of radiation, which is then evaluated by the sensor. As a result, the sensor delivers an output signal of 4 to 20 mA or 0 to 10 Vdc, which is proportional to the solar radiation range.

## Features

- Configurable 0-10 Vdc, 4-20 mA output signal
- 24 Vac or 18-30 Vdc power source
- Output signal linear over entire measuring range
- Measuring range of 0-93 w/ft<sup>2</sup> (0-1000 w/m<sup>2</sup>)
- Rain- and moisture-resistant NEMA 4 enclosure
- Compact housing (2" x 3.62" x 1.8")

## Applications

This sensor can be used in connection with all types of systems and devices capable of acquiring and handling the sensor's 4 to 20 mA or 0 to 10 Vdc output signal.

## QLS60 Specifications

**Rated Voltage Range** ..... 24 Vac ( $\pm$  20% SELV)  
or 24 Vdc (18 to 30V)

**Power Supply (G+, M)**

Rated Frequency at 24 Vac ..... 50/60Hz  
Rated Power Consumption ..... Max. 2.5 VA (1 W)

**Measuring Range** ..... 0 to 1000 W/m<sup>2</sup>

**Time Constant t<sub>63</sub>** ..... </- 2 seconds

**Measured Value Outputs (U, I)**

Voltage Signal Output (U) ..... 0 to 10 Vdc 0 = 1000 W/m<sup>2</sup>  
Current Signal Output (I) ..... 4 to 30 mA 0 to 1000 W/m<sup>2</sup>

**Permissible Cable Lengths With Copper Cable**

18 AWG ..... 164 feet (50 m)  
16 AWG ..... 492 feet (150 m)  
12 AWG ..... 984 feet (300 m)

**Electrical Connections**

Screw Terminals for ..... 2 x 16 AWG or 1 x 12 AWG

**Degree of Protection of Housing** ..... IP 65 to IEC 60 529

**Insulation Class** ..... III to EN 60 730

**Environmental Conditions**

Operation to ..... IEC 60 721-3  
Climatic Conditions ..... Class 3K5  
Temperature ..... -13°F to 131°F (-25°C to 55°C)  
Humidity (Non-condensing) ..... 5 to 95% rh  
Mechanical Conditions ..... Class 3M2  
Transportation to ..... IEC 60 721-3-2  
Climatic Conditions ..... Class 2K3  
Temperature ..... -13F to 158°F (-25C to 70°C)  
Humidity ..... <95% rh  
Mechanical Conditions ..... Class 2M2

**Agency Standards** ..... UL Listed to UL873

cUL Listed to Canadian Standard C22.2 No. 24-93  
CE conformity to EMC directive 2004/108/EC

## QLS60 Product Ordering

Description	Output Signal	Part No.
Solar Impact Sensor	4 to 20 mA or 0 to 10 Vdc	<b>QLS60</b>

### Accessories & Service Kits

## MD Model Power Meter



MD Model Power Meter.

### Description

The MD Model Power Meter is a submetering device designed to provide real time, accurate electricity metering, enabling greater control over energy costs. The meter captures kWh/kW energy and demand data, as well as virtually all relevant energy parameters for diagnostics and monitoring on three-phase or single-phase circuit installations.

The meter uses direct connections to each phase of the voltage and various interchangeable current transformer (CT) options such as split-core CTs or flexible Rogowski Coils (for large loads or large cables and bussbars) to monitor current on each phase. All of Siemens' current transformers are internally shunted for intrinsically safe operation on energized conductors.

The power meter takes over 50 total electrical measurements which are derived from the voltage and current inputs. Electrical load diagnostic parameters, such as power factor (both Apparent and Displacement) and line frequency, are captured in addition to energy and demand values.

The MD Model Power Meter requires no external power and the power supply can accommodate service voltages ranging from 80 to 600V (phase-to-phase). The simple installation is accomplished by connecting the color-coded voltage leads and clearly labeled CTs. A three-LED indicator display confirms proper CT-to-phase installation. The meter automatically adjusts for CT orientation—greatly reducing set-up time and all but eliminating installation errors.

