

RD50, RS50 Indoor Air Quality Sensors

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Description

The RD50 and RS50 range are advanced, configurable sensors designed for use with Trend IQ5ECO's. All variants monitor:

Temperature (T)
Relative Humidity (RH)
Carbon Dioxide (CO₂)

THCPV variants additionally measure:

Particulate Matter (PM1.0, PM2.5, PM10)
Total Volatile Organic Compound (TVOC).

They support BACnet™ MS/TP, Modbus, and Sylk™ protocols, offering flexible integration into building automation systems. They feature long-term accuracy, minimizing maintenance and re calibration needs.

RD50 models include a display for real-time data visualization and user control of parameters. They also comply with Title 24 indoor air quality standards.

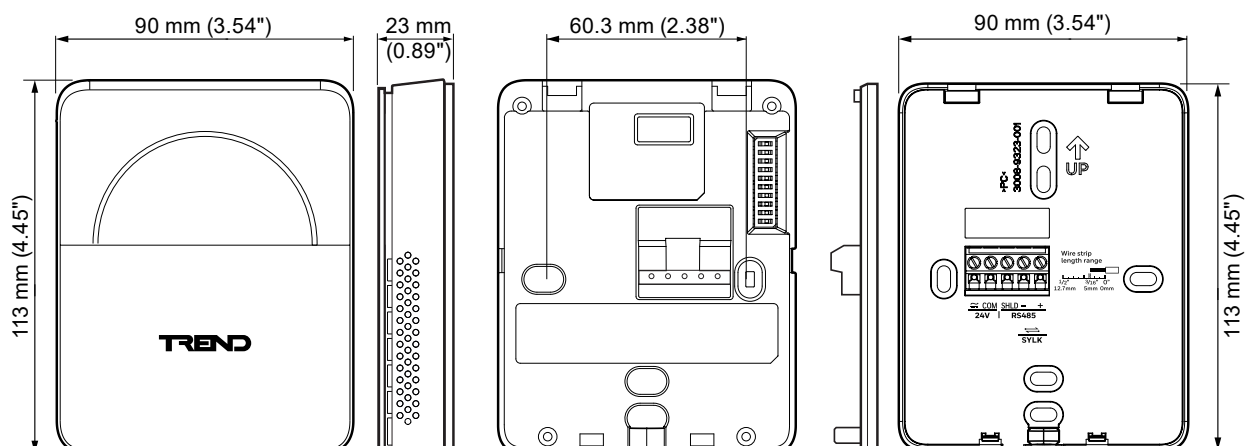
Features

- Easy integration with Trend IQ5ECO controllers.
- Accurate and resilient.
- Pre-calibrated in the factory.
- Over the wire firmware updates save times when upgrading.
- LED ring indicator provide visual indication of parameter levels.
- Air quality score

