Chapter 6
Checks and Maintenance

This chapter explains equipment checks and maintenance. To keep the chamber in good working condition, perform checks and maintenance periodically.

6.1 Check and Maintenance Lists

■Check list

For an explanation on each check item, see "6.2 Checks".

If any of the following checks result bad, contact the place of purchase or ESPEC CORP.

Table 6.1 Check list

Check item	When to check
Main power switch (breaker) trip test	Once monthly Before long test runs
Overheat protector trip test	Before every test
Overcool protector trip test	Before every test
Water suspension relay trip test	Once every 3 months

■Maintenance list

For an explanation on each maintenance item, see "6.3 Maintenance".

Table 6.2 Maintenance list

Maintenance item	When to perform
Condenser cleaning (Air-cooled chambers only)	Once monthly
Water circuit leak check	Once a day
Test area cleaning	Before starting tests After every test
Electric parts compartment/mechanical parts compartment cleaning	Once yearly
Strainer element cleaning and replacement (Water-cooled chamber only)	Once every 3 months (cleaning) When high stage high/low pressure (G11) exceeds 2 MPa. Read on gauge.
Cooling water circuit cleaning	Once yearly
Fuse replacement	Whenever a fuse blows
Air filter cleaning and replacement	Once monthly (cleaning) Once every 10,000 hours (replacement)
Oil filter cleaning and replacement	Once monthly (cleaning) Once every 10,000 hours (replacement)
Door drive belt check	Once yearly
Refrigerator oil check	Once every 6 months
Take-down before long periods of disuse	Before long periods of disuse
Compressor pressure check	Once monthly

■Adjustment list

Adjustments are required to maintain chamber functioning and performance. When adjustment is needed, contact the place of purchase or ESPEC CORP.

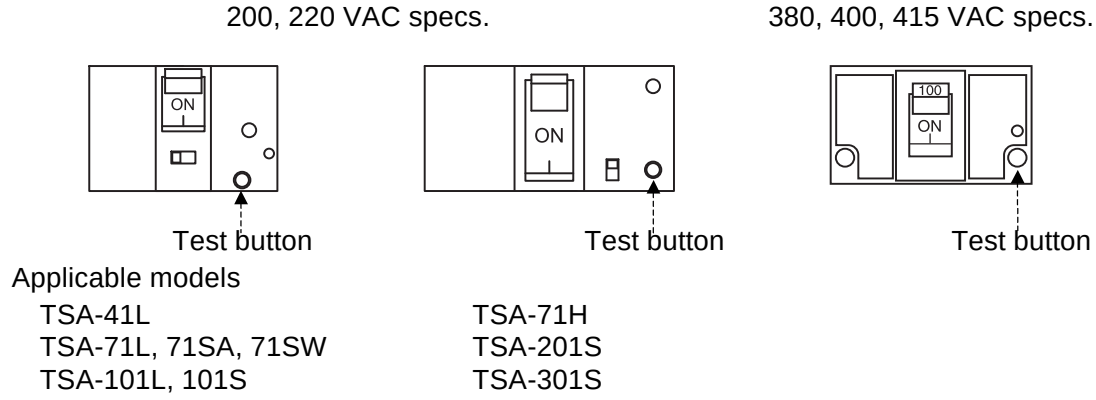
Table 6.3 Adjustment list

Adjustment item	When to adjust
Air pressure switch	Once every 2 years
Regulator pressure	Once every 2 years
Damper opening/closing speed	Once every 2 years
Door drive belt	Check: Once yearly Replacement: Once every 5 years
Chamber door opening/closing speed (optional automatic door)	Once every 2 years

6.2 Checks

Main Power Switch (Breaker) Trip Test

Once a month and before long test runs, test-trip the main power switch (breaker).
With the main power switch in the ON position, press the test button. If the switch's lever falls to the middle position, the breaker is working properly.



Applicable models

TSA-41L	TSA-71H
TSA-71L, 71SA, 71SW	TSA-201S
TSA-101L, 101S	TSA-301S

Fig. 6.1 Test button

Reference

When the main power switch (breaker) trips, the switch's lever falls halfway between the ON and OFF positions. To turn power back ON again, first set the switch to the OFF position and then to the ON position.

Overheat Protector Trip Test

Before every test, test-trip the overheat protector.

Procedure

1. Check the main power switch is in the ON position.
2. Press the ○POWER key on the operating panel to activate power to the instrumentation.
   An opening screen will appear. Touch it anywhere to get the main menu.
3. Press the ○OPER./STOP key on the operating panel or the operating status box in the upper left-hand corner of the display. When the Operation Mode Selection screen appears on the display, press the [START TEST] button under Operation Mode and, when the message appears to confirm your choice, press the [Yes] button.
   Testing will start.
   Perform the overheat protector trip test during high temperature exposure.
4. Set the overheat protector about 5°C lower than test area temperature.
   If the overheat protector is working properly, a buzzer will sound and the Alarm screen will appear on the display when temperature inside the test area reaches the overheat protector setting.
   If an alarm is not generated, something is wrong with the equipment. Contact the place of purchase or ESPEC CORP.
5. To silence the buzzer, press the [Buzzer Stop] button on the Alarm screen.
6. Set the main power switch in the OFF position and return the overheat protector to its usual setting.

Overcool Protector Trip Test

Before every test, test-trip the overcool protector.

