



## Air & Road Conditions (ARC) TS-01 Installation and Operation Manual

### Product Description

The PreCise<sup>®</sup> ARC System, TS-01, is a wired sensor designed to provide accurate road and air conditions information to a remote in-cab display. Easily view and collect data critical to decision making including relative humidity, dew point, air temperature and road temperature.



### Features

- Air Temp:  $\pm 0.5^{\circ}\text{C}$  ( $\pm 1.0^{\circ}\text{F}$ ) typical
- Relative Humidity:  $\pm 4\%$  typical
- Dew Point/Frost Point:  $\pm 2.0^{\circ}\text{C}$  ( $\pm 4.0^{\circ}\text{F}$ ) typical
- Road Temp:  $\pm 1.0^{\circ}\text{C}$  ( $\pm 2.0^{\circ}\text{F}$ ) typical
- Emissivity: calibrated to 0.95
- Field of View:  $10^{\circ}$
- Operating Temp:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $185^{\circ}\text{F}$ )
- Communications:
  - IEEE 802.15.4 (2.4GHz DSSS)
  - SAE J-1708
- Range: 10m (33ft) typical
- Power: 6.5V-32V vehicle power



## Warnings & Cautions



- Read and follow all safety rules and instructions before installing or operating this equipment.
- Never operate a vehicle within a closed area. Always assure proper ventilation before starting engine.
- Always use eye protection. Use goggles that are ANSI approved against impacts and shattering.
- Before wiring, disconnect the negative cable from the battery terminal. Failure to do so may result in electric shock or injury due to electrical shorts. Batteries can generate explosive gases. Keep sparks, flames and smoking materials away from batteries. Always wear eye protection around batteries.
- Do not damage pipe or wiring when drilling holes. When drilling holes in the chassis for installation, take precautions so as not to contact, damage or obstruct pipes, fuel lines, tanks or electrical wiring. Failure to take such precautions may result in fire.
- Do not use bolts or nuts in the brake or steering systems to make ground connections. Bolts or nuts used for the brake or steering systems (or any other safety-related system), or tanks should NEVER be used for installations or ground connections. Using such parts could disable control of the vehicle and cause fire etc.
- Arrange the wiring so it is not crimped or pinched by a sharp edge. Route the cables and wiring away from moving parts (like the seat rails) or sharp or pointed edges. This will prevent crimping and damage to the wiring. If wiring passes through a hole in metal, use a rubber grommet to prevent the wires insulation from being cut by the metal edge of the hole.
- When making connections to the vehicle's electrical system, be aware of the factory installed components (e.g. on-board computer). Do not tap into these leads to provide power for this unit. When connecting the unit to the fuse box, make sure the fuse for the intended circuit has the appropriate amperage. Failure to do so may result in damage to the unit and/or the vehicle.
- Be sure to connect the color coded leads according to the diagram. Incorrect connections may cause the unit to malfunction or damage to the vehicle's electrical system.
- To avoid property damage, personal injury, or death, park the vehicle on a flat level surface, set the parking brake, turn the engine off, and chock the wheels before beginning installation.
- Do not mount the module in a location that could interfere with proper operation of the vehicle, such as behind the gas or brake pedals.
- Avoid any circuits associated with the airbag system. Inadvertent airbag deployment may cause personal injury or death.

# INSTALLATION INSTRUCTIONS

## Before You Start

Prior to installing the PreCise® ARC sensor and display, take time to familiarize yourself with the installation instructions, theory of operation, and system components.

