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“Skyline” Open Loop System 3

Models: “200131C50, 200132C50, 200132C80, 200133C50 and 200133C80”

SRCC OG300 and FSEC Rated Systems

INSTALLATION MANUAL

Dec 8, 2005



The solar energy system described by this manual, when properly installed and maintained, meets or exceeds the minimum standards established by the SRCC. This certification does not imply endorsement or warranty of this product by SRCC.

“The solar energy system described by this manual, when properly installed and maintained, meets the minimum standards established by the Florida Solar Energy Center, in accordance with Section 377.705, Florida Statutes. This certification does not imply endorsement or warranty of this product by the Florida Solar Energy Center or the state of Florida.”

CONGRATULATIONS!

Thank you! You have just purchased the easiest to install active solar water heater made! We have worked on every detail to assure you that the “Skyline 2001 water heater will completely satisfy you in its high level of performance and dependability.

Table of Contents

SUBJECT	SECTION
Tools and Materials.....	1.0.
Systems, Components and Options.....	2.0.
Specifications and Schematics.....	2.1.
Important Notes.....	2.2.
Collector Location, Orientation and Tilt.....	3.0.
Overview of the Basic Installation Steps.....	4.0.
Assembling the Collector (split kits only).....	5.0.
Collector Installation.....	6.0.
Determining the Best Pipe Run.....	7.0.
Making Line Connections.....	8.0.
Tank Connections.....	9.0.
Control Component Details.....	10.0.
Questions and Answers.....	11.0.
Certifications.....	12.0.

PLEASE CALL SolarRoofs.com WITH QUESTIONS:
Toll Free USA Technical Install Help Number: (888) 801-9060

WE WELCOME YOUR COMMENTS! We have endeavored to make the Skyline 2001 installation instructions complete and easy to use. We are always looking to make them better and we **welcome** your comments and suggestions!

BEFORE STARTING INSTALLATION

PLEASE CAREFULLY READ THIS ENTIRE MANUAL FIRST!

Remember! A Collector in the Sun Can Be Very Hot – Cover It To Prevent Burns From Hot Copper Tubing and Very Hot Fluid Coming Out of the Tubes

As the collector has some sharp metal edges and corners, use caution when handling the collector.

This Installation Manual and assumes good technical experience and ability.

The Skyline System 3 can be installed in straightforward situations by two experienced people in less than six hours.

With no experience, the installation will probably take eight to twelve hours, with added complications, like a longer pipe run or two stories, taking longer.

1.0.

Tools and Materials

ITEMS SUPPLIED BY SOLARROOFS.COM:

- Collectors, with mounting rails, Ell brackets, U Center brackets, washers, Tec screws and lags.
- Air Vent, Pressure Relief Valve, copper adaptors and compression unions.
- PV Panel with mounting brackets and hardware
- Storage Tank ‘Quick Connect’ unit including coaxial tank fitting, brass fittings, isolation ball valves, solar loop drain Hose bibs and floating check valve.
- 2 Temperature Gauges with tees.
- 12 Volt Pump, connections and switch.
- 50’ 1/2” outside diameter copper solar loop lines.
- Solar loop installation parts kit including miscellaneous parts, fittings, screws, nuts, bolts, etc.,
- All hardware, two roof boots, 6’ high temp. insulation
- Mixing Valve.
- Installation Manual, Operation and Maintenance Manual and Stickers.
- Optional items such as tilt kit, freeze valve, re-circulation kit with control box.

TOOLS AND MATERIALS NEEDED (to connect to existing water heater):

Overview: Everyday homeowner tools are all that are needed to assemble and install the Skyline solar loop.

Tools and Materials Needed:

- 2 adjustable wrenches and/or wrench set for compression unions.
- Min 18” “Monkey Wrench (best to have 2) for tank water fittings.
- Teflon tape (1/2" wide to seal threaded fittings use 6 turns).
- Quality Pipe Sealant (to seal face of brass union ends).
- Ladder(s) (for roof and for access to attic as needed).
- Tape measure, marking pencil, crayon or chalk (to mark rafters and holes on roof), chalk line.
- 1 1/2" inch wood bit for roof penetrations (for feed and return lines through roof) or 5/8" tile drill bit.
- 7/16" socket with ratchet and 6" extension. (a powerful drill with adapter is desirable for quickly driving lags).
- 1/4" nut driver on high speed drill (to drive 1/4" self tapping screws into collector).
- Caulking gun with quality Polyurethane or Silicone roofing caulk (to fill lag holes and seal flashing to prevent leaks).
- 1/2" or 3/4" wall, 7/8" ID (for domestic lines and brass solar fittings) and 5/8" ID high temperature open cell pipe insulation for solar loop piping.

The following SRCC, OG300 Rated Systems and Components are Covered in this Manual

System 3 and Option List

Packaging and Delivery to Continental 48 States,

2 and 3 collector systems are shipped assembled in a crate by motor freight.
Standard Color for all systems Musket Brown or Dove Gray. See Options for Architectural Colors.

Skyline System 3 with PV Powered Circulator.

- Skyline 2001 Collector(s), Split Kit, Single Piece or Parallel Flow,
- Includes 3 mounting rails and 6 Ell brackets with 3 U brackets per additional collector.
- Solar Feed and Return line compression union and Ell couplers.
- Air Vent, Pressure Relief Valve with Splash Pad.
- Very Light Freeze (VF01) Option: Thermal Freeze Valve.
- PV Panel with switch.
- Light Freeze* (FS03) Option: Recirculation freeze snap switch, 12 volt transformer.
- Storage Tank 'Quick Connect' unit including Isolation Ball Valves, Solar Loop Drain Hose Bibs and Check Valve.
- 12 Volt Electronic Pump and connections.
- 50' 1/2" outside diameter copper solar loop lines.
- Solar loop installation parts kit including miscellaneous parts, fittings, screws, nuts, bolts, etc.,
- All hardware, two roof boots, 6' high temp. 1/2" wall high temperature insulation.
- 2 Thermometers, domestic hot water mixing valve.
- Installation Manual, Operation and Maintenance Manual (O & M manual) Quick Look Operation Guide Tag.

One Collector System, Model Number: 200131C50, use minimum 50 gallon electric tank with bottom element disconnected from upper element

Two Collector System, Model Number: 200132C50, and 80, use 50 or 80 gallon electric tank with bottom element disconnected from upper element

Three Collector System, Model Number: 200133C50 and 80, use 50 or 80 gallon electric tank with bottom element disconnected from upper element

***"Light Freeze" Recirculation freeze protection option** is recommended for mild weather climates and where the temperature occasionally dips below freezing. Recirculation can provide a higher level of freeze protection in light freeze areas. A Thermal Freeze Valve on 4" stub is always included with the "LF" option.

Freeze Protection Options:

NF = No Freeze Zone - Tropical, (no freeze protection at all)

VF = Very Light Freeze Zone - Sub Tropical (45F Dole)

LF = Light Freeze Zone - Temperate (Recirculation and or 45F Dole)

Tilt Kit (option) Tilts collectors approximately 18 degrees from existing roof angle, Other angles available on request. Tilt kits are used when a better winter angle is desired on a low pitch roof or to "re-orientate" panels to face south by running the panels up and down an East or West facing roof. See Special Instructions.

Single Panel: Collector kit with 3 Modified 24" rails with 6" legs and hardware:

(Option Code /#TK01)

Double panels: Collector kit 3 - 4' 1" x 1" Aluminum Rails with 12" legs and hardware:

(Option Code /#TK02)

Tripple panels: Collector kit 3 - 6' 1" x 2" Alum. Rails with 24" legs and hardware:

(Option Code /#TK03)

Standard Color (Default): Musket Brown (C101)

Free Optional Color: Dove/Old Town (Medium) Gray (C109) - Note: This is a no cost option.

Optional Colors Include:

Colonial (light) Gray (CO102), Tahoe Blue (CO103), Colonial Red (CO104), Forest Green (CO105), White (CO106), Buckskin Brown (CO107), Beaver (medium) Brown (CO108), C.B. (medium) Blue (CO110), Spanish Green (CO111), Storm/Slate (dark) Gray (CO112), Royal Brown (CO113), Ivory (CO114), Sea Blue (CO115), Leaf Green (CO116), Pebblestone Clay (CO117), Woodbeige (CO118), Peach (great on many light orange tile roofs) (CO119), Almond (CO120), Black (CO121), Adobe Tan (CO121), Classic Cream (CO122), Bronze (CO123), Heritage Cream (CO124), Marine Green (CO125).

Components (for individual purchase):

MV01, Mixing Valve:

QF34, Quad Flow Diverter

TR50, 50 foot roll of 3/8" ID, 1/2" OD soft copper tubing with 2 compression unions

ES10, El Sid 10 Watt 12V Circulator

HC18, March 809 18 Watt 12V Circulator

PV10, 10 - 11 Watt 12V Panel With Mounting Hardware

PV20, 20 – 21 Watt 12V Panel With Mounting Hardware

PV20, 30 - 32 Watt 12V Panel With Mounting Hardware

PR15, 150 Pound Pressure Relief Valve

CV01, Floating Ball Check Valve

H180, 180 F High Temperature snap switch, open 180 F, close 140 F, place on cold in

“Skyline” 2001 System 3 Solar Water Heater Specifications

COLLECTOR (Panel)

Trim & Frame Materials:	Finished 27 mil Aluminum Trim and Frame = Total 54 mil (1.37 mm).
Insulation:	Bottom: 1" (2.54 cm) Foil Faced Celotex
Absorber Material:	“Black Crystal” coated - all Copper with compression unions.
Glazing:	.236" (6.0 mm) Twinwall Polycarbonate UV Treated
Dimension / Weight:	“Skyline” 20-01-144.3”x 20.”x 3” 38 lb (3.67 m x 0.51 m x 0.076 m 17.24 Kg) 18.4 Net s/f (1.71 m ²)
Fluid Capacity:	.3 Gallons
Recommended Flow Rates:	.20 to .35 GPM (0.946 to 1.324 L/min)
Maximum Working Pressure:	150 PSI (10.21 atm).
Maximum Stagnation Temp:	250 °F (121.11 °C).
Heat Transfer Fluid:	Potable water
Standard Components:	3 Mounting rails, mounting brackets, tech screws and lags
Color:	Musket Brown (C101 – default color) or Dove/Old Town Gray (C109) + optional colors

PV (Photovoltaic) POWERED CIRCULATOR

PV Panel:	10 - 11 or 20 - 21 Watt, 12volt DC with switch.
Circulator:	12 Volt - 10 Watt (2 or 3 collectors) “El Sid” or March 18 Watt 809 12 Volt.

FREEZE PROTECTION

Type:	Freeze Valve - Passive Freeze Valve for light freeze protection down to 30F
Temperature to open:	Very light freeze (VF & LF) 40 °F - Starts to open and drip water at 40° F.
Type:	Light Freeze (LF) Recirculation with 40F Freeze Snap Switch for 12 Volt Circulator using 12 volt Transformer for light freeze protection down to 20F for up to 8 hours, includes switch box with diodes to prevent backflow.
Type:	Solar Loop quick shut off ball valve and drain valve set.

CONNECTING LINES, INSULATION (standard)

Tubing:	1/2" (12.7 mm) OD copper - 50' (15.24 m)
Insulation, High Temperature	(6' (1.83 m) supplied): 1/2" (12.7 mm), 1/2" (13 mm) wall

TUBING CONNECTION METHODS (standard)

Type:	Brass Union, Compression.
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STORAGE TANK (Not Supplied)

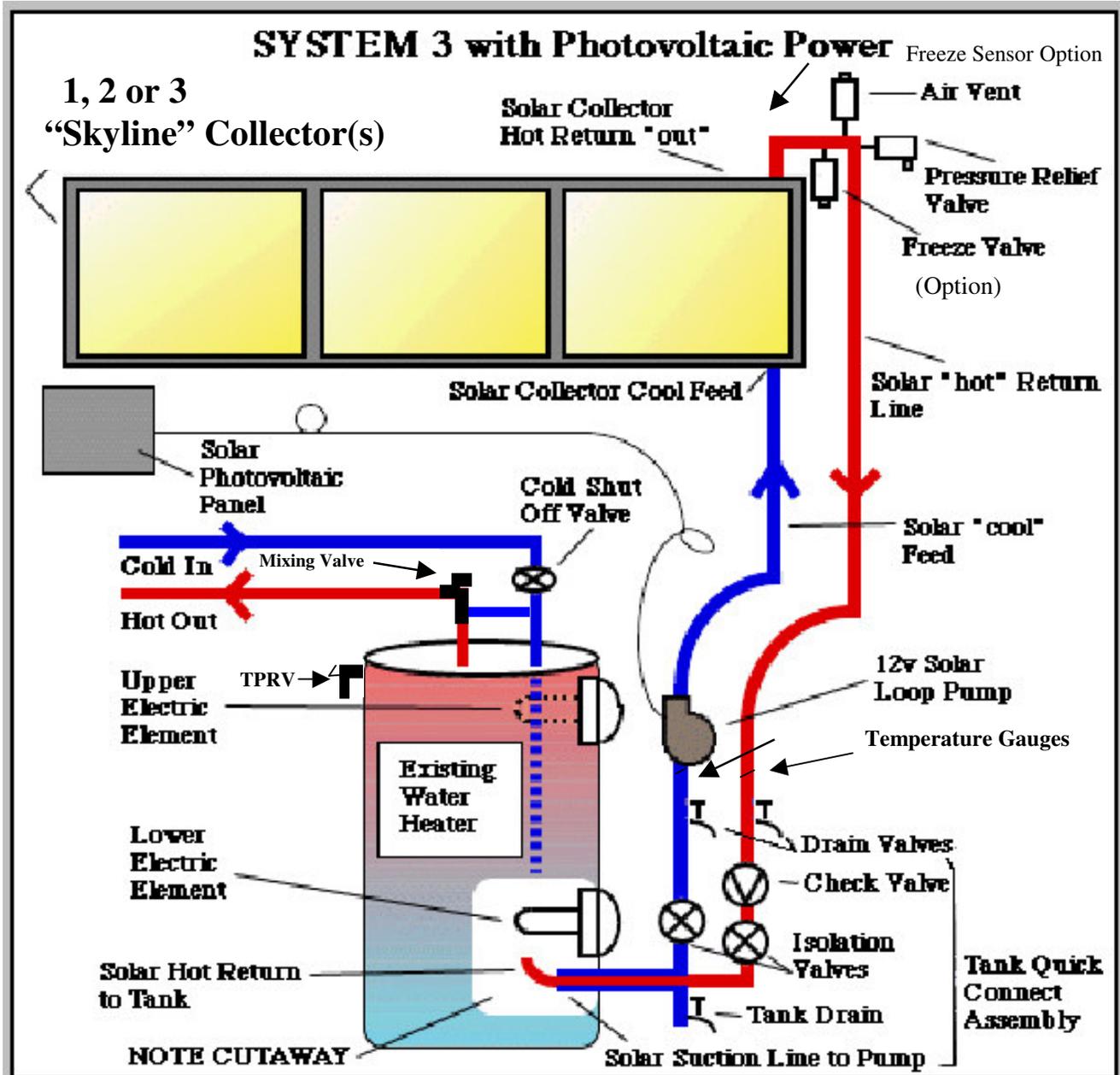
Standard Connections:	Use Existing 50 gallon minimum (189.27 L) tank for 1, 2 or 3 Collectors or 80 gallon (303 L) tank for 2 or 3 Collectors.
	Max. Temperature tank must withstand: 190 °F (87.77 °C)
	Max. Pressure tank must withstand: 150 psi (10.21 atm)

