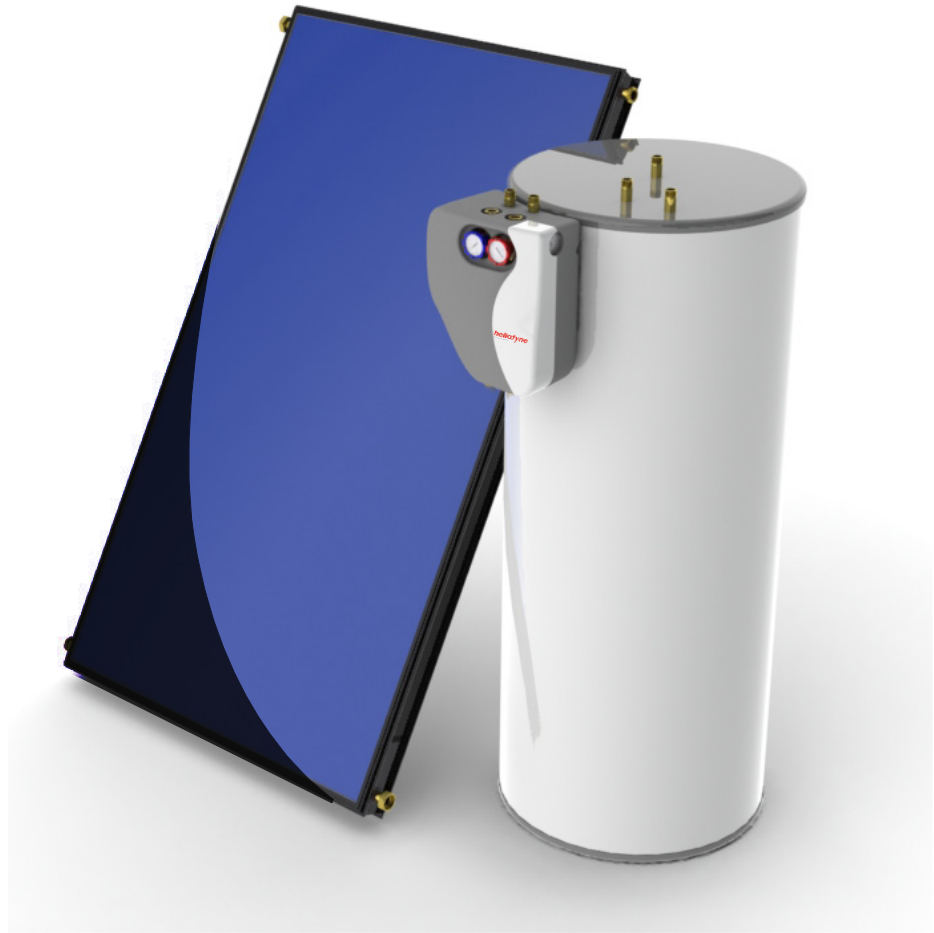


INSTALLATION GUIDE

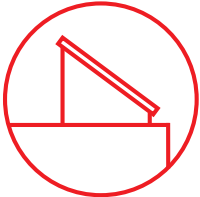
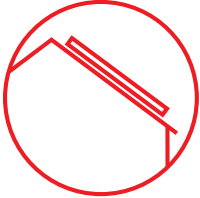
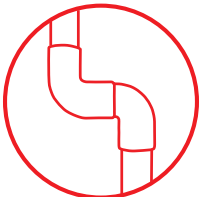
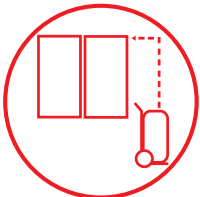
HFLO SYSTEMS

OPEN LOOP SYSTEMS:



v2.5

EXCELLENCE
BY DESIGN

1. PREPARATIONS	3-9
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HELIO-FLO HEAT-TRANSFER APPLIANCE

The Helio-Flo (HFLO) is an all-in-one heat transfer appliance designed for use in open loop systems or in conjunction with a closed loop integrated tank system making it quite versatile for solar water heating applications. The HFLO comes factory assembled with all wiring, plumbing and fittings complete making installation a quick and trouble free experience.

Features

- Simple "Plug & Play" installation
- Comes fully assembled and factory tested
- Compact solution offers a clean look
- Excellent heat transfer rate
- Factory tested to 250 psi
- Mounts onto tank to minimize space
- Available in bottom-tank mounting configurations



OG300 CERTIFIED
Solar Rating and
Certification Corporation



Energy Star



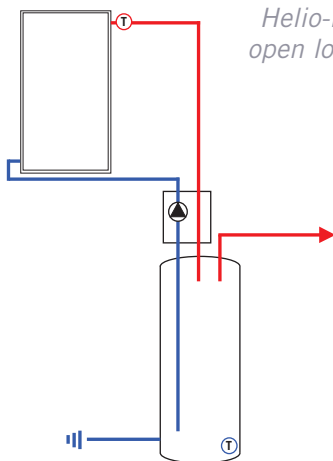
HELIO-FLO PRO UPGRADE



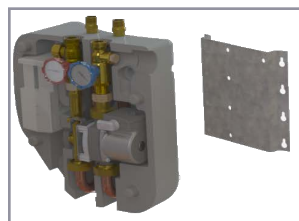
The Helio-Flo Pro (with pre-installed Delta-T Pro controller) further enhances the solar hot water system with the addition of user-friendly customizable settings, remote navigation, automated service reminders, and expanded system performance data. All these features can be accessed by logging onto a dedicated website.

Features

- Remote web-based system monitoring
- Automated service reminders
- Stored energy data (BTU, °F, GPM)
- Adjustable user settings
- BTU/kWh metering
- Vacation mode



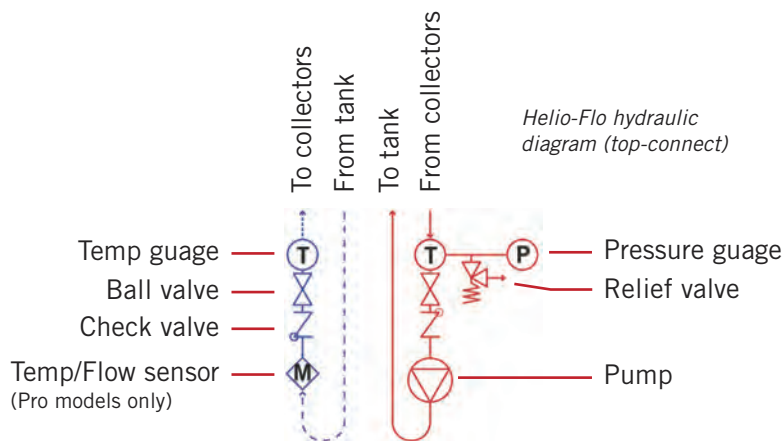
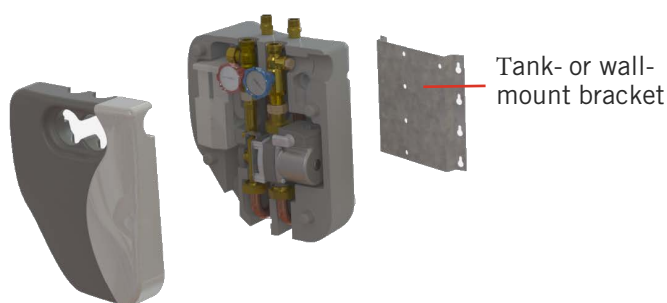
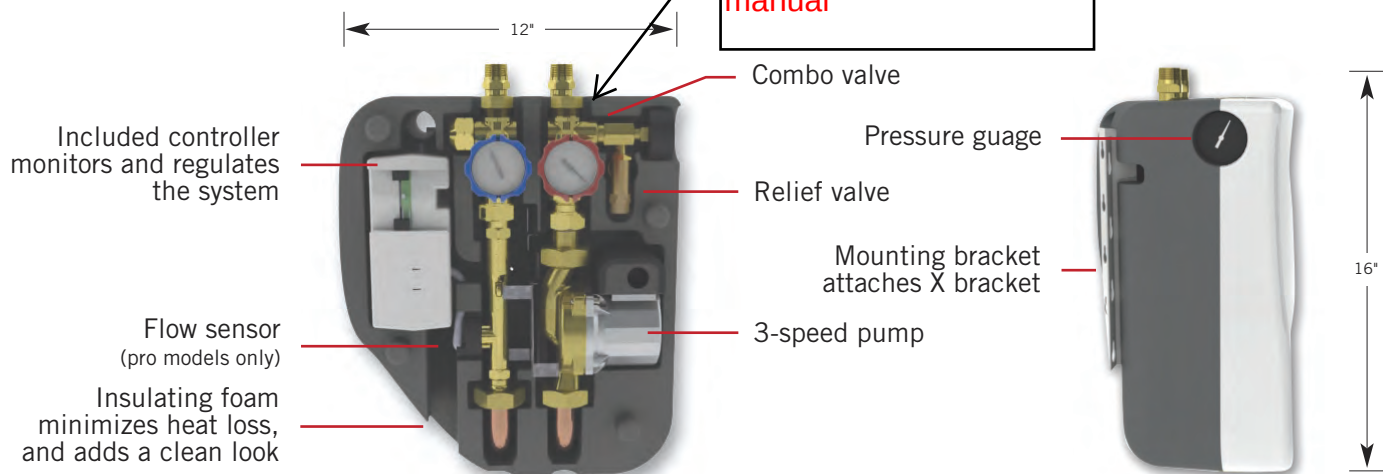
Helio-Flo diagram using an open loop system application