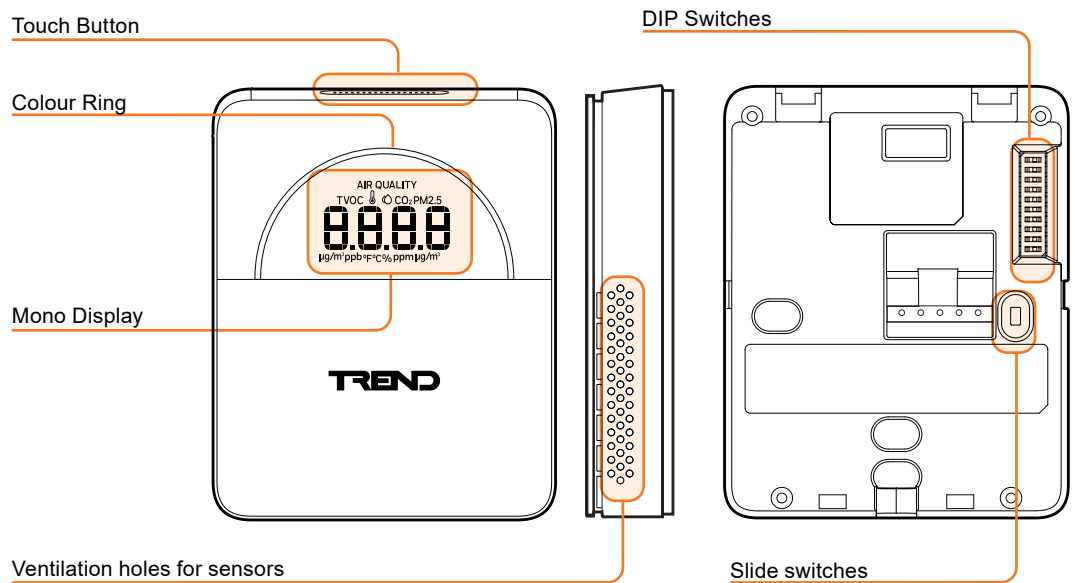
RD50

- LCD display
- Title 24 requirements

Physical



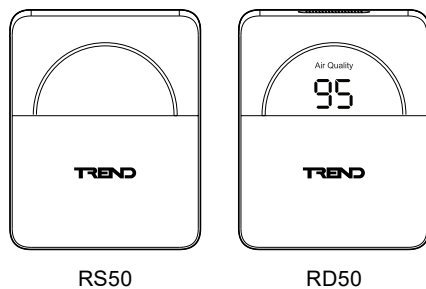
Physical (continued)



FUNCTIONALITY

DESCRIPTION

This range of sensors comprise two types – the RD50 and the RS50:



All variants have integral sensors that provide measurement of:

- Temperature (T)
- Relative Humidity (RH)
- Carbon Dioxide (CO₂)

Selected variants include sensors that provide measurement of:

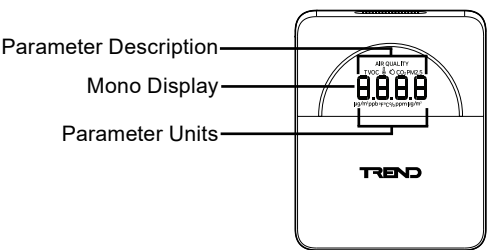
- Particulate Matter (PM1.0, PM2.5, PM10)
- Total Volatile Organic Compound (TVOC)

Variant	T	RH	CO2	PM1.0, PM2.5, PM10	TVOC
-THC	✓	✓	✓	✗	✗
-THCPV	✓	✓	✓	✓	✓

Display (RD50 only)

The RD50 includes a built-in display that can present real-time readings for the following parameters:

- Temperature (T)
- Relative Humidity (RH)
- Carbon Dioxide (CO₂)
- Particulate Matter (PM1.0, PM2.5, PM10)
- Total Volatile Organic Compounds (TVOC)

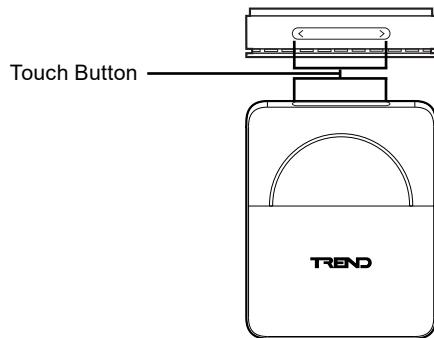


The display can be configured to cycle through all available parameters or only selected ones:

Item	Description
Air Quality	Indoor Air Quality
Sensor Reading	Temperature, Humidity, CO ₂ PM2.5, TVOC (-THCPV variants only)
Error Code	In the event of a sensor failure, the display will show Err followed by the sensor name to indicate the issue. For example, if the PM2.5 sensor fails, the display will show: Err^{PM2.5} If multiple sensors fail, the display will cycle through each failed sensor, showing their respective error codes in turn.

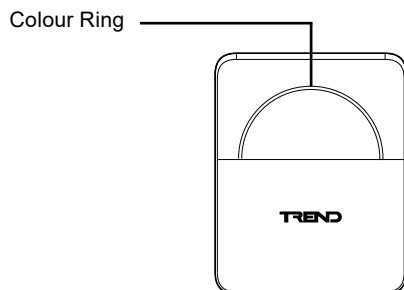
Touch Button (RD50 only)

The Touch Button, located on the top of the RD50, allows adjustment of parameters by either swiping across the button or clicking the left/right controls.



Colour Ring

The colour ring provides a visual indication of air quality, sensor readings, or sensor health. It dynamically changes colour (Green, Yellow, Red) based on detected parameter levels.



