

Model 8141-A, 8141-B, & 8141-D Self-Aspirated Radiation Shield



**User's
Manual**

Rev. A



allweatherinc

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Revision History

Revision	Date	Summary of Changes
A	2020 Apr 9	Added Dwyer option for 8141-D.

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1. INTRODUCTION

The Self-Aspirated Radiation Shield is designed to house temperature/relative humidity probes in an environment protected from the thermal effects of solar radiation and precipitation. This shield with natural ventilation is typically used in applications where the AC power required for motor-aspirated radiation shields is not available.

The design allows air to rise through the shield for constant circulation, and provides protection for the probe from direct and scattered radiation, and from contact with precipitation.

The shield is constructed of 10 thermoplastic discs that block direct and reflected solar radiation from all angles, while permitting air flow past the probe arising from convection and wind. The disc material is specially formulated for high reflectivity and low thermal conductivity, and is resistant to ultraviolet light for improved weatherability.

A threaded hex plug adapter secures the probe inside the RM Young shield while providing easy access to the probe for calibration. The RM Young shield mounts to a vertical mast or tower leg with an outside diameter of 25–50 mm (1" to 2"). Mounting hardware and the hex plug adapter are included.

The Dwyer shield, which supports only the Model 5190 series of temperature/humidity probes, has a plastic mounting retainer for the probe. The Dwyer shield mounts to a vertical mast or tower leg with an outside diameter of 19–38 mm (0.75" to 1.5").

1.1 MODELS

Table 1. Model 8141 Series Radiation Shields

Model	Probes Supported	RM Young	Dwyer
8141-A	Model 5120 humidity probe, and the Model 5129 and 5140 temperature/humidity probes	1	
8141-B	Model 4470, 4480, and 4500 series temperature probes	2	
8141-D	Model 5190 series of temperature/humidity probes	3	4

¹ Includes a mounting adapter compatible with the Model 5120 humidity probe, and the Models 5129 and 5140 temperature/humidity probes

² Includes a mounting adapter for mounting the Model 4470, 4480, and 4500 series temperature probes

³ Includes a mounting adapter for use with the Model 5190 series of temperature/humidity probes

⁴ Includes mounting retainer for the Model 5190 series temperature/relative humidity probes

2. THEORY OF OPERATION

A pure black body will absorb almost 100% of heat radiation. In contrast a pure white or highly polished surface will reflect almost 100% of heat radiation. This shield was designed to reflect most of the sun's direct radiation through the use of multiple shields with highly reflective surfaces. Openings in the top of each intermediate shield aid in natural ventilation.

Optimum temperature measurements can be made using aspirated radiation shields. Shields with fans or blowers give a constant flow of ambient air to the sensor, while self-aspirating and vane-aspirated shields must rely on natural air movement and convective flow. The self-aspirating shield must be used when power is unavailable for fan aspiration. The drawback to the self-aspirating shield is that, under calm conditions, a 2°F (1°C) error can occur due to stagnant air in the immediate surroundings. The only alternative is to use a fan-aspirated shield with a DC fan and batteries whenever power is unavailable.

