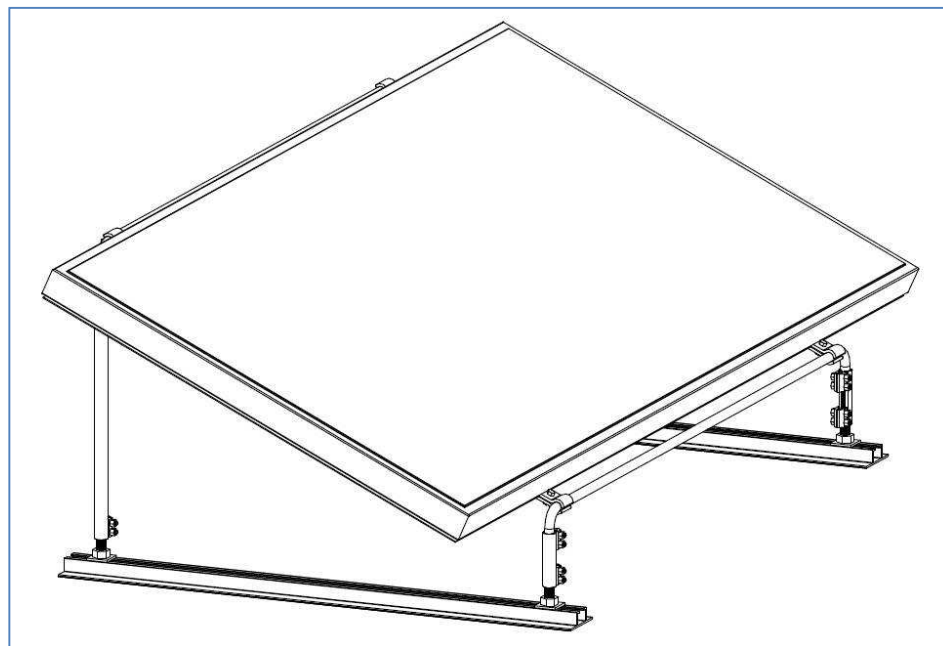




Installation and Maintenance Manual
YC-32 Tubeless Flat Plate Collector

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Scope of this Manual

This manual is intended to provide general information about the YC-32 and guidelines for installing and maintaining the YC-32. It assumes that Sisyan has been directly involved in the design of each system, and that installing personnel has been trained by Sisyan. It also assumes all mounting hardware, plumbing, pumps, and controls for the YC-32's operation are provided or specified by Sisyan.

Introduction

In traditional collectors water flows through rigid metal tubes. In the YC-32, it flows in channels formed between two sheets of aluminum spaced approximately $\frac{1}{4}$ " apart as in Figure 1. The sheets are flexible, making the collector freeze tolerant. Maximum operating pressure is below 2psi, and each collector is permanently vented to the atmosphere to allow failsafe drainback and prevent over pressurization. The volume of water in the collector varies slightly with inclination.

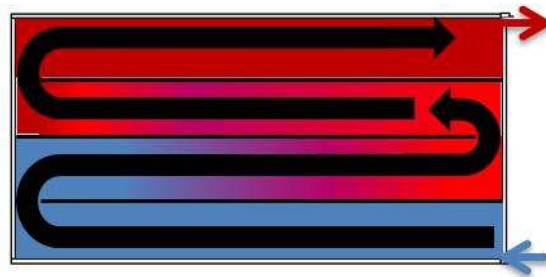


Figure 1: The YC-32 has no tubes. Water flows in channels formed between two .032" sheets of aluminum spaced approximately $\frac{1}{4}$ " apart.

WARNING: Never operate the YC-32 at inlet pressure greater than 52" static head.

Water quality

Mineral content is an important consideration but it is difficult to give precise guidelines. Unless de-ionized water is used, water must be analyzed for each site to determine if any softening is required. Water flowing through the collectors must have a pH between 6.5 and 7.5.

Collector Mounting

The YC-32 is always installed in “landscape” with the long sides horizontal. To ensure proper drainage, the collector must be tilted so the exit manifold is at least 10” higher than the inlet manifold.

