

INSTALLATION INSTRUCTIONS

INDIGO ELECTRONICS AT-4T THERMOSTATIC CONTROL VALVE ATOMIC 4

☑ Caution: Internal parts of this Temperature Control Valve will be damaged if the engine operating temperature is allowed to exceed 210°F. During initial startup especially, insure that the system is full of antifreeze

Antifreeze Pump Impeller – With the engine operating at 180° F with this valve, the antifreeze entering the antifreeze pump will be at about 150° F. **DO NOT USE A “GLOBE” IMPELLER** for this pump as that brand of impeller becomes too flexible at about 120° F and stops pumping antifreeze, causing rapid overheating of the engine.

Note for V-Drive models only: The V-Drive can now be cooled by antifreeze instead of raw water. To do so, the V-Drive should be added in the antifreeze loop between the tee that will mount on the antifreeze pump and the antifreeze pump itself. This will require several additional hose barb fittings. By adding the V-Drive at this point in the antifreeze loop, the V-Drive will be cooled by antifreeze at about 150F and the TCV performance will not be adversely affected by the addition of the V-Drive

Engine Preparation

Drain the antifreeze from the engine. Place battery disconnect switch in “Off” position.

Thermostat Removal

Remove the existing thermostat from its housing on the forward end of the engine. The bypass hose which runs from the antifreeze inlet on the side of the engine to the thermostat housing is no longer needed as all antifreeze will now pass through the engine. The bypass can be eliminated in one of two ways:

1. The 90° fitting on the thermostat housing can be plugged with a 1/8 NPT pipe plug by tapping the existing 90° fitting. In this manner, the hose is left in place but no flow can pass through it. Replace gasket under thermostat housing.
2. The 90° inlet fitting on the thermostat housing can be removed and the opening plugged with the 3/8 NPT pipe plug provided in kit. Replace gasket under thermostat housing. The tee fitting on the side plate of the engine can then be removed. This requires removal of the side plate as there is most likely a fitting on the inside which directs the coolant flow aft within the block. With the plate removed, remove the internal fitting and then the external tee. Replace the tee with the 90° fitting removed from the thermostat housing. Replace the side plate using a suitable sealant on the plate (such as Permatex Form-a-Gasket).

Thermostatic Valve Assembly/Installation

As received, the Thermostatic Control Valve (TCV) has three union fittings attached to it. The removable part has a ½ NPT female connection on the non union end. It is easiest to remove the union assembly from the valve body for assembly of the various pipe fittings. Assemble the fittings (using Teflon tape on all screwed fittings) as follows:

1. Install the ½ close nipple (Part #6 on Thermostatic Control Diagram) in one of the union assemblies. This is now called the “Cold Union.”
2. Install one ½ x ½ hose barb fittings (Part #3) in one of the union assemblies. This is now called the “Controlled Union.”
3. Decide which configuration of fittings you want for the remaining union assembly. One

arrangement provides for a tee being mounted on the TCV. A second arrangement provides for a tee being mounted on the antifreeze pump (original sea water pump) inlet. After making your choice, assemble the appropriate fittings on the remaining union assembly. This is now called the “Hot Union.”

the hose barb fitting on side leg of the tee (installed either on the “Hot Union” or pump inlet).

Installation with Domestic HW Tank

4. **Be sure to “hold back” on the heat exchanger connection with a wrench during the next two (2) steps.** Install the free end of the ½ nipple in the “Cold Union” in the ½ female connection on the heat exchanger. (This is the connection on the end of the “leg” of the heat exchanger, just below the fill cap.) Use a 15/16” (or 23mm) open end wrench on the flat on the union assembly.
5. Attached the TCV to the “Cold Union” connection being sure to install the gasket. The TCV should be oriented such that the “C” leg (“C” for cold) is attached to the “Cold Union” and the adjustment knob is up (the knob can be in any orientation and not affect operation.) Further align TCV to best accommodate other hoses and then tighten union nut.
6. Temporarily attach the “Hot Union” to the “H” leg of the TCV.
7. Temporarily attach the “Controlled Union” to the bottom leg of the TCV.

If a domestic HW tank with a built in heat exchanger is to be used within the antifreeze loop, it should be installed between the discharge of antifreeze from the exhaust manifold and the “Controlled Union” on the TCV.