The LED light behaviour can be configured into two modes:

Colour mode
Neutral mode

Colour mode

LED Behaviour	Air Quality Level	Sensor Reading Level	Sensor Health
Green	Good	Good	-
Yellow	Medium	Medium	-
Red	Poor	Poor (For CO ² , PM2.5 and TVOC)	Sensor Failure

Neutral mode

LED Behaviour	Air Quality Level	Sensor Reading Level	Sensor Health
White On	Good	Good	-
White Breath	Medium	Medium	-
White Blink	Poor	Poor (For CO ² , PM2.5 and TVOC)	Sensor Failure

Air Quality Score

A sixth output provides a simplified Air Quality Index (AQI), represented as a numerical score out of 100, indicating overall air quality.

- For -THCPV variants, the AQI is calculated based on readings from CO₂, PM2.5, and TVOC sensors.
- For -THC variants, the score is based solely on CO₂ levels.

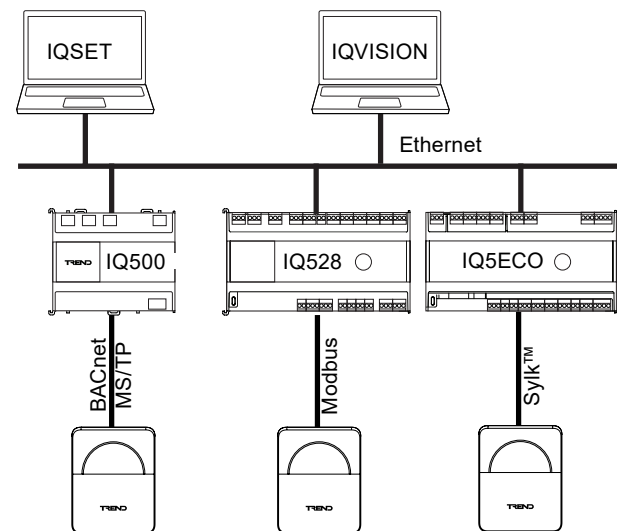
This score offers a quick and accessible way to assess indoor air quality.

Configuration

Sensor configuration is performed using IQSET. Standard templates are provided within IQSET to support quick and error-free setup.

SYSTEM INTEGRATION

The RD50 and RS50 sensors can be integrated into a Trend Building Management System via BACnet MS/TP, Modbus, or Sylk™, connecting to an IQ5 controller as illustrated below.



Note: Connection to IQSET and IQVISION is made via Ethernet. For IQ5ECO IP T1L variants a media adapter is required to interface between T1L and Ethernet.

Connection Limitations

The RD50 and RS50 can connect to via Sylk™ or Modbus.

Sylk™

When RD50 and RS50 sensors are connected to the controller via the Sylk™ the data communication and power requirements limit the number of sensors that can be connected:

- A maximum of 4 sensors can be connected.
- Only one sensor may be powered directly from the Sylk™ bus.
- All other sensors must be powered externally using a separate 24 Vac/Vdc power supply.

Variant	Max if powered by Sylk bus	Max if externally powered
RD50-THCPV-MSP-W	0	4
RS50-THCPV-MSP-W	0	4
RD50-THC-MSP-W	1	4
RS50-THC-MSP-W	1	4

Sylk™ should be used to connect to IQ5ECO controllers.

Modbus

When RD50 and RS50 sensors are connected to the controller via Modbus the data communication requirements limit the number of sensors that can be connected:

- A maximum of 4 sensors can be connected.
- All sensors must be powered externally using a separate 24 Vac/Vdc power supply.

Modbus should be used to connect to IQ500 and IQ528 controllers, requires INT license.

BACnet™ MS/TP

When RD50, RS50 wall modules are connected to the controller via BACnet™ MS/TP:

- A maximum of 4 wall modules can be connected.
- All sensors must be powered externally using a separate 24 Vac/Vdc power supply.

If used to connect to IQ500 and IQ528 controllers an NC license is required.

HARDWARE**Enclosure**

The enclosure comprises a back plate and a clip-on main module. The back plate includes multiple mounting holes, allowing installation with the following standard box formats:

- US single vertical
- BS single
- ME single
- EUR single

Alternatively, it can be mounted directly onto a suitable surface using screws.

