Chapter 7
Troubleshooting

This chapter explains equipment troubles and how to fix it.
When a trouble is detected by one of the self-check features, the trouble is displayed on the instrumentation monitor and a trouble buzzer is sounded. For trouble undetected in self-checks and misoperations (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

The TSA Series is equipped with a buzzer that sounds when a trouble occurs, while the self-check feature displays the trouble on the instrumentation monitor. Displayed alarm codes and their description are given in the alarm table on the following pages. Remedy to trouble as described herein.
For troubles undetected in self-checks, see "7.2 Before you call for service". If the trouble cannot be fixed after taking the prescribed action, contact the place of purchase or ESPEC CORP.

⚠ WARNING

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.

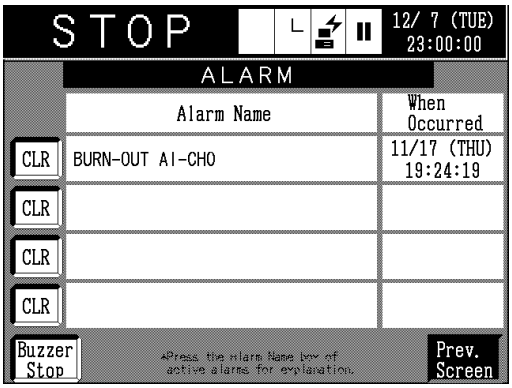
Shut OFF power from the main power switch (breaker) BEFORE detaching the electrical compartment panel or the machinery compartment panel.

7.1.1 When an alarm occurs

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

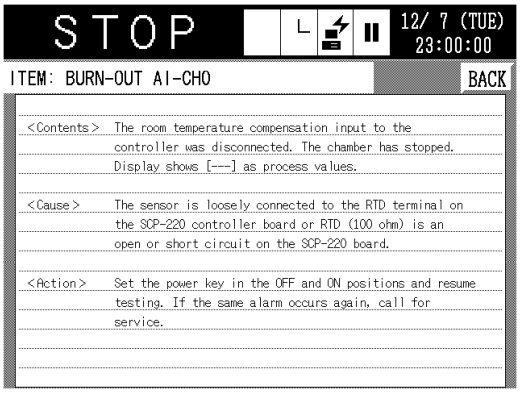
Procedure

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



2. Press an entry under [Alarm Name].

   A screen will appear with information on the contents, cause and action to be taken to fix the trouble.



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 to the problem, contact the place of purchase or ESPEC CORP.

7.1.2 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 OFF, then 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.
H-TEMP. BOX CIRCULATOR 1 FAILURE	The thermal relay of hot chamber circulator 1 tripped. The chamber has stopped.	The air circulator may be overloaded or the motor locked up.	Set the power key OFF 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 hot chamber circulator 2 tripped. The chamber has stopped.	The air circulator may be overloaded or the motor locked up.	Set the power key OFF 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 or inverter alarm of cold 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 main power switch (leakage breaker) OFF and leave chamber OFF awhile. Defrost the chamber. If the same alarm occurs again, call for service.
L-TEMP. BOX CIRCULATOR 2 FAILURE	The thermal relay of cold chamber circulator 2 tripped. The chamber has stopped.	The air circulator may be overloaded or the motor locked up.	
OVERHEAT PROTECTOR TRIP	The (operation panel) overheat protector has activated. The chamber has stopped.	Test area temperature rose above the overheat setting.	Ensure the setting value of the overheat protector is at least 10°C higher than the high temperature exposure value. If the overshoot is large, set the preheat temperature lower. Then, set the power key OFF and resume operations. If the same alarm occurs again, call for service.
	The overheat protector for hot chamber has activated. The chamber has stopped.	Hot chamber area temperature rose above the overheat setting.	Turn the main power switch OFF, and stop the chamber operation for a while, and turn the main power switch ON. Turn the power key ON. If the same alarm occurs again, call for service.
	The thermal switch for cold chamber has activated. The chamber has stopped.	Cold chamber area temperature exceeded the operation valve.	