Filling with Antifreeze

10. Fill heat exchanger completely full of antifreeze.
11. Attach a piece of ½” hose, about 3’ long, to the hose barb fitting on the antifreeze pump inlet. Place the other end of this hose in an open container of antifreeze for initial filling of the engine. About one gallon will be required.
12. Attach a piece of ½” hose to the exhaust manifold antifreeze hose barb fitting (on the aft end of the manifold). This hose should be long enough to reach its final destination which is the hose barb fitting on the “Controlled Union” leg (bottom) of the TCV. For now, place the free end of the hose in the aforementioned open container so as to catch antifreeze during the engine filling process.
13. Start engine and run until you to obtain a steady stream of antifreeze from the hose attached to the exhaust manifold. Add more antifreeze to open container as necessary so as to maintain flow to the antifreeze pump. Vary engine speed so as to attempt to flush any rust and debris from engine into the open container. Run the engine in this manner until the antifreeze leaving the exhaust manifold gets hot (about 130° F). Stop engine.
14. Attach free end of hose attached to the exhaust manifold to the hose barb fitting on the “Controlled Union” leg of the TCV. It may be as easy to measure and cut the hose and then remove

Hose Installation

Note: Material is included with this kit to enable you to construct a temporary filter to be installed as the antifreeze exits the engine manifold. This filter will capture rust and scale that may still be coming out of the engine and prevent it from damaging the TCV.

Depending on the existing routing of hoses and the condition of those hoses, it may well be possible to reuse several of the hoses. The following paragraphs describe what goes where.

8. Install a piece of ½” ID hose between the heat exchanger cold outlet connection (hose barb connection on bottom end of heat exchanger) and

the “Controlled Union” for attaching the hose. Tighten union nut.

15. Attach a piece of ½” hose to the hose barb fitting on the TCV “Hot Union”. This hose should be long enough to reach its final destination which is the hose barb fitting on antifreeze pump inlet. Place the free end in the open container so as to catch antifreeze during the final engine filling process.
16. Rotate the knob on top of the TCV so as to align the number “10” with the small triangle cast into the valve body. This is a good starting point for the following steps.
17. Start engine and run just long enough to obtain a steady stream of antifreeze from the hose attached to the TCV “Hot Union” (about 10 seconds). Stop engine.
18. Remove temporary 3’ hose from antifreeze pump inlet. Install permanent piece of 1/2” hose between the hose barb fitting on the TCV “Hot Union” and the hose barb fitting on the antifreeze pump inlet. Try to keep this hose full of antifreeze while attaching it.
19. Start engine and observe (for about 1 minute) that the heat exchanger remains full of antifreeze. Install cap on heat exchanger and continue to warm engine. Rotate TCV knob in direction of increasing numbers (relative to small triangle on valve body) until #22 is reached. This should give an operating temperature of about 180° F once engine is fully warmed up. It may be

necessary to fine tune the position of the knob to achieve a cruise speed operating temperature of 180° F. Turning the knob CCW yields higher temperatures, CW yields lower temperatures.

20. Open filter in antifreeze line after about 15 minutes of operation. Back flush screens with water to remove debris which has been trapped. Clean screens again after about 30 minutes and then monitor engine temperature to know when to clean again (temperature will rise uncontrollably beyond set point when filter becomes clogged) Filter can be removed after about 3 hours operation.

Operating Tips

The engine temperature can be varied about 100°F by simply rotating the adjusting knob on the top of the valve.