Included tank- or wall-mount bracket simplifies installation

TECHNICAL SPECIFICATIONS

new version has pump on cold supply side-see manual



MODEL	HFL0 048 011	HFL0 048 010
Tank connect configuration	bottom	bottom
Controller type	Pro Ethernet / WiFi	standard
Heat transfer rate (BTU/hour) ¹	48000	48000
Voltage ³	115 VAC, 60 Hz	115 VAC, 60 Hz
Recommended flow rate ² (gals per minute)	2-8	2-8
Max collector surface area	321	321
Max piping resistance (ft of water)	5	5
Weight (lbs)	30	30
Included sensors	2 x 10K Ohm	2 x 10K Ohm
Warranty (years)	3	3

¹ - With 40 Sq. Ft Collector on pump speed 1 ² - With max collector surface area installed ³ - 240 VAC also available

PTLS 080309

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Information & Support: info@heliodyne.com

heliodyne
SOLAR HOT WATER

1. PREPARATIONS

1.0. General Notes

1.0.0. Safety Guidelines

Carefully review all instructions in this manual for installation and use. Do not modify Gobi Collectors or Helio-Pak under any circumstances; use only as designed. This manual and its content are integral parts of both the Helio-Pak and Gobi Solar Collector warranties. Noncompliance with these guidelines will void all warranties.

Follow all local building codes and regulations, as well as these industry accepted guidelines and standards:

IAPMO	USEC, UBC, UPC
ASHRAE	Solar Energy Equipment
NFPA 70	National Electric Code
ASCE 7-05	Minimum Design Loads for Buildings and Other Structures

Select an installation location that is easily accessible for maintenance and servicing

1.0.1. Collector Storage and Handling

Keep collectors covered when storing.

Avoid lifting collectors by the headers. Take care not to scratch the tempered solar glass; follow the glass breakage guidelines at the end of this manual in case of breakage.

Gobi collectors nest and lock into each other for horizontal transportation. Do not transport Gobi upside down or standing on a side.

1.0.2. Collector Installation

Make a site visit prior to installation to verify adequate installation conditions:

- Collector sun exposure, especially during crucial solar hours of 10AM – 2PM. Take into consideration deciduous tree shading, structures, chimneys, etc.
- Use a minimum tilt of 10° in mild areas and 30° in areas with snow.
- Orient collectors within 20° of true South (in North latitudes); use internet maps rather than compass readings for verification.
- Ideal collector tilt for hot water production is equal to site latitude. For space heating combination systems, use tilt equal to latitude plus 15°. Heliodyne recommends a standard of 35° for hot water and 45° for space heating, regardless of location. Use racks only when necessary, as variation up to 15° can have only small effects on performance.
- Avoid banking of snow and ice below or on the collectors.
- Never mount Gobi collectors horizontally in a drainback system.
- Heliodyne recommends 6-12" of flex tubing before any rigid copper lines to allow for thermal expansion in the copper tubing.

1.0.3. Minimum Heat Storage

A minimum of 1.5 – 2.0 gallons of liquid heat storage per square foot of Gobi collector (e.g., 60 – 80 gallons per Gobi 410) is recommended.

Minimize stagnation (no load, no flow) conditions on peak output days by using appropriate system sizing and maximizing year round usage. For design assistance, contact Heliodyne.

Ensure the backup heating capacity is properly sized to produce hot water for installation site on days of little or no solar energy production. Use only ASHRAE 90.2 compliant storage tanks and heaters with R-16 or higher.

1.0.4. Equipment for Installation

For a complete and functional SHW system, ensure the following equipment is ready for installation at the job site:

- Gobi Solar Collectors
- Rack or Flush mount hardware kit
- Appropriate roof penetration hardware and sealant
- Copper tubing, type M or L for collector / heat transfer appliance connections, adapters, elbows and fittings.
- 96/4 Tin/Silver solder
- Non-rubber based insulation (Armaflex); 1/2" wall / R2.6i minimum
- UV resistant covering or coating for outdoor exposed insulation
- Helio-Pak heat transfer appliance (HPAK)
- Isolation valves, tempering valve, air vent
- Storage tank with adequate volume for collectors installed
- Connections for storage tank (flexible or otherwise)
- Dyn-O-Flo HD high temperature propylene glycol or equal
- Pipe hangers or supports installed per code requirement installed without compromising any insulation.

For service, contact Heliodyne: (888)878-8750

1.0.5. Tools

Heliodyne collectors and heat transfer appliances do not require any special tools. Never use plumbing wrenches on hex connections. Always tighten the bolts rather than the nuts. Aside from using the standard plumbing tools (torch, pipe cutter, etc.) the following tools and sizes are used in Heliodyne equipment:

- 9/16" wrench / socket for 3/8" - 16 bolts and nuts
- 3/4" wrench / socket for 1/2" - 13 hanger bolts and nuts
- Adjustable hex wrench for 1.25" thru 1.875" hex sizes
- Phillips screw driver (for tank sensor installation)
- 1/4" drill bit for 3/8" lag screws
- 3/8" drill bit for 1/2" lag screws

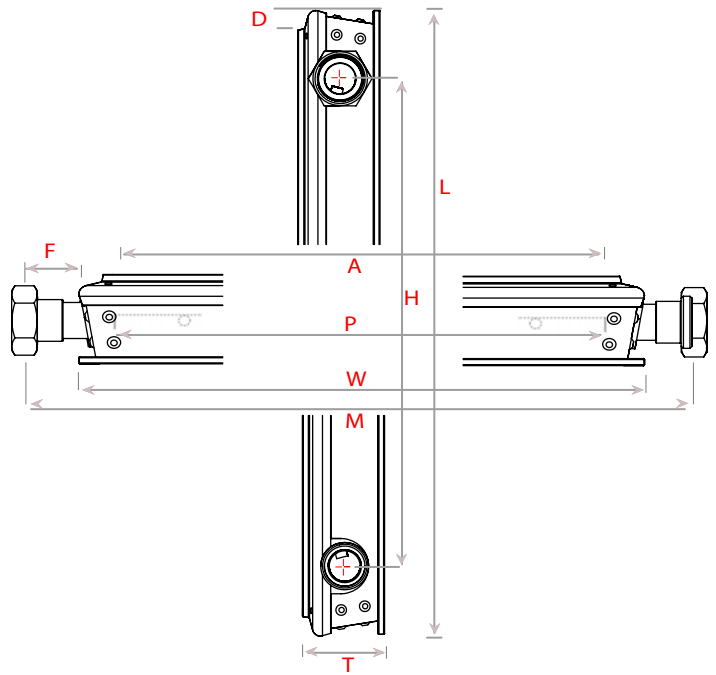
1.0.6. Safety Equipment

Working on roof tops and other elevated collector installation sites as well as using flames can be dangerous; use extreme caution and follow all local codes and good safety practices when installing. Protection against auto-ignition of combustibles - Combustible materials used in solar equipment an adjacent structures shall not be exposed to an elevated temperature that could cause ignition. Heliodyne is not responsible for job safety nor any accidents that may occur, and always recommends:

- Safety glasses
- Roof harness
- Scaffolding rather than ladders
- Solder in well ventilated areas