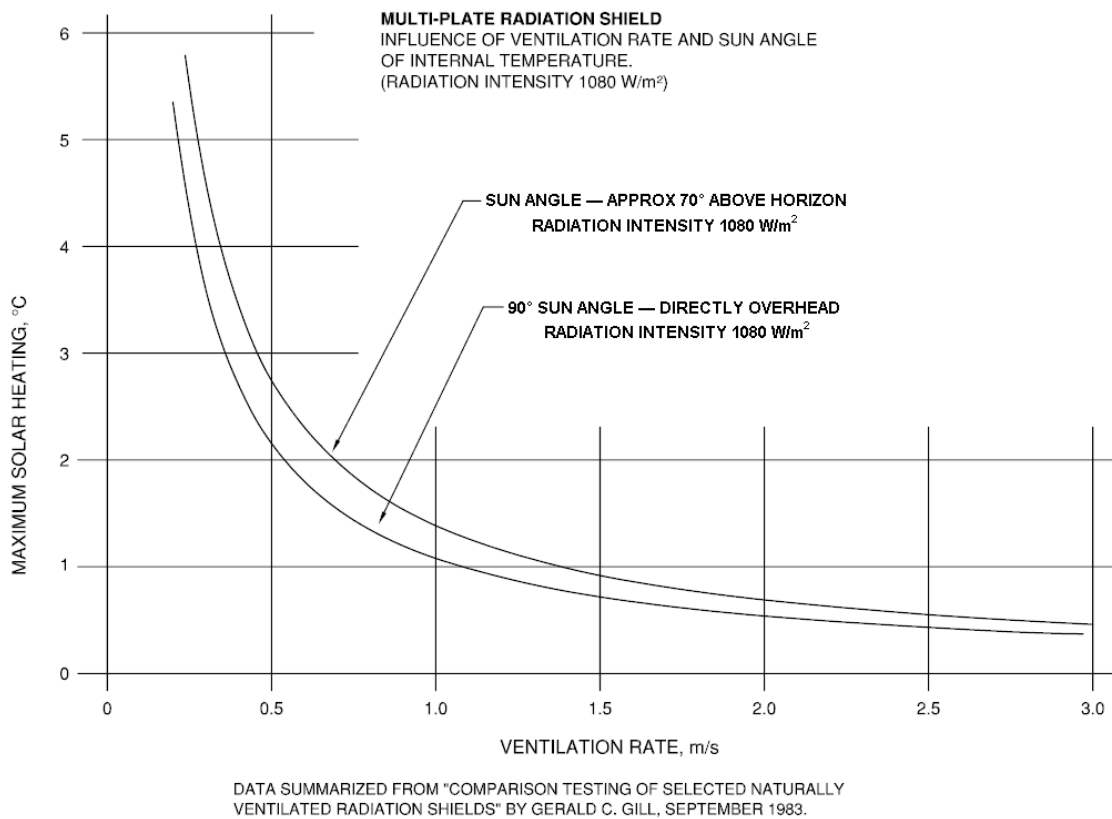


Figure 1. Model 8141 Performance Curve

3. INSTALLATION

The radiation shield is thoroughly tested and fully calibrated at the factory and is ready for installation. Please refer to the return authorization card included in the packing box if damage has occurred. Also, notify All Weather Inc.

Section 3.1 describes the standard installation for the Model 8141-A, 8141-B, and 8141-D radiation shields. The Model 8141-D has two variations, the RM Young variation, described in Section 3.1, and the Dwyer variation, described in Section 3.2.

3.1 RM YOUNG RADIATION SHIELDS

To mount the radiation shield onto a vertical mast or onto one of the tower legs, select a section with an outside diameter from 1-2 inches, and use the U-bolt assembly provided with the shield. Do not over tighten the U-bolt nuts.

The Model 8141-A, Model 8141-B, and 8141-D installations are identical except for the mounting adapter provided with each.

- The Model 8141-A includes a mounting adapter compatible with the Model 5120, 5129, and 5140 probes
- The mounting adapter included with the Model 8141-B is used for mounting Model 4470, 4480, or the 4500 series temperature probes
- The adapter included with the Model 8141-D is used to mount the Model 5190 series temperature/humidity probes.

To install a probe into the Model 8141-A or 8141-D, insert the probe into the mounting adapter and tighten.

To install a probe into the Model 8141-B, insert the probe into the mounting adapter and secure it with the clamp by tightening the clamp's two screws. Do not overtighten.

After installation, the probe's sensing element should be situated at about the shield's midpoint.

The radiation shield should be located as far as possible from sources of heat and ventilation except when it is these sources that are being measured. The shield should also be as far as possible from surfaces and large objects.

Refer to Figure 2.