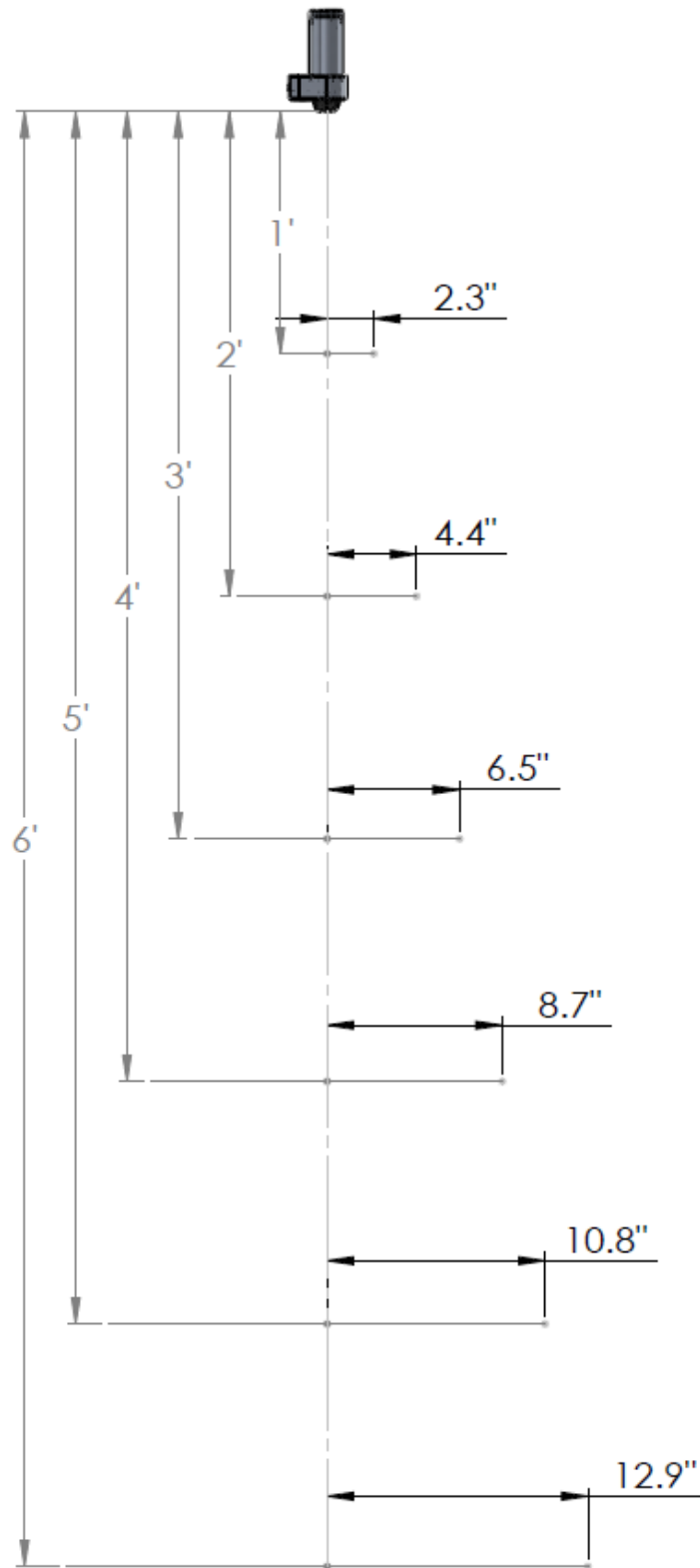
## Mounting Locations

Two sets of #10-32 socket-head cap screws are included with the sensor. The #10-32x3/4" screws are suitable for mounting to tubes between 5/8" and 3/4" in diameter. The #10-32x1-1/4" screws are suitable for mounting to tubes between 15/16" and 1-1/8" in diameter. The screws are driven with a 5/32" Allen wrench.

The sensor needs to have good clearance from the ground and no parts of the vehicle should obstruct the sensor's field of view. The closer to the ground the sensor is the smaller the sample area is for road temperature.

The sensor can be mounted at less than 1 foot; though it is not recommended as the sample size will be small. Also snow, ice, salt, and dirt can be thrown up and cover the distal end of sensor at that height should they be present on the road. Sensor can be mounted as high as 8 feet. **Figure 1** shows the clearance from the vehicle versus the height of the sensor above the road surface. It is important to note the higher the sensor is mounted, the greater distance from the vehicle is needed to ensure the sensor is only measuring road temperatures, and not a combination of the road and vehicle temperatures. For every foot of height the width of the area measured widens by approximately 2.1 inches.