CONTROL

Type:	12 Volt PV Panel with switch which automatically regulates circulator operation.
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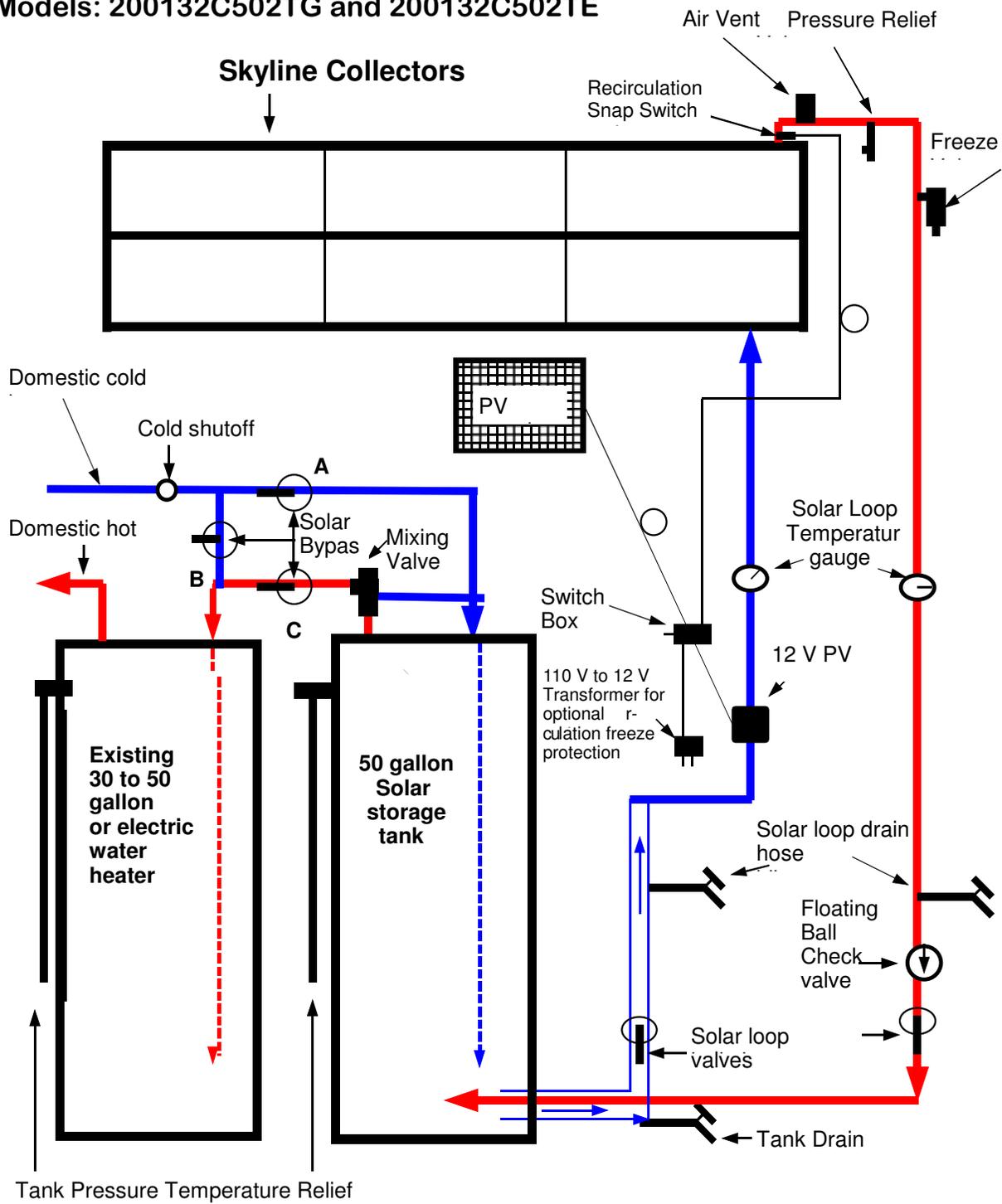
Although we will make every effort to give notice, Specifications and prices subject to change without notice.

“Skyline” Open Loop System 3



2 Tank Skyline System 3 Diagram

Models: 200132C502TG and 200132C502TE



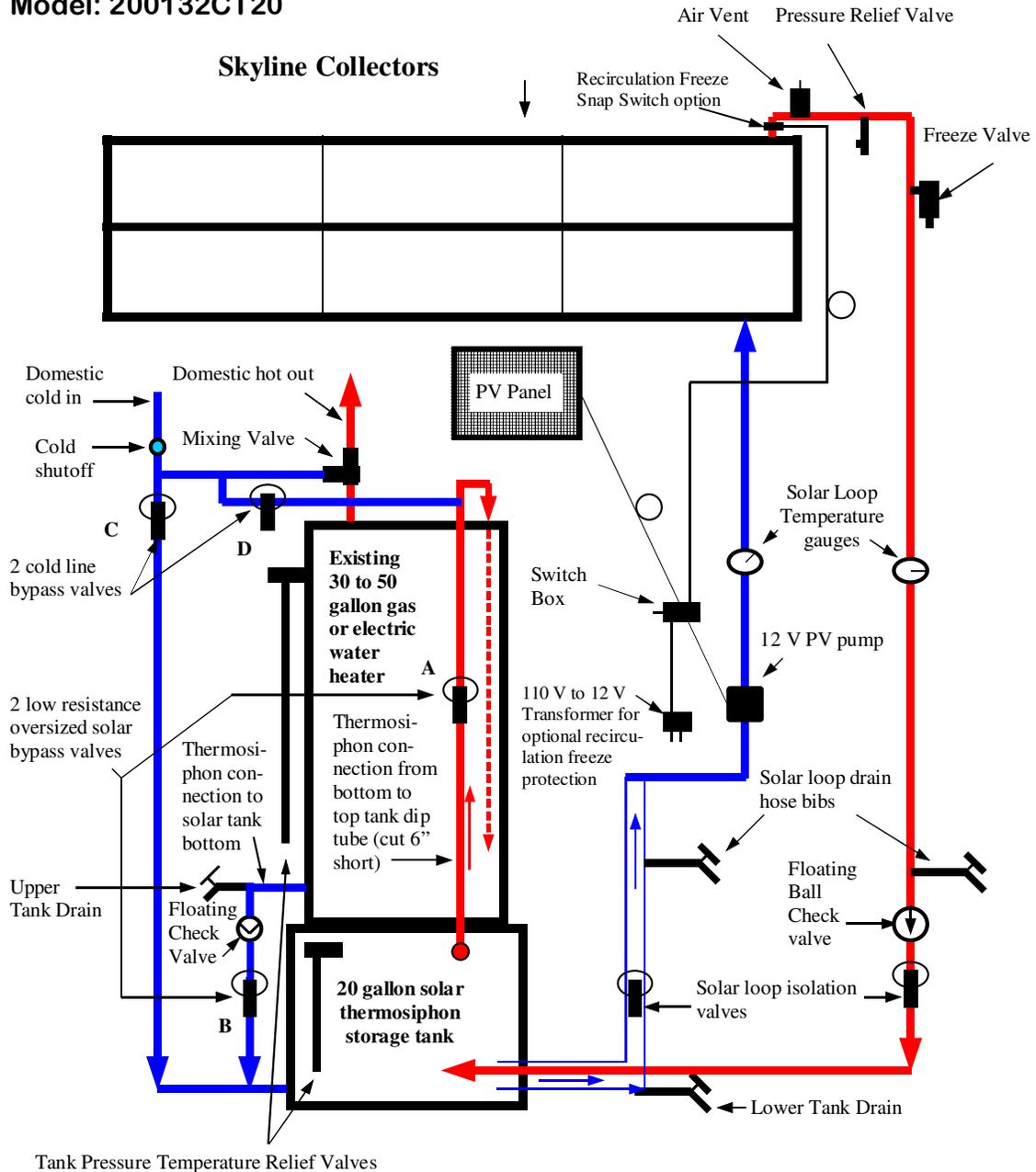
SRCC Required Solar Bypass

Normal Solar Operation: A, and C are Open and B is Closed
 Solar Tank bypass: A and C are Closed and B is Open

Tank Under "Skyline" System 3 "T20"

20 gallon storage tank with thermosyphon loop to heat upper gas or electric tank Model Number: 200132CT20.

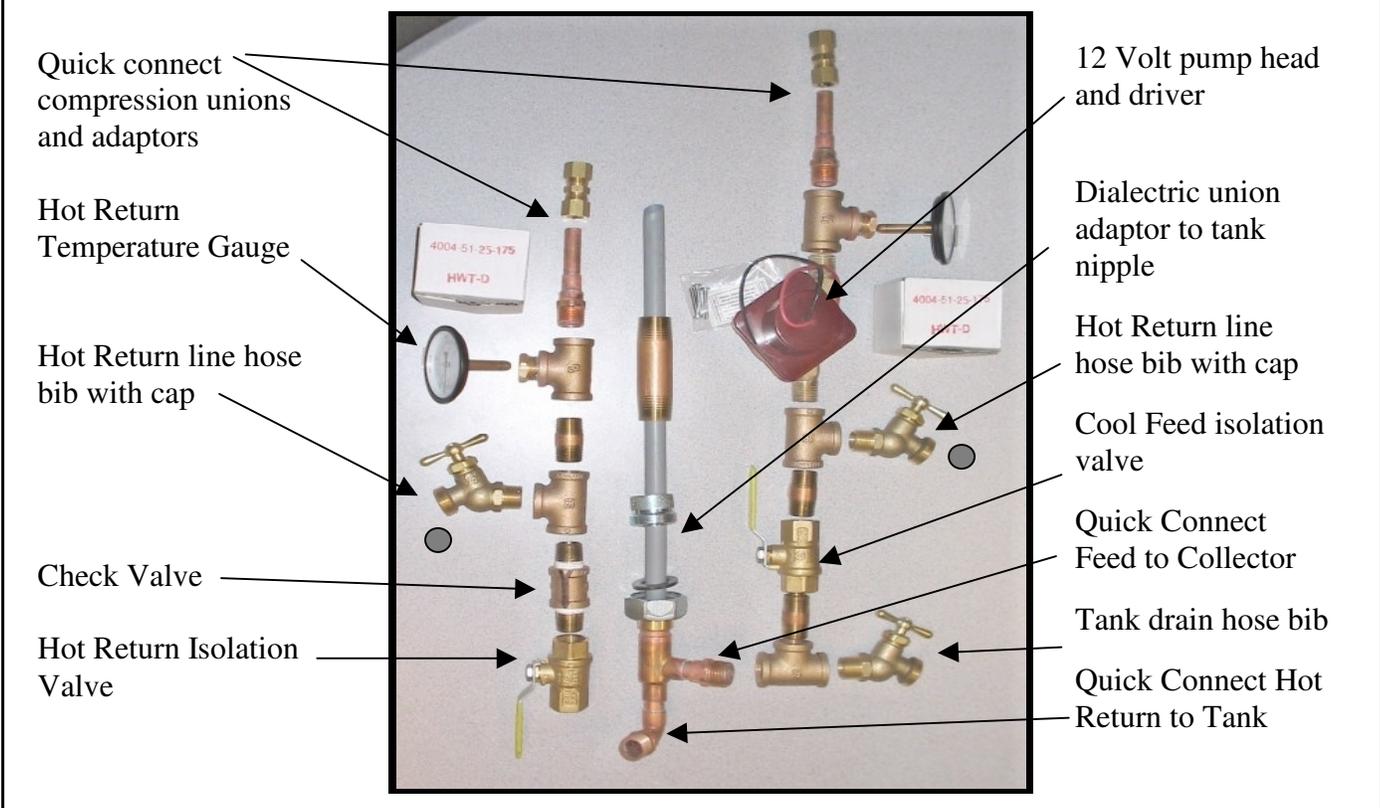
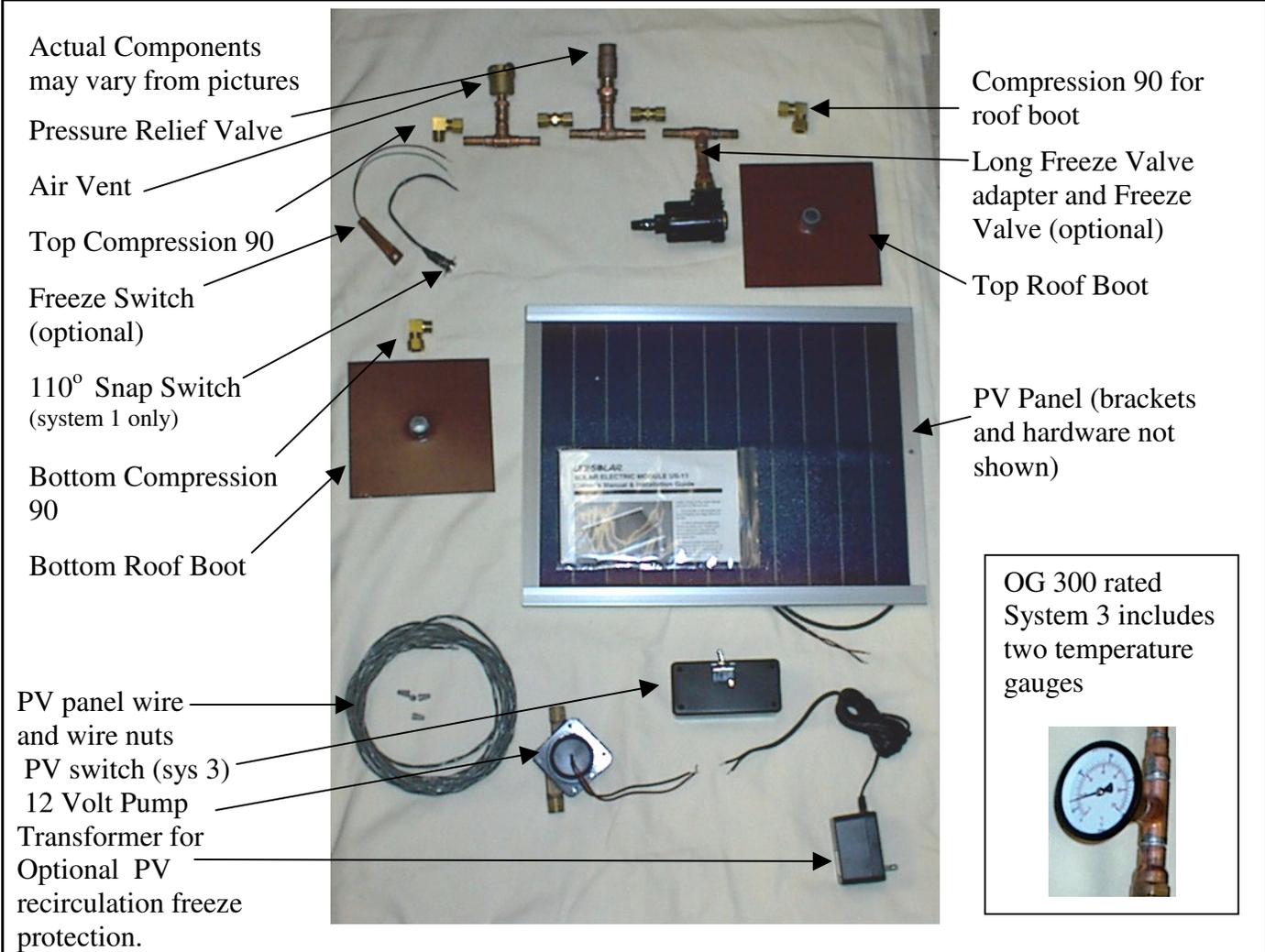
Model: 200132CT20



SRCC Required Solar Bypass Valves

Normal Solar Operation: A, B and C are Open and D is Closed

Solar Tank bypass: A, B and C are Closed and D is Open



IMPORTANT NOTES:

CHECK WITH YOUR LOCAL BUILDING DEPARTMENT FOR CODE COMPLIANCE FOR THE INSTALLATION OF YOUR SOLAR WATER HEATING SYSTEM.

