

Heliodyne Collector Installation, Operation, and Maintenance Guidelines

These Guidelines are an integral part of the Manufacturer's Gobi Solar Collector Warranty.

Noncompliance with these Guidelines will void the collector warranty.

Heliodyne collectors are built of quality materials and assembled with care for continued service and durability to require a minimum of maintenance. Certain steps will assure continued satisfaction.

Note: The factory fitted Dyn-O-Seal unions to interconnect collectors are integral parts and not to be removed. Mating half-unions, caps and complete unions are available from Heliodyne for all installation situations. Use four Helio-Clips per collector to attach to wood stringers, Unistrut, aluminum channel or other base; or, use Heliodyne flush or rack mount hardware.

PRE-INSTALLATION STORAGE

Make sure to store the collectors in a clean dry environment prior to installing them. Keep the collectors covered to protect the glass from any damage.

HANDLING

Do not lift the collectors by their soft headers. The headers should also be protected from other damage. The solar glass cover is double strength tempered and highly impact resistant and durable. However, scratching the glass cover should be avoided as it weakens the glass. Follow the Heliodyne "Glass Replacement" guidelines in case of accidental breakage.

Heliodyne collectors nest and lock into each other for safe horizontal transportation without slippage and damage. Do not transport collectors upside down or standing on a side.

COLLECTOR FILLING AND DRAINBACK SYSTEMS

Avoid thermal shock in absorber plate by filling system when collectors are hidden from direct sunlight. For drainback systems, install a Heliodyne purchased or approved thermal limit switch to avoid collector failure due to shock and creep and to extend collector life. For maximum collector life, use a Helio-Pak System. Failures of this kind may not be covered under warranty repairs, consult Heliodyne for more information.

TILT AND ORIENTATION

Avoid shading of collectors by structures, chimneys or landscaping between the hours of at least 10 AM and 3 PM. Use reasonable rules for orientation and tilt for assured performance. Use a minimum tilt of 10° in mild areas and 30° in areas with snow. If possible, face the collectors within 20° of true South (in the Northern Hemisphere). Use tilt equal latitude minus 5° for year-round hot water and latitude plus 15° for winter space heating. Use racks only when absolutely necessary. Never install collectors sideways (landscape orientation) for drainback systems. In snow country, use a steep enough tilt to allow snow to slide off the collectors; avoid banking of snow and ice below or on the collectors.

MINIMUM HEAT STORAGE

A minimum of 1.5 to 2.0 gallons of liquid heat storage is recommended per square foot of Gobi collector (e.g. 60-80 gallons per Gobi 410), the higher number in areas with more sun and heat. "Stagnation", meaning no-load, no-flow conditions on high output days, is to be minimized by using appropriate system sizing and maximizing year-round usage. For example, with an additional load such as a pool

in summer, by adjusting tilts or other methods such as shunt loops or covering the collectors. Exceptions to these guidelines can apply when heavy day usage keeps up with solar energy output, as in many industrial applications, allowing minimal storage.

INSTALLATION

The following guidelines will help ensure trouble free operation:

- In all cases, follow local building codes and regulations.
- Consult the Heliodyne Flush Mount and Rack Mount instructions for collector attachment.
- Use copper pipe for collector feed and return lines even in low temperature applications (i.e. pools) due to high operation and stagnation temperatures of the collectors. Cast iron piping is permitted in closed-loop glycol systems. Do not use galvanized pipe: it is not compatible with high temperature or propylene glycol.
- Supporting roofs should be in good condition before collector installation.
- Stringers and racks must be securely attached to structural roof members or secured by blocking inside the roof to withstand seismic, wind, snow and other environmental loads. Make sure all roof penetrations are flashed and sealed.
- In installations depending on draining for freeze or boil-out protection such as drain-back water, pool or spa heating, collectors and lines must be sloped to permit draining of all fluid passages. Use a minimum collector tilt of 10° for mild areas and 30° for snow country.
- Use Helio-Clips (4 per collector) as transition pieces to all mounting hardware. Do not penetrate the collector frame. Allow space behind the collector for air circulation. Please consult Heliodyne Flush Mount and Rack Mount instructions.
- Feed supply into bottom header and return from opposite top header of collector or collector array. Interconnect Gobi collector headers to each other by tightening the built-in Dyn-O-Seal union halves after inserting the captive O-rings attached to each collector frame. Sub-manifold arrays of more than eight collectors. Divide the collectors into equal numbers per array and use reverse return plumbing or flow balancing valves to even out flow rates across all arrays.
- Make sure to use the O-rings supplied (attached to collector frame) for the Dyn-O-Seal union connections and verify that they are properly placed in the slots with the brass nut tightened securely. Do not over-tighten or use any sealants on the union threads.
- Keep debris away from all fluid passages. Thoroughly rinse the collector loop before filling to flush out flux, oil, grease, dirt, welding and pipe scale or other contaminant. A solution of 1-2% trisodium phosphate (TSP) can be use with water for flushing the system. Fill the system completely and circulate without adding head, then drain completely. Repeat until the water runs clear. Flush system free of TSP solution with water.
- Pressure test before filling with the operating fluid. If water is used for pressure testing, watch out to prevent collector freezing during cold weather. Remove the expansion tank(s) and reinstall after testing.

