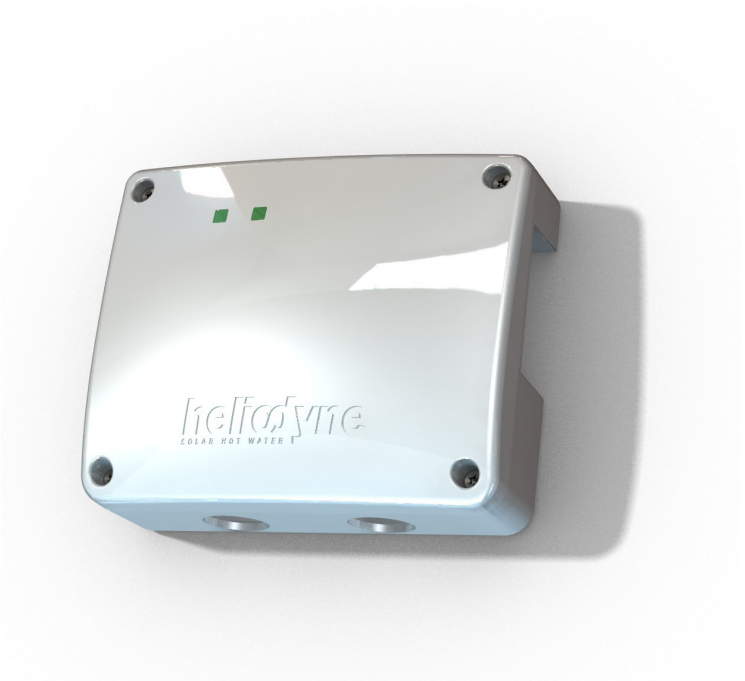
helioDyne
SOLAR HOT WATER

INSTALLATION GUIDE

DELTA T 84 & 94 CONTROL UNIT



EXCELLENCE BY DESIGN

1. DELTA T

1.0. Description

This Delta-T solar controller has been specifically designed to control the basic solar thermal collector system, including open loop, closed loop with a heat exchanger, and drain back, for residential domestic water heating

There are two versions of the Delta-T, the 84 is a hardwire model and can be supplied with 120 VAC or 240 VAC. The 94 model comes with a pre-wired plug and grounded outlet for installation ease.

For operation, the control requires two SAS-10 (10,000 Ohm @ 77°F) thermistor sensors. The differential and other settings have limited adjustability using the DIP switch on the control PCB.

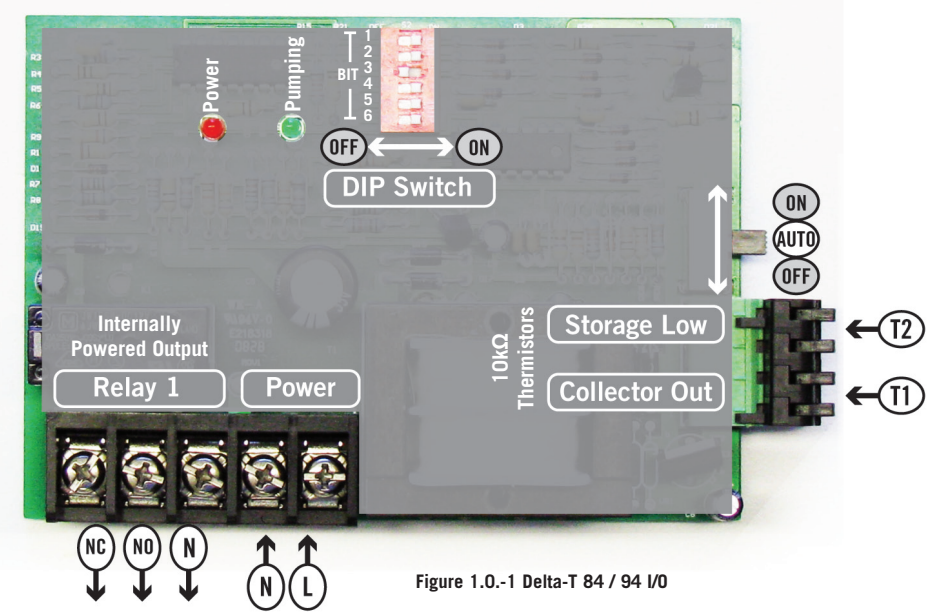


Figure 1.0.-1 Delta-T 84 / 94 I/O

1.1. General Notes

This control conforms to the National Electric Code and is certified by ETL. Installation should adhere to all national and local electric codes, and be installed by a qualified electrician or contractor. Any electrical wiring or modifications to the control I/O should be performed with the power disconnected.