SAFETY FIRST!!

USE CAUTION!!! Do not attempt to self-install without help if you have ANY back or physical limitations!!!

GENERAL WARNINGS:

This manual assumes that the installer has good mechanical experience, can confidently use hand tools, building materials and adhere to safe building and installation practices.

SolarRoofs.com does not assume responsibility for any loss, or injury directly or indirectly, associated with the installation of this system.

Do not install this system alone without someone knowing where you are and what you are doing at all times.

In all cases where a fire-wall (drywall) is penetrated, it is important to seal the hole. A good general rule is to always fill in and seal around all holes made for solar lines to prevent heat loss and to maintain fire-stops.

Properly support all piping according to local code. As a rule, support copper pipe every 6'.

SolarRoofs systems are easy to install; however, problems resulting from a failure to correctly install the system according to the following instructions and to maintain it according to the operation and maintenance manual are not covered by the warranty.

COLLECTOR LOCATION, ORIENTATION AND TILT

Your solar water system will be providing savings for your family and adding value to your home for decades to come. Because the sun rises in the east, crosses over the horizon on the south and sets in the west, you want your collector to face as much to the south as possible. **Your system needs the most sun it can get!**

As long as the collector angle (known as tilt) is at least 14 degrees up from horizontal, (a typical roof angle is 22 to 28 degrees) additional tilt usually has little effect on total year round performance. **The exception** is in areas with very sunny winters (as in most areas of Colorado) where a higher angle, (facing the collector more directly into the winter sun) can help year round performance.

In most areas with **heavy winter overcast**, a solar collector's orientation on a low pitched roof can face anywhere from 45 degrees east to west of south without losing more than 8% of the energy it would have

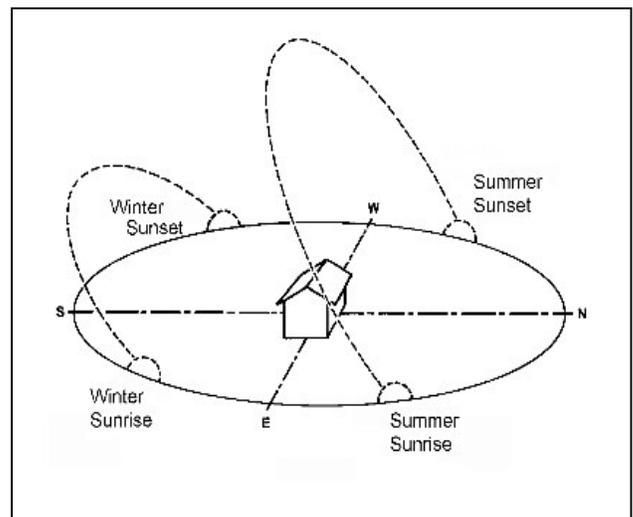
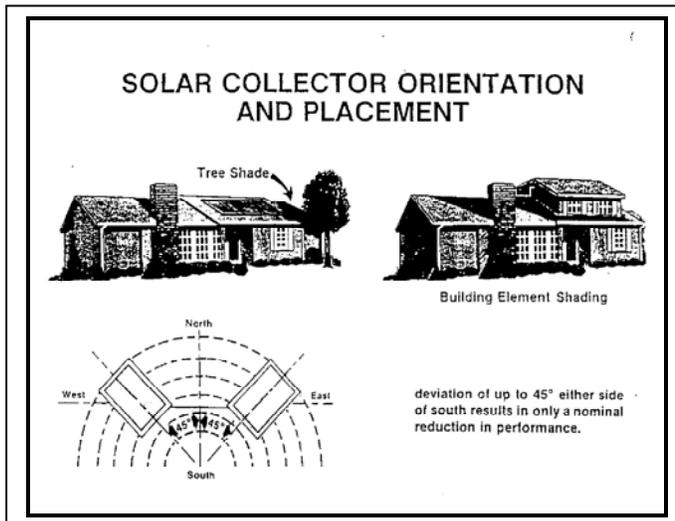
produced if it were facing directly south. At 90 degrees east to west of south the loss is closer to 20%.

Exceptions include easterly facing systems in areas with a lot of morning fog and clear afternoons where south facing or west facing would be much better. The opposite can be true if sunny mornings are very often followed by rainy afternoons.

Take these facts, and your tubing run to the tank, (see 7.0.) into consideration when locating your collector and consult with us if you have any questions.

ROOF CONDITION:

The condition of your roof should be good although one of the features of Skyline system is that removing and replacing the collector is relatively easy for re-roofing.



OVERVIEW - THE BASIC INSTALLATION STEPS:

THE BASIC INSTALLATION STEPS (3 to 8 hours required to install, depending on situation and experience)

1. Unpack collector, for split kits, assemble the collector left and right sections into one unit as per addendum pictures and instructions. Note: not shown, the 24' collector has a center mullion that needs to be attached to the collector after joining the unions. Two 6' sheets of Polycarbonate glazing go into each side of it.
2. Tubing run to tank from collector determined - (See 7.0.). Collector placement on roof located, rafters located and marked, end mounting rails with brackets lagged and sealed into rafters, center mounting rail and brackets placed, lower collector placed into mounting rail brackets, center mounting rail and brackets lagged and sealed into rafter, mounting rail brackets Tec screwed into collector.
3. Collector compression unions connections made, adaptor with air vent and pressure relief valve components installed, two 1 1/2" holes drilled into roof for hot feed and cool return lines. Shingles trimmed and "Roof Boots" installed under shingles and into holes. PV panel installed.

4. Collector cool feed (bottom compression union) and hot return lines (top compression union) installed through roof boots to tank area. PV wire connected and run to water heater area. Insulation partly installed before tubing connections are made. PV panel installed.

5. Water Heater Element turned off, water drained, lower element disconnected from upper element and capped off, lower drain removed, water lines connected including installation of the Mixing valve. Brass fittings with valves connected to tank, pump installed, collector cool feed (from pump) and hot return lines connected by compression union.

6. Water heater refilled, solar loop purged of air, pump wired to PV panel through switch or control box. Finish insulating lines, Fill Tank, Element turned back on.

ASSEMBLING THE COLLECTOR (See Supplemental "Split Kit" Addendum)

COLLECTOR INSTALLATION

BE SECURE AND USE CARE!!!

Good procedure suggests that you always secure your ladder to the gutter so it does not slip. Place blocks in the gutter so the weight of the ladder does not crush the gutter. Protect the surface of the gutter with a cloth to prevent marks.

WALKING ON THE ROOF:

Use soft sole shoes. Walk in the center of the shingle to prevent knocking off the brittle ends of the shingles. This care will keep the roof in good condition and prevent dangerous ball bearing like gravel and tar balls from making the roof treacherous.

Know how to walk on your roof if it is a special type such as Tile or Metal, ask your roofer or ask us. For example, stepping in the center of most Tile roof shingles will break them.

Always put your weight on the last two (overlapping) inches of the tile and away from the side that overlaps the next tile (to avoid chipping off the delicate vertical overlap strip).

On some shingles, such as "Fire-Free", or shake, more damage is done stepping on the end than in stepping on the center. Shake roofs are usually easy to walk on but use care on shake roofs to not crack or break off brittle shakes. **Shake roofs, as well as most roofs, can be treacherous when wet.**

As the Skyline collector is either 6 or 12' long, it is important to place the line connection end so it is the shortest distance from the storage tank.

The collector can be flipped either way to be closest to your storage area. Remember that the feed line from the pump goes to the bottom collector connection and the hot return goes to the top collector connection as shown in the diagrams.

On an average, low pitch single story roof, one able person can safely install the Skyline collector. **Do not install this system alone, be sure someone knows where you are and what you are doing at all times.**

The 20-01 collector is 12 feet long, only 20 inches wide and under 38 pounds, making it an ideal size and weight for one person to lean against the roof or gutter, go up the

ladder and simply pick up the collector and pull up onto the roof.

Collector installation Components:

Note 10-01 collectors will have 2 sets of collector brackets instead of 3

Roof Kit contains:

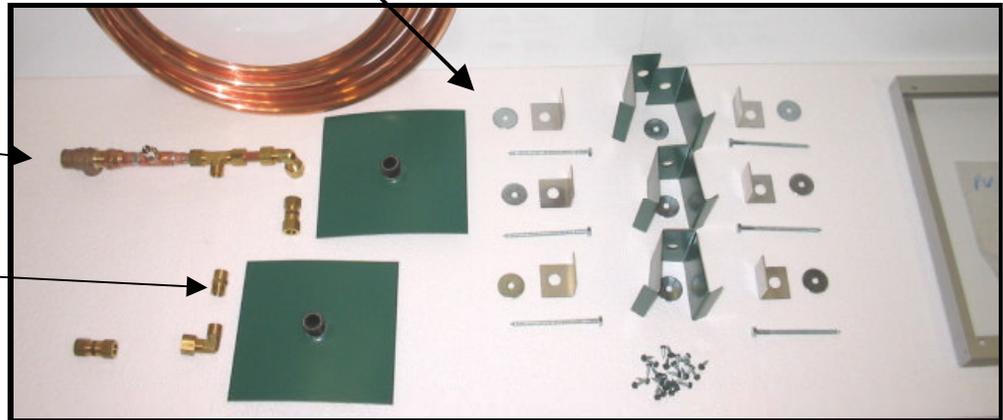
Mounting Ells and washers,
3.5 or 4" Lags,
Center U Brackets for 2 or more collectors,
Color coded Tec Screws for securing Ell brackets and U brackets to collector,
Low profile Roof Boots.



PV Parts Bag contains PV switch Brackets and hardware. See 9.0, Control Component Detail.

Plumbing Kit:

50' of 1/2" OD Copper,
Pressure Relief,
Coin (air) vent,
Soldered adaptor,
Compression fittings,
1 Compression union body per extra collector,
2 compression unions to connect tubing to tank.



Important Instructions Regarding Installing Compression Unions

1/2" OD Compression Union and Ell

Compression Ell

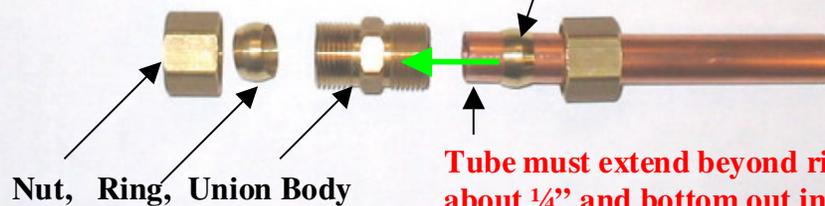
Nut with Ring Inside



It is important to not over-tighten these fittings.

Spraying a little silicone on the threads is helpful.

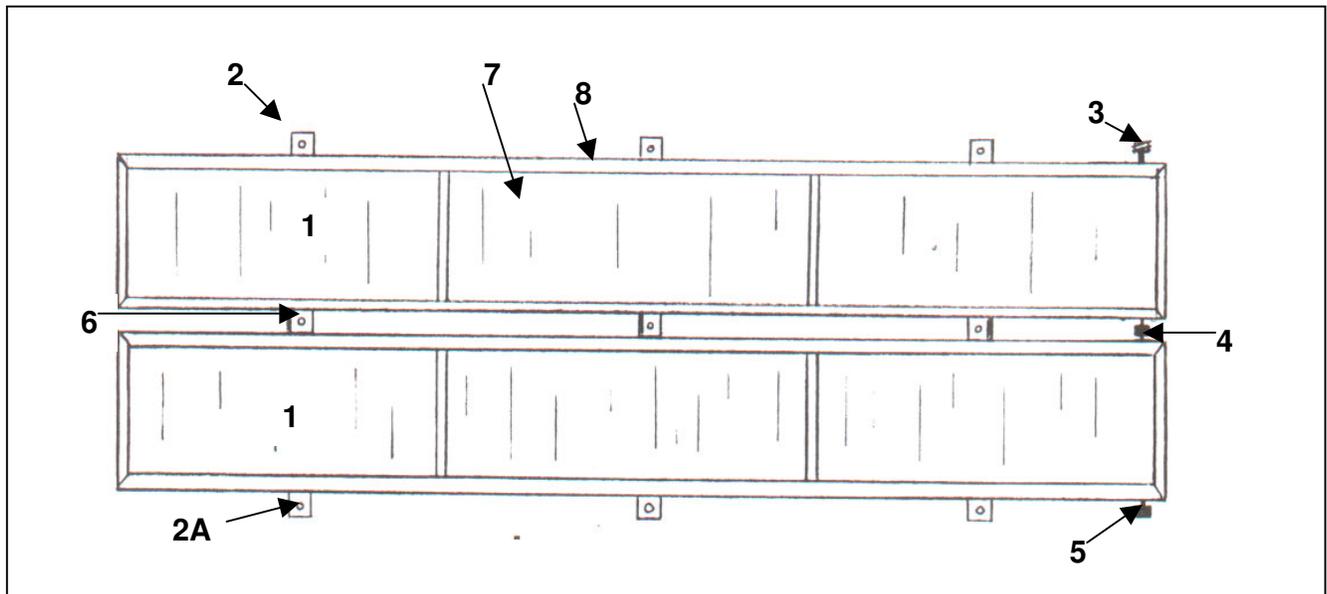
A couple of turns of Teflon tape around the ring helps make sealing easier.



Tube must extend beyond ring about 1/4" and bottom out inside the compression body before tightening nut

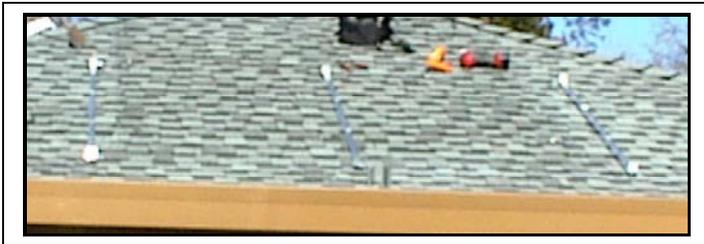
Collectors mount horizontally and Collector Mounting Rails go as shown below.

