

# Chapter 6 Troubleshooting

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This equipment performs self-checks when certain troubles occur. It emits a buzzer and displays the status, cause and remedial procedure on the screen in order to notify and assist the operator. It also inform the operator when maintenance is necessary. These are collectively referred to as “alarms”. This chapter explains about alarms and other possible equipment troubles, their causes and how to remedy the situation. In the following cases, contact ESPEC CORP. or the place if purchase:

When the equipment fails to operate properly after you have taken the prescribed remedial action.

Anywhere in this manual that you are instructed to “Call for service”.

## **WARNING**

- ! When taking action on the primary side of the breaker, be sure to turn off the main power supply switch at your facility. Also, use caution not to apply voltage accidentally.**

Attempting to solve a problem with the power on can result in electric shock and create a very dangerous situation.

Use the supplied breaker handle stopper to prevent the breaker from being turned on accidentally.

- ! Shut the main breaker OFF before attempting to access the electrical compartment.**

## 6.1 Displayed alarms



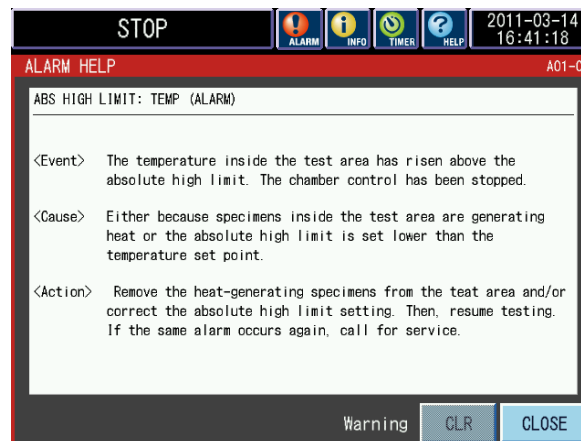
When an alarm is generated, the alarm screen shown below automatically appears and the buzzer is triggered. The ALARM icon keeps blinking until the alarm is cleared.

Press the alarm event on the Alarm screen to display the status details. Check the status details, and then press [Stop Beep] to stop the alarm buzzer.

Alarm screen



Pressing the alarm event displays the following alarm help (details).  
ALARM HELP screen



### Notice

- If the error or warning buzzer is turned OFF, alarm status cannot be notified with a buzzer sound, which may lead to delays in acknowledging an error or warning. Do not turn OFF the buzzer if at all possible.

If the buzzer is turned OFF, the occurrence of an error or warning is indicated only by the red blinking pilot lamps and on the Alarm display screen.

**Reference** | The alarm buzzer notifying a "warning/error" can be set using "Set Sound" on the Configuration screen. This can be accessed from the Chamber Setup screen.

## Corrective action

Take the following action when an alarm is generated. There are 2 types of alarms -"Error" and "Warning"- and they are dealt with differently in some respects.

Error	Generated when trouble occurs with the equipment or a single unit. (A buzzer is emitted.)
Warning	Generated when control is destabilized for reasons other than trouble such as when maintenance is required.

**Reference** | Operation may be continued in backup mode even when an "Alarm" occurs. Refer to the section "Equipment response in backup mode" in Chapter 6.

### ① When an error occurs

**Procedure**

1. Press [Stop Beep] to stop the alarm beep.
2. Check the troubleshooting procedure by following the instructions in the manual or messages on the ALARM HELP screen.

### ② When a warning is generated

**Procedure**

1. Press [Stop Beep] to stop the warning beep.
2. Check the troubleshooting procedure by following the instructions in the manual or messages on the ALARM HELP screen.
3. Press [CLR] on the ALARM HELP screen.  
Even when a "warning" is generated, operation does not stop. However, the warning notification will remain on the ALARM screen until the power is turned OFF.

## Alarm Report screen

When an alarm has been generated, a report can be found by going to the Chamber Setup menu. Report on alarms can be obtained while they are still active, from the ALARM screen, but alarm entries are deleted the moment the actual alarm is cleared. In any case, all alarms occurred to date can be seen on the Alarm Report screen.

This screen reports other system information such as refrigerator defrosting and humidifier cleaning.

### Procedure

1. Select Chamber Setup mode from the menu.

Press the Chamber Setup tab.

Press [Alarm Report] on the Chamber Setup screen.



2. The alarm report is displayed.



- No.: To display the alarm report number (1 - 100).  
Type: To display whether it is an error or a warning.  
Alarm: To display the error event or warning that has occurred.  
Pressing an alarm event displays the ALARM HELP screen corresponding to that event.