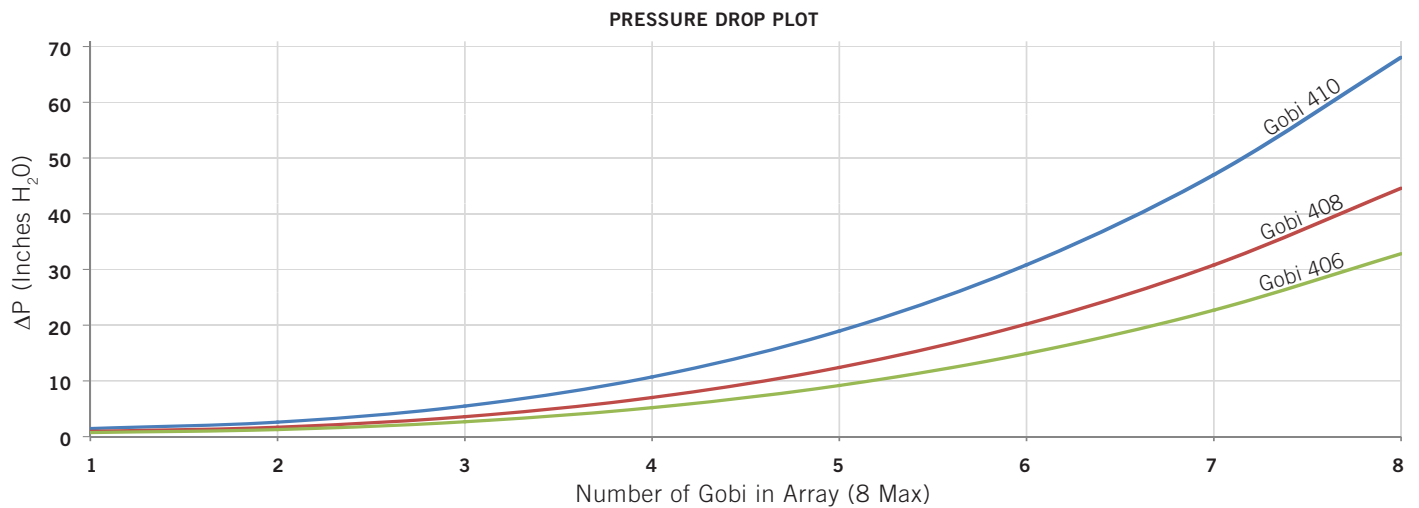
1.1. Technical Specifications for Gobi

DIM	DESCRIPTION	UNITS	GOBI 406	GOBI 408	GOBI 410
L	Length	inch	81.56	97.56	121.56
W	Width		47.56		
T	Thickness		2.75		
H	Header Length		76.88	92.88	116.88
M	Header Width		50.25		
A	Aperture Length		79.25	95.25	119.25
	Aperture Width		45.25		
P	Plate Length		78.0	94.0	118.0
	Plate Width		46.25		
D	Flashing Base		0.61		
F	Flashing Header		1.93		
L x W	Gross Area	ft ²	26.94	32.22	40.15
A _L x A _W	Net Area	ft ²	24.90	29.93	37.47
g	Dry Weight	lb.	74	102	127
G	Full Weight	lb.	80	108	135
V	Volume	Gal.	0.6	0.7	0.8
-	Max Pressure	PSI	150 (10 Bar)		
-	Test Pressure	PSI	300 (20 Bar)		
-	Stag. Temp.	°F	397.6 (203 °C)		



1.2. Flow and Pressure Loss¹

RECOMMENDED DESIGN FLOW RATES WITH WATER ²		
GOBI 406	GOBI 408	GOBI 410
0.67 Gal / min	0.81 Gal / min	1.0 Gal / min

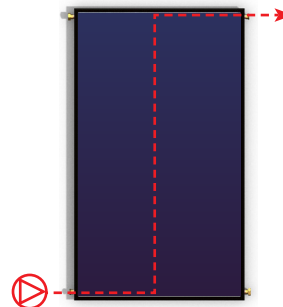
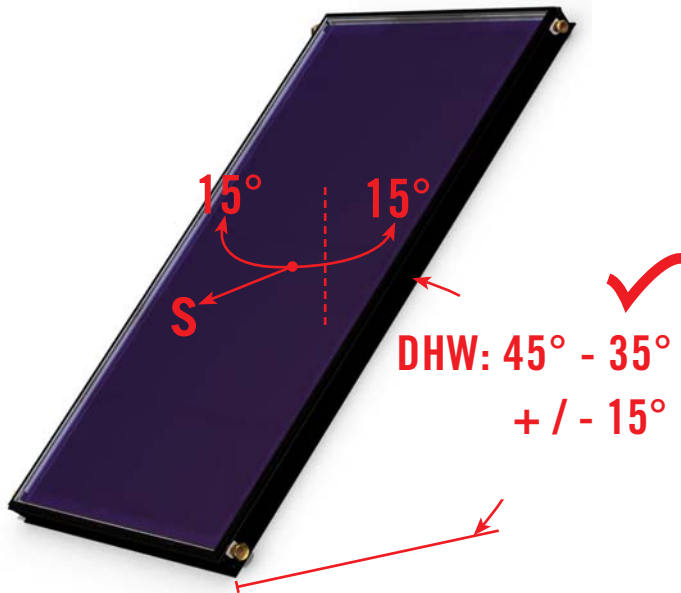


¹ Losses calculated at recommended Gobi design flow rates for 50/50 propylene glycol / water solution.

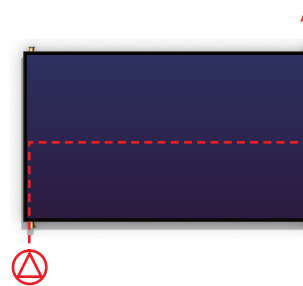
² Minimum flow rates shown. Do not exceed recommended flow rates by more than (3) times.

1.3. Gobi Orientation and Plumbing

1.3.0. Tilt, Azimuth and Orientation



Helio-Pak ✓
Helio-Flo ✓
Drain Back ✓



Helio-Pak ✓
Helio-Flo ✓
Drain Back ✗

1.3.1. DOS-Disc Assembly & Requirements



Figure 1.3.-1 DOS-Disc Assembly
1".....50013
3/4".....50014
1/2".....50016

→ 2x



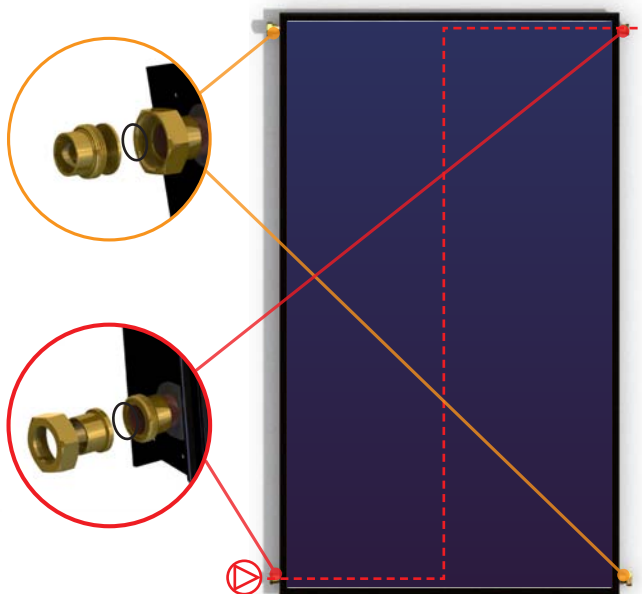
Figure 1.3.-2 Two DOS-Discs Per Vertical Array

OR



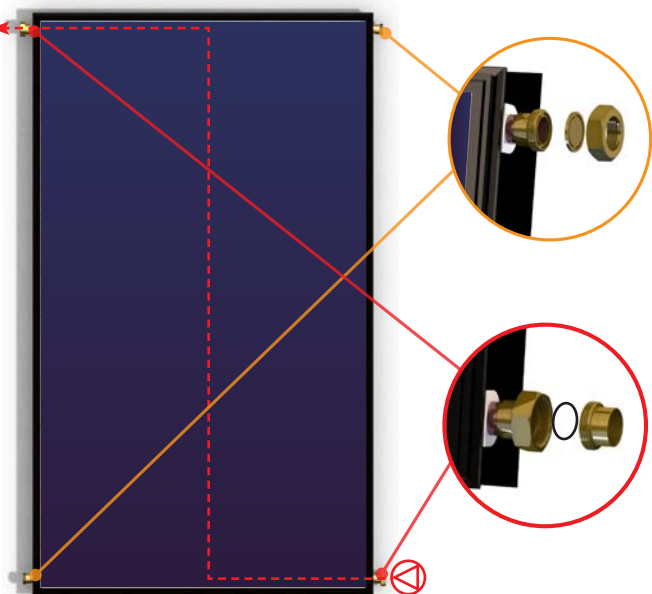
Figure 1.3.-3 Two DOS-Discs Per Horizontal Collector

1.3.2. Supply and Return Connections, Unused Connection Capping



Supply Bottom Left, Return Top Right

OR



Supply Bottom Right, Return Top Left



1.6. HFLO Replacement Parts

1.6.0. HFLO Spare Parts Table (To purchase contact Heliodyne)

ITEM	CODE	PART NUMBER	DESCRIPTION	QUANTITY
1a	HFLO 016 000 HFLO 016 001 HFLO 016 100	50083 50084 50131	HFLO heat transfer appliance with built in heat trap and top tank connections	
1b	HFLO 016 010 HFLO 016 011 HFLO 016 110	50116 50117 50132	HFLO heat transfer appliance with bottom tank connections	
2	HFLO Foam Front	21435	Front insulation casing	1
3	HFLO Foam Back	21436	Back insulation casing	1
4	Acrylic Cover	21442	Front white acrylic cover with logo	1
5	AC: UPS 15-58 CiL2 PV: Laing DC-5	23098 23103	Composite volute circulation pump, 3-speed 20 Watt Photovoltaic driven pump	1
8	Solar Connections	21438	DOS flange combo valve to 3/4" MIP fitting connections to Solar Collectors	2
9	HFLO 2-40FloCast	21423	Bronze flow casting, with flow meter input (plug with clip and O-rings for non Pro models)	1
11	DHW tank: Hot	21729	3/4" NPT fitting hot water out to storage tank	1
12	DHW tank: Cold	21743	3/4" NPT fitting cold water in from storage tank	1
13	Combo Gasket	21186	EPDM gasket for combo valves	3
14	Combo Valve: Hot	23090	Hot combination valve: ball valve, temperature gauge	1
15	Combo Valve: Cold	23091	Cold combination valve: ball valve, temperature gauge	1
20	HFLO Bracket	21204	HFLO Bracket	1
21	X Mount	21453	Tank / Wall Mounting Bracket	
22	Mtg Screws	21194	1/4 - 20 x 1" Self-tapping screws for tank mount	4
24	Elec. Box - bot	21198	HFLO / HPAK electrical box - bottom	1
25	Elec. Box - top	21197	HFLO / HPAK electrical box - top	1
26	Delta- T	21153 21270	Delta - T Control Board, (Standard on PV versions) Delta - T Pro Control Board, Pro or Pro-LITE models only	1
29	SENS 000 001	23029	10,000 Ohm Thermistor Sensors	2
47	Grundfos VFS 2-40	23086	Grundfos vortex flow and temperature sensor, Pro and Pro-LITE models only	1
Optional Equipment (Not Included in HFLO Package)				
58	Combo Valve: Fill	23092	Filling valve with 1" NPSM M / F connections without gasket	-
61	ZZZZ 000 003	23020	Tempering valve, 3/4" sweat	1
62	ZZZZ 000 008	23021	Air vent kit for filling, 1/2" Male NPT	1
63	SENS 000 002	23025	Sensor wire	-
64	ZZZZ 000 005	23023	Tank bypass valve	1
65	DOS Tank Dielectric	50016	Brass DOS tank dielectric union with O-ring, 1"C x 3/4" NPT	1 / Nipple

1.6.1. Tempering Valve

Install a tempering valve to prevent scalding; the solar storage can reach temperatures of 180°F or higher. Some areas may require a rated Anti-Scald valve.