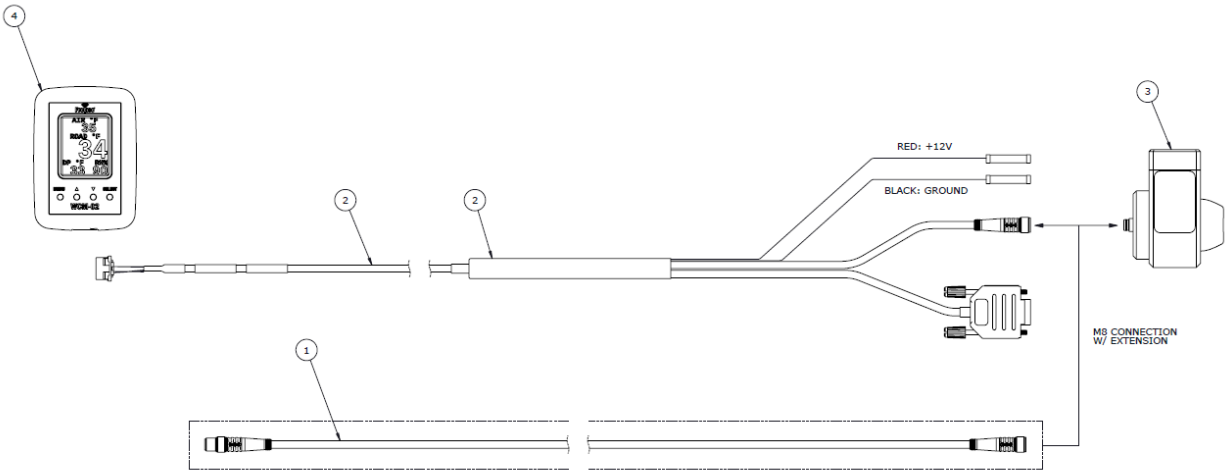
**For questions regarding installation or operation, please contact PreCise Support at 888-254-1634 during normal business hours (7AM-6PM Mountain Time, Monday-Friday) or [support@precisemrm.com](mailto:support@precisemrm.com).**



**Figure 1: Vehicle Clearance versus Height Above Surface**

## Electrical Connections

If the TS-01 is being connected to the WCM-02 display, connect according to Figure 2.



**Figure 2: Wiring to WCM-02**

To connect to a SSC6100 or similar device designed to interface with a RoadWatch\* - compatible M8 connection, follow Figure 3.

\* - RoadWatch is a trademark of Commercial Vehicle Group and is in no way affiliated with PreCise MRM or FORCE America, Inc.



**Figure 3: Wiring to WCM-02**

## TS-01 Specifications

### Sensors

Parameter	Rating	Units
Air Temperature	±0.5	°C (typ)
	±1.0	°F (typ)
Air Temperature Response Time (1)	30	Minutes (typ)
Relative Humidity	±4	% (typ)
Relative Humidity Response Time (1)	30	Minutes (typ)
Road Temperature	±1.0	°C (typ)
	±2.0	°F (typ)
Road Temperature Response Time	1	Second (typ)
Emissivity	0.95	
Field of View	10	°

Notes: (1) when vehicle is moving > 5mph

### 802.15.4 Radio

Parameter	Rating	Units
Range	33	ft (typ)
	10	m (typ)
Radio type	IEEE 802.15.4	
Frequency coverage	2.405-2.480	GHz
RF Sensitivity	-94	dBm (typ)
Maximum RF Input	+5	dBm (min)
Transmitter	Power output	0
	FCC Part 15 ETSI 300/328	FCC ID: OA3MRF24J40MA IC: 7693A-24J40MA

### Power

Parameter	Rating	Units
Supply voltage	6.5	Vdc (min)
	32	Vdc (max)
Supply current	6.5V	20
	12V	12
	32V	8

**Physical**

Parameter	Rating	Units
Dimensions	2.5 x 2.9 x 2.1	in
	62 x 74 x 54	mm
Weight	0.6	lbs
	0.3	kg

**Environmental**

Parameter	Rating
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
Humidity	0% to 100% RH at +40°C
Ingress Protection	IPX9K – High Pressure Steam
Vibration	MIL-STD 810G (7.7g, 20Hz-2kHz).
Shock	±30g

## MANUFACTURER LIMITED WARRANTY AND LIMITATION OF LIABILITY

Manufacturer warrants that on the Date of Purchase this Product will conform to Manufacturer's published specifications for the product, which are available from Manufacturer on request, and Manufacturer warrants that the product is free from defects in materials and workmanship. This Limited Warranty extends for twelve (12) months from the date of delivery. Manufacturer will, at its option, repair or replace any product found by Manufacturer to be defective and subject to this Limited Warranty.

This Limited Warranty does not apply to parts or products that are misused; abused; modified; damaged by accident, fire or other hazard; improperly installed or operated; or not maintained in accordance with the maintenance procedures set forth in Manufacturer's Installation and Operating Instructions.

To obtain warranty service, you must ship the product(s) to the specified Manufacturer location within thirty (30) days from expiration of the warranty period. Contact customer service to obtain a RMA number and write the number on the shipping container. You must prepay shipping charges and use the original shipping container or equivalent. Return shipping charges within the United States, Canada, and Puerto Rico, will be paid by Manufacturer. This Limited Warranty will apply only to a product purchased and located in the United States, Canada, or Puerto Rico.

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### Part 15 Notice:

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.

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