



Product Data Sheet

# **Air-Fi® Wireless Communication Sensors**

(WCS-SB, WCS-SD, WCS-SO, WCS-SCO2,  
WCS-RH, WCS-SB/R)

## **⚠ SAFETY WARNING**

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.



## Introduction

Trane Air-Fi® wireless systems provide significant advantages to better meet customer requirements by providing:

- A lower initial cost
- Ease of installation for reduced risk
- Increased reliability and flexibility for easier problem solving

Air-Fi® components with industry-leading technology and performance have fewer maintenance issues for worry-free operation and cost savings over the life of the system.

## Features and Benefits

| Feature                              |  | Benefit  |
|--------------------------------------|--|--|
| Reduced project labor and complexity |  | Reduces installation time and risks for on-time project completion while increasing return on investment.  |
| Reliable and secure                  |  | Based on the IEEE 802.15.4 standard. The Institute of Electrical and Electronics Engineers (IEEE) is an international non-profit, professional organization, in which coexistence is a fundamental requirement and includes methods for network key establishment, network key transport, frame protection, and device management.   |
| Lifetime batteries                   |  | Batteries will outlast the typical sensor life in typical applications.  |
| Life-cycle savings                   |  | By avoiding (re)wiring, savings are incurred both for the initial installation and whenever the spaces are reconfigured or expanded.   |
| Wireless communications sensor (WCS) | Digital display (WCS-SD)                         | Easy-to-use interface for clear and simple monitoring and control. Can be configured for any Trane system or to meet the customer's preference.  |
|                                      | Base model (WCS-SB)                              | Measures temperature and optional humidity (with WCS-SH) for use in public spaces where no local user interface is preferred.  |
|                                      | 2% relative humidity (RH) sensor module (WCS-SH) | The optional RH sensor module plugs in to any WCS model, further simplifying installation by eliminating the needed for additional wiring.   |
|                                      | Remote temperature (WCS-SB/R)                    | Wireless monitoring of refrigerators and freezers to reduce food and medication waste and risks using external 10K type 2 thermistors (by others). The sensor shall be applied on stable temperature applications only, similar to refrigerator and freezer applications. Rapid temperature changes will reduce battery life.  |
| Occupancy sensor                     | WCS-SO   | Measures temperature and optional humidity (with WCS-SH) as well as occupancy. All sensing values are displayed on an internal LED display, which prevents public viewing.   |
| CO <sub>2</sub> / Occupancy sensor   | WCS-SCO <sub>2</sub>                             | Measures temperature, optional humidity (with optional WCS-SH), CO <sub>2</sub> levels in parts per million, and occupancy. All sensing values are displayed in an internal facing LCD display, which prevents public viewing. This sensor is typically used on demand - control ventilation applications. An LED indicates when movement is observed for proper sensor positioning during installation. |

## Air-Fi Wireless Device Part Numbers

| Air-Fi® Wireless model   |                              |                            | Part number  | BAYSENS     | Global part |
|--|------------------------------|----------------------------|--------------|-------------|-------------|
| Wireless communications sensor—Digital display (WCS-SD)  | Universal                    | Field, factory, or service | X13790955010 | N/A         | SEN02362    |
|  | FC BC UV                     |                            | X13790955040 | N/A         | N/A         |
|  | RTU WSHP                     |                            | X13790955050 | BAYSENS202* | SEN02263    |
|  | Universal—BAA <sup>(a)</sup> |                            | X13790968010 | BAYSENS212* | SEN02265    |
| Wireless communications sensor—Base model (WCS-SB)   | Universal                    |                            | X13790956010 | BAYSENS203* | SEN02264    |
|  | Universal—BAA <sup>(a)</sup> |                            | X13790969010 | BAYSENS213* | SEN02266    |
| Wireless communications sensor accessory—2% relative humidity (RH) sensor module (WCS-SH)        |                              |                            | X13790973030 | BAYSENS230* | SEN02638    |
| Wireless communications sensor—with Occupancy sensor (WCS-SO)                                    | Universal—BAA <sup>(a)</sup> |                            | X13790986001 | BAYSENS154* | SEN2502     |
| Wireless communication sensor—with CO <sub>2</sub> and Occupancy sensors (WCS-SCO <sub>2</sub> ) | Universal—BAA <sup>(a)</sup> |                            | X13790987001 | BAYCO2K200* | SEN2503     |
| Wireless communications sensor—remote temperature (WCS-SB/R)                                     | Universal—BAA <sup>(a)</sup> |                            | X13791004001 | N/A         | SEN02773    |