### Features

- Monitors voltage, current, power, energy, and many other electrical parameters on single and three-phase electrical systems
- RS-485 serial connection communications interface
- Uses either BACnet or Modbus protocol and features two digital pulse output ports
- Mix-and-match Split-Core or Rogowski-style CTs
- LED indicators ensure correct CT orientation during installation
- Line-powered: 80 to 600V Phase-Phase Power Supply (Use on 120/240V, 480/277V, 580/355V, or 380/220V services); 50 or 60 Hz
- Data updates occur every 0.5 seconds
- UL and CE Mark.
- ANSI C12.20-2010 Class 0.2

### Applications

Its flexibility, size, and ease-of-use make it an ideal tool for gathering detailed consumption information in commercial, industrial, governmental, and retail environments. Perfect for tenant submetering and data center monitoring.

#### Note:

The MD Power Meter is sold as a kit consisting of the meter and related current transformers. Please refer to page B-56 for kit ordering information

# MD Model Power Meter Specifications

## Technical

Service type..... Single Phase, Three Phase-Four Wire (WYE),  
Three Phase-Three Wire (Delta)

Power .....From L1 Phase to L2 Phase, 80 to 600Vac CAT III  
.....50/60Hz, 70 mA maximum. Non-user replaceable  
0.5A internal fuse protection

Voltage channels .....80 to 346V AC Line-to-Neutral,  
600V Line-to-Line, CAT III

Current channels .....0 to 5,000+ Amps, depending on CT

Maximum current input.....200% of current transformer rating

Measurement rating ..... True RMS using high-speed  
digital signal processing (DSP)

Line frequency ..... 50/60 Hz

Waveform sampling .....12 kHz voltage and current

Channel sampling rate ..... 500 milliseconds

Measurements.....Volts, Amps, kW, kWh, kVAR,  
kVARh, kVA, kVAh, aPF, dPF

Accuracy.....Better than 1% (<0.2% typical)  
for V, A, kW, kVAR, kVA, PF  
(ANSI C12-20-2010 Class 0.2)

Resolution .....0.01 Amp, 0.1 Volt, 0.01 watt,  
0.01 VAR, 0.01 VA, 0.01  
Power Factor depending on scalar setting

LED indicators .....Bi-color LED (red and green):  
1 LED to indicate communication,  
3 LEDs for correct CT-to-phase installation

Pulse output .....Open Collector, 75 mA maximum current,  
40V maximum open voltage

## Communications

Direct ..... User selectable Modbus or BACnet Master  
Slave Token Passing protocol (MS/TP)

Maximum distance ..... 1200 meters with Data Range  
of 100K bits/second or less

Baud rate ..... 9600 (Modbus default), 19200, 38400,  
..... 57600, 76800 (BACnet default), 115200

Data bits .....8

Parity ..... None, Even, Odd

Stop bit .....1, 2, 0

Data formats .....Modbus or BACnet (MS/TP)

## Mechanical

Operating temperature .....20°F to 140°F (-7°C to 60°C)

Humidity .....5% to 95% non-condensing

Enclosure ..... ABS Plastic, 94-V0 flammability rating

Weight .....12.6 ounces (357 g) exclusive of CTs

Dimensions..... 8.6" x 5.8" x 1.6"  
(21.8 cm x 5.8 cm x 4.0 cm)

## ViewPoint Software

Operating system .....Windows® 8, Windows® 7 (32/64-bit),  
Windows® Vista (32/64 bit) or Windows® XP

Communications port..... One USB to RS-485 converter required

## Safety

Certifications..... UL Listed to UL Standard 61010-1  
cUL certified to CAN/CSA Standard  
C22.2 No. 61010-1

CE Conformity ..... CE Low Voltage and EMC Directives

E-56

Sensors

# MD Model Power Meter Product Ordering

Description	Part No.
Meter with three 100A split core CTs	<b>MD-BM-3-CTSC-100A</b>
Meter with three 200A split core CTs	<b>MD-BM-3-CTSC-200A</b>
Meter with three 400A split core CTs	<b>MD-BM-3-CTSC-400A</b>
Meter with three 600A split core CTs	<b>MD-BM-3-CTSC-600A</b>
Meter with three 16" (5000A) Rogowski Coils	<b>MD-BM-3-RC-16</b>

**NOTE:** Meter is shipped as a BACnet device (default) but can be easily reconfigured into a Modbus device through simple hardware steps. Advanced configuration can be completed by using ViewPoint™ software (orderable from DENT Instruments, Inc. [www.DENTInstruments.com](http://www.DENTInstruments.com) or 800-388-0770).