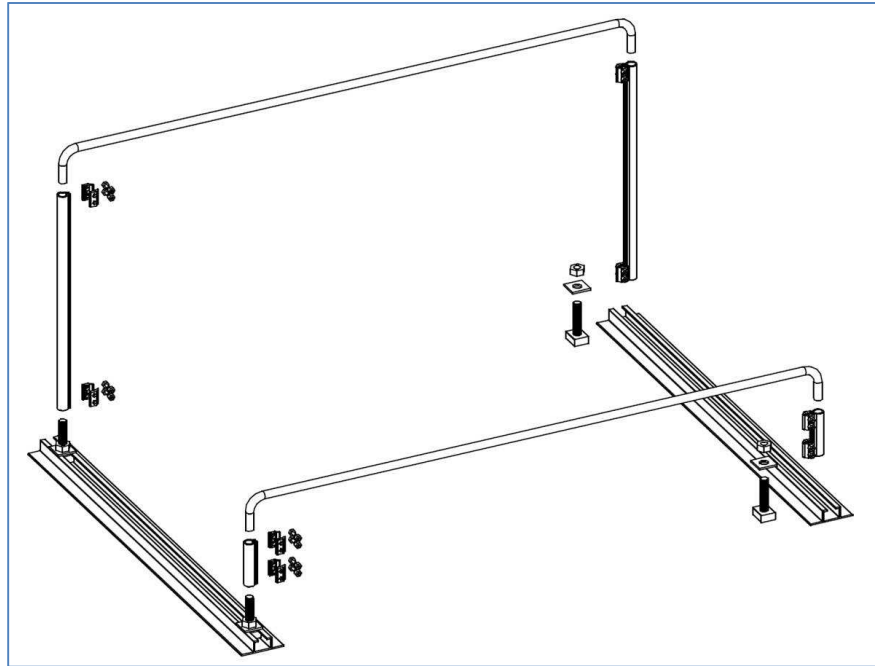
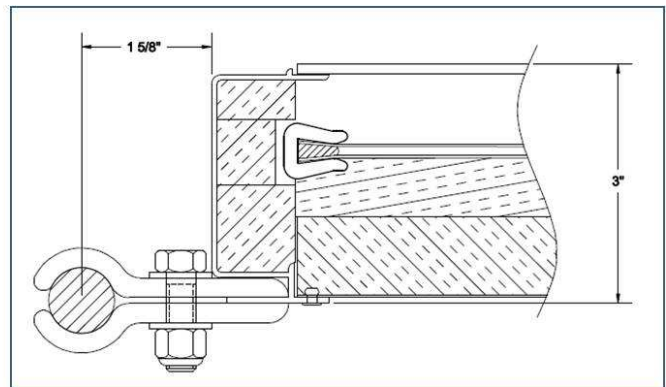
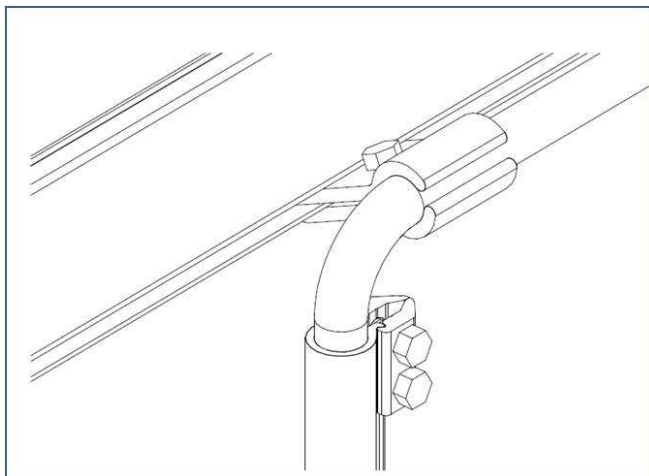


Figure 2: Racking assembly



Figures 3 and 4: Clamped connection between racking and collector.

To mount the collector, first insert the upper jaw of the mounting clamp into the collector frame, and then position the jaw onto the bent bar (see Figures 3-4). This allows the collector to be easily positioned before assembling the hardware. More than four clamps may be required per collector, depending on site requirements.