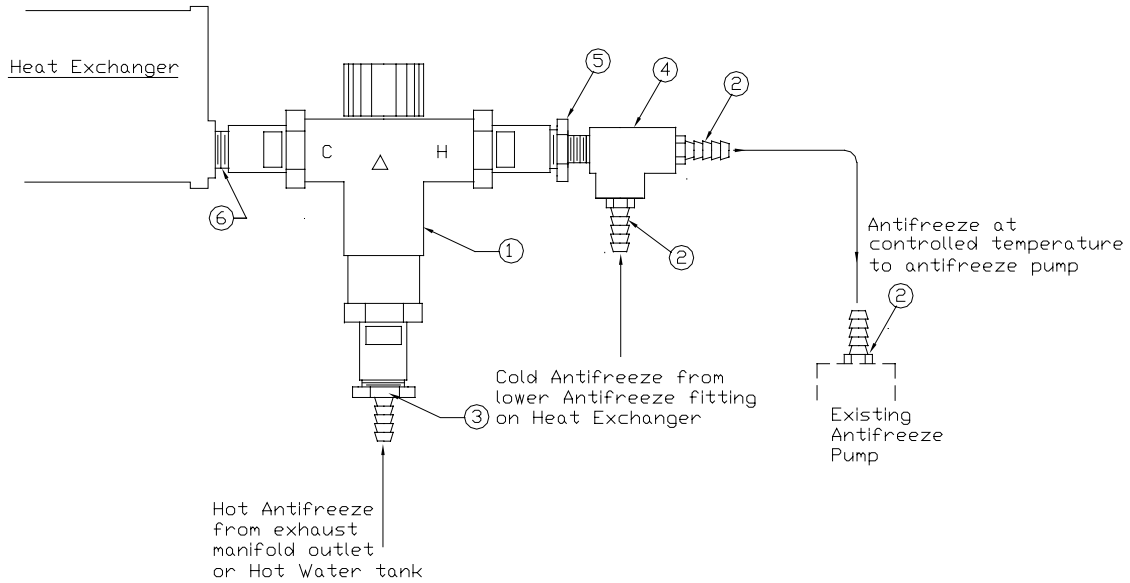
1. Do not turn the adjusting valve in the CW direction beyond number “1”. Doing so can put the valve internals in a closed overtravel position such that no flow at all passed through the valve.
2. The valve should be set to give an engine operating temperature of 180°F at cruise speed. This will yield acceptable operating temperatures at all speeds.
3. Reducing the temperature can be a real bonus in the summer time in that the engine temperature can be reduced during the last 30 minutes of motoring on a hot day, thus helping to reduce the residual heat in the engine box when the engine is shut down.

Parts List

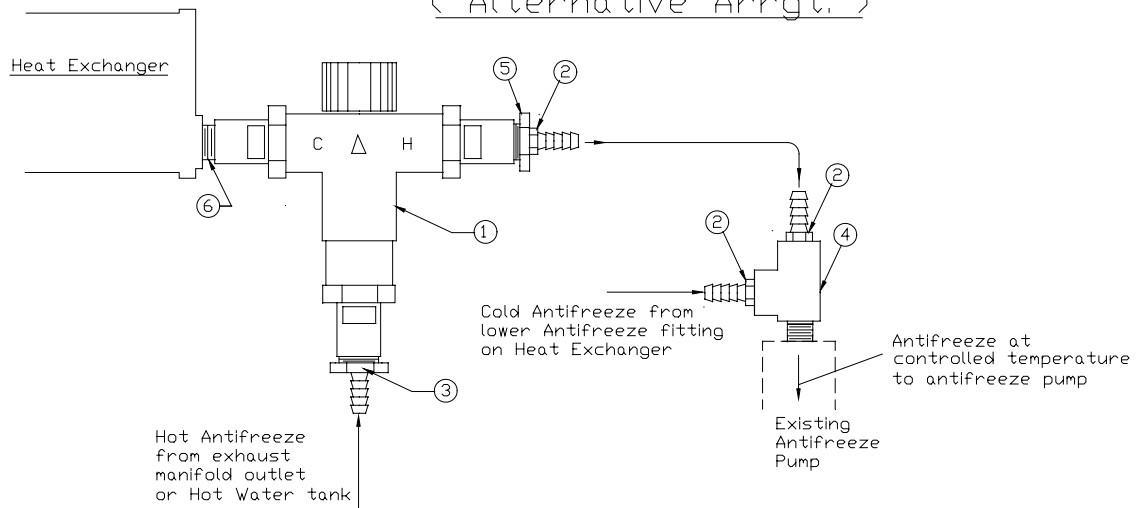
<u>Part No.</u>	<u>Quantity</u>	<u>Description</u>
1	1	Valve, Thermostatic Control
2	3	Hose Barb – to Male Pipe ½ H x 3/8 NPT
3	1	Hose Barb – to Male Pipe ½ H x ½ NPT
4	1	Street Tee – 3/8 NPT
5	1	Reducing Bushing – ½ NPT x 3/8 NPT
6	1	Close Nipple ½
7	1	Hex Head Pipe Plug - 3/8 NPT

8	2	Hose Clamps
9	1	Thermostat Housing Gasket

Thermostatic Control Valve Diagram



Thermostatic Control Valve Diagram (Alternative Arrgt.)