1.2. Mounting

The Delta-T should be mounted on a wall indoors, away from weather and interference. Using the mounting holes on the back of the box, securely install 3 screws into mounting plane leaving 1/4" between the wall and the back of the bolt head; place control back upon screws and slide down to secure box tightly into screw pattern. The back page of this manual has a screw template.

1.3. Power and Wiring

Wire solar loop pumps into Relay 1, using the Normally Open (NO) terminal on the relay. The Normally Closed (NC) terminal can be used to supply power to a unit for use when the collectors are not heating the storage, like a swimming pool or hot tub. The voltage of the controller will determine the relay output voltage.

1.4. Thermistor Sensors

The SAS-10s sense temperature by conduction, and are not for liquid immersion, or inside collectors. For a proper reading, ensure the copper lug on the sensor is firmly against the desired surface using an SS pipe clamp across the flat surface or bolted via the through hole. Use surrounding insulation to avoid ambient temperature and other sources of reading interference.

The sensor leads are 24 GA Class II wiring and carry 4 VDC. Use a conductor 18-24 GA zip or bell wire to run from the sensor location to the control. Use caution when installing to avoid wire damage. Shielded wire is not necessary.

Install the collector sensor on the outlet header connection; install the tank sensor on the bottom of the storage tank, so it is in contact with the metal part of the tank. Insulate the sensors from ambient conditions.

1.6. Operation

The function switch on the right side of the controller should be set in the center, 'AUTO', position for automatic pump control. When the switch is in the 'ON' position, Relay 1 will be on continuously, regardless of temperature difference. With the switch in the 'OFF' position, Relay 1 will remain off.

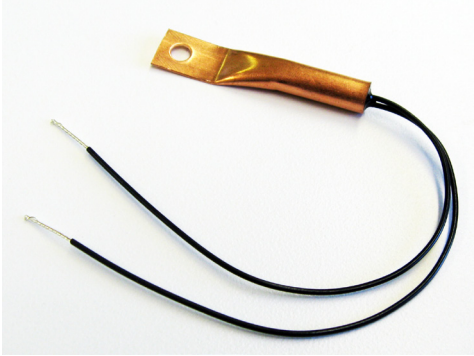


Figure 1.4.-1 SAS-10 Sensor

1.5. DIP Switch Settings

DIP SWITCH #	FUNCTION DESCRIPTION	SETTING WHEN LEFT (OFF)	SETTING WHEN RIGHT (ON)
1	Tank high limit shutoff - automatically turns off Relay 1 when the storage sensor reads switch 4 setting of 160 or 180°F	No high limit function	High limit ON
2	Freeze recirculation - automatically turns on the Relay 1 when the collector sensor reads 42°F or below	No freeze recirculation	Freeze recirc. ON
3	Useful collector temperature - automatically turns off Relay 1 when the collector sensor reads 80°F or below, even with a satisfactory differential (Freeze recirc. can override this function)	No useful collector temperature monitor	Useful collector temperature monitor ON
4	Tank high limit shutoff temperature - choose which temperature to turn the tank off at 160 or 180°F (set below tank manufacturer's guidelines)	180°F	160°F
5 & 6	Differential setting - sets which temperature differential will turn on and off Relay 1 (Heliodyne recommends both switches OFF for glycol systems, and both switches ON for open loop or direct systems)	18°F ON 5°F OFF	9°F ON 4°F OFF

Figure 2 DIP Switch Settings

1.7. Troubleshooting

If a controller stops working, most often it is due to a sensor or wire failure. Detach the sensor plug and measure the sensor resistance with a multi-meter and compare with the chart below for appropriate reading values. Because they are inversely related to temperature, a short reads as a very hot temperature, and an open reads as a very cold temperature.