For dual tank systems with a gas backup, install the tempering valve before the gas water heater and after installing the solar storage tank, to avoid a service call for high limit fuse replacement. For dual tank systems with an electric tank, the tempering valve may be installed before or after the tank. For instantaneous water heaters as backup, consult the manufacturer for the recommended method of tempering or bypass of solar heated water into the heater.

1.6.2. System Overheat Protection

The HFLO does not come with any pressure relief valve. A properly sized T&P valve on the solar storage tank is required to protect the solar loop against over-pressure. Open loop systems have little stagnation protection, because of the street pressure operation. For best results, install a Delta-T Pro controller and operate vacation mode for long absent periods..

1.6.3. Operation of Combo Valves

The combo valves are integrated ball valves with temperature gauges. Reverse thermosyphoning is prevented through the 18" heat traps within the HFLO design. The valves can be operated by turning the plastic handles clockwise, with note taken of the position of the slots on the handles, indicating valve position as pictured in figures 1.6.3.-1 – 3 below. To ensure proper compression fitting seals, clean and round copper tubing must be used. Use a counter wrench on the hex provided to fully torque compression nut fittings. Bush up or down as necessary for proper flow rates.

During operation, the hot temperature gauge should read in the range of 10-20°F higher than the cold gauge, depending on system flow rate..

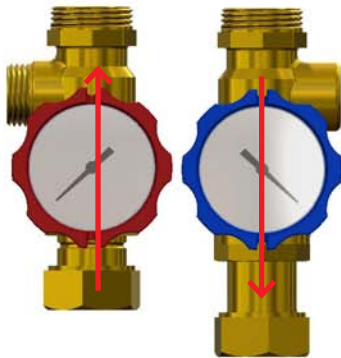


Figure 1.6.3.-1: Ball Valves Open
(Operation Position)

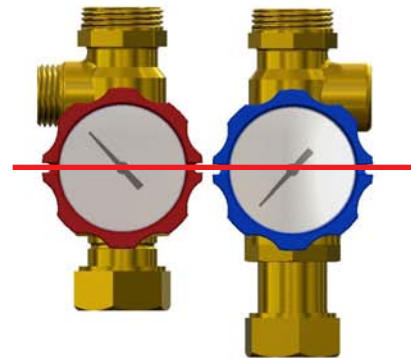


Figure 1.6.3.-3: Ball Valves Closed
(HFLO Servicing)

1.6.5. Solar Control and HFLO electrical

THE ELECTRICAL INSTALLATION SHOULD BE PERFORMED BY AN AUTHORIZED PROFESSIONAL. FOLLOW ALL LOCAL REGULATIONS AND CODES WHEN INSTALLING WIRE, FUSES, GROUNDING, ETC. PROTECT THE HFLO FROM OVERCURRENT. BEFORE ANY ELECTRICAL WORK IS DONE, ENSURE THE HFLO LINE CORD IS DISCONNECTED FROM THE ELECTRICAL SOURCE. FOR PV POWERED SYSTEMS, MAKE SURE PV PANEL IS COVERED UNTIL SYSTEM IS READY FOR OPERATION. REFER TO THE CONTROL MANUAL SHIPPED WITH SYSTEM.

The HFLO AC powered variants come with the basic internal electrical wiring already completed. For simple DHW operation, the installer only needs to plug in the HFLO line cord into a nearby 120 VAC, 60 Hz grounded wall outlet and wire the storage and collector sensor appropriately. The control comes prewired with two sensor lines. Use 22 AWG or larger cable if the sensor lines need to be extended. Connect the sensors to wire using non-metal wirenuts, or other corrosion resistant connection method.

If attaching additional sensors or wiring, such as for the Pro models, remove the top cover of the electrical box and make the appropriate connections.

1.6.6. Flow Sensor: 0X1 Models

The HFLO pro models come with a digital vortex flow and temperature sensor preinstalled and wired to the Delta-T pro control. No adjustment is necessary. See the Delta-T Pro Manual for in-depth explanation.

1.6.7. Pump Operation

The Grundfos UPS 15-58 CiL2 circulation pump is an FDA tested and approved composite volute three speed pump; it comes prewired, set at speed 2. Depending on Gobi surface area installed, the speed may need to be adjusted by rotating the switch to desired speed. Use Table 1.6.7.-1b for pipe size, collector surface and speed reference. Table 1.6.7.-2b shows the pump performance.

HFLO Model	048 0XX
Recommended Flow Rate (GPM)	2-8
Max Gobi Surface Area (Ft²)	321
Recommended Pump Speed	1-3
Max Piping Resistance (Ft H ₂ O)	5

Table 1.6.7.-1b: HPAK Piping Recommendations



Figure 1.6.7.-1: Grundfos UPS 15-78 CiL2 Pump

UPS 15-78 CiL2 Power Ratings:
Speed 1: 80 Watts
Speed 2: 114 Watts
Speed 3: 132 Watts

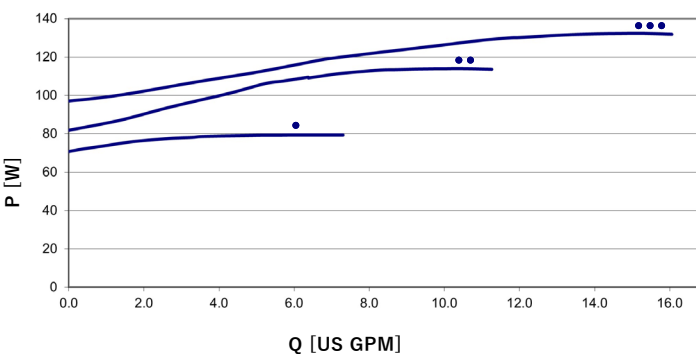
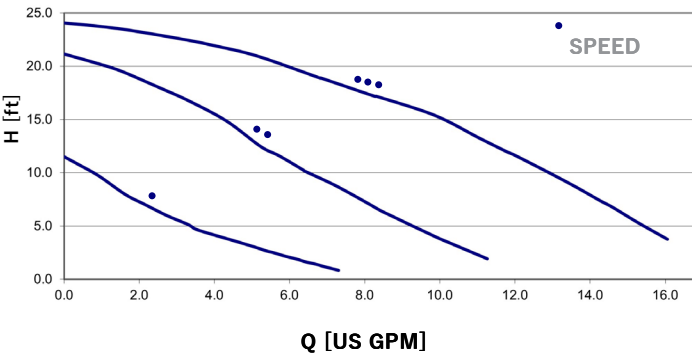