Two Collector 20-01 Top View (10-01 collectors use 2 rails about 1' in from the ends)



The Diagram above is a top view of two collectors installed together showing:

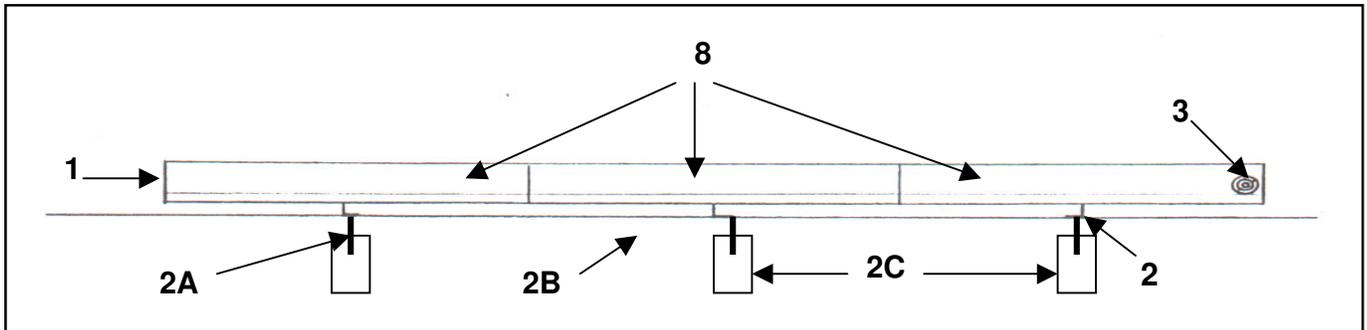
1. Two 20" x 12' Collectors mounted with connections to the right.
 2. The Mounting Rails with Mounting Brackets (3 rails and 6 Mounting Brackets plus 3 Quick Connect Clips (QCC) per additional collector set (6.), 3 two panel rails, 6 Mounting Brackets and 3 QCCs shown in this diagram).
 - 2A. Mounting Rail Lag holes top and bottom.
 3. The "Hot Out" Collector connection going to the storage tank.
 4. The between Collector connection.
 5. The "Cold In" Collector connection from the storage tank.
 6. The Quick Connect Clip bolts to the mounting rail here with the tabs overlapping the top of the collector.
 7. Collector Glazing (Lexan)
 8. Collector trim sections.



Above: Allowing from 14" to 2' for collector overhang, find and mark Rafters for the Three Collector Rails, (shown in this picture are 3 rails for 3 collectors) Use a chalk line to get the 3 rails even at the bottom. Get the center rail as close to center between the end rails as possible. Using a hammer to "Sound Out" the rafters usually finds the rafters. If not, use a feeler bit (long small drill) to drill through the roof from the inside, just beside the rafter. **Be sure to squeeze caulk into all holes to seal them!**

Pre-Drill the bottom holes for the 2 end rails (which will be about 8' apart – you can use the lag itself to "pre drill"), squeeze Caulk into Lag Hole, Place end mounting rail with mounting bracket and washer over hole (above left). Drive Lags into holes but do not tighten. Carefully place the center rail along the chalk line, repeat the procedure for the end rails. Install the upper lags using the same procedure. Note: one and two collector systems have lags at the top and bottom of the rails. Three and four collectors use a center lag at the center of the end rails only. Other Quick connect clips use a carriage bolt.

2001 Side View



The above Diagram shows a side view of the Collector installed on the roof and shows:

(Refer to Color Pictures for Details of Ell Brackets)

1. Side view of a Collector.
2. Mounting Rails (3 per 20-01 collector).
- 2A. Mounting Rail Lag.
- 2B. Roof sheathing.
- 2C. Roof Rafter.
3. Collector feed or return connection.
8. Collector Trim.

LAGS AND RAFTERS:

For maximum strength, you want your mounting rail (2) lags (2A) to go into rafters. After locating the best area for the collector, “sound out” the roof for the rafters with a hammer and mark the rafter centers with chalk. On thick roofs, such as shake, you may need to drill a small hole from the underside of the roof next to the rafter to locate it from the roof and use measurements from thereon. On thin composition roofs, a good stud finder can be very helpful in finding the center of the studs.

It is best to “run the lag into the roof once, remove it, then fill the hole with caulk and run the lag with washer back in and tighten. Some installers like to pre-drill the hole with a smaller bit than the lag to prevent cracking shake shingles.

The Easy Way, (avoids having to locate rafters):

In areas with average wind conditions, (Highest winds up to 75 MPH) the light weight of the collector allows you to use “Hollow Wall Expanding Anchors.”

If using this method, be sure to use the ¼” size bolt. Drill a ½” hole through the sheathing to allow for the thickness of the anchor. Place the anchor in the hole, pull the nut end up, using the supplied ¼” bolt, until it is tight, but do not over tighten!

Expanding Anchor Tile Roof Installations: (be prepared to get longer ¼ / 20 bolts)

NOTE: Correct placement of the collectors on tile is very important. Look for the best locations for the rails so the collector will not bottom out or “Rock.” Do not drill through 2 tiles and do not drill to close to the edge to prevent cracking.

Holes drilled about 3” – 4” in from the end of the tile are usually the best locations. This allows the hole to be only through one tile and closer to the stronger overlap. Relocate holes in the rail as needed. The collector can go over lag heads in the rail.

The expanding anchor can make tile roof installations much easier. On flat tile, a spanner tube usually is not needed, just be sure to not over tighten the anchor bolt.

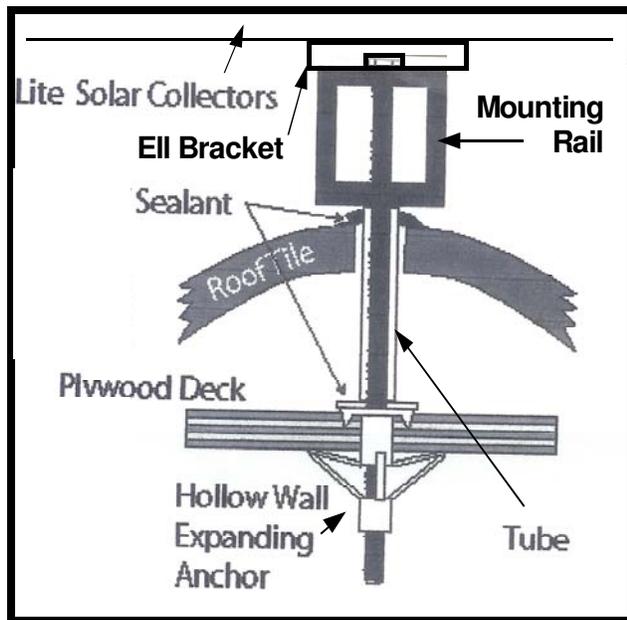
On barrel tile, make a spanner tube out of ½” conduit, copper tube or other sturdy material, drill a hole just large enough to fit the tube through the tile, with it sticking up about ¼” when seated on the Anchor base.

Drill a ½” hole through the sheathing (if you happen to hit a rafter, use a lag). Lift up the end of the tile and place the anchor in the hole and tighten to seat it securely in place.



**Hollow Wall
Expanding Anchor**





Use wisdom, when pulling collectors up onto the roof, have the collector at a good angle to the roof (out at the bottom). Protecting the gutter with a heavy cloth may be a good idea. Do not lean over the edge of the roof at all, simply pull and leverage the collector up onto the roof. The assembled collector is very sturdy but avoid “twisting” it.

If the edge of the roof is over 10 feet from the ground, the bottom of the collector may be placed on a sturdy object or someone may be needed to boost the collector up to you.

On two story houses we strongly recommend two people for safety.

A sling can be made with sturdy rope going all the way around the bottom of the collector with shorter pieces going around the collector to secure the rope in place. Be sure to secure it very well and always have a secure safety rope you can grab onto. Have the second person push the collector up the ladder while it is pulled at the top.

GETTING THE COLLECTOR ONTO THE ROOF:



Protect Edge of Roof with a Tarp and Lean Collector Against Roof



Keeping your body weight over the Roof, pull the Collector Up



Move Up the Roof as you Pull the Collector Up a Foot or so at a Time.



Balance the Collector in the Center and Carry to Installation Area.



A NOTE ON MAKING TUBE CONNECTIONS:

The tube connections top and bottom shown in top view as 3 & 5, are made at the top and bottom of ONE end of the collector. The connections can be at either end of the collector simply by placing the collector end left or right. When two or more collectors are used they also connect at the same end (4).

Make sure you do not have a rafter directly under the collector feed as the feed hole is 1 and 1/2 inches below and in from the end of the collector.

MOUNTING RAIL AND MOUNTING BRACKET INSTALLATION STARTING WITH SINGLE COLLECTOR:

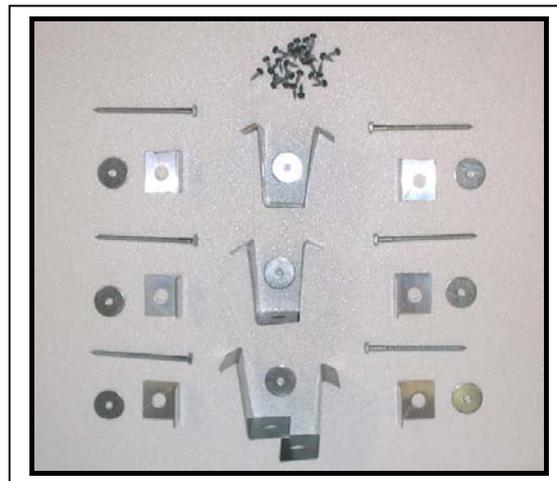
A single 20-01 collector is attached to the roof by three "mounting rails and 6 mounting Ell brackets" (2).



Position the Ell bracket between the trim and frame so it is CENTERED over the Lag hole. Install the collector onto the rails with the mounting bracket tab UNDER the trim and BETWEEN the frame. The small bend at the bottom of the trim makes inserting the mounting bracket easy. Be sure to press the collector all the way down on the mounting rail and secure with two 1/4" color coded self tap screws evenly just above the small bend in the trim. **Be sure to catch the tab with both screws!**



Above: Top Ell Bracket in place and ready for top collector to be installed.



Above: Complete Collector mounting kit for 2 collectors. 3 Ell brackets bottom, three U bracket sets per additional collector and 3 Ell brackets top.

Note: 10-01 collector has 2 sets of each.

Two, Three and Four Panel Mounting Rails and Tilt Kit (two collector maximum per tilt kit):

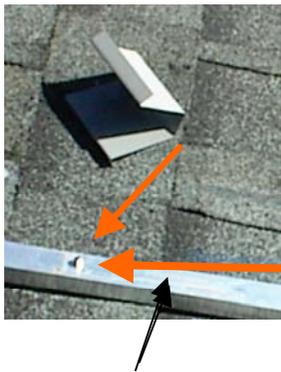
For installing two to four collectors or when two collectors are installed on the optional tilt rack, a special Quick Mount clip (6) is used between the collectors to firmly hold them onto the mounting rail. All holes are predrilled. With a tilt kit sets of 1/4" nuts, bolts and washers are supplied as needed in addition to lags to bolt the tilt kit together and secure the angle brackets.

The Quick Mount clip allows mounting of two collectors on the two panel-mounting rail or the heavy-duty tilt rail without needing to screw a mounting bracket tab into the side of the collector.

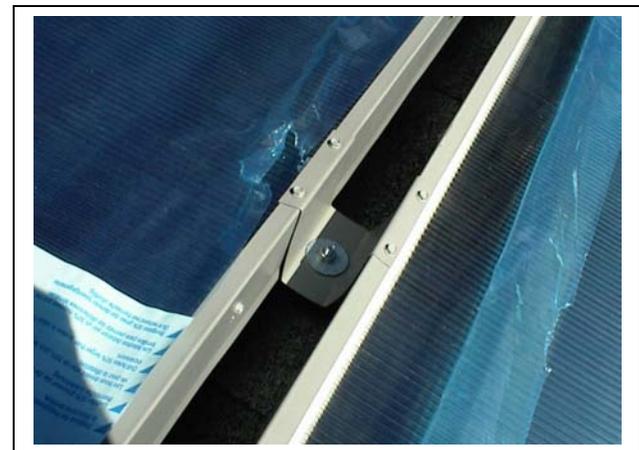
The U shaped clip with outward tabs that go over the edge of the two collectors is secured with a bolt in the center. In high wind areas, it is recommended that the clips be Tec screwed into the frame through the glazing with 2 screws.

Notes on Two, Three and Four Collector Flush Mount Installations:

Place the first collector in place with mounting bracket tabs inserted for final assembly. Tighten down the lags. Place three Quick Mount clips in place over their rail lag hole locations. Partially install the lags to hold the clips loosely in place. **(you will need an extension to your lag driver to get between the collectors)**. Slip the next collector under the clips, connect the compression unions (4) so alignment is assured and then tighten down the lags. Repeat until all collectors are installed.



Quick Connect Clips (QCC's) are supplied in **One or Two pieces** with the single piece shown. Shown, in the top right above, laid out as to how they will go and individually to the left next to the rail with carriage bolt. **It is easiest to remove the nut before placing the collectors on the rails.**



Being sure the trim is pushed in, secure the U bracket at the top on both sides with 2 tec screws going through the bracket, trim and glazing. This makes a very strong connection.



Line up the collectors so the center union body can be installed. Secure the nut to the outside while it is still on the ground so it is not "lost" inside the collector.

FLASHING IN UNDER SHINGLES

For Tile and other roofs, consult with the Factory.
For Composition and Cedar Shake Installation:

ACRSI supplies two special roof “Flashings” which are used to make a waterproof seal for the solar collector feed and return lines. These flashings easily slip under a composition or shake shingle with minimum cutting.

The tubing hole is large enough for the 1/2” od copper

pipe to easily slip through and the small space left can be easily sealed with caulk and further covered with insulation. The base of the flashing can flex and be moved in different directions.

The 6” aluminum base is usually large enough to make a watertight seal and can easily be flashed over by a larger aluminum sheet when needed. It is recommended that a 1 1/2” hole be drilled for the tubing hole.