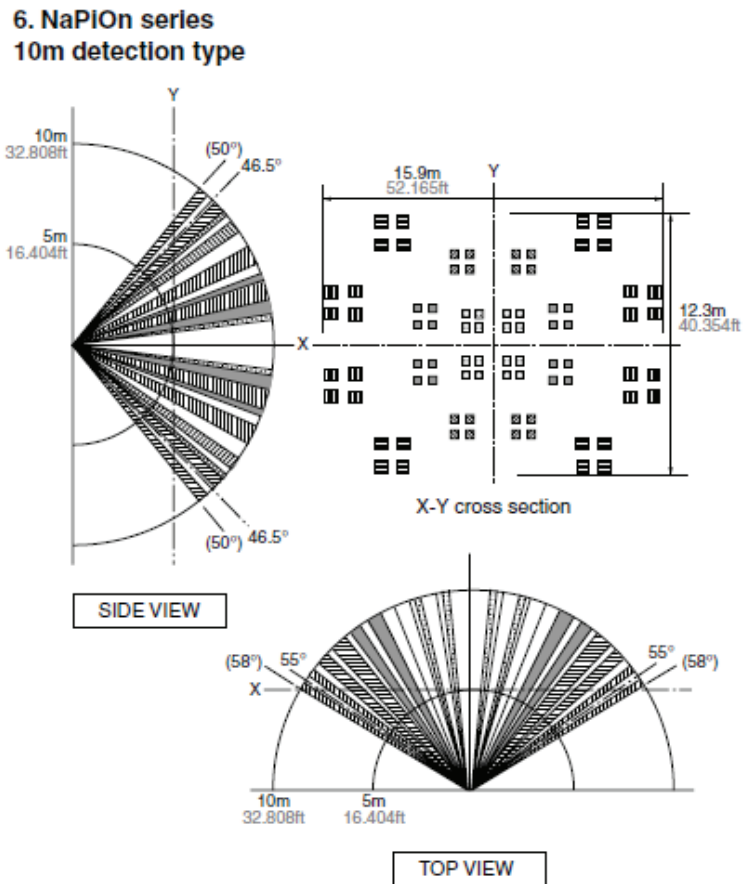
(a) Conforms to Buy America Act guidelines.

## Specifications

| General Specifications                              |  |
|---|--|
| Operating temperature                               | WCS-SB, SD, SO, SCO <sub>2</sub> : 32 to 122°F (0 to 50°C)<br>WCS-SB/R: -58 to 122°F (-50 to 50°C)   |
| Storage temperature                                 | -40 to 158°F (-40 to 85°C)   |
| Storage and operating humidity range                | 5% to 95% relative humidity (RH), non-condensing   |
| Housing material                                    | Polycarbonate/ABS (suitable for plenum mounting), UV protected, UL 94: 5 VA flammability rating  |
| Range <sup>(a)</sup>                                | Open range: 2,500 ft (762 m) with packet error rate of 2%. Indoor: Typical range is 200 ft (61 m); actual range is dependent on the environment. See BAS-SVX55* for more detail.   |
| Output power  | 100 mW   |
| Radio frequency                                     | 2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405–2480 MHz, 5 MHz spacing)  |
| Radio channels                                      | 16   |
| Wireless Communications Sensor (WCS) Specifications |  |
| Accuracy (integrated temperature)                   | 0.5°F for a range of 55 to 85°F (12.8 to 29.4°C)   |
| Accuracy (remote temperature)                       | (See Table 1, p. 4)  |
| Resolution  | +0.125°F over a range of 60°F to 80°F (15.56°C to 26.67°C)/±0.25°F outside this range  |
| Setpoint functional range                           | 45°F to 95°F (7.22°C to 35°C)  |
| Sensor battery                                      | Two (2) AA lithium 1.5 V batteries, 2800 mAh with an expected life of 15 years under typical operating conditions  |
| Address range                                       | 001 to 999   |
| Maximum time between transmissions                  | 15 minutes   |
| Minimum time between transmissions                  | 10 seconds. Time between transmissions can be shorter during user interaction.   |
| Mounting  | Fits a standard 2 in. by 4 in. junction box (vertical mount only). Mounting holes are spaced 3.2 in. (83 mm) apart on vertical center line. Includes mounting screws for junction box and wall anchors for sheet-rock walls.<br>Overall dimensions: 2.9 in (74 mm) by 4.7 in. (119 mm) |
| WCS-SO Sensor Specifications                        |  |
| Coverage Patterns                                   | (See Figure 1, p. 4.)  |
| Occupied Timeout Delay                              | Average 10 minutes after motion is detected (not adjustable)   |
| Maximum Detection Range                             | 32 feet (10 m)   |
| WCS-SCO <sub>2</sub> Sensor Specifications          |  |
| CO <sub>2</sub> range                               | 0 — 10,000 ppm CO <sub>2</sub>   |
| Accuracy at 25°C                                    | ±40 ppm CO <sub>2</sub> + 3% of reading (includes repeatability)   |
| Pressure dependence of output                       | Built-in pressure sensor eliminates inaccuracy due to altitude   |
| Recommended calibration interval                    | None (auto-calibrated)   |
| Response resolution                                 | 50 ppm change or 15 minute heartbeat   |
| Life expectancy                                     | 15 years   |
| Operating temperature                               | From 32°F to 122°F (0°C to 50°C)   |
| Storage temperature                                 | From -40°F to 158°F (-40°C to 70°C)  |
| Humidity range                                      | 20% to 60% RH  |
| Warm-up time  | 1 min @ full spec? 15 min  |
| Housing material                                    | Polycarbonate/ABS blend (wall)   |
| 2% Relative Humidity (RH) Sensor Module             |  |
| Accuracy  | ±1.8% (typical)  |
| Hysteresis  | ±1% (typical)  |
| Response time                                       | 8 seconds  |
| Long-term drift                                     | <0.5% RH/year  |