The following components are shown in Figure 5:

Item	Description	Qty per collector
1	Rail extrusion (cut to length and drilled for each site)	2
2	Threaded rod	4
3	Nut, 22mm	4
4	Square washer	4
5	Threaded block	4
6	Short leg	2

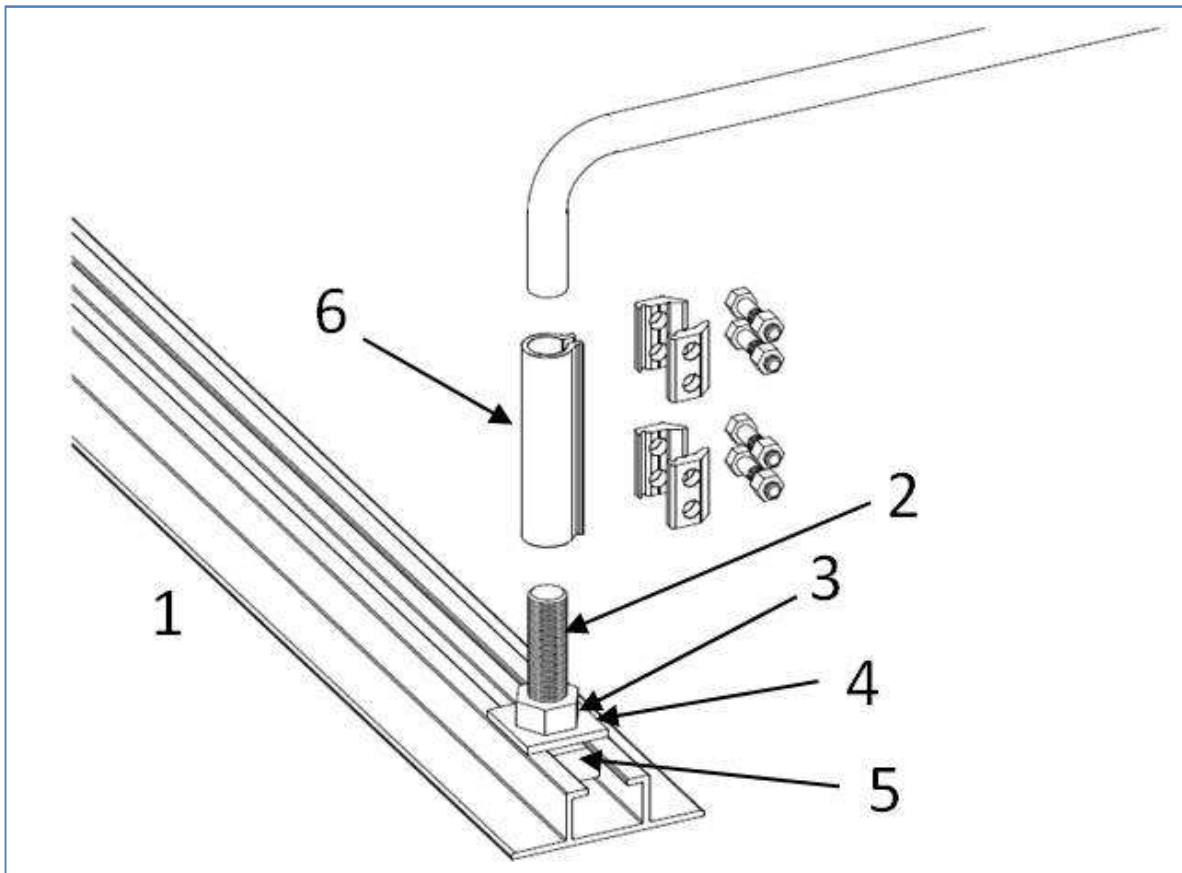


Figure 5: Rail connection details

The following components are shown in Figure 6:

Item	Description	Qty per collector
7	Long leg	2
8	Tube clamp, with hardware	6
9	Collector mounting clamps, with hardware	Min 4
10	Bent bar	2