Installation Considerations: Ensure adequate clearance around the sensor to allow for proper airflow.

Slide Switch

The slide switch works in conjunction with the first two DIP switches to configure the communication protocol used by the sensor.

DIP Switch

The DIP switch is divided into two functional areas:

- **Protocol Selection:**
The first two switches work in conjunction with the slide switch to set the communication protocol used by the sensor.
- **Address Configuration:**
The remaining eight switches are used to define the sensor's network address.

Calibration

Sensors are factory-calibrated and do not require recalibration prior to installation or during regular operation. Routine recalibration is not necessary over the product's lifetime.

However, if sensor readings begin to drift or display anomalous data, recalibration can be performed by applying an offset adjustment based on a verified reference reading.

COMPATIBILITY

Controllers:

Sylk - IQ5ECO
Modbus - IQ500, IQ528

FIELD MAINTENANCE

The RD50 and RS50 require no routine maintenance.

DISPOSAL

COSHH (Control of Substances Hazardous to Health - UK Government Regulations 2002) ASSESSMENT FOR DISPOSAL OF RD50, RS50. No parts affected.

RECYCLING

All plastic and metal parts are recyclable. The printed circuit board may be sent to any PCB recovery contractor to recover some of the components for any metals such as gold and silver.



WEEE Directive:
At the end of their useful life the packaging and product should be disposed of by a suitable recycling centre.

Do not dispose of with normal household waste.
Do not burn.

INSTALLATION

The RD50 and RS50 are designed to be mounted on a standard electrical back box or front panel using two screws. The installation involves:

- Mounting the sensor
- Connecting to the controller
- Connecting power
- Configuring the controller
- Configuring the required parameters
- Testing operation

Instructions for mounting and electrical connections see the RD50 & RS50 Indoor Air Quality Sensors Installation Instructions (TG201528).

ORDER CODES

RS50-THCPV-MSP-W	White room Sensor with sensors for Temperature (T), Relative Humidity (RH), Carbon Dioxide (CO ₂), Particulate Matter (PM _{1.0} , PM _{2.5} , PM ₁₀) and Total Volatile Organic Compound (TVOC). Sylk™ and Modbus connection. Requires separate 24 Vac/Vdc power supply.
RD50-THCPV-MSP-W	White room Sensor with display and sensors for Temperature (T), Relative Humidity (RH), Carbon Dioxide (CO ₂), Particulate Matter (PM _{1.0} , PM _{2.5} , PM ₁₀) and Total Volatile Organic Compound (TVOC). Sylk™ and Modbus connection. Requires separate 24 Vac/Vdc power supply.
RS50-THC-MSP-W	White room Sensor with sensors for Temperature (T), Relative Humidity (RH) and Carbon Dioxide (CO ₂). Sylk™ and Modbus connection. Can be powered via Sylk™ bus or separate 24 Vac/Vdc power supply.
RD50-THC-MSP-W	White room Sensor with display and sensors for Temperature (T), Relative Humidity (RH) and Carbon Dioxide (CO ₂). Sylk™ and Modbus connection. Can be powered via Sylk™ bus or separate 24 Vac/Vdc power supply.

GENERAL SAFETY INSTRUCTIONS

- Please pay attention that changes, or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
 1. This device may not cause harmful interference.
 2. This device must accept any interference received, including interference that may cause undesired operation.
- This equipment complies with FCC/IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 0.656 ft (20 cm) between the radiator and your body.
- This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:
 1. This device may not cause interference.
 2. This device must accept any interference, including interference that may cause undesired operation of the device
- CAN ICES-3(B)/NMB-3(B).
- l'appareil contient des émetteurs/récepteurs exempts de licence qui sont conformes aux CNR exempts de licence d'Innovation, Sciences et Développement économique Canada. L'exploitation est soumise aux deux conditions suivantes:
 1. l'appareil ne doit pas produire de brouillage,
 2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
- ce matériel est conforme aux limites de dose d'exposition aux rayonnements, FCC / CNR-102 énoncée dans un autre environnement. cette équipement devrait être installé et exploité avec distance minimale de 20 entre le radiateur et votre corps.

