

MODEL C35

The Model C35 has many factory and field selectable options to allow its use in a wide variety of system applications. The following is a brief summary of control functions and temperature thresholds. Refer to the C35 brochure and/or Application and Installation Manual for more detailed information.

MODEL	OUTPUT 1			OUTPUT 2			OUTPUT 3
	ON/OFF DIFF (°F)	HI LIMIT (°F)	FREEZE (°F)	ON/OFF DIFF (°F)	HI LIMIT (°F)	FREEZE (°F)	POOL SWEEP
C35-1S-3T	4/1 OR 8/3*	65 - 104	40/45 RECIRC	_____	_____	_____	6 MINUTES
C35-1SN-3T	4/1 OR 8/3* 8/3 COOLING	65 - 104	40/45 RECIRC	_____	_____	_____	6 MINUTES
C35-1S-2S-3T	4/1 OR 8/3*	65 - 104	40/45 RECIRC	4/1 OR 8/3*	65 - 104	40/45 R RECIRC	6 MINUTES
C35-1S-2S(DHW) -3T	4/1 OR 8/3*	65 - 104	40/45 RECIRC	8/3 OR 20/5*	115 - 212	40/45 RECIRC	6 MINUTES
C35-1S-2F-3T	4/1 OR 8/3*	65 - 104	_____	_____	_____	44/70 DRAIN	6 MINUTES

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* Optional field programmable thresholds. See installation section of manual.

All of the above models can be thoroughly tested using the QUICK CHECK Solar Control Tester and the procedure that follows (with some minor exceptions that are identified in each pertinent section). The procedure is divided into the following parts:

PART	APPLIES TO
A. Basic Power Tests	All models
B. Functional Test "OUTPUT 1"	All models
C. Functional Test "OUTPUT 2"	Drain-down model C-35-1S-2F-3T
D. Functional Test "OUTPUT 2 & 3"	Nocturnal Cooling model C-35-1SN-3T
E. Functional Test "OUTPUT 2"	C35-1S-2S-3T & C35-1S-2S(DHW)-3T only

A. BASIC POWER TESTS (ALL MODELS)

1. Disconnect all sensors and verify proper sensors and wiring by using the procedure described on page 46 of this guide.
2. Connect **FREEZE JUMPER(S)** on output 1 (and output 2 if applicable) "FREEZE" sensor terminals.
3. **POWER** light: When AC power is applied to the C35, the "POWER" light should illuminate, if not:

*Check AC power connections:
Black & White leads--115VAC
Black & Red leads--230VAC

*Make sure the unused power lead is properly terminated and not contacting the bonding plate.

*Check the "XFMR" plug is completely engaged into the printed circuit card connector.

*If the circuit breaker "opens" then the wiring or pump is most likely shorted. Make sure the problem is corrected before re-applying power -- repeated current surges can permanently damage your C35.

*If all of the above are normal, then the C35 is defective.

4. **"MODE"** switch(es) **"ON"**: Check that the **"OUTPUT"** light(s) illuminate and that the valves and/or pumps (if installed) operate. If the **SWEEP ENABLE** indicator was previously lit, it should turn off; if it was previously off, it should remain off. If any problems are detected, check:

*If the indicator lights do not illuminate, the C35 is defective.

*That output modules are securely plugged into the correct connectors on the printed circuit board.

*Check the fuses on the LV and LV-2 output modules. If a fuse is blown, the cause should be determined (valve wiring short?), before a new module is installed.

IMPORTANT: Output module fuses should be replaced only by qualified service personnel and only with an exact replacement part (UL listed 5 AMP SLO-BLO type). Failure to use exact replacement part may cause inadequate overload protection for the C-35 internal power supply.

*If two motorized valves connected to a single LV module lose mechanical synchronization it is possible for the valve internal limit switches to cause continuous valve cycling. To prevent this, always use Model LV-2 output modules when TWO 3-way valves are connected to the same valve output.

*Check output wiring to valves and/or pumps.

5. "MODE" switch(es) "OUT": The "OUTPUT" lights should turn off and also the valves pumps should respond accordingly. If not, check:

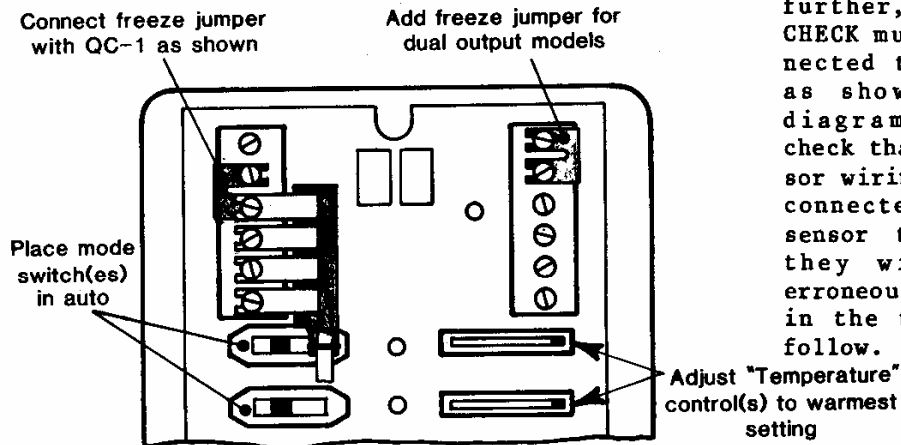
*Recirculate freeze protection can override mode switch "OFF" operation. If this is occurring, temporarily short the "FREEZE" sensor terminals--the output should turn off.