(a) Range values are estimated transmission distances for satisfactory operation. Actual distance is job specific and must be determined during site evaluation. Placement of the WCI is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper signal quality. Signal quality is more greatly affected by walls, barriers, and general clutter. Note that sheetrock walls and ceiling tiles offer little restriction to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers. More details information, including wiring schematics, are available at <http://www.trane.com>.

**Figure 1. WCS-SO Sensor coverage patterns**



**Note:** This sensor coverage pattern also applies when occupancy sensing is activated on WCS-SCO<sub>2</sub> applications.

**Table 1. Remote sensor input resolution**

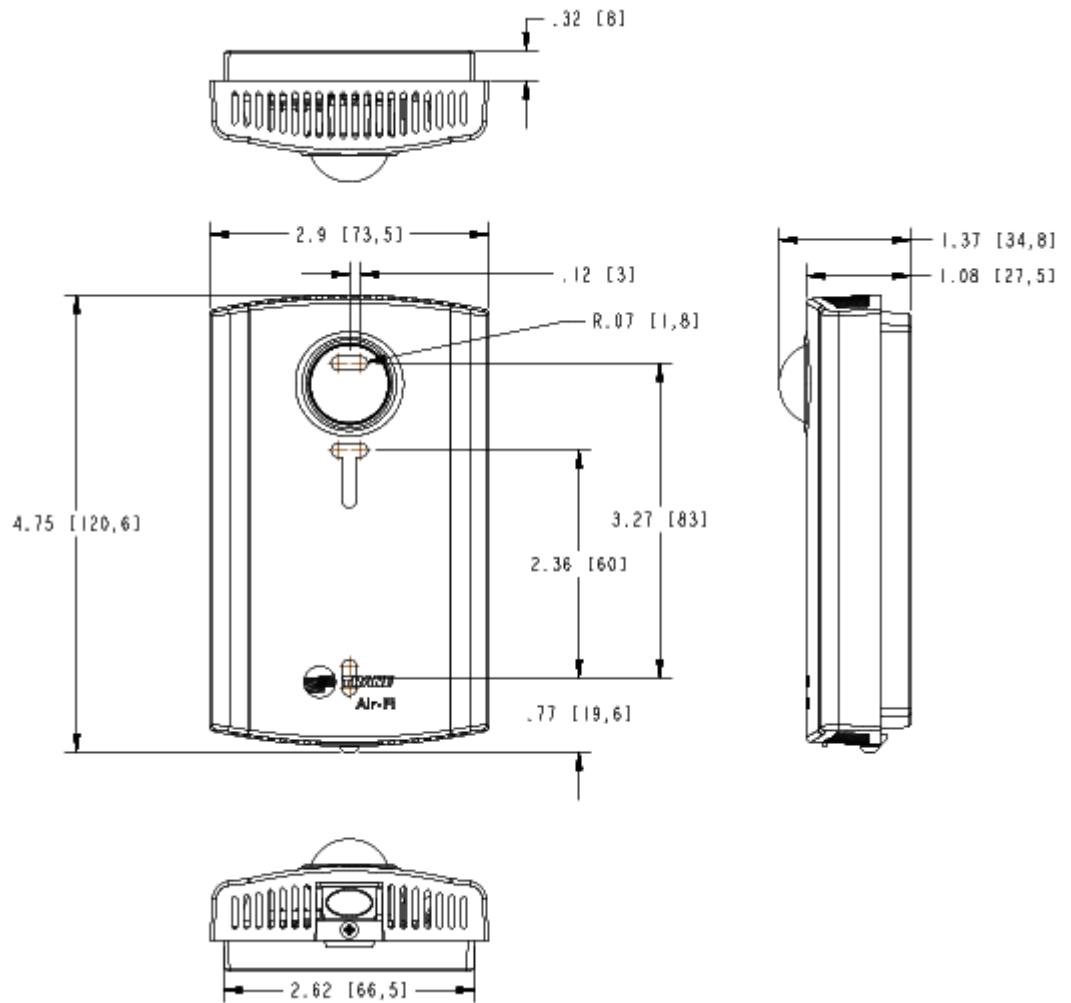
| Temperature Input Range               | Resolution <sup>(a)</sup> |
|---------------------------------------|---------------------------|
| -10 °F to 80 °F                       | ≤ 0.2 °F                  |
| -11 °F to -30 °F and 81 °F to 100 °F  | ≤ 0.3 °F                  |
| -31 °F to -40 °F and 101 °F to 122 °F | ≤ 0.4 °F                  |
| -41 °F to -58 °F                      | ≥ 0.4 °F                  |