SPECIFICATIONS

ELECTRICAL

Display (RD50 only) Mono segment display
Supply Voltage

Variant	Power via Sylk™	External
RD50-THCPV	x	✓ 24 Vac/Vdc ±20%
RS50-THCPV	x	✓ 24 Vac/Vdc ±20%
RD50-THC	✓	✓ 24 Vac/Vdc ±20%
RS50-THC	✓	✓ 24 Vac/Vdc ±20%

Power consumption

RD50-THCPV-MSP-W
24 VAC 3.8 VA
24 VDC 1.5 W
RS50-THCPV-MSP-W
24 VAC 3.8 VA
24 VDC 1.4 W

RD50-THC-MSP-W
24 VAC 3.2 VA
24 VDC Sylk™ 0.9 W

RS50-THC-MSP-W
24 VAC 3.2 VA
24 VDC Sylk™ 0.8 W

Rated Impulse Voltage 500V

Communication BACnet MS/TP, Modbus over RS-485, or Sylk™

BACnet MS/TP

Cable type Unscreened twisted pair.
Bus length 60 m (200 ft) max.
Address range 1 to 15 (1 to 10 supported by IQVISION).
Number of sensors 4 maximum

Modbus over RS-485

Cable type Unscreened twisted pair.
Bus length 60 m (200 ft) max.
Address range 1 to 15 (1 to 10 supported by IQVISION).
Number of sensors 4 maximum

Sylk™ Bus

Cable type Unscreened twisted pair.
Bus length 60 m (200 ft) max.
Address range 1 to 15 (1 to 10 supported by IQVISION).
Number of sensors 4 maximum

Temperature Sensor

Technology Type Multiple NTC compensate
Range 0 to 50°C (32 to 122°F)
Output resolution 0.1 °C (0.1 °F)
Accuracy ±1 °C (±1.8 °F)

Humidity Sensor

Technology Type CMOSens Sensor Chip
Range 0 to 100% RH
Output resolution 0.1% RH
Accuracy ±3 % RH @ 20 to 80 % RH at room temperature

CO₂ Sensor

Technology Type Photoacoustic NDIR
Range 400-5000 ppm
Output resolution 1 ppm

Accuracy ±50 ppm ±2.5 % reading @ 400 to 1000 ppm
±50 ppm ±3 % reading @ 1001 to 2000 ppm
±40 ppm ±5 % reading @ 2001 to 5000 ppm

PM1.0, PM2.5, PM10

Technology Type Laser Scattering Particle Sensor
Range 0 to 5000 µg/m³
Output resolution 1 µg/m³
Accuracy (According to GRIMM Technology)
PM1.0 ± 10 µg/m³, 0 to 100 µg/m³; ± 10 % reading, 101 to 500 µg/m³
PM2.5 ± 10 µg/m³, 0-100 µg/m³; ± 10 % reading 101-500 µg/m³
PM10 ± 25 µg/m³ 0-100 µg/m³; ± 25 % reading, 101-500 µg/m³

TVOC

Technology Type Metal Oxide (MOx) Chemiresistor
Range 8-2820 ppb (16-5640 µg/m³)
Output resolution 1 ppb (1 µg/m³)
Accuracy (According to Ethanol) ± 10 ppb ± 15 % reading @ 8-250 ppb (± 20 µg/m³ ± 15 % reading @ 1-500 µg/m³)

MECHANICAL

Dimensions (WxHxD) 90 x 113 x 23 mm (3.54 x 4.45 x 0.89")
Colour White
Weight 189g (0.42 lbs)
Mounting
Junction box US single vertical, BS single, ME single, EUR single
Surface mount On drywall, stone, etc. in retrofit cases.

ENVIRONMENTAL

Approvals and Certifications

- RoHs IEC63000
- CE EN 60730-1, EN 60730-2-9
- FCC CFR 47 Part 15 Subpart B
- UL UL 60730-1, UL 60730-2-9
- ISSED ICES - 003 issue 7
- BTL BACnet Smart Sensor (B-SS)
- RCM

Ambient Environmental Limits

Humidity 0 to 95% RH, non-condensing
Temperature
Storage -40 to +65.5°C (-40 to 150°F)
Operating 0 - 50 °C (32 - 122 °F)
Pollution degree 2.
Protection IP20
Type of Action Type 1
Purpose of Control Operating Control
Construction of Control Independently Mounted Control

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