“Roof Boot” Flashing and Waterproofing Details

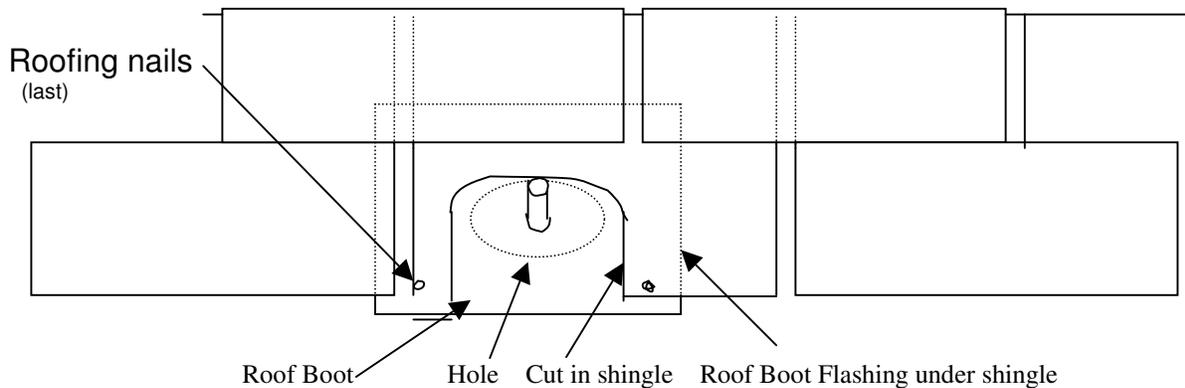
The 2 aluminum flashings supplied with the system are easily installed but require careful alignment to assure a good fit. It is recommended that up to a 1 1/2” hole be drilled to give “working room” when installing the roof boot. **Spacers are included with flush kits to make boot installation easier. Pre-fit roof connections prior to drilling (see Section 8, top and bottom connections).**

NOTE: sound out your roof to be sure no rafters are under where holes will need to be drilled!

Preposition the roof boot where it will go when the pipes are connected to the compression 90 in its final

“out” position. Mark the center of the hole, remove the fitting and place out of the way. Using a 1 1/2” hole saw or paddle bit, drill the hole. Carefully pry up the shingle and slip the Roof Boot under the shingle so water will freely flow over the roof boot.

If needed, add aluminum flashing to assure a watertight installation (especially needed with Cedar Shake). Caulk the sides as needed and it is good to put two roofing nails in the bottom of the boot to secure it AFTER the pipes are installed and fully secured.



Note that Roof Boot is UNDER the shingles at the top and most of the sides so water flows over the top. The shingle is cut down from where the hole is drilled.



Use a “lifting Tool” with smooth edges to go under and lift the shingle without cutting it. Lift shingles before installing collectors.



Drill a 1 1/2” hole 1 1/2” in and centered 2” below the edge of the collector. Slip flashing under shingles.

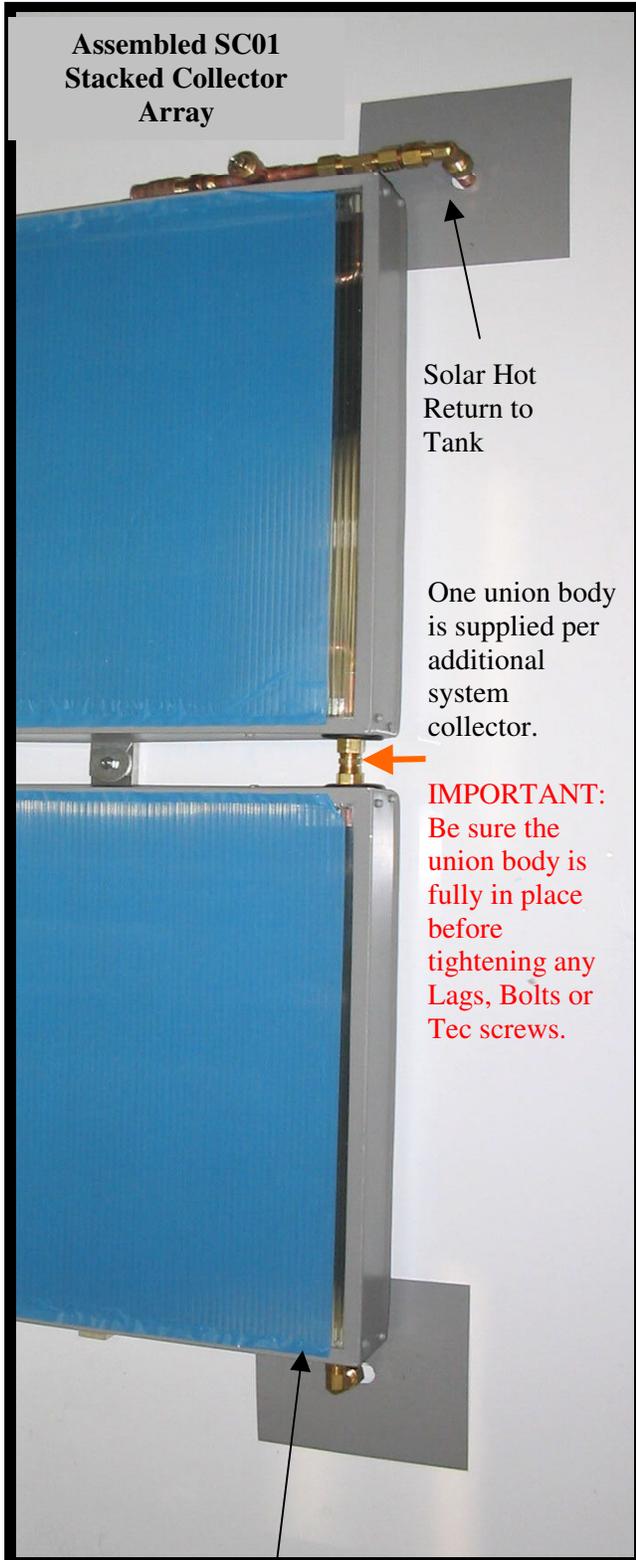


Properly placed, the feed line is right above the flashing tube hole. The edge of the collector is 1 1/2” above the lower edge of the rails.

SC01 Stacked Array Installation Kit

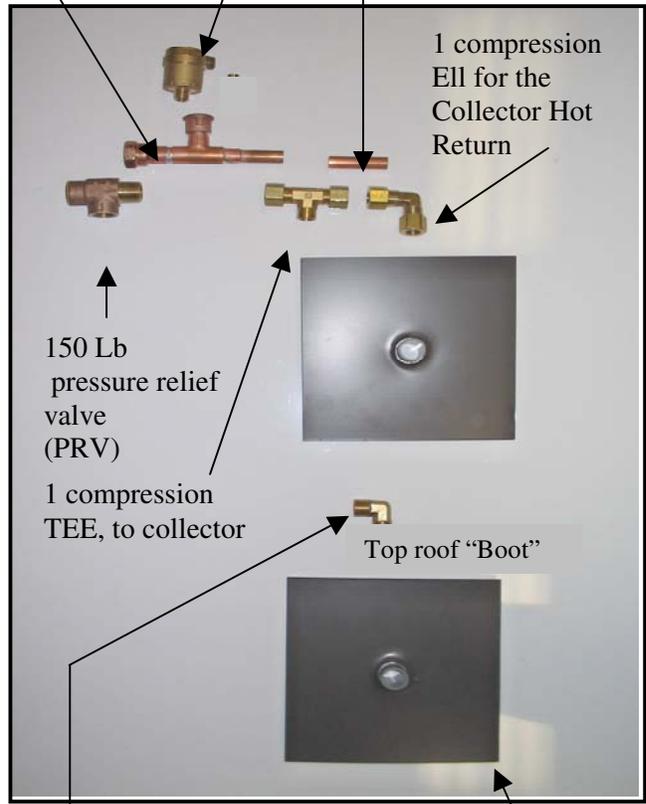
Loosely assemble your kit, per the following pictures, to locate the exact location of your roof penetrations and then follow the flashing and roof boot installation instructions.

SC01 - Stacked Collector Array Installation Kit



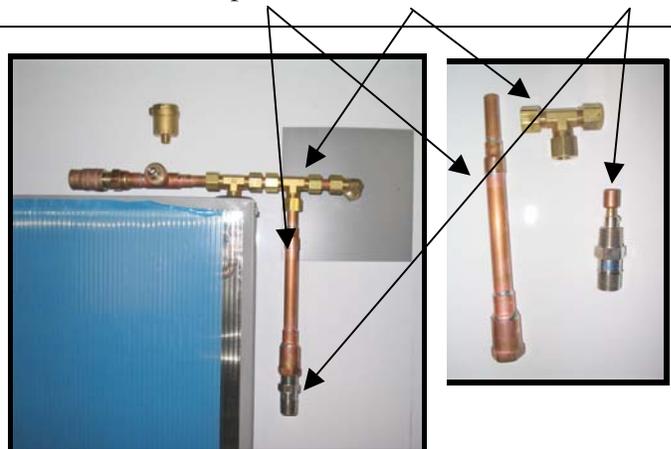
Feed Ell from Pump

Pre-soldered adaptor for Pressure Relief Valve and Coin Vent / Air Vent 2" stick of copper



1 compression Ell for the feed. Bottom Roof "Boot"

FV04 Freeze Valve option for SC01 Includes: Adaptor, Tee, and Freeze Valve



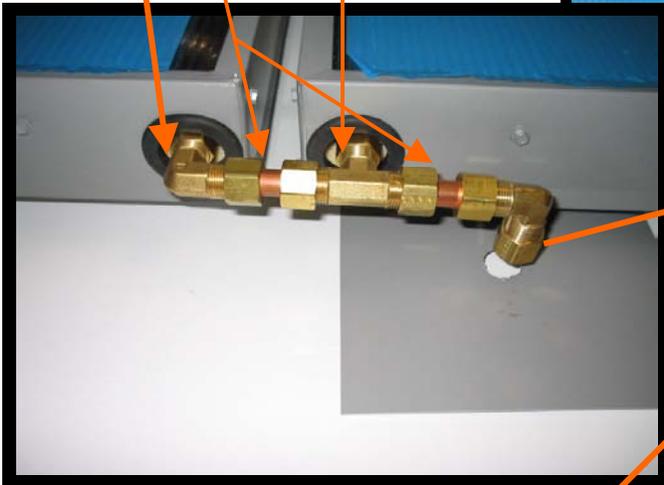
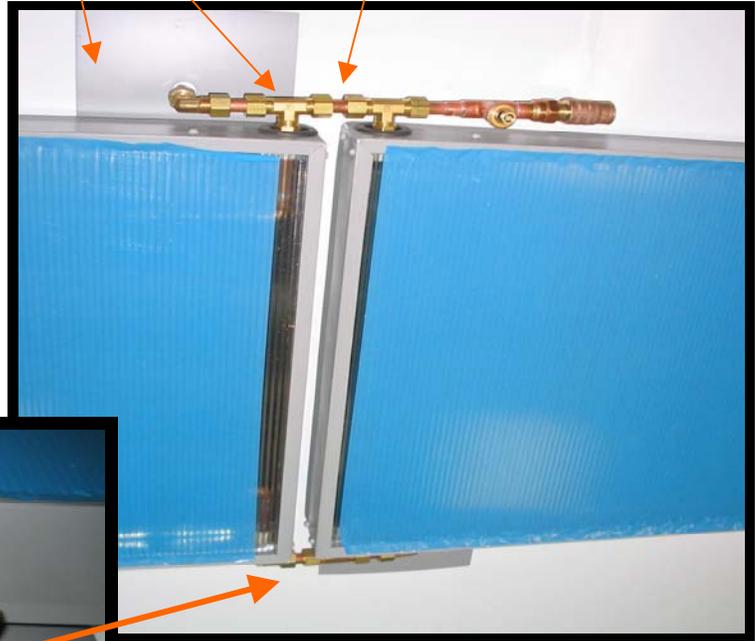
SSC1 Side by Side Collector Installation Kit

IMPORTANT SSC1 TIP: Before installing the last Left collector, lift shingle for the flashing to go under See: "Roof Boot" Flashing and Waterproofing Details.

The SSC1 is the same as SC01 with addition of a Tee and 2" stick of copper for 2nd collector.

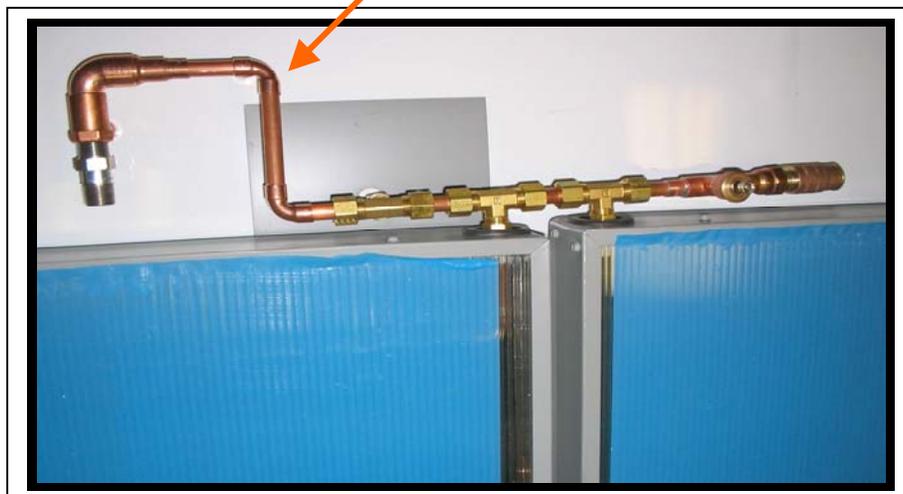
The SSC1 Feed has an additional Ell,

2 copper sticks
and a
Tee for the
second collector.



FV05 Freeze Valve option for SSC1. As the Freeze Valve must point down, this special adaptor includes an additional TEE and presoldered U bend for the 40F Freeze Valve.

(Actual part may vary from picture)



DETERMINE THE BEST PIPE RUN

COORDINATE THE PIPE RUN WITH THE BEST SOUTH FACING COLLECTOR LOCATION FOR THE SHORTEST RUN.

IMPORTANT: SLOPE all lines to DRAIN! It is important that all pipes between the collectors maintain a 1/4" per foot drop to prevent traps and assure that all fluid drains when the drain valves are opened.

COMMON RUNS

In many one-story homes, the run is a simple matter of going up into the garage rafter area and to the roof or going through a wall or ceiling into the attic.

Common pipe runs to the basement include runs adjacent to air return chases, plumbing and vent lines and through closets. **In a two story house runs can be challenging; however, it is amazing how often a good solution is at hand.**

CHASES: Look for pipe, fireplace and duct chases with room around them. The pipes can often be dropped down next to a duct, especially in a one-story house, in just a few minutes.

CLOSETS: Sometimes the easiest way to run the pipes is through closets (look for "stacked" closets in a two-story house). Since 1/2" copper pipes are fairly flexible, drilling through even many shelves with an angle drill is easy as alignment does not have to be precise.

NOTE: Copper pipes get harder, even brittle with multiple bending, bend your pipe as little as possible for the easiest installation! Unroll the soft copper in smooth even strokes and be sure the connections for the collector are above the roofline so no water could get into the house if the connection leaks.

DRYWALL: It is sometimes necessary to cut drywall at the floor or ceiling level in order to cut the holes in a fire-stop. Usually this hole can be made out of sight in a closet. After sealing the fire-stop, it may be desirable to make the remaining drywall removable by putting a simple frame around it and placing it back in place with a few finish nails.

INFILTRATION AND FIRE-STOPS: In all situations, remember that infiltration is one of the main

sources of energy loss in a house. In no way should the installation of a solar system contribute to this loss! ALWAYS seal up any holes made in the house envelope especially in the attic and fire-stops. Fire-stops must be properly put back in place so their important function is preserved. Converting to copper pipe for two feet on either side of the fire-stop may be required in some areas.

