


# Chapter 7

## Troubleshooting

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This chapter explains equipment trouble and how to remedy it. When trouble is detected by one of the self-check features, the trouble is displayed on the instrumentation panel display and a trouble buzzer is sounded. For trouble undetected in self-checks and misoperation which can be easily mistaken as trouble, see "7.2 Before You Call for Service". This chapter also includes trouble information for options.

# 7.1 Alarm and Action

 **DANGER**

- **ELECTRIC SHOCK!** Before working on the power circuits on the primary side of the main power switch (breaker), shut OFF primary power supply and check the line is dead. Also, take measures to prevent accidental charging.  
Working with primary power supply ON runs the risk of electric shock.
- **Shut OFF power from the main power switch (breaker) BEFORE** detaching the electric parts compartment panel or the mechanical parts compartment panel.

The TSA Series is equipped with a buzzer that sounds when trouble occurs as well as self-check features which display the trouble on the instrumentation panel display. Displayed alarm codes and their content are given in the alarm table on the following pages. Remedy trouble as described therein.

For trouble which is undetected in self-checks, see "7.2 Before You Call for Service". If the trouble cannot be remedied after taking the prescribed action, contact the place of purchase or ESPEC CORP.




## When an Alarm Occurs

The chamber will be in one of the below states when an alarm occurs.

- Procedure
1.

When trouble occurs with the chamber or controller, the Alarm screen appears on the display.



STOP



9/13 (SAT)  
19:58:46

Alarm Report

No.	Type	Alarm	When Occurred
10	ALM	COMMUNICATION ERROR-1	9/12 (FRI)14:20:19
9	ALM	BURN-OUT AI-CHO	9/13 (SAT)16:37:25
8	ALM	BURN-OUT AI-CHI	9/13 (SAT)17:20:58
7	ERR	TEST AREA DOOR OPEN	9/13 (SAT)18:51:27
6	ALM	HI STAGE REFRIG. TEMP.	9/13 (SAT)19:03:14
5	ALM	HI STAGE REFRIG. OVERCURRENT	9/13 (SAT)19:07:13
4	ALM	H-TEMP. BOX CIRCULATOR 1 FAILURE	9/13 (SAT)19:14:05
3	ALM	H-TEMP. BOX CIRCULATOR 2 FAILURE	9/13 (SAT)19:20:55
2	ALM	H-TEMP. BOX ABS. HIGH LIMIT TEMP.	9/13 (SAT)19:33:18
1	ALM	COMMUNICATION ERROR-2	9/13 (SAT)19:45:05




No.

Prev. Screen

2. Press an entry under **Alarm Name**.

A screen will appear with information on the Contents, Cause and Action to be taken to remedy the trouble.

<b>STOP</b>		<b>L</b>		9/17 (WED) 11:35:20
ITEM: Burn-Out Ai-CH0			<b>BACK</b>	
<Contents>	The room temperature compensation input to the controller was disconnected. The chamber has stopped. Display shows [---] as process values.			
<Cause>	The sensor is loosely connected to the RTD terminal on the SCP-220 controller board or RTD (100 ohm) is an open or short circuit on the SCP-220 board.			
<Action>	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.			

3. Try correcting the trouble as explained in the troubleshooting information. However, if instructed to “call for service” or if the action you take fails to remedy the problem, contact the place of purchase or ESPEC CORP.