## Rogowski Coil Flexible Current Transformer



SCT-R16-A4-U  
Coil Flexible Current Transformer.

### Description

Rogowski Coil Flexible Current Transformer has been designed for accurate, non-intrusive measurement of AC current, pulsed DC or distorted waveforms. This type of sensor may be used to measure AC current over a wide dynamic range and from 20 Hz to 5 kHz.

### Features

- Accuracy is <10%\*
- 333 mVAC/1000A @ 60Hz;  
109.17 mVAC/1000A @ 50 Hz
- Window size: 5.0"
- 33The Rogowski Coil CT is UL Rated to 100KA AC. The Siemens MD Model Power Meter is rated for 5 to 5000A.

### Applications

May be used with Siemens BACnet/Modbus Energy Meter.

#### Note:

Rogowski Coil Current Transformers are sold as a kit consisting of three coils and a MD Power Meter. Please refer to B-56 for kit ordering information.

E-57

Sensors

# Rogowski Coil Specifications

## Electrical

(All accuracies specified at 20°C [+ 2°C]. Rogowski Coil installed using best practices with conductor centered in the CT window and ensure any external conductors are a minimum distance of > 2X the diameter of the RoCoil.)

Output Signal.....	131 mV/1000A @ 60 Hz 109.17 mV/1000A @ 50 Hz
Current Range.....	.5 to 5000A AC
Wire Colors.....	White = (+) positive Brown = (-) negative Bare wire = shield
Phasing.....	Arrow points towards load
Phase Shift.....	< 0.2° at 50/60 Hz
Frequency Range.....	.20 Hz to 5 Hz
Linearity.....	+/- 0.2%
Conductor Position Sensitivity.....	+/- 2% maximum
Influence of External Field.....	+/- 1.5% maximum
Temperature Sensitivity.....	0.07% per °C
Phase Error.....	< -0.5°
Ratio Error.....	< 0.5%

## Electrical

Coil Materials.....	Blue thermoplastic rubber, flame-retardant UL 94 V-0 rated
Coupling Materials.....	PA6 UL 94 V-0 rated
Shielding.....	100% transducer, 100% output lead
Operating temperature.....	-4°F to 158°F (-20°C to 70°C)

## Safety

Working Voltage.....	1000 Vrms, maximum
Dielectric Strength.....	7400 Vac around coil 1000 Vac rated leads
Certifications.....	UL Recognized to UL Standard 61010-1 cUL Recognized to CAN/CSA Standard C22.2 No. 61010-1
CE Conformity.....	CE Low Voltage Directive 2006/95/EC

## Split-Core and Midi Hinged Split-Core Current Transformers

**NEW!**



SCT-SCM-0400-U  
Split Core Current Transformer.

### Description

Split-Core Current Transformers provide linear output voltage that is directly proportional to the input current. These transformers are safely and easily installed over existing electrical power lines without disconnecting the lines or interrupting service.

Midi Hinged Split-Core Current Transformers are small, low-cost devices with high accuracy (<0.5%) over a wide dynamic range with excellent phase shift. These current transformers are ideal where space is limited such as when metering multiple loads within a panel board. Use for current measurement, energy metering, load surveys, demand metering, energy research, and sub-metering.

#### Split-Core Features (400A & 600A)

- Available with two window sizes: 1.25" (3.20 cm), 2.0" (5.1 cm)
- Available in two current ranges: 400A Model is 8 to 520A AC; 600A Model is 30 to 780A AC
- Output: 333 mV at rated current
- Ratio error: <1% at rated current (typical)
- Phase error: <2° at rated current (typical)

#### Midi Hinged Split-Core Features (100A & 200A)

- Window size: 1.0" (25 mm) for 100A, 200A
- Available in two current ranges\*:  
to 200A AC (for 100A)  
to 300A AC (for 200A)
- Output:  
333 mV @ 100A AC (3.33 mV/A AC) (for 100A)  
333 mV @ 200A AC (1.67 mV/A AC) (for 200A)
- Ratio Error:  
<0.3% from 1.0A to 200A AC (typical) (for 100A)  
<1.0% from 1.0A to 300A AC (typical) (for 200A)
- Phase Error:  
<0.5° from 1.0A to 200A AC (for 100A)  
<0.5° from 1.0A to 300A AC (for 200A)

\* May depend on meter compatibility. See associated Meter Specifications for details.