STORAGE: You will need to purchase a Rheem (Rudd or Richmond) Storage Tank, 80 Gallon with heat exchanger, Model # RH-81V080HE1.

You will need room to work around it and space for the solar hardware, usually a foot on the drain side of the heater is adequate. Install the tank connection components.

The Rheem Storage Tank is equipped with a top element only. To enhance your DHW efficiency, during the winter, first try using low flow showerheads and aerators and/or add a 220v switch to the top element. Another good plan is to use a 220v timer set to heat the water for two hours before you get up in the morning and for two hours before you get home from work.

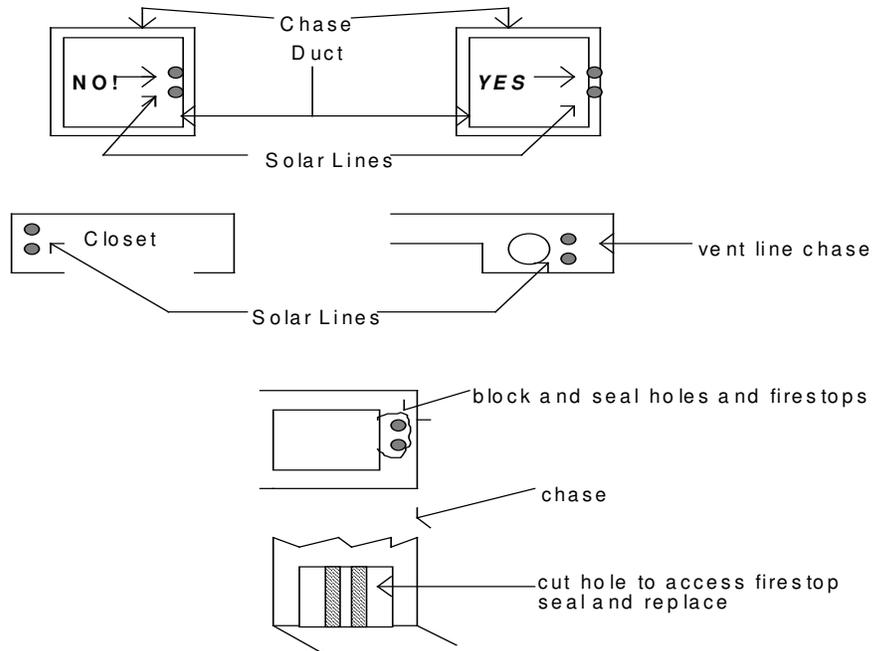
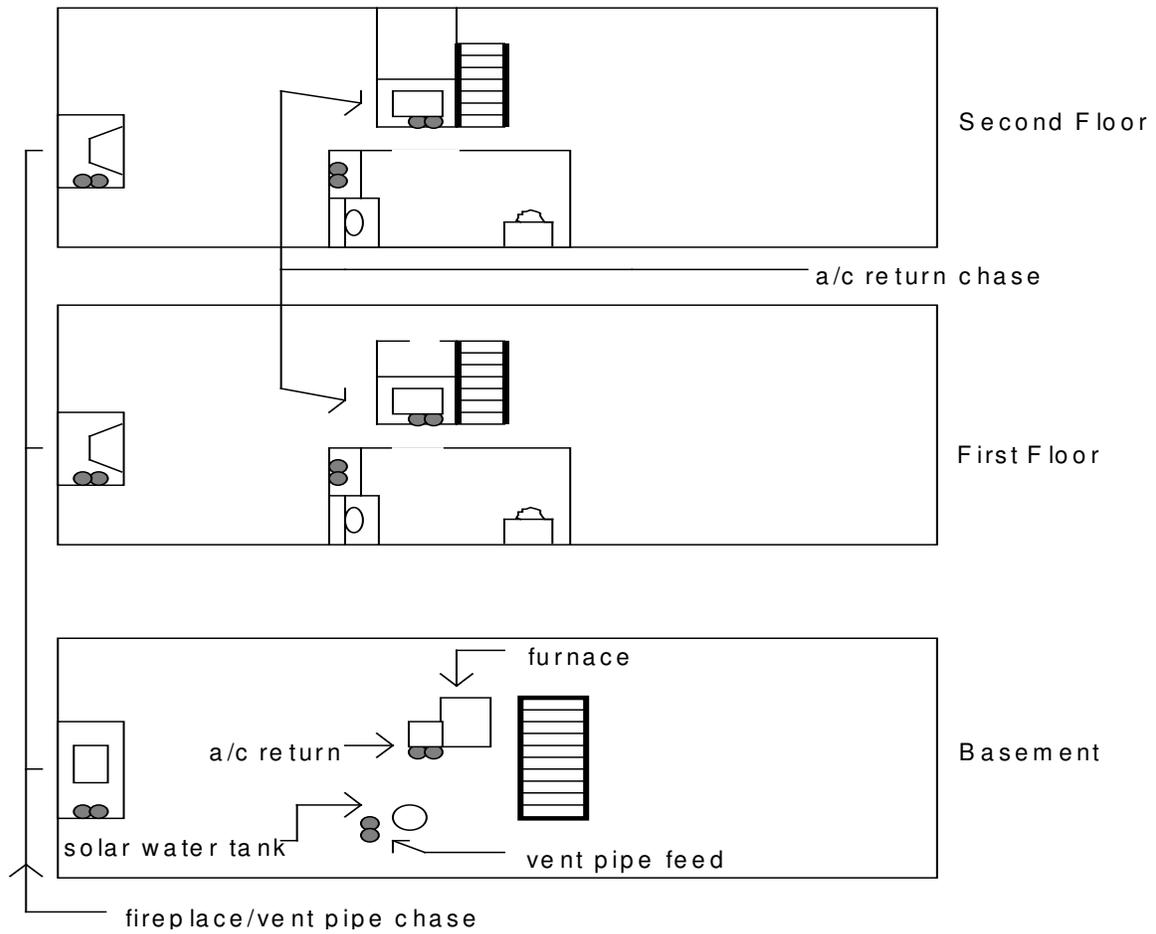
Try turning the power off during sunny summer days. You should have ample Hot water with 2 panel for a family of 3 and with 3 panels for a family of 4 or 5 on clear summer days.

INSULATION: INSULATION OF EXPOSED COPPER PIPES IS NEEDED. A MINIMUM 1/2" R-2.6 (closed-cell insulation)* IS NEEDED AND 3/4" R-4.5 OR BETTER IS RECOMMENDED. Check your state and local codes to see if any greater thickness is required ESPECIALLY IF REBATES OR INCENTIVES ARE INVOLVED.

Determining The Pipe Run (birds eye view)

*Look for the following:

Note: ●● = solar pipe run



Making Line Connections

Line connections are easily accomplished using the supplied brass compression connectors.

When using compression connectors, be sure a small amount of tubing material is showing on the outside of the ring and that you use a small amount of Teflon Tape on the joining surfaces before tightening. Be sure no tape

gets inside the tubing. See Section 6.

Preparing the Collector

Pull the Absorber tubes fully out of the inlet and outlet holes. The absorber fins should line up side beside in the collector.

Collector Connections:

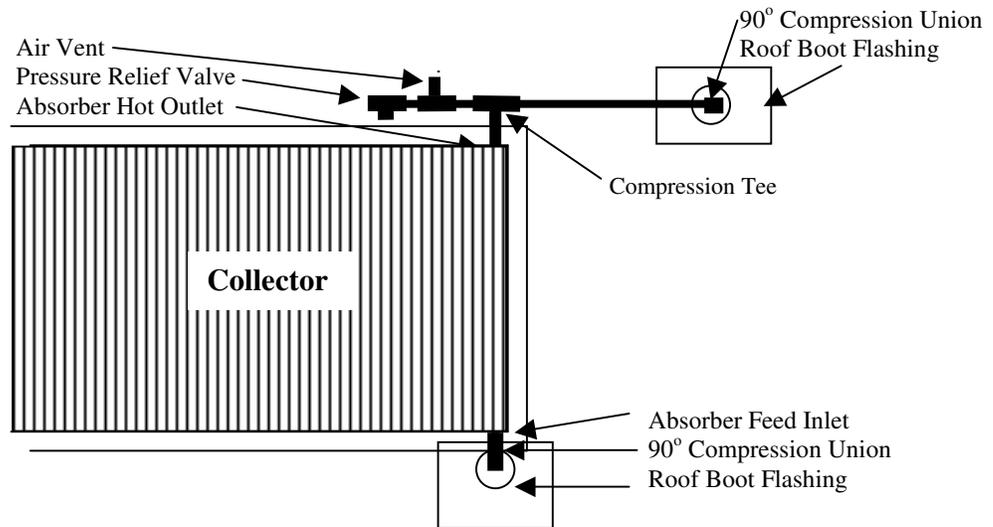


Diagram to the Left
Applies only to SC01
Stacked Array
Also see 6.0.

Collector Top Connection:

At the collector top connection, connect the supplied Tee compression fitting. Attach the pressure relief valve and air vent in the end of the Tee. Pressure relief should face down and the air vent up. The copper tubing may be installed into the Compression Tee, through the hole in the flashing later filled with caulk and insulated.

Tighten, but do not over tighten the connections. Be sure the line with the pressure relief and other valves on it are parallel with the roof. As mentioned, the pressure relief valve should be tightened so it faces down directly onto the roof, onto the supplied aluminum splash sheet, for safety. The air vent must face directly up, with no tilt, for proper operation.

Bottom Connection of Collector:

When the end of the union is flush with the edge of the collector, alignment in the collector is correct.

Put in the 90° compression union at this point and drill a 1 1/2" hole directly below it for the roof boot flashing to be installed.

Cut the shingle as needed and slide the roof boot flashing

into place. The copper tubing will be installed into the union and the hole in the flashing later filled with caulk and insulated.

NOTE: The hole in the side of the collector will be covered with insulation as a final step. All insulation over fittings is done last, after the system is pressurized, to allow for checking for leaks and tightening the unions as needed.

Paint outside insulation with Latex paint or cover with aluminum tape to protect it from UV degradation.

The 50' roll of 1/2" OD copper tubing is easily unrolled and straightened by placing it on the ground and unrolling it as you lightly step in the unrolled portion.

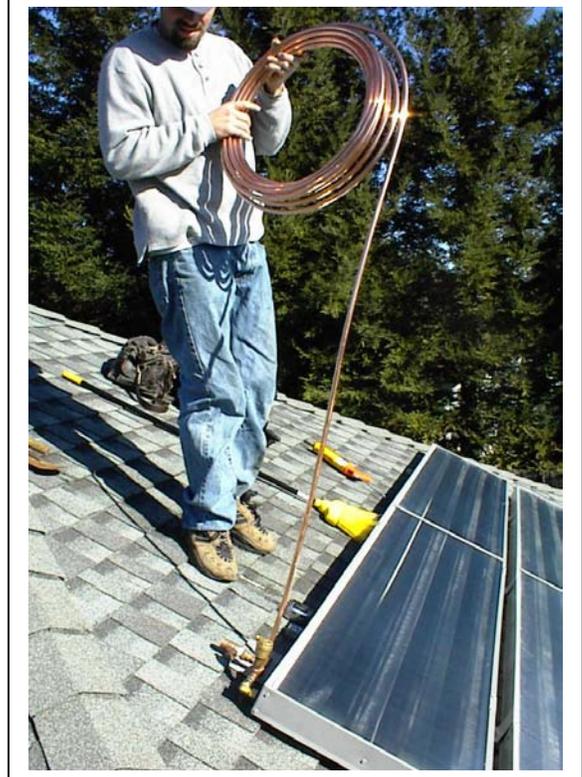
It is sometimes easiest to feed the pipe down through the roof boot flashing and into the tank area.

A variety of techniques can be used depending on the situation such as needing to pull the pipe through an attic where it may need to come up from the bottom and be fed through the roof.



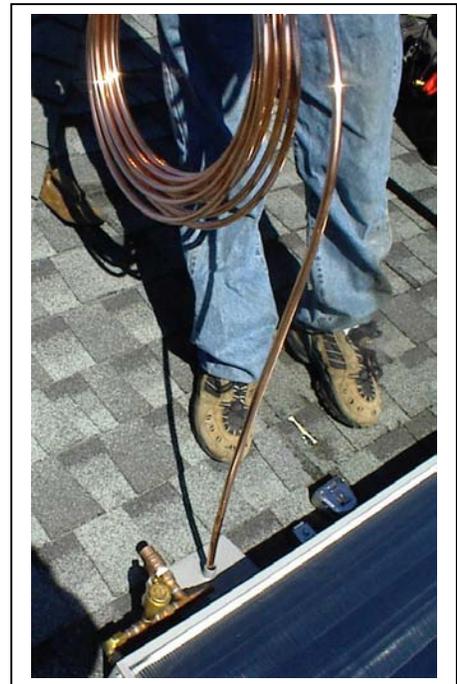
To prepare for the pipe runs, straighten the copper lines by putting a foot on the end and carefully unroll the tube and keep the line straight.

Carefully unroll the tubing through the roof boot into the attic. If available, have a partner guide the tubing to the tank being very careful not to kink the line. When working alone, it may be easier to unroll the tube in the attic or first floor and send the tubing up and through the roof boot from the attic.



SRCC requires a splash plate under the pressure relief valve shown here glued to the shingles under the outlet.