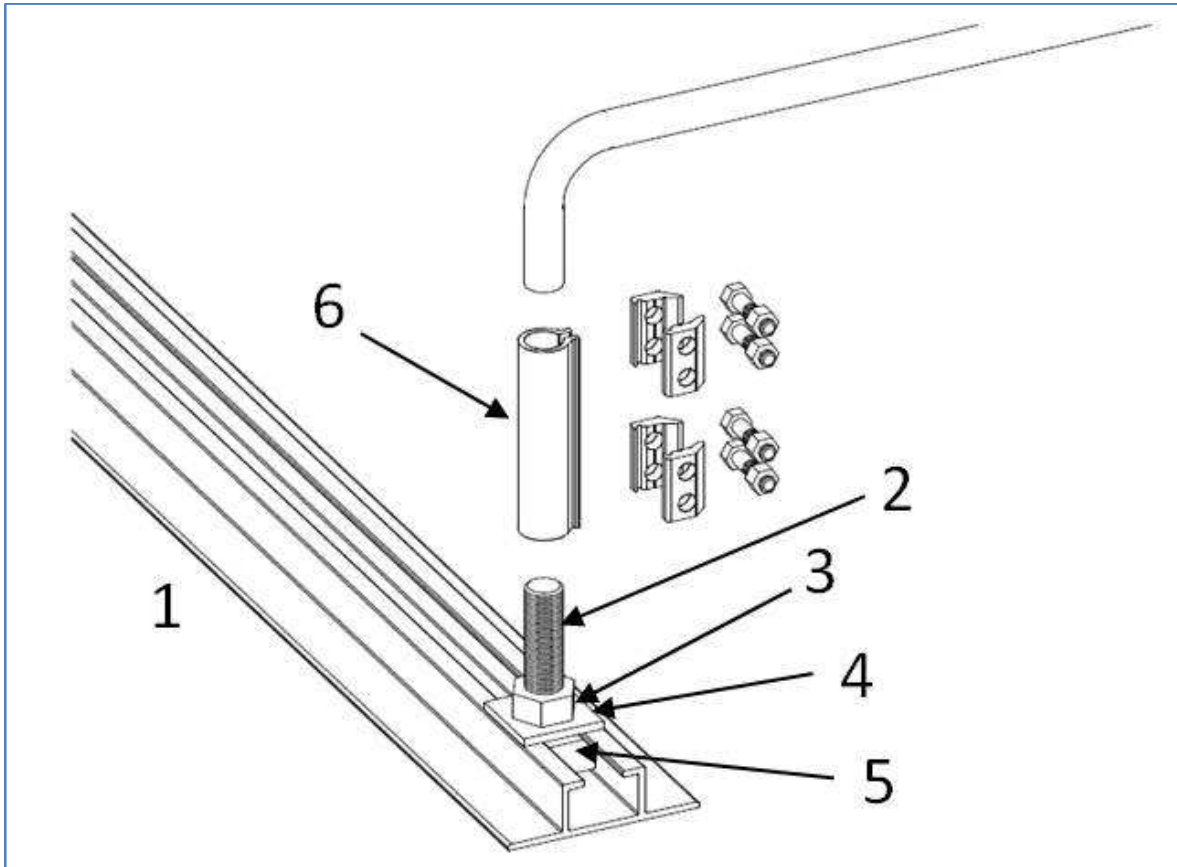


Figure 6: Connection between long leg and upper bar. Collector mounting clamp also shown.

Roof Installation

Installation details will be included in site-specific engineering. Each leg will be cut to length as needed per site roof. Compound angles can be accommodated. See Figures 7-9.

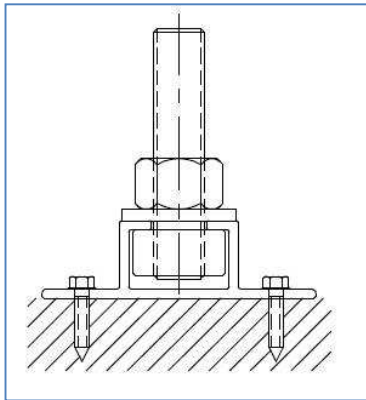


Figure 7: Schematic of rail mounting to roof, for illustration purposes only. Also shown is connection between rail and threaded rod.

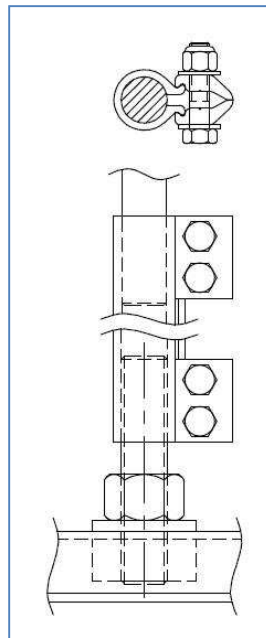


Figure 8: The threaded rod of Figure 7, long leg, and bent bar are connected by two clamping assemblies. Also see Figure 6.