### Applications

Siemens energy monitoring components are used for a variety of applications including building automation, tenant sub-metering, performance verification, energy management, and new technology assessment.

#### Note:


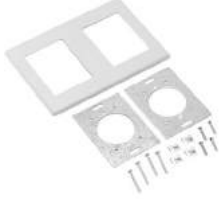






The Split-Core and Midi Hinged Split-Core Current Transformers are sold as a kit consisting of three transformers and an MD Power Meter. Please refer to page B-65 for kit ordering information.



## Table of Contents

PRODUCT	PAGE #
<b>Sensors</b>	
Mounting Devices/Kits	E-62
Replacement Parts	E-62 — E-63
Sun Shield	E-63








## Accessories & Service Kits

	Description	Product Group	Quantity	Part No.
<b>Sensors</b>				
	<b>Single Adapter Base Kit.</b>	T, RH & RH/T Sensors		
	<ul style="list-style-type: none"> <li>• Beige</li> <li>• White</li> </ul>		1	544-782A
	<b>Double Adapter Base Kit.</b>	T, RH & RH/T		
	<ul style="list-style-type: none"> <li>• Beige</li> <li>• White</li> </ul>		1	544-783A
	<b>Extender Ring Kit.</b>	T, RH & RH/T		
	<ul style="list-style-type: none"> <li>• Beige</li> <li>• White</li> </ul>		1	544-785A
	<b>Non-Conduit Rough-in Kit.</b> Comes with plastic GWB protrusion piece which is discarded when wall sensor is installed.	T, RH & RH/T Sensors	1	544-784
	<b>Metal Gym Guard.</b> Desert Beige	RT Sensors	1	182-621
	<b>Electrical Box (2 x 4) Adapter Plate Kit.</b>	T, RH & RH/T Sensors	Pkg. of 5	192-506
	<b>Electrical Box (2 x 4) Adapter Base. (low profile)</b>	T, RH & RH/T Sensors	Pkg. of 5	192-507
	<b>Adapter Base.</b>	T, RH & RH/T Sensors	1	192-307

E-62

Sensors

## Accessories & Service Kits

	Description	Product Group	Quantity	Part No.
<b>Sensors</b>				
	<b>Adapter Frame.</b>	RT Sensors	1	<b>192-308</b>
	<b>Conduit Assembly Kit.</b>	599 Series Diff. Pressure Sensors	1	<b>590-500</b>
	<b>Humidity Sensor Filter Cap.</b>	Q Series Duct/Outdoor Air Humidity	1	<b>AQF3101</b>
	<b>Replaceable 2% Humidity Sensor Tip.</b>	Q Series Duct/Outdoor Air Humidity	1	<b>AQF3150</b>
	<b>Replaceable 2% Certified Humidity Sensor Tip.</b>	Q Series Duct/Outdoor Air Humidity	1	<b>AQF4150</b>
	<b>Replacement Flange Kit.</b>	Q Series Duct Humidity	1	<b>7466200680</b>
	<b>Sun Shield.</b>	Q Series Outdoor Air Humidity	1	<b>AQF3100</b>
	<b>Stainless Steel Well.</b>	Pipe Temp. Sensors		
	0.26"D x 2 1/2"L (18 mm D x 64 mm L)		1	<b>AQE2000.005</b>
	0.26"D x 4"L (18 mm D x 102 mm L)		1	<b>AQE2000.010</b>
	0.26"D x 6"L (18 mm D x 152 mm L)		1	<b>AQE2000.015</b>

E-63

Sensors



## Find products and our complete offering online

The Siemens Webshop helps you save time:

- Search for products by part number or description
- Check availability and pricing
- Print out product information for submittals
- Link to technical documentation
- Download installation instructions
- Create a reusable template order form for frequently ordered parts

**Order from our complete portfolio at:**

**[www.usa.siemens.com/buildingtechnologiesonlineordering](http://www.usa.siemens.com/buildingtechnologiesonlineordering)**