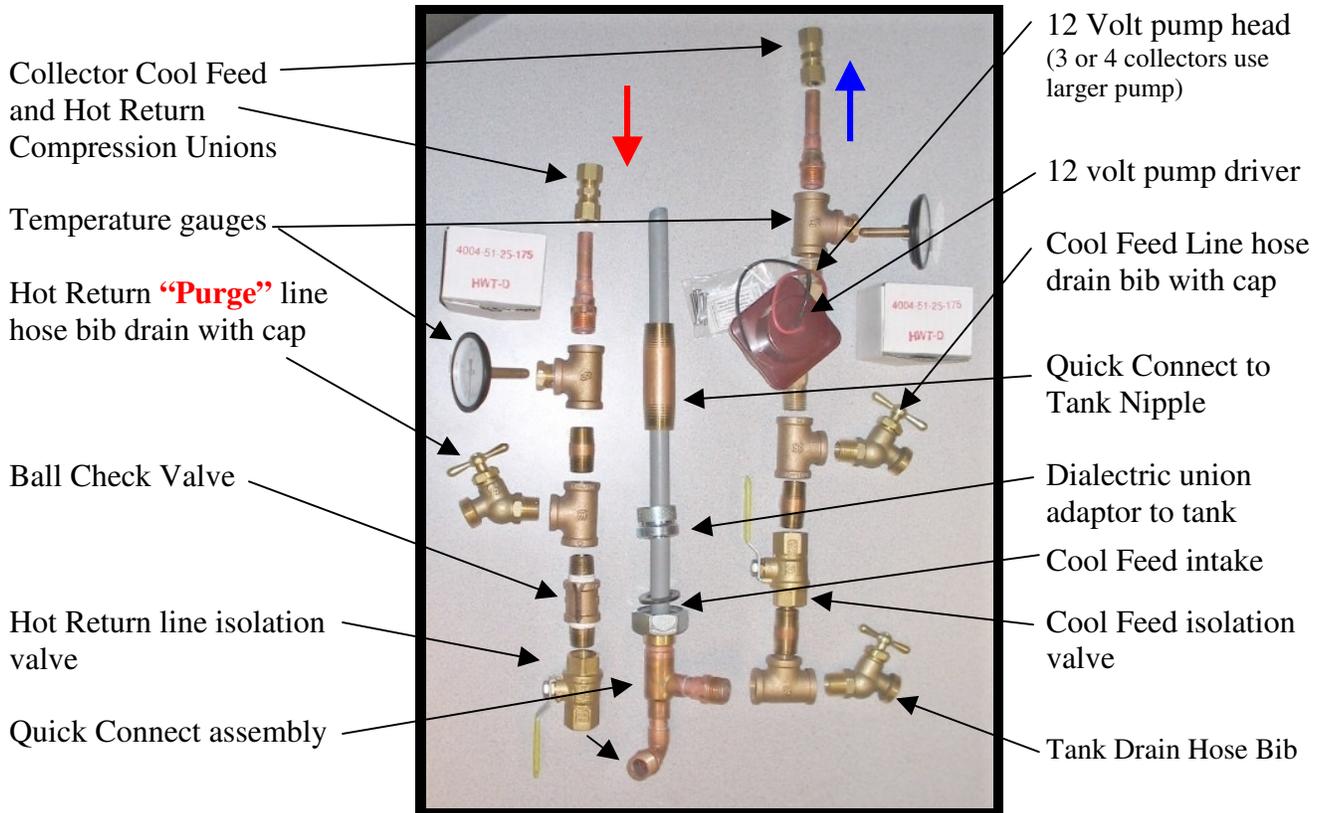
Fully insulate all lines. Press about ½" of supplied high temperature insulation into grommet hole to fully seal. Covering the insulation with aluminum tape and painting is recommended. Be sure to overlap top over bottom like the shingles for good water shedding.



TANK CONNECTIONS

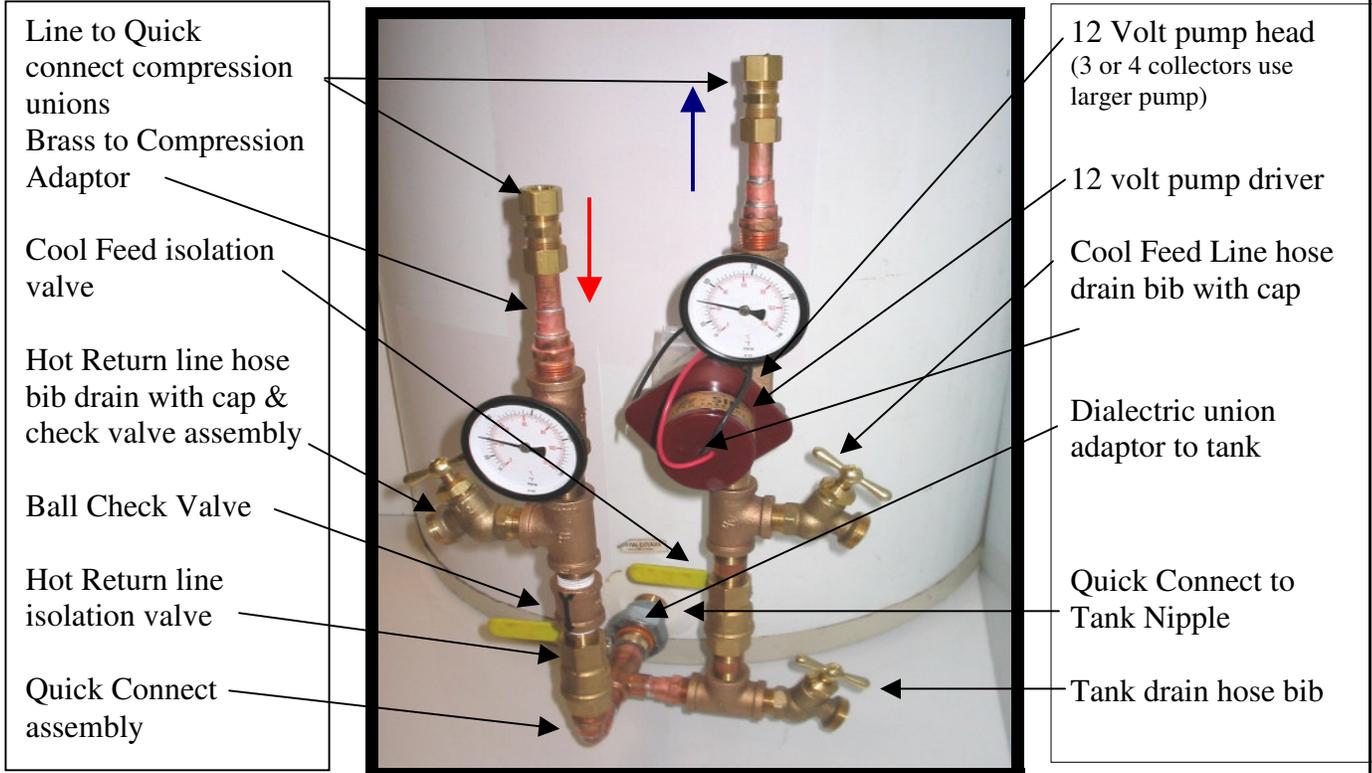
The Tank connection is made by the following steps (see Pictures) **Use 6 tight turns of Teflon Tape on all fittings:**

1. Turn off Gas supply or turn Water Heater Element off at the Breaker to the tank. Be Sure to mark it with a label "Do Not Turn On".
2. Drain the water completely from the water heater (CAUTION! It could be hot!).
3. Remove the lower drain hose bib completely from the tank, teflon tape and install brass nipple.
4. Teflon tape and carefully slip the "Easy-Connect Assembly" through the brass nipple and tighten the fitting. Assemble the brass fittings and valves as shown being careful to not block the next component to be assembled from turning.
5. Install the Pump Head onto the "Easy-Connect Assembly".
6. Cut and connect the collector cool feed and hot return lines using the unions supplied.
7. **Refill the Water heater**, open the isolation ball valves, check for leaks at the tank and on the roof. Tighten, but **DO NOT OVERTIGHTEN**, as needed.
8. **Purge the solar loop of air, by opening the "purge" hose bib on the hot return line until all air is out of the system.**
9. Install the PV panel on the roof at the same angle as the collector and wire the PV panel into the circulator using supplied wiring diagram. Check for good circulation, only about .25 GPM is needed and the hot return isolation ball valve can be used to slow the flow. Proper flow can be determined when the Ball in the return check valve rattles only slightly.
10. Turn Electric Element or Gas back on.
11. Finish insulating, attach labels according to diagram and support the lines and You're Done!



Installing the "Skyline" Open Loop Quick Connect Fittings to the Existing (non self-cleaning) Water Heater

Note: Tank "Top Connect Kit" is two parts with the hot return dip tube part screwing into the tank "hot" port and the pump side collector feed side part screwing into the tank "cold" port. Line connections are the same.



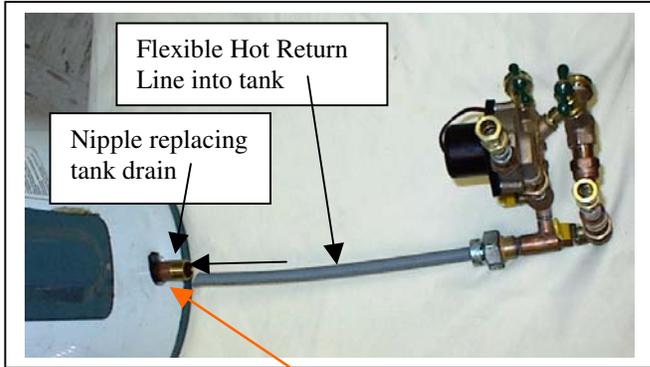
IMPORTANT NOTE
Install Pump Driver Head Last after system has been charged and checked for leaks

Quick Connect (QC) Base will be installed and tightened onto Dielectric union first and then the above components will be installed as shown.

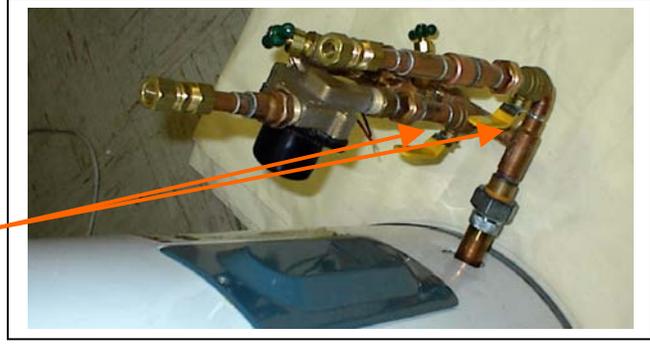
Tips: A little dab of pipe dope onto the OUTER surface of unions will help in sealing them, **do not get dope any into lines as pipe dope can Jam driver rotor!**

Install the pump adapter to pump head first, then install adaptor into QC base, then install Hot Return assembly onto Quick Connect.

Tighten Dielectric Union and install QC components (except Driver Head) onto QC Base, close isolation valves. Tank can now be filled with water if needed.



Remove old tank drain. Teflon tape nipple, (at least 6 turns) install and tighten nipple. Quick Connect assembly is then inserted into tank through nipple.

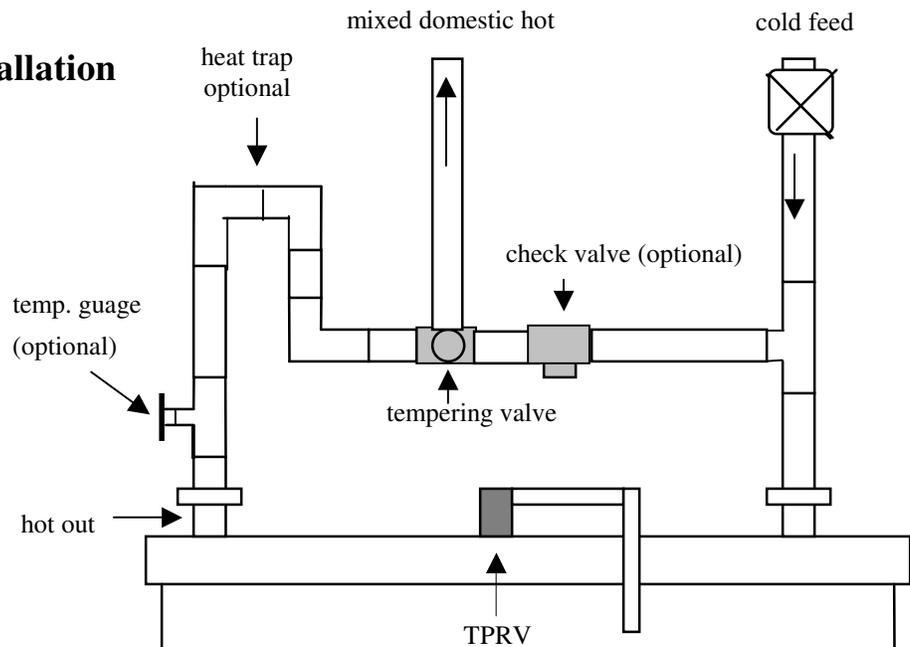


System 3 and 5 OG300 Required Mixing Valve (Note: mixing valve only is included with system 3 and 5, suggested installation shown below, check valve optional and is not included):

A mixing valve to prevent dangerously high temperatures by automatically allowing cold water to mix into the hot water is Required for SRCC OG300 and can be installed by your plumber.



Mixing Valve Installation



See Wiring Diagram for Snap Switch and Transformer Connections

Before insulating the lines, pressurize the solar loop with water and thoroughly test for leaks.

Mount the sheet titled "Important Warnings and Instructions" onto the tank.

Cut out and place the labels with their corresponding components

CONTROL COMPONENT DETAILS

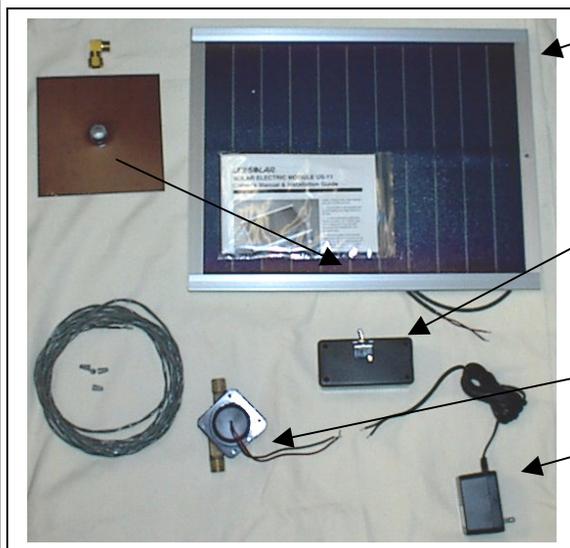
Pump Connections: The PV panel wire is simply attached to a 14 to 18 gauge wire (supplied with full system) using wire nuts. It is then attached to the switch, which in turn is connected to the 12 Volt pump using wire nuts.

PV Wire: DO NOT ALLOW THE PV WIRE TO TOUCH THE PIPE! IT WILL MELT AND SHORT OUT! Drill a small hole under the panel, run the PV wire most of the way through it, seal with caulk (lifting a shingle a little before drilling can help) and put PV panel in place over it.

Recirculation Freeze Protection:

The Recirculation freeze protection freeze sensor attaches to the hot out line just as it leaves the collector box. Use electrical tape to secure the sensor and attach the leads into the transformer and circulator circuit as shown in the wiring diagram below.

Note: This sensor closes at 40F for Recirculation freeze protection which is used extensively in mild weather conditions where temperatures occasionally dip below freezing (to as low as 20F for a few hours).



10 Watt or 20 Watt PV Panel

System 3 with Recirculation Freeze Protection may include a Pre-Wired Switch box with Diodes. Simply connect Switch Box wires as labeled to the PV Panel, Pump and Freeze Snap Switch

12 Volt Pump
Transformer for pump (system 1) or for PV recirculation freeze protection.

For systems Using A Switch Only:

We recommend going through the switch, breaking one wire for the switch and going out about 6" so the PV wire can be connected to the Pump wire with wire nuts. This way the Pump is easier to disconnect and service.

The on off switch is usually attached to an insulated pipe near the pump using tie wraps.

See Wiring Diagram on 2nd page below



Photovoltaic (PV) panel: Place the PV panel on the same plane as the collector. If you have a tilt kit you may need to fabricate a tilt assembly for the PV panel.