*If the "OUTPUT 1" light is off but the valve or pump loads do not respond accordingly, check that the output module(s) are properly installed, that the LV module fuses are not blown, and that all output wiring is correct.

*Otherwise, the C35 is defective.

B. FUNCTIONAL TESTS - OUTPUT 1 (ALL MODELS)

IMPORTANT: For the following tests set the C-35 Output 1 "TEMPERATURE" slide control to its WARMEST setting (full right most position) and "MODE" switch(es) to the "AUTO" position. Be sure to connect jumpers on "FREEZE" sensor terminals as shown in diagram below.



Before proceeding further, the QUICK CHECK must be connected to the C35 as shown in the diagram. Also, check that all sensor wiring is disconnected from the sensor terminals--they will cause erroneous results in the tests that follow.

1. DIFFERENTIAL TEMPERATURE TEST

FIGURE 3

Place the QUICK CHECK "TEST" switch in the "DIFFERENTIAL" position and the "MODEL" switch in the "C30/C35" position. Adjust the center knob (the position of the other knobs is irrelevant) and note the turn on and turn off points. The thresholds on standard C35's are 4 on/ 1 off. These may have been field modified to 8 on/3 off (by clipping resistors R113 and R116). If the control fails to operate or the thresholds have shifted significantly (more than $\pm 3^{\circ}\text{F}$) then the C35 is defective.

2. HIGH LIMIT TEST

Place the Quick Check "TEST" switch in the "HIGH LIMIT" position corresponding to the 80-110°F scale and verify that the C-35 Output 1 "TEMPERATURE" slide control is set to its warmest setting (full right hand position).

Adjust the QC-1 "HIGH LIMIT" knob (again, the position of the other two knobs is irrelevant) and note the point where OUTPUT 1 turns off. OUTPUT 1 should turn off at 104 ± 3 °F. If OUTPUT 1 fails to operate, or if the threshold has shifted significantly then the C-35 is defective.

3. HIGH LIMIT DRAIN TEST

This test applies only to Model C35-1S-2F-3T controls with jumper J3 installed on the printed circuit board. This jumper enables the drain on high limit function. Check that OUTPUT 2 (Drain valve output) turns on and off coincidentally with OUTPUT 1 during the high limit test above.

4. RECIRCULATE FREEZE PROTECTION

This test applies to all models except C35-1S-2F-3T which is covered in section C.

IMPORTANT: Place the QUICK CHECK "TEST" switch in the "FREEZE" position and "DIFFERENTIAL" knob to its full counter-clockwise ("0") position. The position of the "HIGH LIMIT" knob is irrelevant.

Adjust the "FREEZE" control (right knob) and note the points where "OUTPUT 1" turns on and off. Recirculation should start when the temperature falls to approximately 40 and stop when the temperature rises to 45. A major deviation ($\pm 5^\circ$) from these thresholds indicates a control problem.

C. DRAIN DOWN FREEZE PROTECTION (MODEL C35-1S-2F ONLY)

IMPORTANT: Place the QUICK CHECK "TEST" switch in the "FREEZE" position and "DIFFERENTIAL" knob to its full counter-clockwise ("0") position. The position of the "HIGH LIMIT" knob is irrelevant.

Adjust the "FREEZE" control (right knob) and note the points where OUTPUT 2 turns on and off. Drain-down (output 2 off) should occur at 44°F and refill should occur around 70°F. A major deviation ($\pm 5^\circ$ on drain, $\pm 10^\circ$ on refill) indicates a control problem.

All C35 drain-down controls have the internal logic that allows the differential to override the drain-down function. This allows solar collection to take place on cold but sunny days. The differential override can not be tested using the QC-1. With the QUICK CHECK disconnected, "open circuit" the "FREEZE" sensor terminals to simulate a freezing condition, and "short" the "COLLECTOR" sensor terminals to simulate solar collection. The "STORAGE" sensor terminals should be "open circuited".

Both OUTPUTS 1 and 2 should be on (solar collection overriding freeze protection). If the collector short is removed, both OUTPUTS 1 and 2 should turn off.