Displayed alarm	Contents	Cause	Action
OVERCOOL PROTECTOR TRIP	The (operation panel) overcool protector has activated. The chamber has stopped.	Test area temperature dropped below the overcool setting.	Ensure the setting of the overcool protector is set at least 10°C lower than low temperature set point. If the undershoot is greater than setting, raise the precool temperature. Set the power key OFF and resume testing. If the same alarm occurs again, call for service.
AMBIENT TEMPERATURE CIRCULATOR FAILURE	The thermal relay of ambient temperature air circulator runs. The chamber has stopped.	The air circulator may be overloaded or the motor locked up.	Set the power key OFF and resume operations. If the same alarm occurs again, call for service.
TEST AREA DOOR OPEN	Door switch has tripped. Testing has been suspended.	Start or restart testing soon after closing the door or 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	Testing cannot start because the test area door switch has tripped.	Start or restart testing soon after closing the door or the test area door is opened.	Close the door and press the CLR key on the ALARM screen to clear the alarm. Then, press START key.
TEST AREA DOOR OPEN	A dry cycle cannot run because the test area door switch has tripped.		Close the door and press the CLR key on the ALARM screen to clear the alarm. Then, press DRY CYCLE key.
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. In case of built-in air compressor, check 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. In case of built-in air compressor, check it is running properly and pressure rises. If everything is OK, there may be an air leak. Call for service.
WATER SUSPENSION RELAY TRIP	(Water-cooled type only) The chamber has stopped because the cooling water pressure has been lower than preferred value	Cooling water of refrigerator is not supplied.	Set the power key OFF and check for cooling water supply to the refrigerator. 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 hot chamber 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.

Displayed alarm	Contents	Cause	Action
L-TEMP. BOX ABS. HIGH LIMIT TEMP.	The temperature inside the cold chamber 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 cold chamber has dropped below the absolute low limit. The chamber has stopped.	Possible causes include lost air flow due to excess of specimens, inadequate damper operation due to low air pressure and large undershoot due to low precool target.	Check air pressure. Stop test for a while and defrost the chamber. Resume testing. 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.
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 after setting the POWER key OFF and stopping the chamber for a while. Reset the number of Defrost Cycle, or select the auto defrost mode.
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 open / short circuited.	Set the power key OFF and ON; 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 OFF and ON; 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 TW terminal on the SCP-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key OFF and ON; 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 OFF and ON; resume testing. If the same alarm occurs again, call for service.

Displayed alarm	Contents	Cause	Action
BURN-OUT AI-CH5	The hot chamber 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 OFF and ON, resume testing. If the same alarm occurs again, call for service.
BURN-OUT AI-CH6	The cold chamber 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 OFF and ON; 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 OFF and ON; 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 OFF and ON; 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-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key OFF and ON; resume testing. If the same alarm occurs again, call for service.
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-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key OFF and ON; 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-220 controller board or there is an open circuit in the connected thermocouple.	Set the power key OFF and ON; 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; 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; resume testing. If the same alarm occurs again, call for service.

Displayed alarm	Contents	Cause	Action
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.
SPECIMEN OVERCOOLING	The specimen overcool alarm tripped. The chamber has stopped.	Possible causes include lost air flow due to an excess of specimens, undershoot due to a low 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.

Displayed alarm	Contents	Cause	Action
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 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.
HI STAGE REFRIG. DISCHARGE TEMP.	The high stage refrigerator discharge pipe temperature switch tripped. 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 temperature, water temperature and supply pressure, and power supply voltage 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.	The low stage refrigerator discharge pipe temperature switch tripped. 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 temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges, there is sufficient space above/behind the chamber and power supply voltage is not fluctuating. Set the power key OFF and repair as necessary and resume testing. If the same alarm occurs again, call for service.
HI STAGE REFRIG. HIGH PRESSURE HIGH PRESSURE ERR	The high stage refrigerator high/low pressure switch tripped. The chamber has stopped.	The high stage refrigerator condenser pressure exceeded the allowed level.	Check ambient temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges. Check also the condenser, strainer and cooling pipe for clogging. Also, check there is sufficient clearance above and behind the chamber, and voltage is not fluctuating. If the problem is elsewhere, set the power key OFF and call for service.