Table 1.6.7.-3: UPS 15-78 CiL2 Performance

3. HELIO-FLO INSTALLATION

3.0. Helio-Flo Connections and Hydraulic Schematic

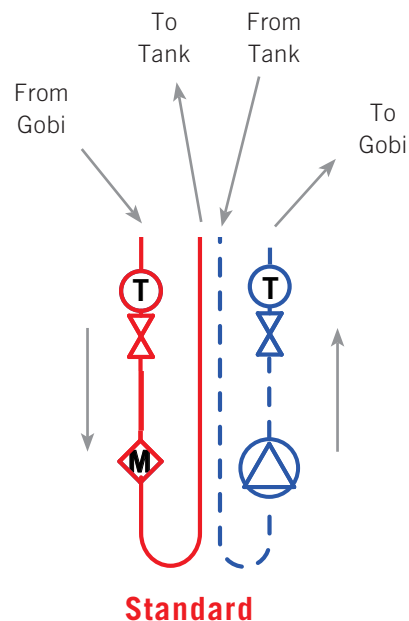
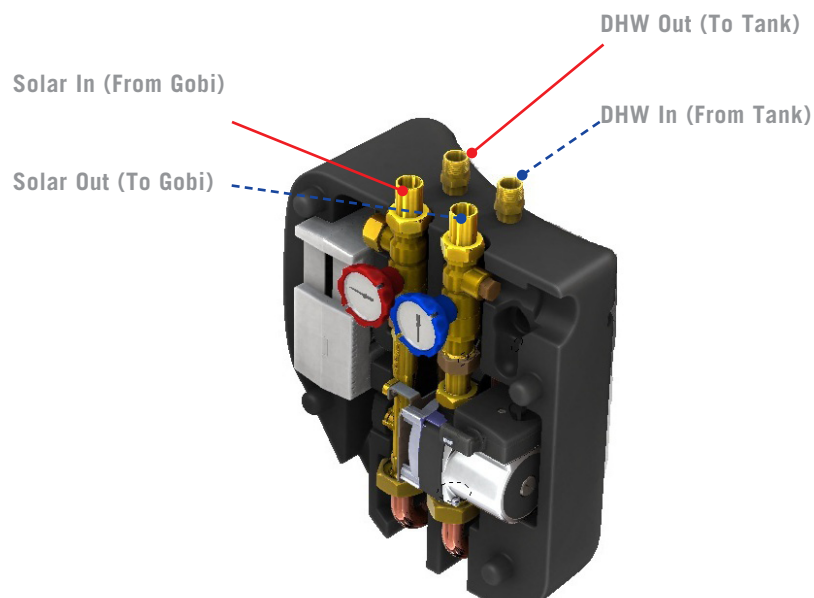
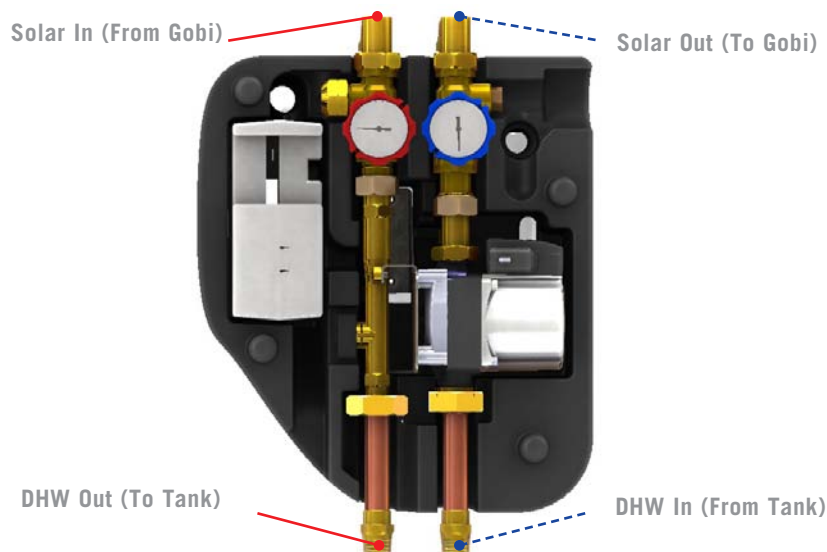


Figure 3.0.-1: HFLO Connections

OPTION - Bottom Mount



HFLO 048 X1X

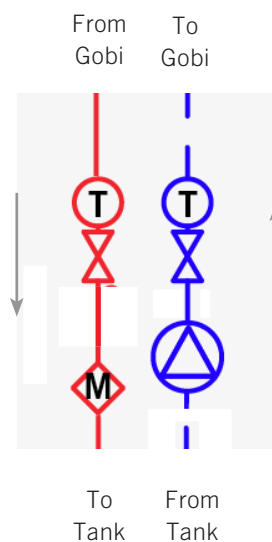


Figure 3.0.-2: HFLO Bottom Mount Hydraulic

3.1. Tank Orientation

The HFLO is manufactured for installation off center, so the left edge aligns with the side of the tank, rather than each of the center lines matching up. If using a Helio-Tank for installation, orient the proper solar connections near the HFLO connections to reduce piping. On all tanks: ensure proper dip tube length by inspection.

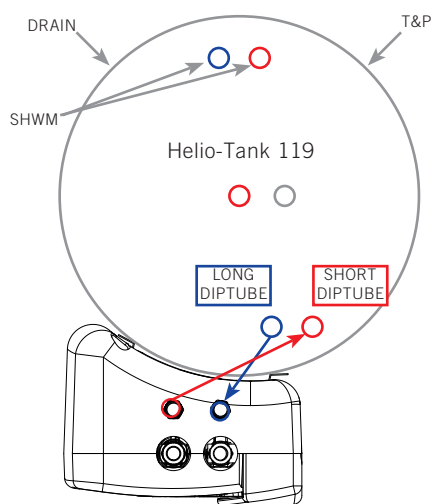
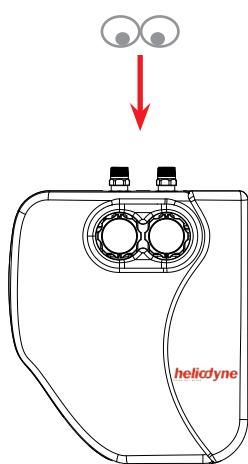


Figure 3.1.-1: HFLO Top Mount and Helio-Tank 119 Connections

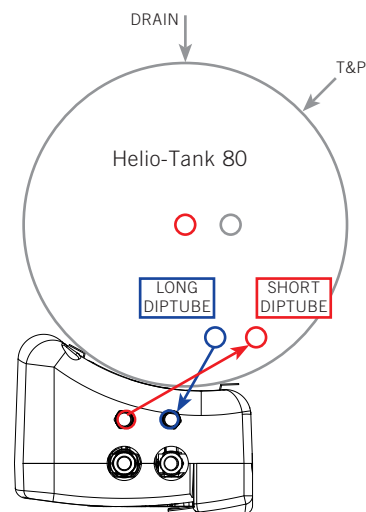


Figure 3.1.-2: HFLO Top Mount and Helio-Tank 80 Connections

3.2. Plumbing Multiple Tanks

If using multiple tanks to achieve proper storage ratio, always use reverse return plumbing with the cold lines the longest, to ensure least heat loss, and that each tank gets the same amount of circulation. For Helio-Tanks, use the 119 and connect all 2" side ports for increased layering and higher performance.

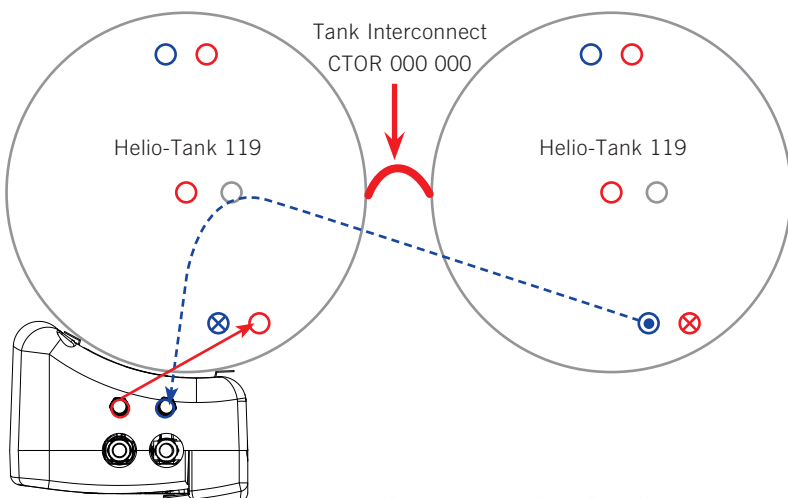


Figure 3.2.-1: HFLO with Multiple Helio-Tank 119

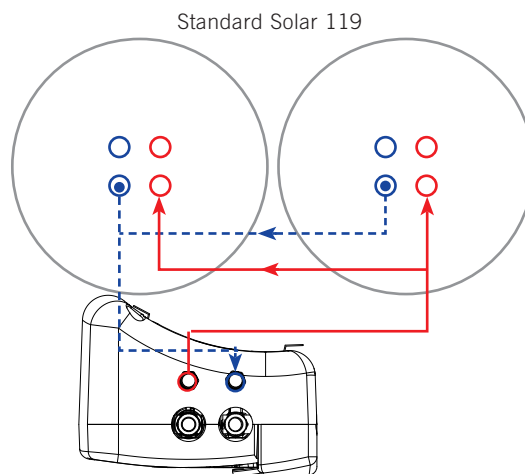


Figure 3.2.-2: HFLO with Multiple Standard Solar Tanks

3.4. Sensor Installation

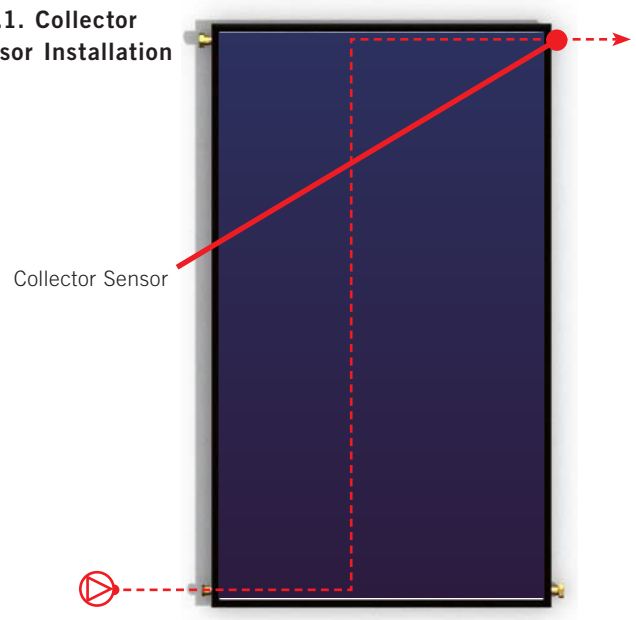
HFLO's come with the necessary sensors pre-wired into the control; for more information see the separate control manual. The controls require at least one tank sensor: on the bottom of the storage tank; the top tank sensor is optional. Most solar storage tanks have a stud near the bottom for placement; the Helio-Tanks have studs for both top and bottom. If a specific area is not available, attach to a metal drain, disconnected lower element, or use the cold in for lower tank sensor; use the hot out for a top tank sensor. The collector sensor must go on the outlet header of the array.