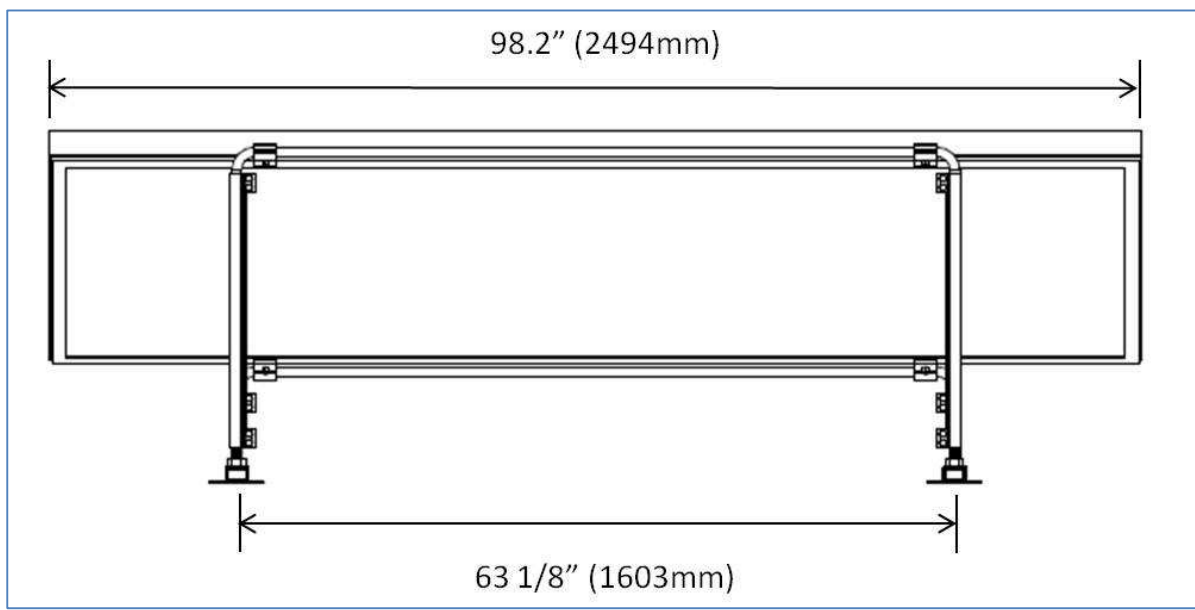


Figure 9: End view

Tilt Adjustment

The racking system and flexible plumbing allow the unique ability to adjust collector tilt (see Figure 10.) Possible uses include protecting collectors from hurricane-force winds or making seasonal changes. To allow this option, longer rails and an additional set of short legs are needed. The collector is lowered by replacing the long legs with two more short legs. The collectors can be operated as long as the exit manifold is 10" higher than the inlet manifold and flows are adjusted as described below.

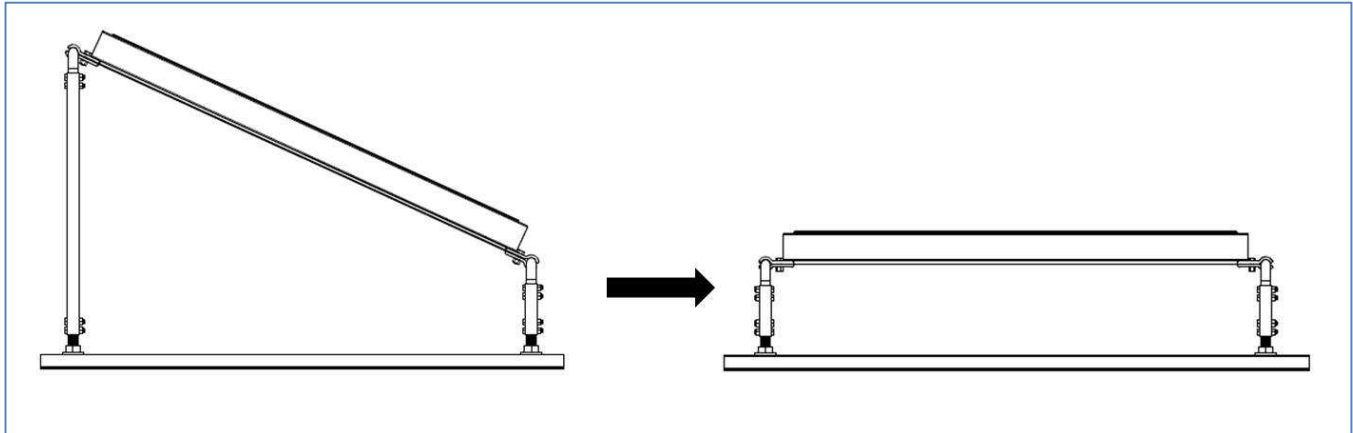


Figure 10: Optional tilt adjustment

Duct Mounting

Each cluster of panels will have an insulated duct containing the feed line and return lines. The duct is mounted to the racking and is inclined at least $\frac{1}{4}$ " per 12" (2% slope) to allow draining. The number of collectors per group will be site specific. Mounting hardware for ducting will be part of the site-specific design.