## Alarm Table

Table 7.1 Alarm table

Displayed alarm	Contents	Cause	Action
PHASE REVERSED	Reverse or misaligned phase was detected in primary (3-phase) power supply. The chamber has stopped.	Primary power supply is not correctly connected to the chamber.	Set the power key in the OFF position followed by main power switch (leakage breaker). Check power supply phase and connection. Repair as necessary and resume testing. If the same alarm occurs again, call for service.
HI STAGE REFRIG. TEMP.	The high stage refrigerator temperature switch or motor protector tripped. The chamber has stopped.	The compressor/motor may have overheated. Compressor surface temperature may have dropped.	Check ambient/water temperature are within allowable ranges, there is sufficient space above/behind the chamber and power supply voltage is not fluctuating. Repair as necessary and resume testing. If the same alarm occurs again, call for service.
LOW STAGE REFRIG. TEMP.	The low stage refrigerator temperature switch or motor protector tripped. The chamber has stopped.	The compressor/motor may have overheated. Compressor surface temperature may have dropped.	Check ambient/water temperature are within allowable ranges, there is sufficient space above/behind the chamber and frost does not build up on the evaporator. Repair as necessary and resume testing. If the same alarm occurs again, call for service.
HI STAGE REFRIG. DISCHARGE TEMP.	A temperature outside of the specified range was detected on the temperature controller channel (Ai-10ch) that monitors the high stage compressor discharge pipe temperature. The chamber has stopped.	The high stage compressor discharge pipe temperature is higher than specified. Possible causes include compressor trouble, refrigeration circuit trouble, and refrigerant leak.	Check ambient/water temperature are within allowable ranges, there is sufficient space above/behind the chamber and power supply voltage is not fluctuating. Repair as necessary and resume testing. If the same alarm occurs again, call for service.
LOW STAGE REFRIG. DISCHARGE TEMP.	A temperature outside of the specified range was detected on the temperature controller channel (Ai-11ch) that monitors the low stage compressor discharge pipe temperature. The chamber has stopped.	The low stage compressor discharge pipe temperature is higher than specified. Possible causes include compressor trouble, refrigeration circuit trouble, and refrigerant leak.	Check ambient/water temperature are within allowable ranges, there is sufficient space above/behind the chamber and power supply voltage is not fluctuating. Repair as necessary and resume testing. If the same alarm occurs again, call for service.
H-TEMP. BOX CIRCULATOR 1 FAILURE	The thermal relay of high temperature chamber circulator 1 tripped. The chamber has stopped.	The air circulator may be overloaded or the motor locked up.	Set the power key in the OFF position and leave chamber OFF awhile. Cool the air circulator and resume testing. If the same alarm occurs again, call for service.
H-TEMP. BOX CIRCULATOR 2 FAILURE	The thermal relay of high temperature chamber circulator 2 tripped. The chamber has stopped.	The air circulator may be overloaded or the motor locked up.	Set the power key in the OFF position and leave chamber OFF awhile. Cool the air circulator and resume testing. If the same alarm occurs again, call for service.
L-TEMP. BOX CIRCULATOR 1 FAILURE	The thermal relay of low temperature chamber circulator 1 tripped. The chamber has stopped.	The air circulator may be overloaded or the motor locked up.	Frost buildup may have caused overload. Set the power key in the OFF position and leave chamber OFF awhile. Defrost chamber and resume testing. If the same alarm occurs again, call for service.
L-TEMP. BOX CIRCULATOR 2 FAILURE	The thermal relay of low temperature chamber circulator 2 tripped. The chamber has stopped.	The air circulator may be overloaded or the motor locked up.	Frost buildup may have caused overload. Set the power key in the OFF position and leave chamber OFF awhile. Defrost chamber and resume testing. If the same alarm occurs again, call for service.