For Pro models: the energy production is default set to calculate via the collector outlet sensor and the pre-installed flow meter temperature and flow sensor. For greater accuracy in integrated tank systems, install an additional thermistor sensor just above the inlet to the heat exchanger and connect to T4 at the Delta-T Pro. Consult controller manual for recommended sensor positions.

3.4.0. Storage Sensor Panel Removal and Installation



3.4.1. Collector Sensor Installation



3.5. Helio-Flo Tank Mounting

Use the self-tapping screws provided with the HFLO to mount the X-Bracket to the storage tank (or wall nearby) as shown in figure 3.5-1, then hang the HFLO on the studs of the X-Bracket. Use a level for straightness; the studs in the X-Bracket should be approximately two inches below the top of the tank, to align with the top of the HFLO foam.

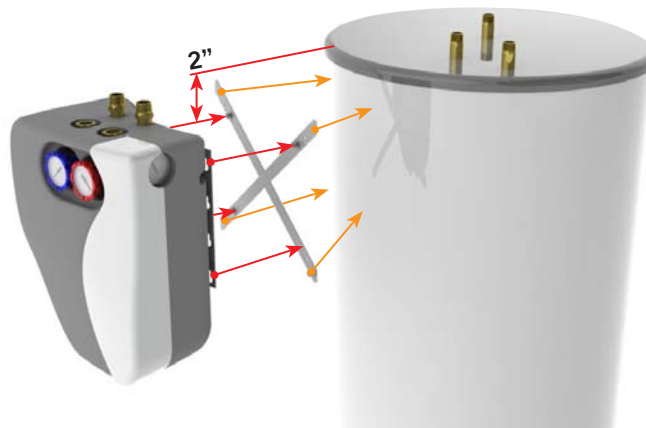


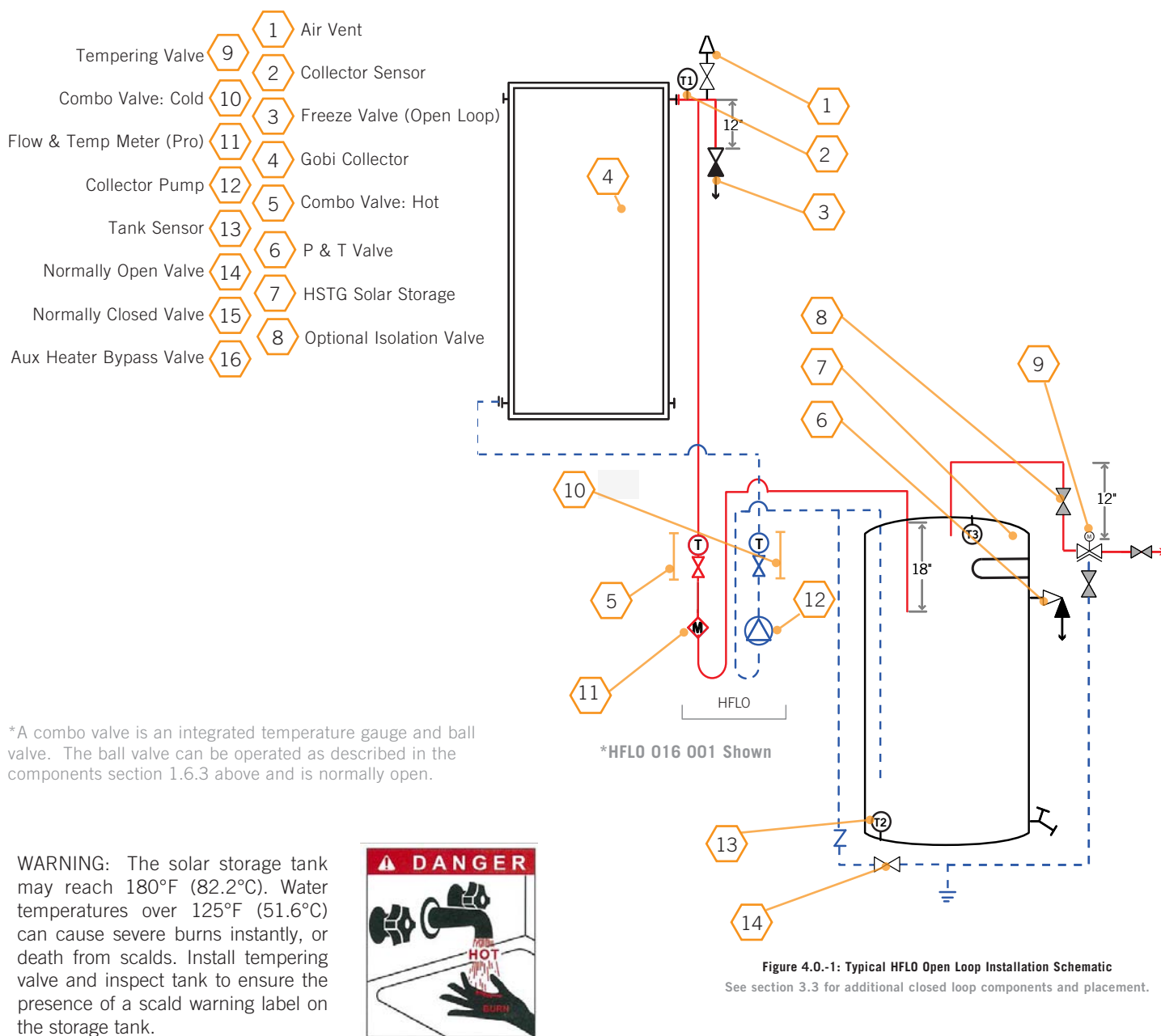
Figure 3.5.-1: HFLO Tank Mounting

4. PIPING

4.0. Connect the HFLO to the Tank

Insulate all hot water piping, as well as the final five feet of cold water storage inlet piping to a minimum R2.6. To enable backup heat during solar system maintenance, isolation and shut off valves must be installed as recommended in installation schematics below. Use dielectric unions when connecting piping to the storage tank nipples.

When using the Helio-Tank, appropriately sized flex hoses can be purchased from Heliodyne to avoid rigid copper plumbing. In the case of standard storage tanks, Heliodyne Gas Tank, or multiple tanks, this is unavoidable. When using the Helio-Tank, the DHW Cold is shared with the HFLO Cold. NEVER share the hot DHW and HFLO to prevent cold water entering the hot line.



4.2. Additional Tank Schematics

If your tank is not here, contact Heliodyne with questions. Refer to the valve descriptions on the previous page. In accordance with SRCC standard OG-300, all piping and valves must be labeled. Attach the waterproofed labels provided with this manual to the appropriate components using zip-ties.

NOTE: For single tank electric systems: disconnect lower element for proper operation.

NOTE: For single tank gas systems: tanks with electric pilot and HFLO Pro ONLY

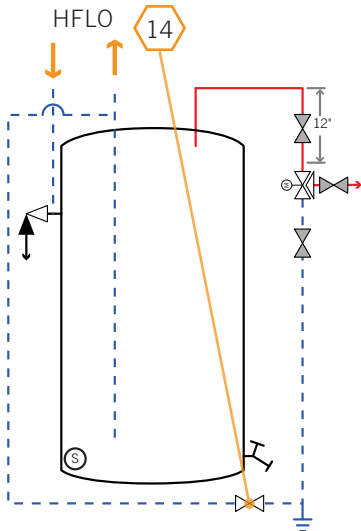


Figure 4.2.-1: Single Standard Tank

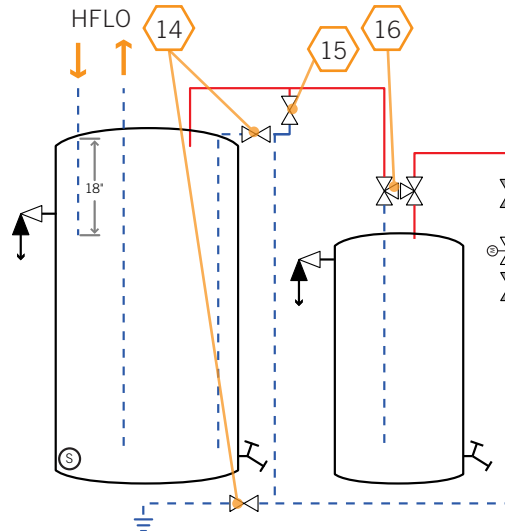


Figure 4.2.-2: Dual Tank: Electric Backup

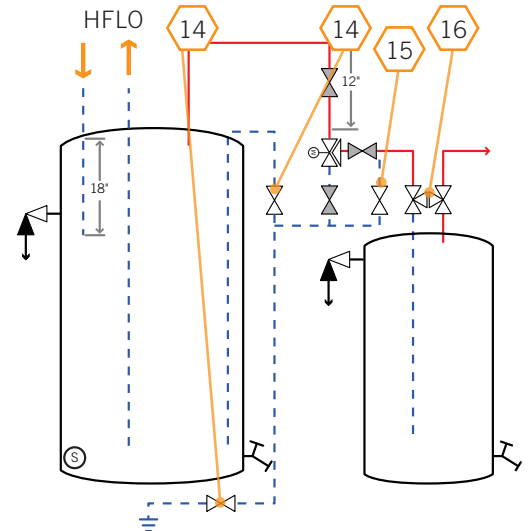


Figure 4.2.-3: Dual Tank: Gas Backup

4.2.1. Solar heating with Tankless (Flowthrough) Water Heaters

For systems with Tankless or On-Demand Water Heaters, solar pre-heated water can potentially overheat the internal gas water heater components. For this reason Heliodyne recommends using a Mixing Valve prior to entry into the On-Demand Unit, to mix down the solar heated water to the maximum temperature limit of the gas heater.