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RECOMMENDED FLOW RATE

Do not exceed recommended flow rates: 0.025 GPM to 0.075 GPM per square foot of collector (standard 1 GPM to a maximum of 3 GPM for a Gobi 410).

FLUID QUALITY AND MAINTENANCE

ANTIFREEZE

A good antifreeze and closed-loop system design provides year-round protection in all areas. Use only Dyn-O-Flo HD propylene glycol high temperature fluid to 325°F with inhibitors in a 50/50 solution with water for collector protection and service life. Use of other fluids may void warranty. Water requirements are shown in the table below.

MINERAL	MAX LEVEL
Chlorides	25PPM
Sulfates	25PPM
Calcium*	50PPM
Magnesium*	50PPM

*Calcium and magnesium expressed as PPM calcium carbonate. Total hardness as calcium carbonate should be less than 100 ppm.

If the quality is not known, use distilled water. Household water can be used for priming ONLY, if necessary. Care must be taken that the pH is in the range of 8 to 10. The reserve alkalinity must be above zero at all times; a suitable range is 10 to 25. Monitor these levels periodically! Verify a no scale potential by calculating the Langelier Saturation Index, (LSI). An LSI below zero indicates no scale potential.

Design all parts for 150 psig to prevent boil out when system is stagnating. Consult Heliodyne Helio-Pak closed-loop system Manuals.

WATER

Plain tap water may be used in the all-copper absorbers of the Gobi collectors. Water containing suitable inhibitors and buffers (as recommended by their manufacturers) may be used with copper. Salt water or any solutions containing salt water may not be used. See the above 'ANTIFREEZE' heading for water composition guidelines.

- Do not use aggressive pitting water or scaling water. Scale deposits reduce collector efficiency and could plug passages. Verify there is no scale potential by calculating the LSI. If the available water supply is scaling water, use a Heliodyne Helio-Pak closed-loop system.
- Verify the water pH is above 7.5 to avoid pipe corrosion.
- Do not allow collectors containing water to freeze, which will rupture the fluid passages. Protect the collectors with a closed-loop antifreeze system in freezing areas.
- In non-pressurized systems, such as drain-back systems, do not allow water to boil in the collectors. Make sure all collector

passages and piping gravity drain automatically in no-flow conditions. Slope all piping to at least 1/4" per Foot.

- Use vacuum relief at the collector high point to facilitate draining.
- Do not use Heliodyne Collectors directly with pool water.

NON-AQUEOUS

In some cases, a non-water base fluid may be a design options. Recommended fluid is Brayco 888 synthetic hydrocarbon, undiluted. Do not flush with water when using non-aqueous fluids. System design criteria differ from glycol systems. Use only components compatible with the fluid. Recommended flow rate is 11 BTU per square foot of collector per hour and °F.

MAINTENANCE

- Visually inspect the collectors and hardware to verify structural integrity;
- In case of accidental glass breakage, cover the collector and protect the inside from weather until a replacement can be made. Use low iron tempered solar glass 5/32" thick and consult Heliodyne instructions.
- Check your Systems Manual for proper operation of the system and inspect for leaks.
- Check collector flowrate. Excessive flow rates are to be avoided and can damage the collector.
- When glycol is used, periodically test the water/antifreeze mixture for concentration, pH and reserve alkalinity;
- In periods without rainfall, hose or wash off the collectors to keep efficient.
- In an emergency, call your installer or Heliodyne for a recommendation.

SYSTEM SHUTDOWN

If the collector system is properly installed and utilizes an antifreeze mixture, it is protected against freezing and boil-out and does not require a shutdown for periods less than a month. However, if the system is to be unused for more than one month, a shutdown is recommended. Switch the controller to "OFF" or unplug, and cover the collectors securely with a tarp or plywood during prolonged summer absences.

GENERAL MAX GOBI OPERATING CONDITIONS

Max operating pressure: 150 psi
 Max operating temp: 350° F
 Max collector wind loads: 38 PSF