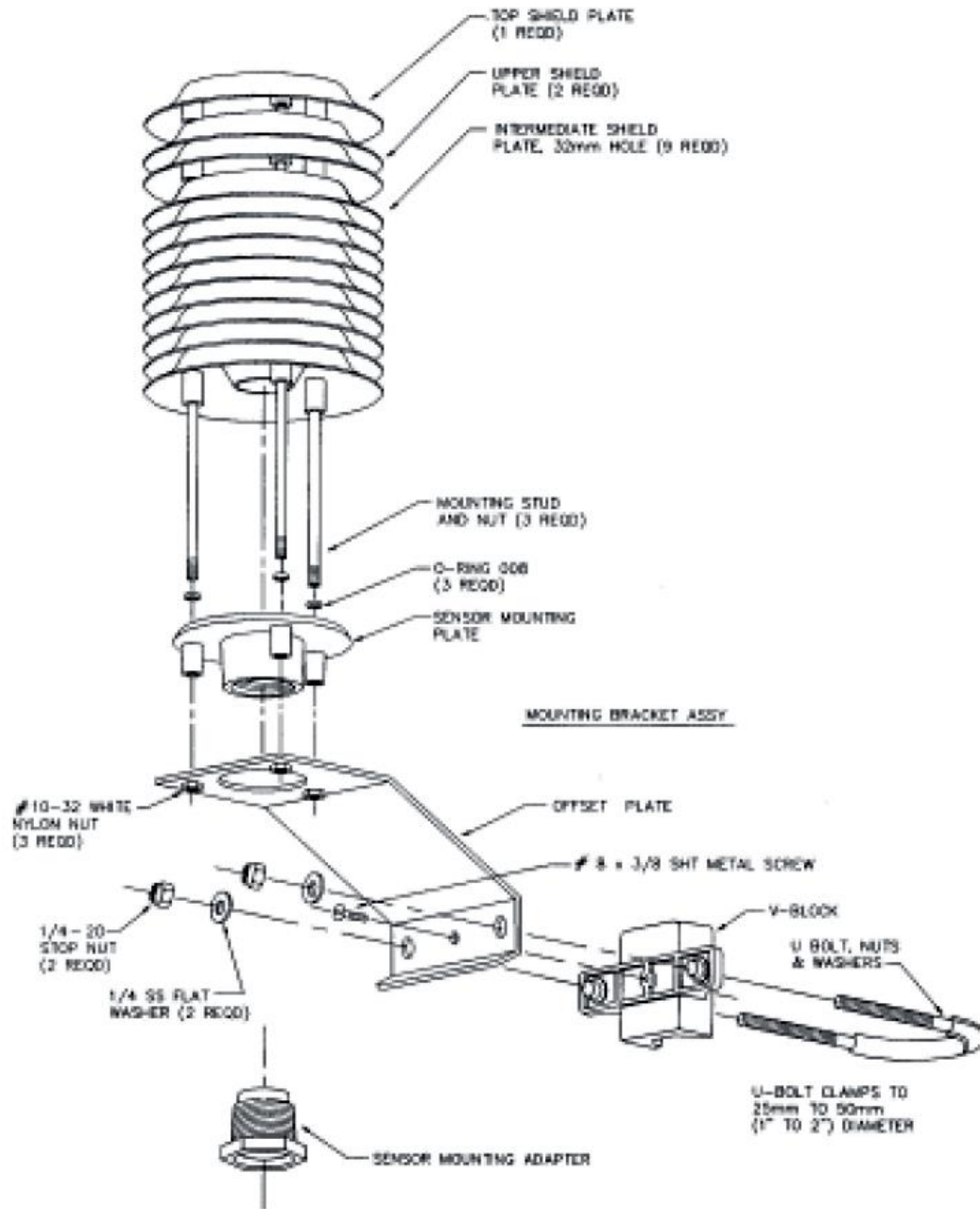


Figure 2. Model 8141 Series RM Young Radiation Shield Mounting Instructions

3.2 DWYER RADIATION SHIELDS

1. Loosen plastic probe retainer on radiation shield by unscrewing two retainer screws.
2. Insert probe into the probe retainer as shown.
3. Slide probe in mounting retainer completely into radiation shield.
4. Screw plastic probe retainer to the radiation shield until the probe is held firmly in place.
5. Do not over tighten the screws.
6. Remove the U bolt from the mounting bracket.
7. Secure the radiation shield to pipe with a diameter of 19–38 mm (0.75" to 1.5").

Refer to Figure 3.