1.7.0. On/Off Test

This test verifies the controller will turn on and off. Switch the controller 'ON,' power is applied to the Normally Open terminal on Relay 1. This may be verified with a DC voltmeter across Relay 1 terminals NO and N. If a pump is connected, it should turn on.

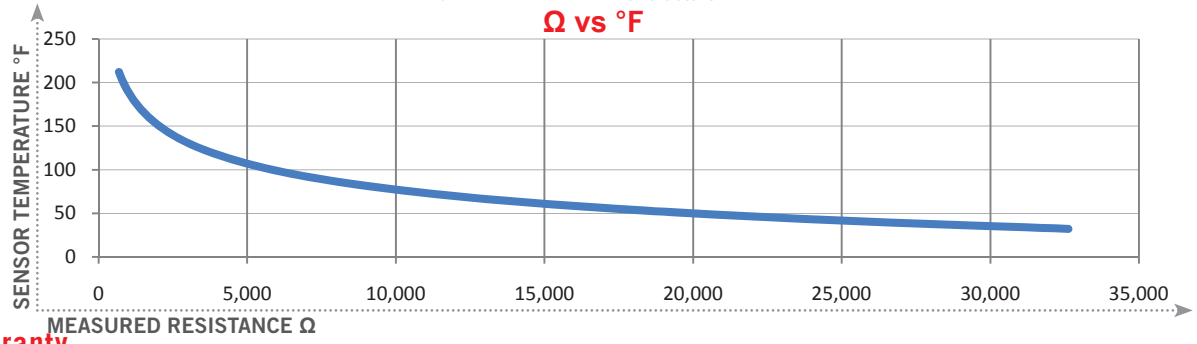
With the switch in the 'OFF' position, power is applied to the NC terminal on Relay 1. This may be verified with a voltmeter across NC and N on Relay 1.

When the switch is 'ON', the pump LED indicator should be on. If not, consult the manufacturer.

1.7.1. Basic Function Test

This test verifies the DIP settings are working correctly. The DIP switches (figure 2) for a particular function must be on to test for that function.

Place DIP switches 1 to ON and 2 to OFF (remaining switches can be either on or off.) Switch controller to 'AUTO.' If the sun is not out or pumps do not automatically turn on, place the collector sensor (T1) in a cup of hot water to turn the pumps ON. Short across the storage tank sensor (T2): this should turn the controller OFF. Next, allow the sensors to come to thermal equilibrium (about 1/2 hour) or until the pumps are OFF. Short across the collector out sensor (T1): this should turn the controller ON. If the controller does not respond to these tests, consult the manufacturer.



2.0. Warranty

Heliotrope Thermal DBA. HELIODYNE, shall provide a warranty for defects in compliance with the purchased goods delivered after 3/1/2008 as follows: the Delta-T and Delta-T 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 are 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:

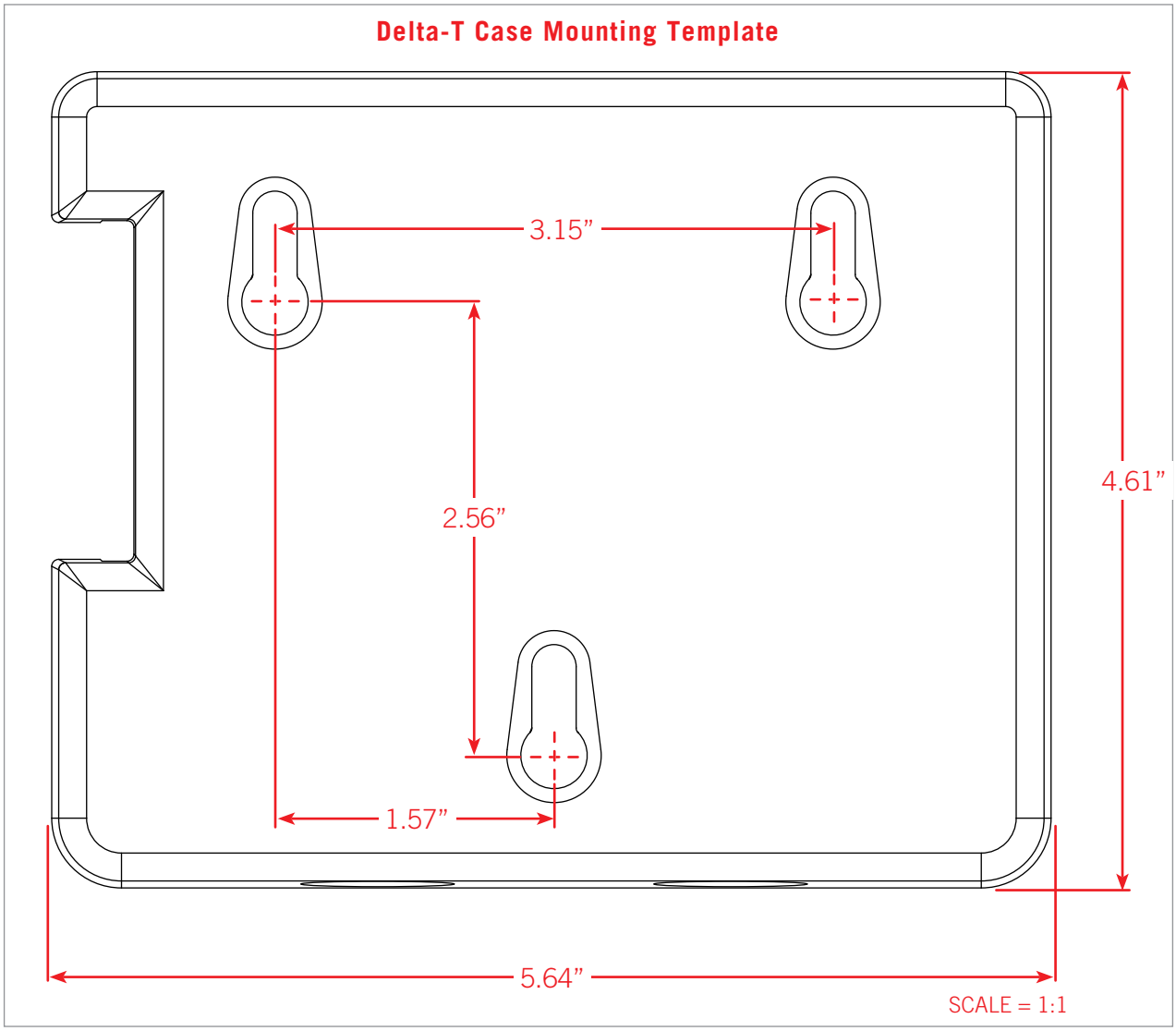
- Conditions resulting from a defect in a component or part that does not make up the HELIODYNE Product.
- Conditions resulting from a significant departure from Heliodyne's Installation Instructions.
- Conditions resulting from any misuse, abuse, negligence, weather damage, accident or alteration.
- 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.

Delta-T Case Mounting Template



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Product Technical Notice – August 15, 2014

Power Supply Protection for Delta-T Pro

The Delta-T Pro and Pro Lite controllers by Heliodyne are computerized controllers that are programmed to accomplish diverse instrumentation, control, and networking tasks with a single processor.

Voltage spikes, current surges, and noise can occur in a building's AC power supply once a month or hundreds of times a day. They can arrive from the grid or be generated inside the building by fluorescent lighting, electric motors, HVAC equipment and office machines.

If a sufficiently strong power surge is supplied to the Delta-T Pro, it may be subject to data loss, settings resetting to their default, network disconnection, or general failure. For this reason Heliodyne recommends installing a surge suppressor between the Delta-T Pro and a power source.

A variety of surge suppressors are available. Some surge suppressors include a circuit breaker for overcurrent protection, which is different from power surges. Overcurrent is a condition where equipment draws more current than its rating, such a ground fault or short circuit. Typically, overcurrent events happen on the consumer's side of the power supply, whereas power surges happen on the utility side of the power supply.

If a surge suppressor is selected that does not provide a separate circuit breaker, there is no interruption to the power supply when the protection activates or the suppressor reaches the end of its lifetime.

For convenience, Heliodyne offers some off-the-shelf surge suppressors that are selected to provide a basic level of protection. Please contact your Heliodyne salesperson for more information.

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