STOP

ALARM

ACCESSORY

TIMER

HELP

2010-08-02  
09:00:00

Alarm Report

S30

No.	Type	Alarm	Date
10	ERR	HUMIDIFIER SCALE BUILDUP ALARM	2011-03-14 10:03:26
9	ERR	HUMIDIFIER DRAIN FAILURE	2011-03-14 10:03:26
8	WAR	HUMIDIFIER DRAIN WARNING	2011-03-14 10:03:26
7	ERR	HUMIDIFIER WATER SUPPLY ALARM	2011-03-14 10:03:26
6	ERR	HUMIDIFIER FAILURE	2011-03-14 10:03:35
5	WAR	CHECK HUMIDIFIER SWITCH	2011-03-14 10:03:35
4	ERR	OVERHEATING	2011-03-14 10:03:35
3	ERR	OUTPUT CIRCUIT FAILURE	2011-03-14 10:03:35
2	ERR	HEATER FAILURE	2011-03-14 10:03:35
1	ERR	AIR CIRCULATOR FAILURE	2011-03-14 10:03:35

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Seek No.

CLOSE

- Date: To display the date and time the error or the warning occurred.  
: To select the previous/next page.  
Seek No.: Input the alarm report number to jump to the corresponding alarm or warning.

- Reference
- Displays the last 10 alarm reports per screen in reverse chronological order of occurrence.
  - Up to 100 warning and error events can be stored. When the number of events exceeds 100, the reports are deleted in chronological order.

## Equipment response in the backup mode

This chamber has a backup feature that can be turned ON/OFF from the chamber setup mode.

If "ON" is selected for Backup Mode, the chamber issues a warning when an error occur, but continue operation. (Refer to the program response table below)

The backup mode can be turned OFF from the touch screen, but in this situation, the entire system will shut down when trouble occurs.

Though in some cases test conditions cannot be met once the backup mode kicks in, the mode itself has been added to protect specimens against damage which might occur when the entire system is shut down, as well as to minimize time loss as best possible when total shutdown does in fact occur.

To better understand equipment behavior in the backup mode and use the chamber more effectively, the below table describes how the chamber responds when trouble occurs.

To check under which error statuses backup mode is applied, refer to "Alarm tables" in "Chapter 6 Troubleshooting".

Program response in backup mode

Trouble	Equipment response when backup mode is "ON" and kicks in.	When "OFF" is selected for Backup Mode
Humidifier related trouble	Operation continues.	Equipment suspends operation. (Status) is "Program Suspended" or "Constant-value Operation".
Refrigerator related trouble	Unaffected refrigerators continue running. However, the test system shuts down if there is only one refrigerator in the system or if all refrigerators are affected.	
Other	Test system shutdown	

## Reference

In the Alarm tables on the following pages, "BU" is indicated where the backup mode is available for use.

For information on setting backup mode in the event of an alarm, refer to section 10.2 "Setting the equipment response during the operation" in "Chapter 4 Management Setting" of the Reference Manual.

## Alarm tables

Alarms are displayed as a pretext to the backup mode kicking-in. If the mode is OFF when an error occurs, the entire system will shut down. However, in the program mode, the operation will pause.

The following codes are used in these tables:

(If corrective actions fail to restore normal operation of the chamber, please contact ESPEC CORP. or the place of purchase .

BU: Indicates the backup mode is available against the error in question.

COM. OP: Alarm number of communication function is displayed.  
(Optional)

Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
REFRIGERATOR FAILURE	2320	•	—	Test system down	All refrigerators in error state.	Error notification already made for each refrigerator separately	<ul style="list-style-type: none"> <li>Remedy on each alarm occurrence</li> <li>Turn [POWER] key OFF.</li> </ul>
REFRIG.-□ TEMP ALM: COMP SURFACE  □ indicates the refrigerator No.	2056 2209 2219 2096 2249 2259 2136 2289 2299 2176 2433 2443	• BU		For single refrigerator chambers • Test system down  For multiple refrigerator chambers. • Refrigerator changeover and continued operation.  In program mode, system does not pause.	Compressor temperature switch tripped because of high temperature on the surface.	<ul style="list-style-type: none"> <li>Refrigerator breakdown</li> <li>Condenser trouble</li> <li>Gas leak</li> <li>Overheating</li> <li>Open-phase</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Cool down the compressor.</li> </ul>
REFRIG.-□ UNIT FAILURE (For air-cooled spec. only)  □ indicates the refrigerator No.	2061 2101 2141 2181	• BU			Temperature rise in refrigerator unit discharge pipe, or reverse phase in unit wiring.		<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Check the cooling water.</li> <li>Cool down the refrigerator.</li> </ul>
REFRIG.-□ CURRENT VALUE ALM: COMP  □ indicates the refrigerator No.	2059 2212 2222 2099 2252 2262 2139 2292 2302 2179 2436 2446	• BU			Compressor thermal relay tripped because of overcurrent.	<ul style="list-style-type: none"> <li>Refrigerator breakdown</li> <li>Condenser trouble</li> <li>Overheating</li> <li>Open-phase</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Check the cooling water.</li> <li>Cool down the refrigerator.</li> </ul>
REFRIG.-□ HIGH PRESSURE  □ Indicates refrigerator No.	2057 2210 2220 2097 2250 2260 2137 2290 2300 2177 2434 2444	• BU			Refrigeration circuit high pressure switch tripped because of pressure rise.	<ul style="list-style-type: none"> <li>Cooling tower fan stopped</li> <li>Foreign matter inside condenser</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Check the cooling water.</li> </ul>

Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
REFRIG.-□ LOW PRESSURE □ Indicates refrigerator No.	2058 2211 2221 2098 2251 2261 2138 2291 2301 2178 2435 2445	● BU		For single refrigerator chambers • Test system down  For multiple refrigerator chambers. • Refrigerator changeover and continued operation.  In program mode, system does not pause.	Refrigeration circuit low pressure switch tripped because of pressure drop.	• Evaporator is heavily frosted over.	• Turn [POWER] key OFF. • Perform defrosting.
REFRIG □ BURN-OUT: DISCHG TEMP □ indicates the refrigerator No.	2040 2226 2080 2266 2120 2306 2160 2450	● BU			Burn-out of the refrigerator discharge pipe thermal sensor is detected.	Burn-out of the refrigerator discharge pipe thermal sensor	• Turn [POWER] key OFF. • Call for service
REFRIG-□ BURN-OUT: COND TEMP □ indicates the refrigerator No.	2041 2081 2121 2161	● BU			Burn-out of the refrigerator condenser thermal sensor is detected.	Burn-out of the refrigerator condenser thermal sensor	• Turn [POWER] key OFF. • Call for service
REFRIG-□ BURN-OUT: EVAP IN TEMP □ indicates the refrigerator No.	2042 2213 2224 2082 2253 2264 2122 2293 2304 2162 2437 2448	● BU			Burn-out of the refrigerator evaporator inlet thermal sensor is detected.	Burn-out of the refrigerator evaporator inlet thermal sensor	• Turn [POWER] key OFF. • Call for service
REFRIG-□ BURN-OUT: EVAP OUT TEMP □ indicates the refrigerator No.	2043 2214 2225 2083 2254 2265 2123 2294 2305 2163 2438 2449	● BU			Burn-out of the refrigerator evaporator outlet thermal sensor is detected.	Burn-out of the refrigerator evaporator outlet thermal sensor	• Turn [POWER] key OFF. • Call for service
REFRIG-□ BURN-OUT: COMP SUCTION TEMP □ indicates the refrigerator No.	2044 2084 2124 2164	● BU			Burn-out of the refrigerator compressor inlet thermal sensor is detected.	Burn-out of the refrigerator compressor inlet thermal sensor	• Turn [POWER] key OFF. • Call for service
REFRIG-□ BURN-OUT: DISCHG TEMP □ indicates the refrigerator No.	2053 2223 2093 2263 2133 2303 2173 2447	● BU			Temperature of the refrigerator discharge pipe rises and an error is detected.	• Refrigerator breakdown • Condenser trouble • Gas leak • Overheating • Open-phase	• Turn [POWER] key OFF. • Cool down the compressor.



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Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
REFRIG-□ OUT-OF-RNG: DISCHG TEMP  □ indicates the refrigerator No.	2048 2229 2088 2269 2128 2309 2168 2453	● □ □		For single refrigerator chambers · Test system down  For multiple refrigerator chambers. · Refrigerator changeover and continued operation.  In program mode, system does not pause.	Temperature of the refrigerator discharge pipe remains out of normal range over the determined period of time.	<ul style="list-style-type: none"> <li>Refrigerator breakdown</li> <li>Condenser trouble</li> <li>Gas leak</li> <li>Overheating</li> <li>Open-phase</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Cool down the compressor.</li> </ul>
REFRIG-□ OUT-OF-RNG: COND TEMP  □ indicates the refrigerator No.	2049 2089 2129 2169	● □ □			Temperature of the refrigerator condenser remains out of normal range over the determined period of time.	<ul style="list-style-type: none"> <li>When upper limit detected</li> <li>Refrigerator breakdown</li> <li>Condenser failure</li> <li>Gas leak</li> <li>Overheating</li> <li>Open-phase</li> <li>When lower limit detected</li> <li>Frosted cooler</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>When upper limit detected</li> <li>Check cooling water.</li> <li>Cool down the refrigerator.</li> <li>When lower limit detected</li> <li>Perform defrosting.</li> </ul>
REFRIG-□ OUT-OF-RNG: EVAP IN TEMP  □ indicates the refrigerator No.	2050 2215 2227 2090 2255 2267 2130 2295 2307 2170 2439 2451	● □ □			Temperature of the refrigerator evaporator inlet remains out of normal range over the determined period of time.	<ul style="list-style-type: none"> <li>Gas leak</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> </ul>
REFRIG-□ OUT-OF-RNG: EVAP OUT TEMP  □ indicates the refrigerator No.	2051 2216 2228 2091 2256 2268 2131 2296 2308 2171 2440 2452	● □ □			Temperature of the refrigerator evaporator outlet remains out of normal range over the determined period of time.	<ul style="list-style-type: none"> <li>When upper limit detected</li> <li>Heat generation from specimens</li> <li>When lower limit detected</li> <li>Frosted cooler</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>When upper limit detected</li> <li>Remove heat generating objects.</li> <li>When lower limit detected</li> <li>Perform defrosting.</li> </ul>
REFRIG-□ OUT-OF-RNG: COMP SUCTION TEMP  □ indicates the refrigerator No.	2052 2092 2132 2172	● □ □			Temperature of the refrigerator compressor inlet remains out of normal range over the determined period of time.	<ul style="list-style-type: none"> <li>Evaporator is heavily frosted over.</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Perform defrosting.</li> </ul>
REFRIG-□ INVERTER COMMUNICATION ERROR  □ indicates the refrigerator No.	2072 2112 2152 2192	● □ □			A Communication error is detected on the refrigerator inverter.	<ul style="list-style-type: none"> <li>Breakdown of the refrigerator inverter</li> <li>Burn-out of the communication cable</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> </ul>
REFRIG-□ INVERTER ERROR T00  □ indicates the refrigerator No.	2064 2104 2144 2184	● □ □			Refrigerator inverter IGBT shortcircuits.	<ul style="list-style-type: none"> <li>Moisture adheres to the IGBT of the refrigerator inverter.</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Dry inverter.</li> </ul>
REFRIG-□ INVERTER ERROR T01  □ indicates the refrigerator No.	2065 2105 2145 2185	● □ □			A position detecting circuit error is detected on the refrigerator inverter.	<ul style="list-style-type: none"> <li>Breakdown of the refrigerator inverter</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> </ul>

Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
REFRIG-□ INVERTER ERROR T02 □ indicates the refrigerator No.	2066 2106 2146 2186	● □ □ □		For single refrigerator chambers • Test system down	A current sensor alarm is detected on the refrigerator inverter.	<ul style="list-style-type: none"> <li>Breakdown of the compressor</li> <li>Breakdown of the refrigerator inverter</li> </ul>	• Turn [POWER] key OFF.
REFRIG-□ INVERTER ERROR T03 □ indicates the refrigerator No.	2067 2107 2147 2187	● □ □ □			A motor lock error is detected on the refrigerator inverter.	<ul style="list-style-type: none"> <li>Breakdown of the compressor</li> <li>Breakdown of the refrigerator inverter</li> </ul>	• Turn [POWER] key OFF.
REFRIG-□ INVERTER ERROR T04 □ indicates the refrigerator No.	2068 2108 2148 2188	● □ □ □		For multiple refrigerator chambers. • Refrigerator changeover and continued operation.  In program mode, system does not pause.	A breakdown error is detected on the refrigerator inverter.	<ul style="list-style-type: none"> <li>Breakdown of the compressor</li> <li>Breakdown of the refrigerator inverter</li> </ul>	• Turn [POWER] key OFF.
REFRIG-□ INVERTER ERROR T05 □ indicates the refrigerator No.	2069 2109 2149 2189	● □ □ □			Temperature error (off-temp.) is detected by the heatsink sensor on the refrigerator inverter.	<ul style="list-style-type: none"> <li>Breakdown of the refrigerator inverter</li> </ul>	• Turn [POWER] key OFF.
REFRIG-□ INVERTER ERROR T06 □ indicates the refrigerator No.	2070 2110 2150 2190	● □ □ □			The Heatsink sensor on the refrigerator inverter has short-circuited or burnt out.	<ul style="list-style-type: none"> <li>Burn-out of the heatsink sensor on the refrigerator inverter</li> <li>Moisture is adhered.</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Dry inverter.</li> </ul>
REFRIG-□ INVERTER ERROR T07 □ indicates the refrigerator No.	2071 2111 2151 2191	● □ □ □		Test system down	A case thermo action error is detected on the refrigerator inverter.	<ul style="list-style-type: none"> <li>Breakdown of the compressor</li> <li>Breakdown of the refrigerator inverter</li> </ul>	• Turn [POWER] key OFF.
INVALID REFRIGERATOR SETUP	2322	●		Test system down	Setting of the refrigerator model is wrong.	Incorrect input setting of the refrigerator model	<ul style="list-style-type: none"> <li>Turn main power breaker OFF and ON again.</li> <li>Call for service</li> </ul>
REFRIG.: COOLING WATER FAILURE (For water cooled spec. only)	2321	●		Test system down	Water suspension relay tripped because of pressure drop in cooling water line.	<ul style="list-style-type: none"> <li>Stopped cooling tower pump</li> <li>Clogged cooling water strainer</li> <li>Water leak in cooling water line</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Check cooling pump functions.</li> <li>Check for leaks in cooling water line.</li> <li>Clean strainer.</li> </ul>
REFRIG-□ CURRENT VALUE ALM: COND FAN (For air-cooled type) □ indicates the refrigerator No.	2060 2100 2140 2180	● □ □ □		For single refrigerator chambers • Test system down  For multiple refrigerator chambers. • Refrigerator changeover and continued operation.  In program mode, system does not pause.	The thermal relay tripped due to an increase in the current value of the compressor fan.	<ul style="list-style-type: none"> <li>Breakdown of the compressor fan</li> <li>Overheating</li> <li>Open-phase</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Cool down the compressor fan.</li> </ul>
HUMIDIFIER BOIL-DRY	1800	● □ □		<ul style="list-style-type: none"> <li>System switches over from temp. &amp; humidity control to temperature-only control.</li> </ul> In program mode, system pauses.	Dry-boil temperature sensor tripped because of humidifier cylinder overheating.	<ul style="list-style-type: none"> <li>Humidifier water supply circuit trouble</li> <li>Dirt inside the humidifier cylinder</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Clean humidifier.</li> </ul>