Displayed alarm	Contents	Cause	Action
OVERHEAT PROTECTOR TRIP	The (operating panel) overheat protector has activated. The chamber has stopped.	Test area temperature rose above the overheat setting.	Check to assure the setting of the overheat protector is set at least 10°C higher than the setpoint high temperature. If overshoot is greater than setting, lower the preheat temperature. Set the power key in the OFF position and resume testing. If the same alarm occurs again, call for service.
OVERCOOL PROTECTOR TRIP	The (operating panel) overcool protector has activated. The chamber has stopped.	Test area temperature dropped below the overcool setting.	Check to assure the setting of the overcool protector is set at least 10°C lower than setpoint low temperature. If undershoot is greater than setting, raise the precool temperature. Set the power key in the OFF position and resume testing. If the same alarm occurs again, call for service.
AMB TEMP.CIRCULAT OR FAILURE	The thermal relay of the ambinet temperature air circulator tripped. The chamber has stopped.	The air circulator may be overloaded or the motor locked up.	Set the power key in the OFF position and resume testing. If the same alarm occurs again, call for service.
TEST AREA DOOR OPEN	Test area door switch has tripped. Testing has been suspended.	The door was opened during chamber operation.	Close door securely and press the CLR key on the ALARM screen to clear the alarm. Then, press RESUME on Operation Mode Selection screen to resume testing.
TEST AREA DOOR OPEN	Test area door switch has tripped. Testing has not started.	The door was opened during chamber operation.	Close door securely and press the CLR key on the ALARM screen to clear the alarm. Then, press START TEST on Operation Mode Selection screen to start testing.
TEST AREA DOOR OPEN	Test area door switch has tripped. Dry mode has not started.	The door was opened during chamber operation.	Close door securely and press the CLR key on the ALARM screen to clear the alarm. Then, press DRY MODE on Operation Mode Selection screen to resume testing.
LOW AIR SUPPLY PRESSURE	Air supply pressure has dropped below the specified level. The chamber is still running.	Air supply pressure may be low due to long period of disuse or air supply may be off.	Check air supply. If an air compressor is built-in, check to see if it is running properly and pressure rises. After appropriate treatment, press the CLR key to clear the alarm. Then press the START TEST on Operation Mode Selection screen to start testing.
AIR SUPPLY CIRCUIT DOWN	Air supply pressure has dropped below the specified level without recovering. The chamber has stopped.	Air supply is OFF or supply pressure is low.	Check air supply. If an air compressor is built-in, check to see if it is running properly and pressure rises. If everything is OK, there may be an air leak. Call for service.
WATER SUSPENSION RELAY TRIP	The cooling water was not supplied in the water-cooled specification. The chamber has stopped.	Cooling water of refrigerator is not supplied.	Set the power key in the OFF position and check for cooling water supply to the refrigerator. Repair as necessary and resume testing. If the same alarm occurs again, call for service.
HI STAGE REFRIG. PRESSURE	The high stage refrigerator high/low pressure switch tripped. The chamber has stopped.	Condenser pressure may be high or vapor pressure low.	Check ambient/water temperature are within allowable ranges, the condenser or strainer are not clogged, and there is sufficient space above/behind the chamber. If the problem is elsewhere, set the power key in the OFF position and call for service.

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Displayed alarm	Contents	Cause	Action
LOW STAGE REFRIG. PRESSURE	The low stage refrigerator high/low pressure switch tripped. The chamber has stopped.	Condenser pressure may be high or vapor pressure low.	Check ambient/water temperature are within allowable ranges, the condenser or strainer are not clogged, and there is sufficient space above/behind the chamber. If the problem is elsewhere, set the power key in the OFF position and call for service.
REFRIG. CONDENSER FAN FAILURE	Condenser fan thermal relay tripped because of fan overheating. The chamber has stopped.	The fan has overheated.	Set the power key in the OFF position and check for condenser clogging by dust. Repair as necessary and resume testing. If the same alarm occurs again, call for service.
HI STAGE REFRIG. OVERCURRENT	The thermal relay of high stage refrigerator tripped. The chamber has stopped.	The compressor/motor may be overloaded or locked up.	Check ambient temperature is within allowable ranges, there is sufficient space above/behind the chamber and power supply voltage is not fluctuating. Repair as necessary and resume testing. If the same alarm occurs again, call for service.
LOW STAGE REFRIG. OVERCURRENT	The thermal relay of low stage refrigerator tripped. The chamber has stopped.	The compressor/motor may be overloaded or locked up.	Check ambient temperature is within allowable ranges, there is sufficient space above/behind the chamber and power supply voltage is not fluctuating. Repair as necessary and resume testing. If the same alarm occurs again, call for service.
H-TEMP. BOX ABS. HIGH LIMIT TEMP.	The temperature inside the h-temp. box has risen above the absolute high limit. The chamber has stopped.	Possible causes include lost air flow due to excess of specimens and inadequate damper operation due to low air pressure.	Check specimen quantity and air pressure. Resume testing. If the same alarm occurs again, call for service.
L-TEMP. BOX ABS. HIGH LIMIT TEMP.	The temperature inside the l-temp. box has risen above the absolute high limit. The chamber has stopped.	Possible causes include lost air flow due to frost buildup and inadequate damper operation due to low air pressure.	Check air pressure. Stop test for a while and defrost the chamber. Resume testing. If the same alarm occurs again, call for service.
L-TEMP. BOX ABS. LOW LIMIT TEMP	The temperature inside the l-temp. box has dropped below the absolute low limit. The chamber has stopped.	Possible causes include lost air flow due to excess of specimens and large undershoot due to low precool target.	Check specimen quantity and precooling target. To prioritize recovery time over amount of undershoot, change overcool protection alarm setting in test pattern.
OVERHEATING (TEST AREA)	Test area temperature rose above overheat protection alarm. The chamber has stopped.	Possible causes include lost air flow due to excess of specimens and inadequate damper operation due to low air pressure.	Check specimen quantity and air pressure. Resume testing. If the same alarm occurs again, call for service.
OVERCOOLING (TEST AREA)	Test area temperature dropped below overcool protection alarm. The chamber has stopped.	Possible causes include lost air flow due to excess of specimens and large undershoot due to low precool target.	Check specimen quantity and precooling target. To prioritize recovery time over amount of undershoot, change overcool protection alarm setting in test pattern.
CIRCUIT BREAKER TRIP	The circuit breaker has tripped. The chamber has stopped.	Possible causes include errors in refrigerator, air circulator and condenser fan (air-cooled spec.).	Set the power key in the OFF position and leave chamber OFF awhile. Resume testing. If the same alarm occurs again, call for service.
FROSTED OVER	The evaporator is frosted over. The chamber has stopped to protect the refrigeration system.	Excessive frost buildup is preventing proper refrigeration operation. Defrost Cycle is not properly set or precooling lasts too long.	Manually defrost the chamber, reset the number of Defrost Cycle, or select the auto defrost mode.