Connect the solar storage tank top ports as per tank manual for normal DHW applications



WARNING: A check valve is needed on the piping inlet to the solar storage tank, to ensure the cold water supply to the mixing valve remains at groundwater temperatures. Without this check valve there is a potential for scalding temperatures!

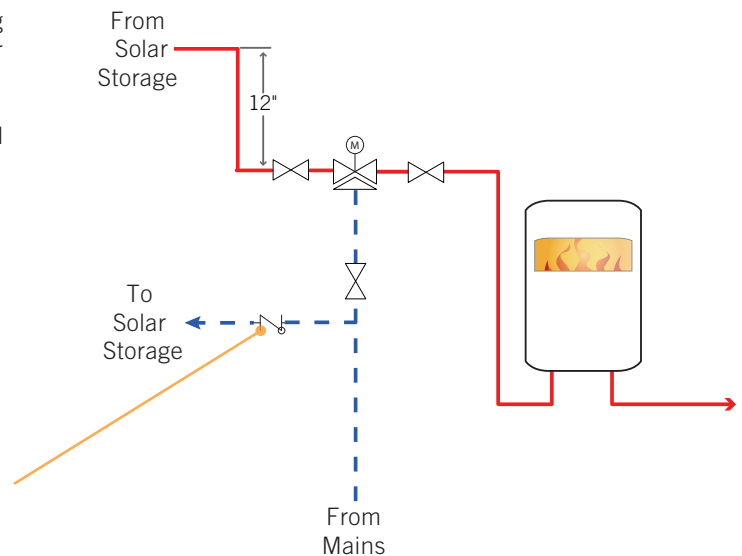


Figure 4.2.2-1: Flow Thru Connection

4.3 Single Gas Tank Systems with Electric Ignition Pilot Light.

Heliodyne Delta-T Pro and Pro-LITE controllers have built in logic to control an electric-ignition pilot light for single gas tank systems, allowing their use for the first time with solar thermal collectors. For more information on the controller logic, refer to Delta-T Pro and/or Pro-LITE manuals. The requirements for single gas tank usage are:

1. Electric Ignition Pilot Light
2. HFLO Pro or Pro-LITE Models only
3. An additional temperature sensor located at the top of the storage tank.
For HFLO Pro systems, this extra sensor can be a RTD Thermistor sensor (T3).

For HFLO Pro-LITE systems, this MUST be a digital Grundfos RPS sensor. Please contact local Heliodyne dealer for more information.

4.3.1. Gas-Fired Tank with 2 Side Ports:

Use tank side ports to connect HFLO water lines. Plumb HFLO cold suction line into lower port, the HFLO hot return to the top side port. Connect the tank top ports as per tank manual for normal DHW applications

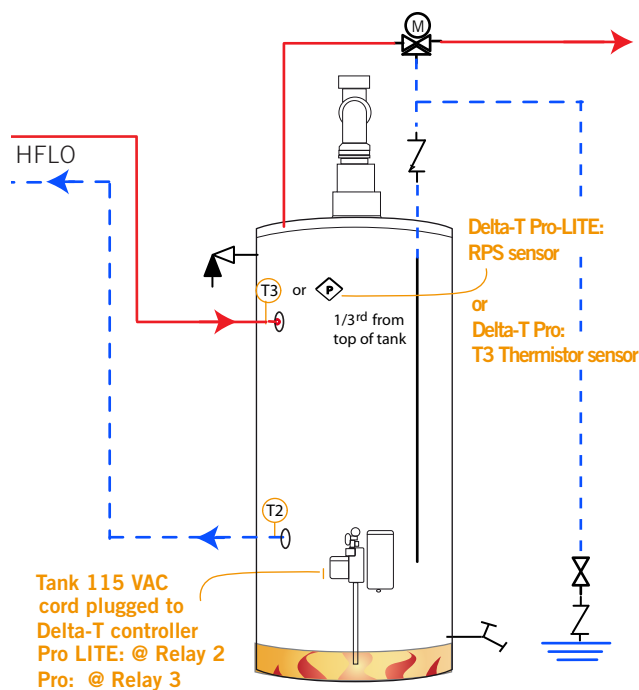


Figure 3.2-1: HFLO PRO or PRO LITE with side-port
Electric-Ignition Gas Tank

4.3.2. Gas-Fired Tank, no Side Ports:

If no side ports exist: add copper T-Fitting into the bottom drain line and plumb HFLO cold suction line to the new fitting. Cut the tank top DHW cold inlet diptube to a length of 1/3rd from the top of the tank.

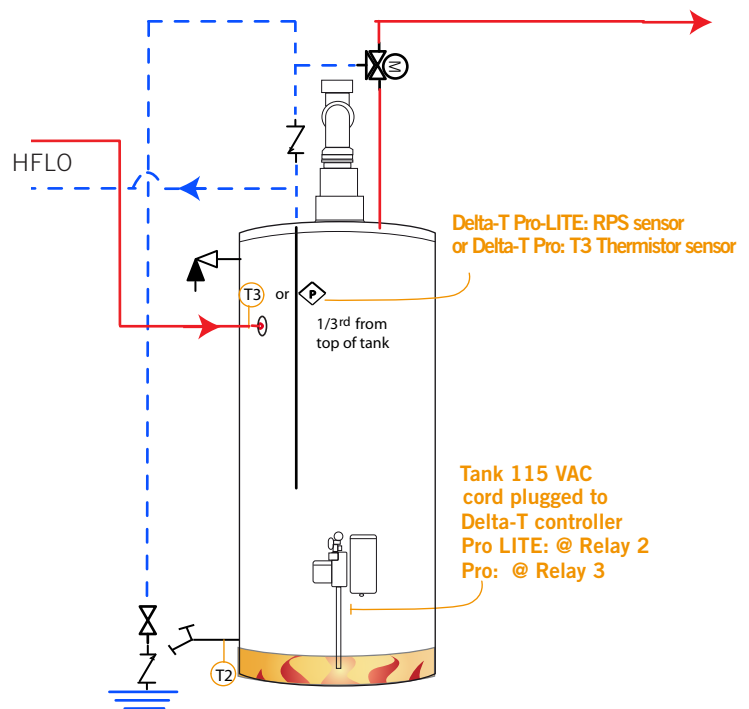


Figure 3.2-2: HFLO PRO or PRO-LITE with top-port
Electric-Ignition Gas Tank

4.2.0. Electric Ignition Gas Tanks with Pro Controller

5. COMMISSIONING

5.0. Clean and Pressure Test the Collector Loop

Before filling the collector loop with potable water, pressure test the collector loop to check for soldering leaks and proper joint mates. For closed loop systems, remove the expansion tank first and cap the connection. Fill the collector loop with water using the site hose and pressurize up to mains pressure; the filling station can also be used. Heliodyne recommends pressure testing up to at least 100 psig. Monitor the pressure gauge for drops in pressure, inspect all joints.

After pressure testing, flush the system with water, or a 1-2% solution of TSP and water. Flushing can be done easiest using the filling valve installed between the collector and HFLO (for either open or closed loop) and a filling station.

5.2. Final Fill and Commissioning

5.2.0. Only For: Open Loop System Versions

Filling an open loop system is quite simple. Since the collectors, HFLO, and storage tank are all on the same fluid circuit, it is only necessary to re-open the storage tank supply from mains water, and the system will begin to fill automatically. With the air vent open, the system is able to rid itself of air pockets, though it is good practice to run the circulation pump manually after the system has filled, to assist in bleeding.

After filling, ensure the controller is set to run in freeze protected mode (see accompanying manual for further detail). Plug in the power cord and set the controller to run in “Auto”.

6. O&M

6.0. Annual Operational Checks and Troubleshooting

Every year the solar system should be checked to ensure optimal performance; these annual checks performed by a qualified professional should not take the place of good operation overview by the systems owner. Annually or more often, the following content should be verified.