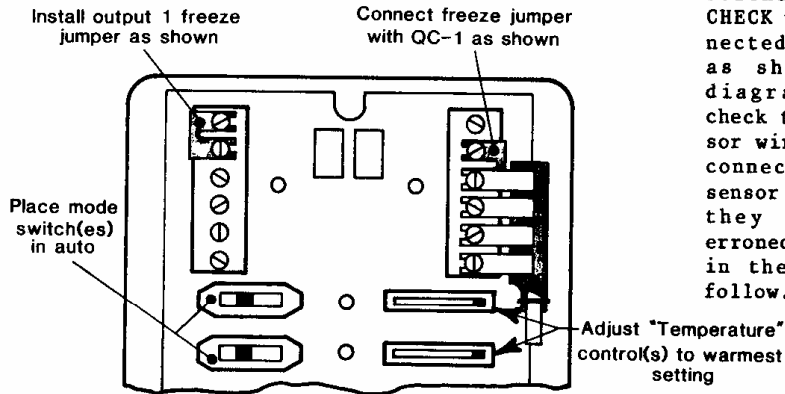
D. NOCTURNAL COOLING FUNCTIONAL TESTS, (MODEL C35-1SN-3T ONLY).

The C-35 Nocturnal Cooling function can NOT be tested using the QC-1. With the QC-1 disconnected, "short" the "STORAGE" and "FREEZE" sensor positions and leave the "COLLECTOR" terminals "open circuited". The "OUTPUT 1" and "NOCTURNAL COOLING" outputs should turn ON simultaneously.

This completes the test procedure for the C35-1S-3T, C35-1SN-3T and C35-1S-2F-3T models. For dual differential models, continue to part E.

E. FUNCTIONAL TESTS - OUTPUT 2 (DUAL DIFFERENTIAL MODELS)

IMPORTANT: For the following tests set the C-35 Output 2 "TEMPERATURE" slide control to its WARMEST setting (full right most position) and "MODE" switches to their "AUTO" position. Be sure to connect the jumpers on the "FREEZE" terminals as shown in the diagram below.



Before proceeding further, the QUICK CHECK must be connected to the C35 as shown in the diagram. Also, check that all sensor wiring is disconnected from the sensor terminals--they will cause erroneous results in the tests that follow.

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1. DIFFERENTIAL TEMPERATURE TEST (OUTPUT 2) FIGURE 4

Place the QUICK CHECK "TEST" switch in the "DIFFERENTIAL" position and the "MODEL" switch in the "C30/C35" position. Adjust the center knob (the position of the other knobs is irrelevant) and note the "OUTPUT 2" turn on and turn off points. The standard thresholds are 4 on/1 off on C35-1S-2S-3T and 8 on/3off on C35-1S-2S(DHW)-3T. These may have been field modified to 8/3 and 20/5 respectively by cutting printed circuit board resistors R213 & R216 (check the operation label inside the C35 cover). If the control fails to operate or the thresholds have shifted significantly (more than $\pm 3^{\circ}\text{F}$) then the C35 is defective.

2. COMBINATION SYSTEM LOGIC TEST

Jumpers J1 and J2 on the printed circuit card allow the C-35 to perform additional logic functions for combination systems (i.e. where one collector array is used to solar heat two different storage systems; pool/spa, pool/dhw).

If J1 is installed: Check that both OUTPUTS 1 and 2 turn on and off during the differential test described above.

If J2 is installed: Wait until the "SWEEP ENABLE" indicator illuminates (maximum 9 minute delay). When OUTPUT 2 turns on via the differential test described above, The "SWEEP ENABLE" should turn off and stay off (wait 10 minutes to verify).

3. HIGH LIMIT TEST (OUTPUT 2)

Place the Quick Check "TEST" switch in the "HIGH LIMIT" position corresponding to the 80-110°F scale (105-220 scale for C35-1S-2S(DHW)-3T) and verify that the C-35 Output 2 "TEMPERATURE" slide control is set to its warmest setting (full right hand position).

Adjust the QC-1 "HIGH LIMIT" knob (again, the position of the other two knobs is irrelevant) and note the point where OUTPUT 2 turns off. OUTPUT 2 should turn off at 104 ± 3 °F (215 ± 10 °F for C35-1S-2S(DHW)-3T). If OUTPUT 1 fails to operate, or if the threshold has shifted significantly then the C-35 is defective.

4. RECIRCULATE FREEZE PROTECTION (OUTPUT 2)

IMPORTANT: Place the QUICK CHECK "TEST" switch in the "FREEZE" position and "DIFFERENTIAL" knob to its full counter-clockwise ("0") position. The position of the "HIGH LIMIT" knob is irrelevant.

Adjust the "FREEZE" control (right knob) and note the points where "OUTPUT 2" turns on and off. Recirculation should start when the temperature falls to approximately 40 and stop when the temperature rises to 45. A major deviation ($\pm 5^\circ$) from these thresholds indicates a control problem.

If you still suspect a problem exists but no problems were identified after completing the above procedure (Did you check sensors per step A1?) then contact either the wholesaler from whom you purchased the control, the nearest IE Representative, or the IE factory for additional troubleshooting assistance.