Displayed alarm	Contents	Cause	Action
PATTERN SETTING TIME INVALID	Invalid time setting was detected in the data of Pattern operation that was going to start. The execution of Pattern operation has stopped.	Invalid time setting is included in the data of Pattern operation.	Check the time setting of Pattern operation data. The alarm can be cleared by pressing the CLR key on the ALARM screen to clear the alarm. If the same alarm occurs, call for service.
OUT OF ALLOWABLE OPE. RANGE	Temperature setting value outside of allowable operating range was detected in the operating data to be started. The chamber has stopped.	Temperature setting value outside of allowable operating range is included in the operating data.	Set the power key in the OFF position and call for service.
BURN-OUT AI-CH0	The room temperature compensation input to the controller was disconnected. The chamber has stopped. Display shows [---] as process values.	The sensor is loosely connected to the RTD terminal on the SCP-220 controller board or RTD (100 ohm) is an open or short circuit on the SCP-220 board.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH1	The test area upstream input to the controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the TD terminal on the SCP-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH2	The test area downstream input to the controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the TD terminal on the SCP-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH3	The specimen temperature input to the controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the Ai-3 terminal on the SCP-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH5	The H-temp. box input to the controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the Ai-5 terminal on the SCP-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH6	The L-temp. box input to the controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the Ai-6 terminal on the SCP-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH7	Refrigerator measurement channel (Ai-7ch) of controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the Ai-7 terminal on the SCP-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH8	Refrigerator measurement channel (Ai-8ch) of controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the Ai-8 terminal on the SCP-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH9	Refrigerator measurement channel (Ai-9ch) of controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the Ai-9 terminal on the SCP-221 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.