All Systems:

6.0.0. Check the collector pump for operation

- With proper operation, the hot or red gauge should read 10-20°F hotter than the blue gauge.
- With a temperature difference greater than 20°F, set the pump speeds to a higher level. For a difference less than 10°F, set the pump speeds to a lower level.
- Loud operation or squealing means air in the system, follow filling guidelines for re-pressurization.
- No temperature difference could mean a pump failure, test pump supply voltage at pump electrical box, listen and feel for OP.
- No temperature difference could also mean a diptube wasn't installed correctly, or at the right length. Review tank schematics in this manual for proper length.
- The hot and cold ball valves could be turned incorrectly; ensure the slots on the top and bottom of the plastic red or blue colored handle are aligned vertically.
- The filling valve bypass could be turned incorrectly; ensure the slot aligns vertically.

6.0.1. Check the control and sensors

- Ensure the sensors are giving proper readings by either viewing the software in the Delta-T Pro, or using a multimeter to measure resistance. See the control manual for further details.
- Check wiring to ensure it is undamaged and continuous.

6.0.2. Check pressure gauge

- Pressure gauge on HFLO should be no less than 30 psig when system is cold. Follow filling guidelines for re-pressurization.
- Inspect system for leaks.

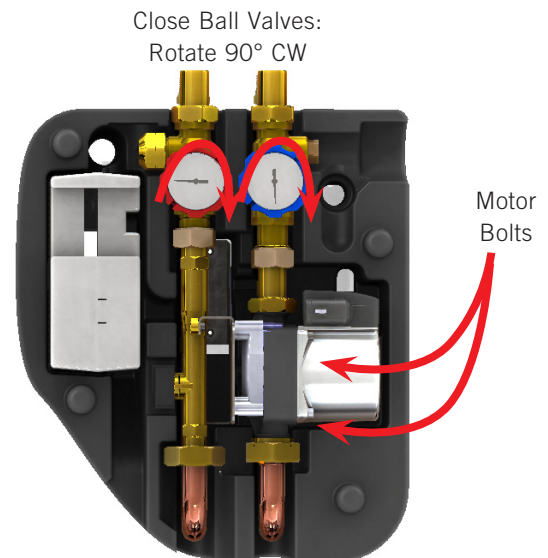
6.1. Maintenance

To replace parts on the HFLO, close the hot and cold ball valves for servicing equipment underneath them such as pump, heat exchanger, flow sensor, etc, and turn off the water supply to the storage tank. For servicing PRV, pressure gauge, expansion tank or collectors and piping, the system should be drained in the direction of flow via the fill valve. If the fluid is good, drain it to a bucket for reuse. Estimated time per component: 1-2 hours.

To replace any of the combo valves, unscrew appropriate valve, and replace gasket with valve; torque connections to 30 lb-ft. Estimated time: 2 hours.

To service a pump, the motor housing only needs replacing, as volutes have no moving parts. Disconnect electricity from HFLO, then disconnect the pump wiring with the spring clamps. Unscrew the four allen-keyed bolts and replace motor and electrical connections. Torque bolts to 80 lb-in. Estimated time: 2 hours

To service the controller, disconnect the electricity from the unit and remove the box housing, unplug all connections and power wiring, and replace the board. After reinstalling a new controller, test operation by turning the control on manually. Estimated time: 1 hour.



7. SYSTEM NOTES

7.0. System Notes

Installation and service should be performed by qualified personnel only.

Always follow the most recent version of the Heliodyne Collector Installation and Maintenance Guidelines for collector installation.

7.0.0. System Fluid Information

Always use copper tubing for collector supply and return connections. Black iron pipe can also be used, with proper dielectrics. Never use galvanized pipe or plastic based products, such as PEX.

Rinse system with 1 – 2% mixture of trisodium phosphate and water. Remove the expansion tank for testing only, and pressure test system with water before filling.

Maintain minimum operating pressure of 30psig when system is cold to avoid pump cavitation. If using an air vent during filling, ensure it is closed during system operation.

7.0.1. Safety Precautions

Follow all local codes and regulations. All equipment should be grounded for protection against lightening.

It is the installer's responsibility to ensure all the codes and inspections are carried out and that he or she is fully versed in these guidelines.

Work should only be performed on the HFLO and system when it is disconnected from the power supply.

When creating and repairing roof penetrations, ensure final seal disallows any unwanted animal or creature intrusion, and the integrity of the structure is not compromised. Penetrations through fire-rated assemblies must not reduce fire resistance capacity below code.

7.0.2. Components

Place the HFLO and tank in a non-freezing environment.

Building materials adjacent to solar components must not be exposed to elevated temperatures produced by the solar system.

Solder suitable for 400°F and 150 psig must be used: 96/4 Tin / Silver is recommended.

Use non-plastic pipe insulation, such as Armaflex.

Route the pressure relief port on the HFLO to drain to avoid accidental scalding in case of release.

7.0.3. Description Of Product and Operation

The HFLO is a fully automatic solar energy heat transfer appliance. The controller senses the collector and storage temperatures and powers both circulation pumps when the collector has achieved enough temperature over the solar storage tank. See the Delta-T and Delta-T Pro manuals for full descriptions of operation, functions and warranties.

7.0.4. Commissioning

After the system is filled, it is normal for the initial pressure to drop as air comes out of solution. Repressurize the system to ensure at least 30 psig when cold. Ensure the control has appropriate freeze protection settings (if applicable) and the tank high limit has been set at a temperature at or below the tank manufacturer's recommendation.

8. WARRANTY

8.0. Warranty

HELIODYNE, shall provide a warranty for defects in compliance with the purchased goods delivered after 3/1/2009 as follows: the HFLO and HFLO Pro product (Products) to be free from defects in material and workmanship, and malfunctions and failure to perform, under normal use and service, for a period of three (3) years from date of installation, provided that said products have been installed in accordance with HELIODYNE's Installation Instructions. This warranty applies to the first retail buyer and to any subsequent owners.

In the event that evidence cannot be provided to indicate the date of installation, then the period of time shall be thirty six (36) months from the date of manufacture.

Objects are warranted at HELIODYNE's discretion by repair of the object of purchase or replacement of defective parts, exchange or reduction of price. The right of the contractor to convert objects is ceded by common consent. Replaced parts become the property of HELIODYNE. Wages and costs spent on installation and disassembly must be covered by the client. This provision similarly applies to all warranty agreements. It is at HELIODYNE's discretion to replace defective goods with similar, faultless goods. In this case, any rights to cancel the agreement cease. The client expressly waives the right for it and its legal successors to assert claims for damages or loss of profit (including without limitation special, indirect, loss of use, contingent, or consequential damages) due to defects or nonconformity in the purchased good. The warranty set forth above constitutes the sole and exclusive remedy against HELIODYNE for the furnishing of any nonconforming or defective goods. THE ABOVE WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE.

If the Product contains a defect that cannot be repaired after a reasonable number of attempts to do so, you, the buyer, may elect either a refund of its purchase price, or a replacement without charge. A replacement may consist of a new or factory rebuilt product of at least the same quality. A new warranty shall apply to any replacement.

Claims on warranty will only be admitted and considered if they are announced in writing immediately after the defect was first noticed. Oral communication or communication by telephone is not sufficient. To obtain service on the Product, notify Heliodyne Customer Service by email at sales@heliodyne.com, by letter to **4910 Seaport Ave., Richmond, CA, 94804**. Provide proof of purchase and date.

Should service be requested and no defect found in the Product, then a reasonable charge will be made for the service.

In no event shall HELIODYNE be liable for the following:

- Conditions resulting from a defect in a component or part that does not make up the HELIODYNE Product.
- Conditions resulting from a significant departure from Heliodyne's Installation Instructions.
- Conditions resulting from any misuse, abuse, negligence, weather damage, accident or alteration.
- Consequential damages such as: damage to your property, loss of time, inconvenience or loss of use of the Product or any incidental expenses resulting from any breach of the express warranty. Conditions that may occur in the normal operation of the Product shall not be invoked by HELIODYNE to reduce or defeat the coverage of this warranty.

HELIODYNE's liability under this warranty shall be in lieu of all warranties of fitness and in lieu of all warranties of merchantability. Heliodyne shall not be liable for any incidental or consequential damages covered by a defective product. The maximum liability under this warranty shall not exceed the contract price of the Product. Some states do not allow the exclusion or limitations of incidental or consequential damages, and some states do not allow limitations on implied warranties, such as that of fitness and of merchantability. Therefore the above exclusions and limitations do not apply to you.

The warranty excludes damage caused by force majeure and malfunction that are due to improper assembly, and/or product installation. HELIODYNE is not liable for possible costs resulting from defects. In order for HELIODYNE to accept liability:

- Installation must have been carried out by a licensed specialized company (heating contractor or plumber) following the version of installation instructions in force;
- HELIODYNE or its representative was given the opportunity to check complaints on site immediately after any defect occurred;
- Confirmation exists that the system was commissioned properly and that the system was checked and maintenance was performed annually by a specialized company licensed for this purpose. The warranty agreed by HELIODYNE is only valid for their clients.

This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. Unless otherwise explicitly agreed in writing, it is understood that these are the only written warranties given by HELIODYNE, and HELIODYNE neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with the Product.