Displayed alarm	Contents	Cause	Action
LOW STAGE REFRIG. HIGH PRESSURE HIGH PRESSURE ERR	The low stage refrigerator high pressure switch tripped. The chamber has stopped.	The low stage refrigerator condenser pressure exceeded the allowed level.	Check ambient temperature, water temperature and supply pressure, and power supply voltage 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 OFF and call for service.
HIGH STAGE REFRIG. LOW PRESSURE LOW PRESSURE ERR	The high stage refrigerator low pressure switch tripped. The chamber has stopped.	The high stage refrigerator evaporator pressure exceeded the allowed level.	Check ambient temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges. If the problem is elsewhere, set the power key OFF and call for service.
LOW STAGE REFRIG. LOW PRESSURE LOW PRESSURE ERR	The low stage refrigerator low pressure switch tripped. The chamber has stopped.	The low stage refrigerator evaporator pressure exceeded the allowed level.	Check ambient temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges. If the problem is elsewhere, set the power key OFF and call for service.
HIGH STAGE REFRIG. OVERLOAD	The high stage refrigerator circuit breaker, temperature switch or motor protector tripped. The chamber has stopped.	The compressor/motor may be overloaded or locked up.	Check ambient temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges. Check also there is sufficient clearance above and behind the chamber, and voltage is not fluctuating. If no issues are detected, set the POWER key OFF and leave the chamber OFF awhile. If the same alarm occurs again, call for service.
LOW STAGE REFRIG. LIQUID BACK	The low stage refrigerator liquid backflow detection temperature switch tripped. The chamber has stopped.	The low stage compressor surface temperature exceeded the specified level of the temperature switch.	Check ambient temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges. If no issues are detected, set the power key OFF and defrost the chamber and resume testing. If the same alarm occurs again, call for service.
BROWER BREAKER TRIP	The air circulator circuit breaker tripped. The chamber has stopped.	Air circulator trouble may have occurred.	After setting the POWER key OFF, reset circuit breaker and leave the chamber OFF awhile. If the same alarm occurs again, call for service.
HEATER BREAKER TRIP	The heater circuit breaker tripped. The chamber has stopped.	Heater trouble may have occurred.	After setting the POWER key OFF, reset circuit breaker and leave the chamber OFF awhile. If the same alarm occurs again, call for service.
CIRCUIT BREAKER TRIP	The circuit breaker has tripped. The chamber has stopped.	Possible causes include errors in overheat/overcool detector or refrigerator solenoid valve.	After setting the POWER key OFF, reset circuit breaker and leave chamber OFF awhile. Resume testing. If the same alarm occurs again, call for service.

Displayed alarm	Contents	Cause	Action
HI STAGE REFRIG. OVERLOAD	The low stage refrigerator circuit breaker, temperature switch or motor protector tripped. The chamber has stopped.	The compressor/motor may be overloaded or locked up.	Check ambient temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges. Check also there is sufficient clearance above and behind the chamber, and voltage is not fluctuating. If no issues are detected, set the POWER key OFF and leave the chamber OFF awhile. If the same alarm occurs again, call for service.
LOW STAGE REFRIG. 2 DISCHARGE TEMP.	The low stage refrigerator 2 discharge pipe temperature switch tripped. The chamber has stopped.	The low stage compressor 2 discharge pipe temperature is higher than specified. Possible causes include compressor trouble, refrigeration circuit trouble, and refrigerant leak.	Check ambient temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges. Then check that there is sufficient space above/behind the chamber and power supply voltage is not fluctuating. Set the power key OFF and repair as necessary and resume testing. If the same alarm occurs again, call for service.
LOW STAGE REFRIG. 2 OVERLOAD	The low stage refrigerator 2 circuit breaker, temperature switch or motor protector tripped. The chamber has stopped.	The compressor/motor may be overloaded or locked up.	Check ambient temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges. Check also there is sufficient clearance above and behind the chamber, and voltage is not fluctuating. If no issues are detected, set the POWER key OFF and leave the chamber OFF awhile. If the same alarm occurs again, call for service.
LOW STAGE REFRIG. 2 LIQUID BACK	The low stage refrigerator 2 liquid backflow detection temperature switch tripped. The chamber has stopped.	The low stage compressor 2 surface temperature exceeded the specified level of the temperature switch.	Check ambient temperature, water temperature and supply pressure, and power supply voltage are within allowable ranges. If no issues are detected, set the power key OFF and repair defrost the chamber and resume testing. If the same alarm occurs again, call for service.
Ext. Equipment Failure (ALARM)	Trouble was detected in a peripheral unit of the chamber. The chamber has stopped.	Troubleshoot the peripheral unit as explained in the instruction manual of that unit.	Take appropriate actions referring to the manuals for external devices. Set the POWER key OFF, and then resume operations. If the same alarm occurs again, call for service.

Displayed alarm	Contents	Cause	Action
Invalid time (economy ope. mode)	Exposure temperature setting was detected out of range. The chamber is running without the eco operation.	The eco operation and exposure time were set as follows. • When Economy Mode (Operating Conditions Setting screen) is set to AUTO Set exposure time < 15 min • When Economy Mode (Operating Conditions Setting screen) is set to MANU (1) Set high temperature exposure setting time + (ambient temperature exposure setting time x 2) < precool suspension time (2) Set precool suspension time > 4 hours or set precool suspension time < 5 min. (3) Set low temperature exposure setting time + (ambient temperature exposure setting time x 2) < preheat suspension time	Either turn OFF the eco operation or change the operating conditions. • When Economy Mode (Operating Conditions Setting screen) is set to AUTO Set exposure time ≥ 15 min • When Economy Mode (Operating Conditions Setting screen) is set to MANU (1) Set high temperature exposure setting time + (ambient temperature setting time x 2) ≥ precool suspension time (2) Set precool suspension time ≤ 4 hours or set precool suspension time ≥ 5 min. (3) Set low temperature exposure setting time + (ambient temperature setting time x 2) ≥ preheat suspension time