(a) Resolution does not include field supplied 10K Type 2 thermistor tolerance.

## WCS Dimensions

The following dimensions are typical for WCS-SB, WCS-SB/R, WCS-SD, WCS-SO, and WCS-SC02.

**Figure 2. Dimensions**



## Agency Compliance

|                            |   |
|----------------------------|---|
| United States              | <p>UL listed: UL 94, 5 VA flammability rating and UL916.<br/>Energy Management Equipment FCC CFR47, Sec. 15.247 &amp; subpart E, Digital Modulation Transmission with no SAR (FCC ID: TPF-251701).</p> <p>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, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p> <p>Changes or modifications not expressly approved by the manufacturer for compliance could void the user's authority to operate the equipment.</p> <p><b>Note:</b> This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:</p> <ul style="list-style-type: none"> <li>• Reorient or relocate the receiving antenna.</li> <li>• Increase the separation between the equipment and receiver.</li> <li>• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.</li> <li>• Consult the dealer or an experienced radio/TV technician for help.</li> </ul>  |
| Canada                     | <p>CSA-C22.2 No. 205-M1983 Signal Equipment Industry Canada (IC: 6178A-251701)</p> <p>Cet appareil est conforme à la partie 15 du règlement du FCC. Son fonctionnement fait l'objet des deux conditions suivantes: (1) Cet appareil ne produit pas de brouillages nuisibles, et (2) cet appareil doit pouvoir recevoir n'importe quel type d'interférence, y compris les brouillages pouvant occasionner un fonctionnement non désiré.</p> <p>Les changements et les modifications n'ayant pas été approuvés expressément par le fabricant comme étant conformes, pourraient rendre nulle le droit de l'utilisateur à faire fonctionner cet équipement.</p> <p><b>Remarque:</b> Cet équipement a été testé et reconnu comme étant conforme aux limites des appareils numériques de classe B, tel qu'indiqué dans la partie 15 du règlement du FCC. Ces limites ont été établies afin de fournir un niveau de protection raisonnable contre le brouillage nuisible dans les installations résidentielles. Cet appareil produit, utilise, et peut aussi émettre des fréquences radioélectriques. Si celui-ci n'est pas installé et utilisé conformément aux instructions, il peut provoquer des brouillages nuisibles dans les communications radioélectriques. L'absence d'interférence n'est cependant pas garantie dans toutes les installations. Si cet équipement provoque des brouillages nuisibles dans la réception des communications radioélectriques ou de télévision (ceci pouvant être déterminé en allumant et en éteignant l'équipement), l'utilisateur est encouragé à essayer de corriger l'interférence en utilisant un ou plusieurs des moyens suivants :</p> <ul style="list-style-type: none"> <li>• Réorienter ou changer l'emplacement de l'antenne réceptrice.</li> <li>• Éloigner l'équipement et le récepteur l'un de l'autre.</li> <li>• Brancher l'équipement à une prise de courant se trouvant sur un circuit différent de celui sur lequel le récepteur est branché.</li> <li>• Faire appel aux services du fournisseur ou d'un technicien radio/TV qualifié.</li> </ul> |
| IEEE/radio frequency range | <p>IEEE 802.15.4-2003, IEEE Standard for Information Technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements, Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low Rate Wireless Personal Area Networks (LR-WPANs)</p>   |

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