Yet a second alternative installation of the valve is to mount it on the Existing Antifreeze pump. The tee would remain as shown above except the upper hose barb fitting would be replaced with a 3/8 close nipple or hex nipple. Then the valve "H" connection would be attached to the nipple with a 3/8 x 1/2 reducing bushing in the valve. The "C" connection and the heat exchanger would then each receive a hose barb fitting.

Different configurations for mounting the Indigo Temperature Control Valve



TCV mounted in line with female NPT fitting on Heat Exchanger



TCV mounted 90 degrees to female NPT fitting on Heat Exchanger



TCV mounted 180 degrees to female NPT fitting on Heat Exchanger

Temporary Filter For Antifreeze Loop

With the installation of an Indigo Temperature Mixing Valve (TCV) on an Atomic 4 which has just been converted to Fresh Water Cooling (FWC), the potential exists for damage to occur to the internal parts of the TCV from rust and scale particles circulating with the antifreeze.

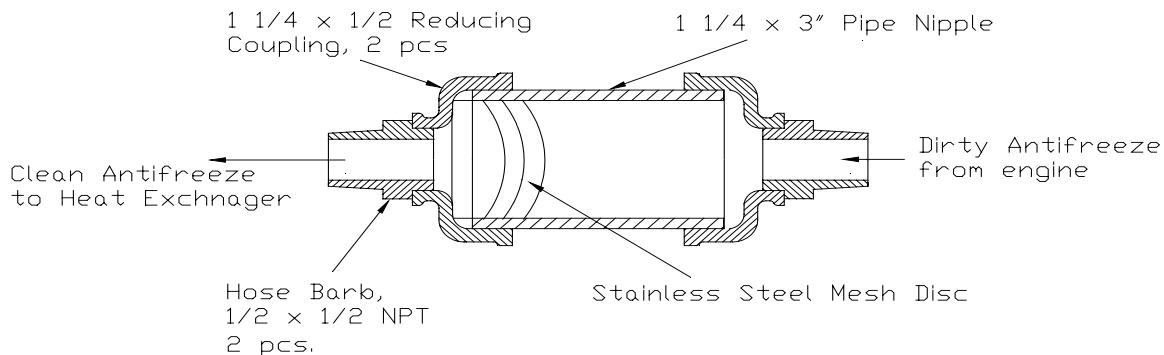
It is strongly recommended that a temporary antifreeze filter be installed for the first three (3) hours of operation. A very simple filter can be constructed from the following components:

- One 1 ¼" NPT x 3" steel pipe nipple
- Two 1 ¼" x ½" NPT" reducing couplings
- Two ½" NPT x ½" hose barb fittings
- Three stainless steel screen discs, coarse, medium, fine (included in kit)

Construction:

1. Push the coarse stainless steel screen disc into one of the nipple about 1". Push the medium stainless steel screen disc into the nipple about ½". Push the fine stainless steel screen disc into the nipple about ¼". The antifreeze should be allowed to flow through the discs going from coarse to fine.
2. Screw a reducing coupling on each end of the nipple, noting which end of the nipple has the finest screen disc in it.. Use Teflon tape on threads.
3. Screw a hose barb fitting in each reducing coupling. Use Teflon tape on threads.
4. Install filter assembly in the hose that runs from the exhaust manifold antifreeze discharge to the heat exchanger. Orient the filter assembly such that the fine screen disc end of the filter is away from the exhaust manifold.

The discs may become plugged fairly soon after starting the engine. Watch the engine temperature. If the temperature begins to rise such that the TCV does not control it, shut down, disassemble the filter and back flush the discs. After running the engine for about fifteen minutes, back flush the discs. After about an additional thirty minutes of operation, back flush again. Run for an additional 3 hours and check discs. System should be clean. If not, continue operating and flushing screens until clean.



Temporary Filter for
new FWC engine with
Temperature Mixing Valve