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Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
HUM. SCALE BUILDUP WARNING	1801		•	Operation continues uninterrupted. In program mode, system does not pause. * If left unattended for 120 hours, system interprets trouble as error and humidifier stops operating.	Temperature switch inside humidifier cylinder tripped.	Too much scale inside cylinder	Clean humidifier.
HUM. SCALE BUILDUP ALARM	1802	• BU		• System switches over from temp. & humidity control to temperature-only control. In program mode, system pauses.	Temperature switch inside humidifier cylinder has been in error status for 120 consecutive hours.	Too much scale inside cylinder	• Turn [POWER] key OFF. • Clean humidifier.
HUM. DRAIN FAILURE	1803	• BU		• System switches over from temp. & humidity control to temperature-only control. In program mode, system pauses.	Humidifier water level does not drop when draining.	• Drainage pump malfunction • Clogged drain line • Humidifier float sensor trouble	• Turn [POWER] key OFF. • Clean humidifier.
HUM. WATER SUPPLY WARNING	1804		•	• Operation continues uninterrupted. In program mode, system does not pause.	Humidifier was not filled within specified time limit.	• Water supply valve not reopened. • Clogged humidifier strainer • Water leak • Low water pressure • Humidifier float sensor trouble • Water supply suspended because safety device in RO water purifier (option) tripped.	• Check valve. • Clean strainer. • Check water supply line. • When water supply is restored, normal operation is automatically resumed.
HUM. WATER SUPPLY ALARM	1805	• BU		• System switches over from temp. & humidity control to temperature-only control. In program mode, system pauses.	Humidifier was not filled within specified time from when "WARNING" was issued.		• Turn [POWER] key OFF. • Check valve. • Clean strainer. • Check water supply line. • Check the safety devices of water purifier.
HUMIDIFIER FAILURE	1806	• BU		• System switches over from temp. & humidity control to temperature-only control. In program mode, system pauses.	Humidifier breaker tripped because of overcurrent.	• Short-circuit or current leakage in humidifier circuit	• Turn main power breaker OFF. • Reset humidifier breaker inside electrical compartment.
CHECK HUMIDIFIER SWITCH	1808		•	• Operation continued uninterrupted. In program mode, system pauses. • Humidifier stops.	"Humidifier ON/OFF switch" installed on humidifier is set to OFF during humidity-only run.	The humidifier is now being cleaned or the switch was left in OFF position after cleaning of the humidifier. Note that water supply starts if this switch is returned to the ON position or the [CLR] key on the instrumentation screen is pressed during humidifier cleaning.	Set the humidifier ON/OFF switch to "ON" position after cleaning is complete.

Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
AIR CIRCULATOR FAILURE	1816	•		Test system down	Air circulator (AC unit) thermal relay tripped because of overcurrent.	Overloaded air circulator or motor	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Halt operations shortly to cool down air circulator motor.</li> </ul>
HEATER FAILURE	1817	•		Test system down	Heater circuit breaker tripped due to an increase in the current value of the heater.	Short-circuit or current leakage in heater circuit	<ul style="list-style-type: none"> <li>Turn main power breaker OFF.</li> <li>Reset heater breaker inside electrical compartment.</li> </ul>
OUTPUT CIRCUIT TROUBLE	1818	•		Test system down	Output circuit breaker tripped due to an increase in the current value of the chamber control circuit.	Short-circuit, ground-fault or overcurrent of the output circuit	<ul style="list-style-type: none"> <li>Turn main power breaker OFF.</li> <li>Reset the output circuit breaker inside the electrical compartment.</li> </ul>
OVERHEATING	1819	•		Test system down	Overheat protector tripped because of abnormal temperature rise inside chamber.	<ul style="list-style-type: none"> <li>Heat generation from specimens</li> <li>Low overheat protector setting</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Remove heat-generating specimens.</li> <li>Check overheat protector setting.</li> </ul>
AIR CONDITIONER OVERHEATING	1821	•		Test system down	The heater temperature switch tripped because of abnormal temperature rise inside air conditioner.	<ul style="list-style-type: none"> <li>Heat generation from specimens</li> <li>Heater control error</li> <li>Air circulator trouble</li> <li>Power breaker was shut off during high temperature testing.</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Cool down air conditioner to max. 50°C by forcing air inside.</li> </ul>
POWER PHASE FAILURE	1822	•		Test system down	Reverse phase or open phase detected on primary side (Detected even while the chamber is not running.)	Wrong connection in primary power line	<ul style="list-style-type: none"> <li>Turn main power breaker OFF.</li> <li>Check power supply connections.</li> </ul>
ABS. HIGH LIMIT: TEMP.	1832	•		Test system down	Temperature inside chamber exceeded absolute upper limit alarm setting.	<ul style="list-style-type: none"> <li>Heat generation from specimens</li> <li>Upper limit setting too low</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Remove heat-generating specimens.</li> <li>Check upper limit alarm setting.</li> </ul>
ABS. HIGH LIMIT: HUM.	1840		•	<ul style="list-style-type: none"> <li>Operation continues uninterrupted.</li> <li>In program mode, system pauses.</li> <li>Humidifier stops operating.</li> </ul>	Humidity inside chamber exceeded absolute upper limit alarm setting.	<ul style="list-style-type: none"> <li>Temporary rise in RH during step transition in program mode</li> <li>Upper limit setting too low</li> <li>Refrigerator is in oil return operation.</li> </ul>	<ul style="list-style-type: none"> <li>Check upper limit alarm setting.</li> <li>Operation is restored automatically when humidity drops below setting.</li> </ul>
ABS. LOW LIMIT: TEMP.	1833	•		Test system down	Temperature inside chamber dropped below absolute lower limit alarm setting.	<ul style="list-style-type: none"> <li>Excessive refrigeration</li> <li>Cooling caused by specimens</li> <li>Lower limit setting too high</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Remove trouble-causing specimens.</li> <li>Check lower limit alarm setting.</li> </ul>
ABS. LOW LIMIT: HUM.	1841		•	<ul style="list-style-type: none"> <li>Operation continues uninterrupted.</li> <li>In program mode, system pauses.</li> </ul>	Humidity inside chamber dropped below absolute lower limit alarm setting.	<ul style="list-style-type: none"> <li>Temporary drop in RH during step transition in program mode</li> <li>Lower limit setting too high</li> <li>Refrigerator is in oil return operation.</li> </ul>	<ul style="list-style-type: none"> <li>Check lower limit alarm setting.</li> <li>Operation is restored automatically when humidity rises above setting.</li> </ul>

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Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
UPPER DEV. LIMIT: TEMP.	1834			<ul style="list-style-type: none"> <li>Operation continues uninterrupted.</li> <li>In program mode, system pauses.</li> <li>Heater and humidifier stop operating.</li> </ul>	Temperature inside chamber exceeded upper deviation limit alarm setting.	<ul style="list-style-type: none"> <li>Heat generation from specimens</li> <li>Upper limit setting too low</li> <li>Refrigerator is in oil return operation.</li> </ul>	<ul style="list-style-type: none"> <li>Remove heat-generating specimens.</li> <li>Check upper limit setting and set 10°C higher than set point.</li> <li>Operation is restored automatically when temperature drops below setting.</li> </ul>
UPPER DEV. LIMIT: HUM. (Option)	1842			<ul style="list-style-type: none"> <li>Operation continued uninterrupted</li> <li>In program mode, system pauses.</li> <li>Humidifier stops.</li> </ul>	Humidity inside chamber exceeded upper deviation limit alarm setting.	<ul style="list-style-type: none"> <li>Temporary rise in relative humidity during step transition in program mode</li> <li>Relative humidity alarm setting is too low.</li> <li>Refrigerator is in oil return operation.</li> </ul>	<ul style="list-style-type: none"> <li>Check upper limit alarm setting and set 10%rh higher than humidity set point.</li> <li>Operation is restored automatically when humidity drops below setting.</li> </ul>
LOWER DEV. LIMIT: TEMP. (Option)	1835			<ul style="list-style-type: none"> <li>Operation continues uninterrupted.</li> <li>In program mode, system pauses.</li> </ul>	Temperature inside chamber dropped below lower deviation limit alarm setting.	<ul style="list-style-type: none"> <li>Chamber door is open.</li> <li>Ventilation fan is running.</li> <li>Excessive refrigeration</li> <li>Cooling caused by specimens</li> <li>Refrigerator is in oil return operation.</li> </ul>	<ul style="list-style-type: none"> <li>Check door and ventilation fan.</li> <li>Remove trouble-causing specimens.</li> <li>Operation is restored automatically when humidity rises above setting.</li> </ul>
LOWER DEV. LIMIT: HUM. (Option)	1843			<ul style="list-style-type: none"> <li>Operation continues uninterrupted.</li> <li>In program mode, system pauses.</li> </ul>	Humidity inside chamber dropped below lower limit deviation alarm setting.	<ul style="list-style-type: none"> <li>Temporary drop in RH during step transition in program mode</li> <li>Lower limit setting too high</li> <li>Refrigerator is in oil return operation.</li> </ul>	<ul style="list-style-type: none"> <li>Check lower limit alarm setting and set 10%rh lower than humidity set point.</li> <li>Operation is restored automatically when humidity rises above setting.</li> </ul>
BURN-OUT: AIR CON TEMP SENSOR	1848	•		Test system down	Burn-out detected at the air conditioner temperature control sensor.	<ul style="list-style-type: none"> <li>Loose terminal on the temperature controller unit to which the temperature sensor is connected.</li> <li>Burn-out of the temperature sensor</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>
BURN-OUT: AIR CONDITIONER HUM SENSOR□	1849	•		Test system down	Burn-out detected at the air conditioner humidity control sensor.	<ul style="list-style-type: none"> <li>Loose terminal on the temperature controller unit to which the humidity sensor is connected.</li> <li>Burn-out of the humidity sensor</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>
BURN-OUT (RTD)	1880	•		Test system down	Burn-out detected at the instrumentation temperature sensor.	<ul style="list-style-type: none"> <li>Loose terminal on the temperature controller unit to which the temperature sensor is connected.</li> <li>Burn-out of the temperature sensor</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>
BURN-OUT (RTD1)	1896	•		Test system down	Burn-out detected at the air conditioner temperature control sensor.	<ul style="list-style-type: none"> <li>Loose terminal on the temperature controller unit to which the temperature sensor is connected.</li> <li>Burn-out of the temperature sensor</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>

Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
BURN-OUT (RTD2)	1911	•		Test system down	Burn-out detected at the air conditioner temperature control sensor.	<ul style="list-style-type: none"> <li>Loose terminal on the temperature controller unit to which the temperature sensor is connected.</li> <li>Burn-out of the temperature sensor</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>
SYSTEM ERROR	—	•		Test system down	System error. (Detected even while the chamber is not running.)	System internal error	<ul style="list-style-type: none"> <li>Turn main power breaker OFF and ON again.</li> </ul>
REFRIG. <input type="checkbox"/> CONDENSER ERROR  <input type="checkbox"/> Indicates the refrigerator No.	2062 2102 2142 2182	• BU		For single refrigerator chambers · Test system down  For multiple refrigerator chambers · Refrigerator changeover · Control continues  In program mode, system does not pause.	Condenser discharge pipe temperature switch or motor protector is activated.	<ul style="list-style-type: none"> <li>Refrigerator breakdown</li> <li>Condenser trouble</li> <li>Overheating</li> <li>Open-phase</li> <li>Reversed-phase operation</li> <li>Ambient temp. is too high</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>
REFRIG. <input type="checkbox"/> CONDENSER SURFACE TEMPERATURE ERROR (HIGH) <input type="checkbox"/> indicates the refrigerator No.	2075 2115 2155 2195	• BU			Condenser surface temperature exceeds the reference value.	<ul style="list-style-type: none"> <li>Refrigerator breakdown</li> <li>Condenser trouble</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>
REFRIG. <input type="checkbox"/> CONDENSER SURFACE TEMPERATURE ERROR (LOW)  <input type="checkbox"/> Indicates the refrigerator No.	2079 2119 2159 2199	• BU			Condenser surface temperature is below the reference value.	<ul style="list-style-type: none"> <li>Evaporator is heavily frosted over.</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Perform defrosting.</li> </ul>
REFRIG. <input type="checkbox"/> CONDENSER SURFACE TEMPERATURE DISCONNECTION ERROR  <input type="checkbox"/> Indicates the refrigerator No.	2077 2117 2157 2197	• BU			Disconnection of condenser surface temperature sensor is detected.	<ul style="list-style-type: none"> <li>Condenser surface temperature sensor of refrigerator is disconnected.</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>
REFRIG. <input type="checkbox"/> CONDENSER SURFACE TEMPERATURE RANGE ERROR  <input type="checkbox"/> Indicates the refrigerator No.	2073 2113 2153 2193	• BU			Condenser surface temperature is outside the normal range for longer than predetermined period of time.	<ul style="list-style-type: none"> <li>Refrigerator breakdown</li> <li>Condenser trouble</li> <li>Gas leak</li> <li>Overheating</li> <li>Open-phase</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Cool down the compressor.</li> </ul>
REFRIG. <input type="checkbox"/> COOLING BYPASS TEMPERATURE ERROR  <input type="checkbox"/> Indicates the refrigerator No.	2076 2116 2156 2196	• BU			Cooling bypass temperature exceeded the reference value.	<ul style="list-style-type: none"> <li>Solenoid valve for cooling bypass breakdown</li> <li>Thermal expansion valve breakdown</li> <li>Feeler bulb contact failure</li> <li>Gas leak</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>