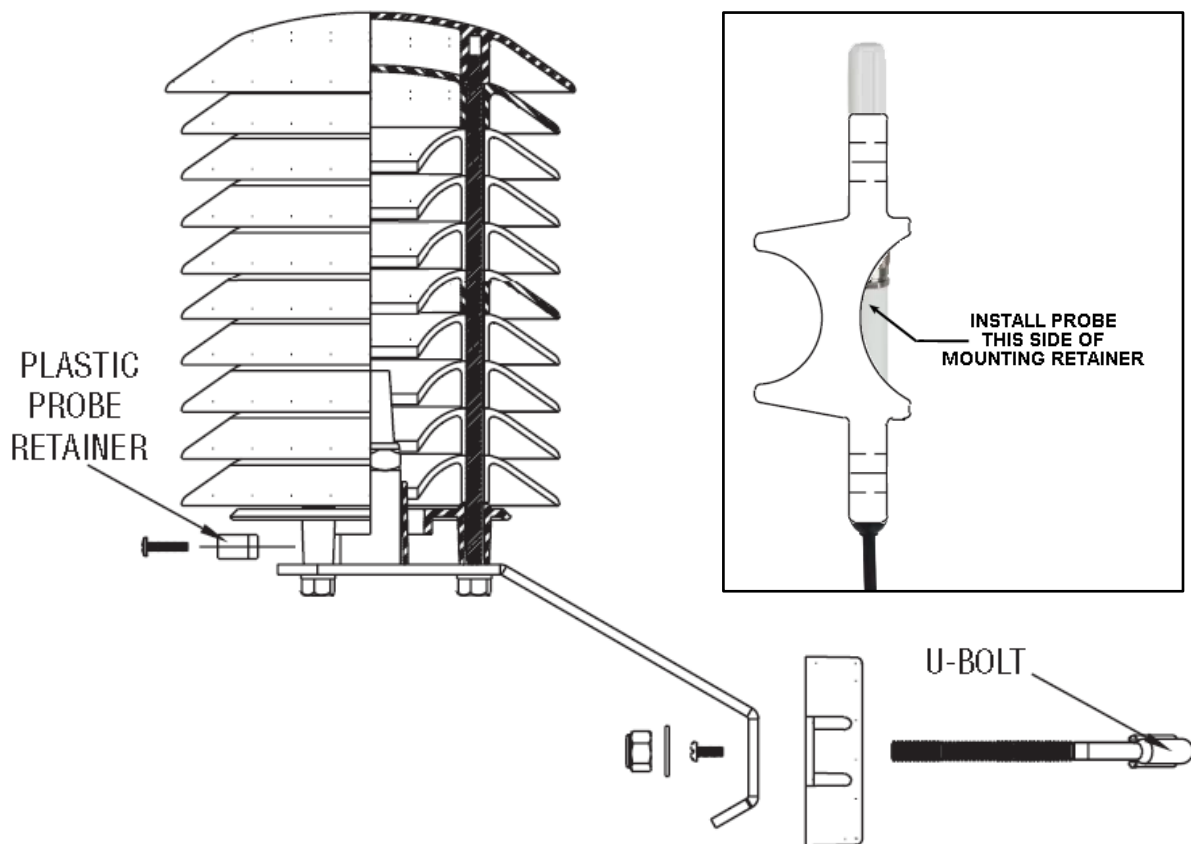


Figure 3. Model 8141-D Dwyer Radiation Shield Mounting Instructions

4. CALIBRATION

The Model 8141-A, 8141-B, and 8141-D Self-Aspirated Radiation Shields require no calibration.

5. MAINTENANCE

Maintenance is limited to keeping the shield clean and free of debris. Do not paint this shield any other color. Replace any defective parts immediately.

6. SPECIFICATIONS

Parameter		Specification
Mounting Capacity	8141-A	1 Humidity Probe, or 1 combination Temperature/Humidity Probe
	8141-B	1 Temperature Probe
	8141-D	1 combination Temperature/Humidity Probe
Radiation Error @ 1080 W/m ² (depends on solar radiation intensity and wind speed)		0.4°C (0.7°F) rms @ 3 m/s (6.7 mph) 0.7°C (1.3°F) rms @ 2 m/s (4.5 mph) 1.5°C (2.7°F) rms @ 1 m/s (2.2 mph)
Material		UV stabilized white thermoplastic
Environmental		
Operating Temperature		-50 to +50°C (-58 to +122°F)
Mechanical		
Dimensions (with mounting bracket)	Young	260 mm H × 163 mm D (10.25" H × 6.4"D)
	Dwyer	130 mm D × 269 mm H (5.125" D × 10.58" H)
Mounting	Young	U-bolt fitting for vertical pipe O.D. 25–50 mm (1–2")
	Dwyer	U-bolt fitting for vertical pipe O.D. 19–38 mm (0.75" to 1.5")
Weight		0.7 kg (1.6 lb)
Shipping Weight		1.5 kg (3.2 lb)

7. WARRANTY

Any defect in design, materials, or workmanship which may occur during proper and normal use during a period of 1 year from date of installation or a maximum of 2 years from shipment will be corrected by repair or replacement by All Weather Inc.



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