Plumbing and adjusting flow rates

Operating flow rates are 0.5-1.4gpm. In the YC-32's operating pressure range, the simplest means of determining flow rate is to measure the time needed to fill a container with a known volume. Conventional flow meters may add substantial flow restriction.

To ensure proper flows:

- a. Install the provided flow control clamp between the circulator and the inlet manifold (see Figure 11).
- b. It is important to provide sufficient head at the circulator entrance port. This is typically at least 18".
- c. Start with the inlet clamp fully closed. Increase the flow gradually by opening the clamp.

WARNING: If collector is filled too quickly it can be over pressurized. Flow rate into collector should not exceed 1.4 gpm. At 1 gpm, collector may take approximately 5 minutes to fill.

- d. The end of the return line must be at least 40" below the outlet manifold. (In actual installations the vertical drop is likely to be much greater than this.)
- e. A siphon will develop in the return line, drawing air through the vent (Figure 12). The larger the vertical drop, the stronger the siphon and the more air that will be drawn. To avoid thermal losses, the air intake should be controlled. Install a flow clamp at the end of the return line, and restrict the flow until air bubbles are minimized.



Figure 11: Inlet plumbing



Figure 12: outlet plumbing with permanent vent

Connecting sensors

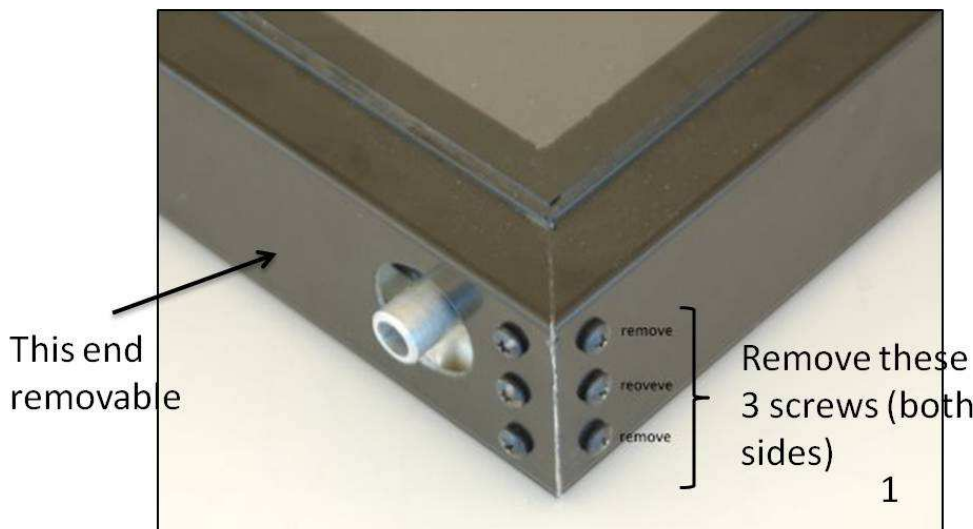
Each array will have temperature sensors and control switches provided with the specific site design. Instructions for connecting the switches and sensors will be provided separately.

Maintenance:

System thermal performance should be monitored so that any degradation can be found early and reversed.

Exchanging the absorber panel:

The YC-32 absorber panel can be exchanged. To take a panel off-line, the array must first be drained. Remove the rubber boots and silicone tubing. Crimp both lines. Remove the panel from the array. Place panel on an elevated flat surface.



1. Remove 6 screws total and cut RTV silicone that seals removable end (top and bottom)
2. Slide out absorber, with glass wool insulation

TECHNICAL SPECIFICATIONS

Length	98.2" (2494mm)
Width	50.2" (1275mm)
Depth	3" (76mm)
Weight (empty)	129 lbs (59 kg)
Max fluid content (at 1.4gpm)	At 20 degrees of tilt: 4.8 gallons (18.2l) At 90 degrees of tilt: 5.6 gallons (21.3l)
Gross surface area	34.23 ft ² (3.18m ²)
Net surface area	30.96 ft ² (2.88m ²)
Absorber coating	Black selective
Operating configuration	Drainback only
Max operating pressure	52" static head, or 1.9 psi (0.13 bar)
Tubing connections	0.63" (16mm)
Recommended flow rates	0.5 – 1.4gpm (1.9 – 5.3 liters/min)
SRCC rating	Pending