## Chapter 6 Troubleshooting

Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
REFRIG □ COOLING BYPASS TEMPERATURE DISCONNECTION ERROR  □ Indicates the refrigerator No.	2078 2118 2158 2198	● □ □ □			Disconnection of cooling bypass temperature sensor of refrigerator is detected.	· Cooling bypass temperature sensor of refrigerator disconnected.  · Turn [POWER] key OFF. · Call for service	
REFRIG □ COOLING BYPASS TEMPERATURE RANGE ERROR  □ Indicates the refrigerator No.	2074 2114 2154 2194	● □ □ □			Cooling bypass temperature exceeds the range for longer than the predetermined period of time.	Solenoid valve for cooling bypass breakdown. · Thermal expansion valve breakdown. · Feeler bulb connection failure. · Gas leak  · Turn [POWER] key OFF. · Call for service	

### ■ Alarms related to optional equipment

BU: Indicates the backup mode is available against the error in question.

COM. OP: Alarm number of communication function is displayed.  
(Optional)

Displayed message	COM. OP	Type of alarm		Equipment response	Description	Probable cause(s)	Remedy
		Error	Warning				
OVERCOOLING (Option)	1820	•		Test system down	Overcool protector tripped because of abnormal temperature drop inside chamber.	<ul style="list-style-type: none"> <li>Excessive refrigeration.</li> <li>Cooling caused by specimens.</li> <li>Overcool protector setting too high.</li> </ul>	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Remove trouble-causing specimens.</li> <li>Check overcool protector setting.</li> </ul>
OPERATOR SAFETY SWITCH TRIP (Option)	1824	•		<ul style="list-style-type: none"> <li>Test system down</li> <li>Alarm buzzer emitted.</li> </ul>	Operator safety switch inside the chamber was triggered. (Detected even while the chamber is not running.)	Someone inside the chamber triggered the operator safety switch.	<ul style="list-style-type: none"> <li>Press reset [BZ. OFF] key on operation panel and check inside chamber.</li> <li>Free personnel from inside.</li> <li>Turn [POWER] key OFF.</li> </ul>
DEHUMIDIFIER FAILURE (Option)	1810	• BU		<ul style="list-style-type: none"> <li>Dehumidifier only stops operating.</li> <li>Operation continues uninterrupted.</li> </ul>	Safety device for external dehumidifier tripped.	See dehumidifier's instruction manual for error description and cause.	<ul style="list-style-type: none"> <li>Turn main power breaker OFF.</li> <li>Eliminate cause of error inside dehumidifier.</li> </ul>
Dehumidifier module Failure (Option)	1850	• BU		<ul style="list-style-type: none"> <li>Dehumidifier only stops operating.</li> <li>Operation continues uninterrupted.</li> </ul>	The dehumidifier module temperature sensor is burnt out.	The dehumidifier module temperature sensor is burnt out.	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Call for service</li> </ul>
WATER LEAK ALARM (Option)	1827	•		Test system down	A water leak is detected by the water leak detector. (Detected even while the test system is down.)	Moisture adheres to the water leak sensor.	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Eliminate the cause of the water leak.</li> <li>Dry water leak sensor.</li> </ul>
INVERTER FAILURE (Option)	1825	•		Test system down	Variable velocity device inverter failure is detected on the air circulator fan.	Breakdown of the inverter	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF</li> <li>In case of recurrence, call for service</li> </ul>
EXTERNAL EQUIPMENT(□): ALARM (Option) □ indicates the external equipment No.	1856 1857 1858 1859 1860	•		Test system down	Error detected in connected external unit. (Detected even while the chamber is not running.)	See external unit's instruction manual for error description and cause.	<ul style="list-style-type: none"> <li>Turn [POWER] key OFF.</li> <li>Eliminate cause of error inside external unit.</li> </ul>
EXTERNAL EQUIPMENT(□): WARNING (Option) □ indicates external equipment No.	1864 1865 1866 1867 1868		•	Test system down	Warning condition detected in connected external unit. (Detected even while the chamber is not running.)	See external unit's instruction manual for error description and cause.	<ul style="list-style-type: none"> <li>Eliminate cause of error inside external unit.</li> <li>Operation is restored automatically when warning state is cleared.</li> </ul>
EMERGENCY STOP ALARM (Option)	1826	•		Test system down	Emergency stop pushbutton triggered (Detected even while the chamber is not running.)	Emergency stop pushbutton was pressed for some reason.	<ul style="list-style-type: none"> <li>Check why switch was pressed.</li> <li>Turn [POWER] key OFF.</li> </ul>