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Displayed alarm	Contents	Cause	Action
BURN-OUT AI-CH10	Refrigerator measurement channel (Ai-10ch) of controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the Ai-10 terminal on the SCP-221 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH11	Refrigerator measurement channel (Ai-11ch) of controller was disconnected. The chamber has stopped.	The sensor is loosely connected to the Ai-11 terminal on the SCP-221 controller board or there is an open circuit in the connected thermocouple.	Set the power key in the OFF and ON positions and resume testing. If the same alarm occurs again, call for service.
COMMUNICATIO N ERROR 1	The instrumentation detected communication trouble between the CPU board and display board. The chamber has stopped.	Communication error between the CPU board and display board.	Set the main power switch OFF and ON to resume testing. If the same alarm occurs again, call for service.
COMMUNICATIO N ERROR 2	The instrumentation detected communication trouble between the display board and temperature controlling unit. The chamber has stopped.	Communication error between the display board and temperature controlling unit.	Set the main power switch OFF and ON to resume testing. If the same alarm occurs again, call for service.
STT EXPOSURE TIME (WARNING)	With STT ON, specimen temperature did not reach the set point within the forced step shift time, so the process has shifted to the next exposure.	Too many specimens are loaded resulting in longer time to reach the set point or exposure shift time is set too short.	Check the specimens and the set point. Press CLR on the ALARM screen to clear the alarm.
SPECIMEN TEMP. SENSOR 1 ERROR	Disconnection of the specimen temperature input to the controller was detected. The chamber is continuing the test using the remaining specimen temperature input.	The sensor is loosely connected to the Ai-3 terminal on the SCP-220 (ANALOG) controller, there is an open circuit in the connected thermocouple, or the specimen temperature input connector is not connected to the terminal correctly.	After stopping operation, check connection of the specimen temperature measuring thermocouple and the specimen temperature input connector. Press the POWER key to turn power to the instrumentation OFF and resume testing. If the same alarm occurs again, call for service.
SPECIMEN TEMP. SENSOR 2 ERROR	Disconnection of the specimen temperature input to the controller was detected. The chamber is continuing the test using the remaining specimen temperature input.	The sensor is loosely connected to the Ai-4 terminal on the SCP-220 (ANALOG) controller, there is an open circuit in the connected thermocouple, or the specimen temperature input connector is not connected to the terminal correctly.	After stopping operation, check connection of the specimen temperature measuring thermocouple and the specimen temperature input connector. Press the POWER key to turn power to the instrumentation OFF and resume testing. If the same alarm occurs again, call for service.
SPECIMEN TEMP. SENSOR ERROR	Disconnection of all specimen temperature inputs to the controllers was detected. The chamber is continuing the test.	The specimen temperature input connectors are not connected to the terminals correctly.	Check connection of the specimen temperature input connector and the specimen temperature sensor setting of 'Sensor Offset / Setting.' Press the POWER key to clear the alarm and resume testing. If the same alarm occurs again, call for service.
SPECIMEN OVERHEATING	The specimen overheat alarm tripped. The chamber has stopped.	Possible causes include lost air flow due to an excess of specimens, overshoot due to a high preheat temperature, and inadequate damper operation due to low air pressure.	Check specimen quantity, preheat temperature and air pressure. If the same alarm occurs again, call for service.



Displayed alarm	Contents	Cause	Action
SPECIMEN OVERCOOLING	The specimen overcool alarm tripped. The chamber has stopped.	Possible causes include lost air flow due to an excess of specimens, overshoot due to a high precool temperature, and inadequate damper operation due to low air pressure.	Check specimen quantity, precool temperature and air pressure. If the same alarm occurs again, call for service.
SPECIMEN TEMP. SENSOR ERROR	All specimen temperature inputs used for the test were disconnected. Testing has stopped.	The specimen temperature input connector is not connected to the terminal correctly or there is no valid specimen temperature sensor.	Check connection of the specimen temperature input connector and the specimen temperature sensor setting of 'Sensor Offset / Setting.' Press the POWER key to turn power to the instrumentation OFF and resume testing. If the same alarm occurs again, call for service.
SPECIMEN TEMP. SENSOR OFF	All specimen temperature sensors are set to OFF. Testing has stopped.	All specimen temperature sensors are set to OFF.	Check the specimen temperature sensor setting of 'Sensor Offset / Setting.' Press the POWER key to turn power to the instrumentation OFF and resume testing. If the same alarm occurs again, call for service.
SPECIMEN TEMP. SENSOR ERROR	Disconnection of all specimen temperature inputs to the controllers was detected. The chamber is continuing the test.	The specimen temperature input connectors are not connected to the terminals correctly.	Check connection of the specimen temperature input connectors. Press CLR on the ALARM screen to clear the alarm. If the same alarm occurs again, call for service.
SPECIMEN TEMP. SENSOR OFF	All specimen temperature sensors are set to OFF. The chamber is continuing the test.	All specimen temperature sensors are set to OFF.	Check the specimen temperature sensor setting of 'Sensor Offset / Setting.' Press the CLR on the ALARM screen to clear the alarm. If the same alarm occurs again, call for service.
Shortage of cooling water	Cooling capacity (condenser) is trouble. Continuous operation may cause damage on the chamber.	Shortage of cooling water or water temperature of cooling water is too high.	Remedial action: Press the POWER key to turn off. clean the strainer to have enough water supply. If the same alarm occurs again after remedial action, call for service.