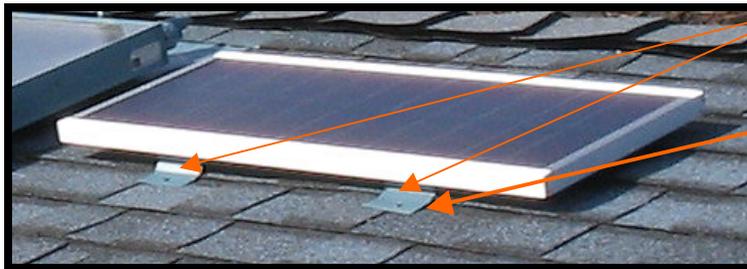
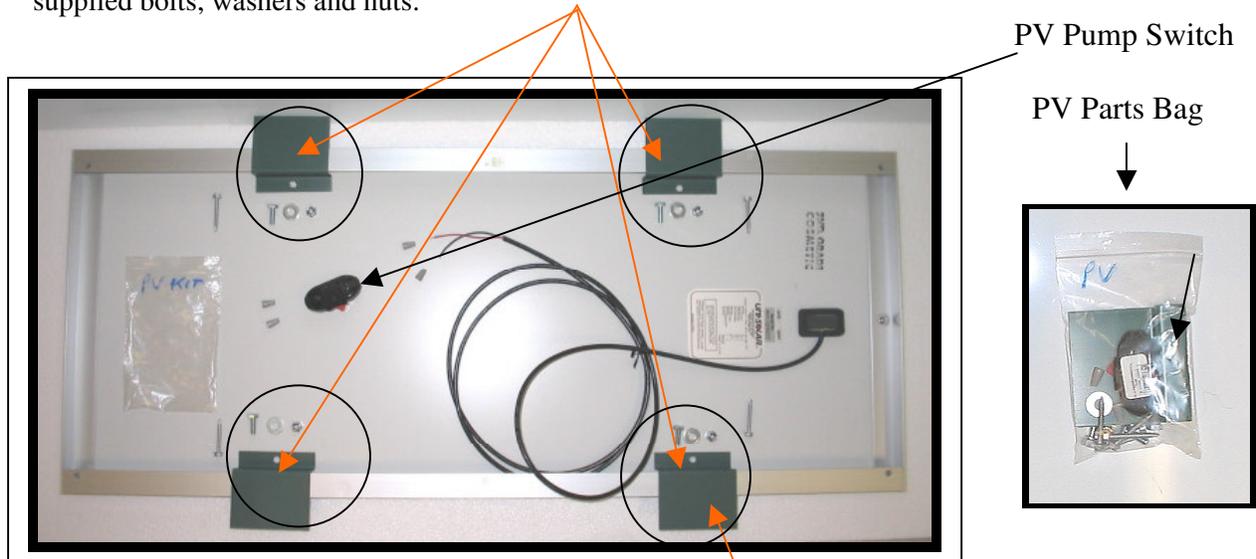
Attach the PV panel to the brackets with the supplied nuts and as shown.

Screw brackets to roof with supplied long Tec Screws.

The PV brackets are bolted to the PV panel through existing holes in the frame of the PV panel with the supplied bolts, washers and nuts.

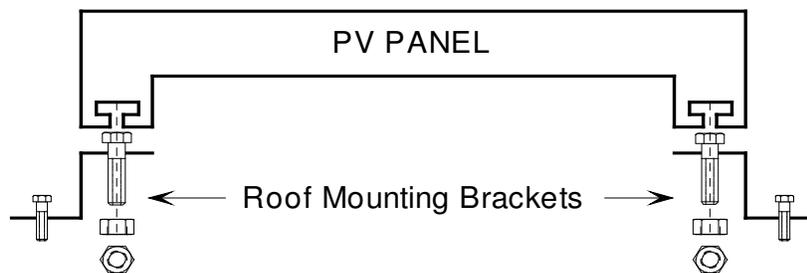
Seal the roof penetrations with a quality sealant.

Wire nuts are supplied to connect the PV wire to the supplied wire, which then goes to the switch. We recommend going through the switch, breaking one wire for the switch and going out about 6" so the PV wire can be connected to the Pump wire with wire nuts. This way the Pump is easier to disconnect and service.



Long Tec Screws, go through the PV bracket and into Roof.

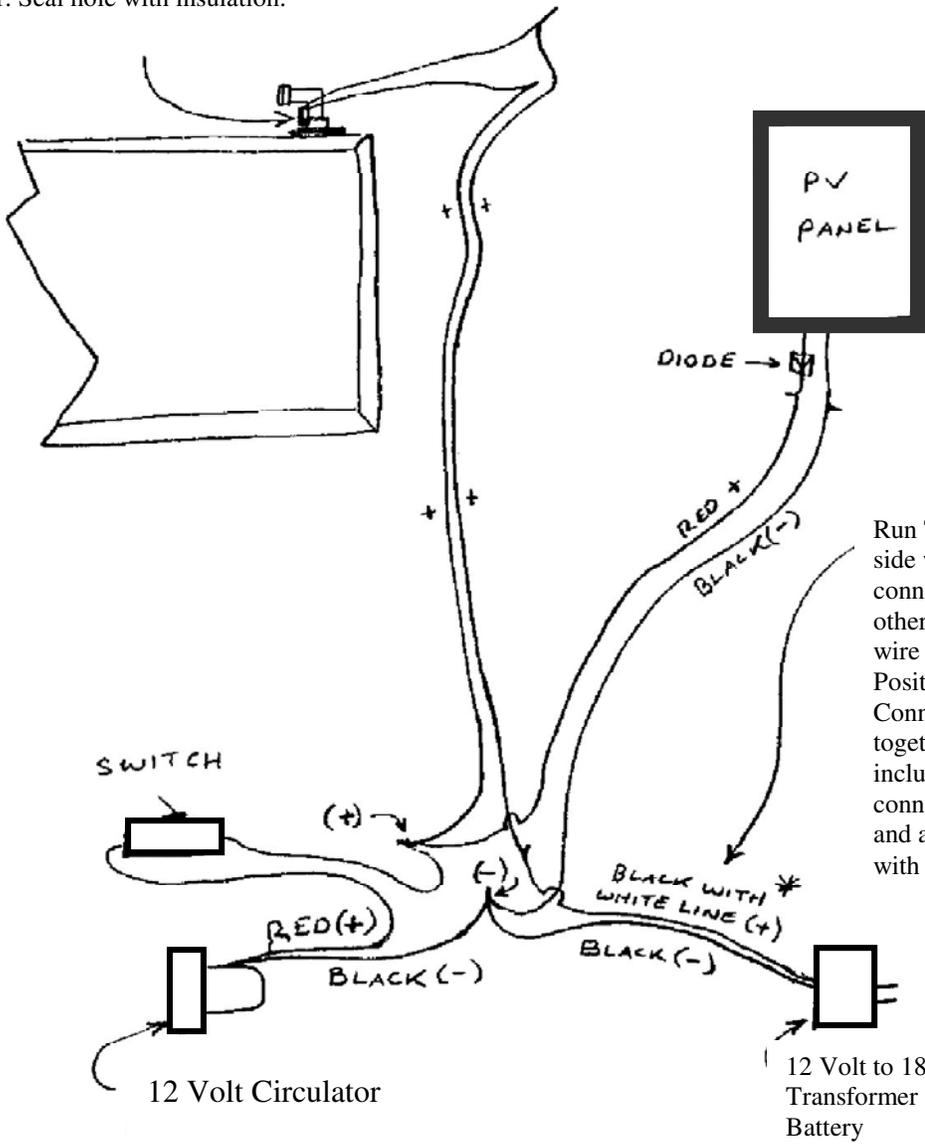
Be sure to put a dab of calk under the bracket where the Tec screw will go through the roof.



6/11/99 10

Skyline "Recirculation" Freeze Protection Option

Freeze Sensor can be taped to the collector outlet or placed a few inches inside the collector. Seal hole with insulation.



Run Transformer + Positive side wire to freeze sensor, connect to either lead, run other lead via the connecting wire to + Pump and PV + Positive wires.

Connect all - Negative wires together. System 3 may include a labeled box, simply connect the wires as indicated and attach box to the tank with two sided tape.

We Hope Your installation Went Smoothly!!

PLEASE CALL SolarRoofs.com with Questions or comments:

Toll Free USA Install Help Number: (888) 801-9060

Now Enjoy the Savings!

QUESTIONS AND ANSWERS:

HOW DO I GET THE MOST EFFICIENCY FROM MY SOLAR WATER HEATER?

As a standard electric water heater usually has two elements, having an electrician disconnect the lower element will increase the efficiency of the solar system. This is because of what is known as “The First Law of Solar”, which is “Keep It Cool”. In other words, the lower the temperature a collector can work at, the greater its efficiency and the more energy it can deliver.

Street water is usually 55 to 60 degrees F but an element at the bottom of the tank will heat this water electrically to at least 110 degrees F. The collector must do its job starting at 110 degrees F rather than 55 or 60 degrees F. It is easy to see that more electricity will be used. When disconnecting the lower element it is important to be aware that you will have less continuous supply of water on cloudy days because only the upper element is heating the water. By “staging” the use of water (not having two showers going at once, etc.), the element has time to “recover” the water temperature on cloudy days, so this problem is easily overcome.

Another easy method to increase storage efficiency is to have a 220-volt timer installed by an electrician. It will activate the element for 3 hours in the early morning (say from 5AM to 8AM) for showers etc. and on again in the early evening (say from 4PM to 10PM) for evening use if solar gain hasn't been good that day. This greatly increases the solar efficiency by not allowing the element to come on during hours of solar gain as well as keeping it off during non-use nighttime hours. Ideally, it is most efficient to completely turn off the electricity in sunny weather.

WHAT ABOUT FREEZE PROTECTION?

All open loop system (street pressurized water in the collector) collectors, components and lines, whether they include freeze protection devices or not, are not covered for freeze damage and their solar loop should be fully drained in hard freeze conditions.

Open loop (collector continually open to street pressure water), serpentine copper absorber collectors with “Thermal Freeze Valves” are generally considered to be protected in light and very infrequent (1 to 4 times per year) freeze conditions for

temperatures as low as 30 degrees F.

Serpentine copper absorber collectors with “Thermal Freeze Valves” and Recirculation freeze protection are generally considered to be protected in light and infrequent (4 to 12 times per year) freeze conditions for temperatures as low as 20 degrees F as long as 110v power remains on.

The “serpentine” absorber in “Skyline 2001” horizontal mount collectors is less likely to freeze than a “parallel flow” absorber with multiple risers. This is because water flows through only one tube in a serpentine absorber unlike a parallel flow absorber where the flow could be unequal to non-existent in some of the tubes.

A “Thermal Freeze Valve” starts to open at about 45 degrees F allowing a small amount of water to flow out on the roof thus causing water to flow up from the bottom of the storage tank, through the absorber, and out onto the roof as long as temperatures remain low.

A “Thermal Freeze Valves” including Recirculation freeze protection system also causes water to flow out onto the roof as above but in addition causes the pump to continuously circulate water at a greater rate of flow in the entire solar loop from the bottom of the tank and back to the lower part of the tank as long as the power is on. Naturally the lower part of the tank can get very cold in the process. Having the element on gives further protection in freezing temperatures.

If unusual freeze conditions are predicted, it is recommended that the solar pump be turned off, solar loop isolation valves be closed, the solar hose bibs opened and fully drained into a bucket. After this, connect a short section of laundry hose to the “hot return line” hose bib and blow into it until all residual water in the absorber is out and air flows freely out the “cool feed line” hose bib. See Installation Manual as well as Operation and Maintenance Manual for further details.

WHAT ABOUT HIGH TEMPERATURES?

The Skyline 2001 collector will not be damaged by stagnation in ambient temperatures as high as 120 F.



This product certified by
Solar Rating and Certification
Corporation
c/o FSEC, 1679 Clearlake Road
Cocoa, FL 32922

SRCC Document OG-300
Conformance to HUD UM 100

ACR Solar
International
5840 Gibbons Dr.
Carmichael, CA 95608

Model No: Fireball 2001
Gross Area:
1,897 m² (20,10 ft²)
Serial Number:

Mildly Cloudy Day
Rating in Category C

12 MJ/day
11 Mbtu/day

SOLAR COLLECTOR CERTIFICATION

FLORIDA SOLAR ENERGY CENTER
1679 Clearlake Road
Cocoa, FL 32922-5703



FSEC 00030

MANUFACTURED BY:
ACR Solar International Corp.
5840 Gibbons Dr., Suite G
Carmichael, California 95608

MODEL #
Fireball 2001

SERIAL #

has been tested for thermal performance and meets the minimum
standards established by the Florida Solar Energy Center as
directed by Section 377.705 Florida Statutes.

THERMAL PERFORMANCE RATINGS*

Low Temp. (35°C, 95°F)	19,000 kJ/day 18,100 Btu/day
Intermediate Temp. (50°C, 122°F)	15,600 kJ/day 14,800 Btu/day
High Temp. (100°C, 212°F)	7,000 kJ/day 6,600 Btu/day

GROSS COLLECTOR AREA: 1,865 m² (20,07 ft²)
COVER PLATE AREA: 1,720 m² (18,52 ft²)
COLLECTOR LENGTH: 3,658 m (12,00 ft)
COLLECTOR WIDTH: 0,510 m (1,67 ft)
COLLECTOR WEIGHT: 17,2 kg (38,0 lb)
FLUID CAPACITY: 1,8 L (0,5 gal)
REC. FLOW RATE: 34 Liquid mL/s (0,5 gpm)
TEST PRESSURE: 1103 kPa gauge (160 psig)
MAX. WIND LOAD: 2394 Pa (50 psf)
THERMAL PERFORMANCE EFFICIENCY (ASHRAE 93-88)

Y INTERCEPT: 60,4

SLOPE: $373 \frac{\text{Watts}}{\text{m}^2 \cdot ^\circ\text{C}}$ ($66 \frac{\text{Btu}}{\text{ft}^2 \cdot \text{hr} \cdot ^\circ\text{F}}$)

INCIDENT ANGLE MODIFIER, AXIS 1: 0,21 AXIS 2: N/A

*Based on an assumed standard day for Florida.

	<p>This product certified by Solar Rating and Certification Corporation c/o FSEC, 1679 Clearlake Road Cocoa, FL 32922</p> <p>SRCC Document OG-300 Conformance to HUD UM 100</p>	<p>ACR Solar International 5840 Gibbons Dr. Carmichael, CA 95608</p>	<p>Solar Energy Factor 1.4</p>
		<p>System Model 200131C50</p>	<p>System Serial No. _____</p>

	<p>This product certified by Solar Rating and Certification Corporation c/o FSEC, 1679 Clearlake Road Cocoa, FL 32922</p> <p>SRCC Document OG-300 Conformance to HUD UM 100</p>	<p>ACR Solar International 5840 Gibbons Dr. Carmichael, CA 95608</p>	<p>Solar Energy Factor 2.0</p>
		<p>System Model 200132C50</p>	<p>System Serial No. _____</p>

	<p>This product certified by Solar Rating and Certification Corporation c/o FSEC, 1679 Clearlake Road Cocoa, FL 32922</p> <p>SRCC Document OG-300 Conformance to HUD UM 100</p>	<p>ACR Solar International 5840 Gibbons Dr. Carmichael, CA 95608</p>	<p>Solar Energy Factor 2.9</p>
		<p>System Model 200133C80</p>	<p>System Serial No. _____</p>