Procedure

1. Check the main power switch is in the ON position.
2. Press the ○POWER key on the operating panel to activate power to the instrumentation.
   An opening screen will appear. Touch it anywhere to get the main menu.
3. Press the ○OPER./STOP key on the operating panel or the operating status box in the upper left-hand corner of the display. When the Operation Mode Selection screen appears on the display, press the [START TEST] button under Operation Mode and, when the message appears to confirm your choice, press the [Yes] button.
   Testing will start.
   Perform the overcool protector trip test during low temperature exposure at or below –10°C.
4. Set the overcool protector about 5°C higher than test area temperature.
   If the overcool protector is working properly, a buzzer will sound and the Alarm screen will appear on the display when temperature inside the test area reaches the overcool protector setting.
   If an alarm is not generated, something is wrong with the equipment. Contact the place of purchase or ESPEC CORP.
5. To silence the buzzer, press the [Buzzer Stop] button on the Alarm screen.
6. Set the main power switch in the OFF position and return the overcool protector to its usual setting.

Water Suspension Relay Trip Test

Test the water suspension relay once every 3 months.

Procedure

1. Check the main power switch is in the ON position.
2. Press the ○ POWER key on the operating panel to activate power to the instrumentation.
   An opening screen will appear. Touch it anywhere to get the main menu.
3. Press the ○ OPER./STOP key on the operating panel or the operating status box in the upper left-hand corner of the display. When the Operation Mode Selection screen appears on the display, press the [SETUP ONLY] button under Operation Mode and, when the message appears to confirm your choice, press the [Yes] button. Testing will start.
4. Close the primary water supply valve.
   If the water suspension relay is working properly, a buzzer will sound and the Alarm screen will appear on the display. If an alarm is not generated, something is wrong with the equipment. Contact the place of purchase or ESPEC CORP.
5. To silence the buzzer, press the [Buzzer Stop] button on the Alarm screen.
6. Set the main power switch in the OFF position and reopen the primary water supply valve.

6.3 Maintenance

Condenser Cleaning (Air-cooled chambers only)

⚠ DANGER

- **Set the main power switch in the OFF position BEFORE detaching the rear panels.**
  The mechanical parts compartment contains rotating and drive parts. Detaching the rear panels with power ON can be extremely dangerous.

⚠ CAUTION

- **SHARP EDGES! DO NOT touch condenser fins with bare hands.**
  Fins are sharp and you may get cut.

Dust and dirt accumulates on the fins of the air-cooled condenser (chamber rear) and can eventually clog the unit. In such case, cooling air flow may be disrupted to the point of causing performance to drop or safety devices to trip which will inhibit operation. If the chamber is operated in this state for any considerable period of time, the cooling unit may breakdown.
Therefore, clean the condenser fins roughly once a month.

Procedure

1. Turn OFF power from the main power switch and detach the rear cover.

2. Vacuum away adhering dust from both the rear cover vent and condenser fins.
   When dust cannot be removed with a vacuum cleaner, flush with water from above the condenser to clean.

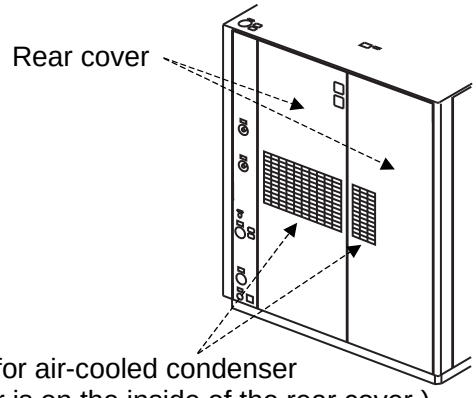


Fig. 6.2 Rear panels with condenser air intake vents

3. Reattach the rear panels as before.

Note Be careful not to bend condenser fins. Bent fins will destabilize heat exchange and lower chamber performance.

Water Circuit Leak Check

If water has leaked from the water circuit, it will become a bad influence to an installation place, and the cause of a trouble.
Check the leakage-of-water once a day.

Procedure

1. Check the leakage-of-water from drain port.

2. Check the leakage-of-water from the connection portions of strainer or nipple. (Water-cooled chambers only)

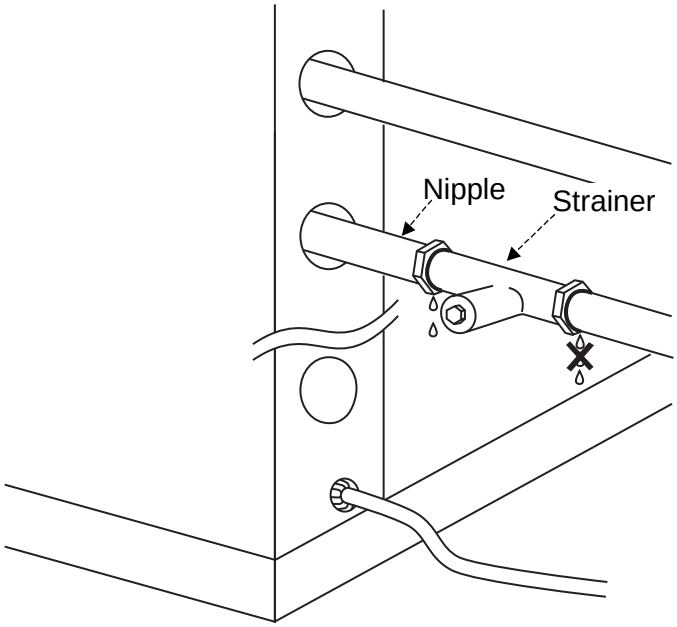


Fig. 6.3 Water Circuit Leak Check

Note When a leak is discovered, pinpoint and fix a leak part.

Test Area Cleaning

Dust and impurities that adhere to the test area floor and walls can be carried throughout the system by air currents and eventually stick to heaters, air circulators and other components. This can lead to trouble and throw off test results. Before and after tests, clean the test area.

Procedure

1. Open the chamber door.

2. Wipe the test area with a soft cloth.

3. Close the chamber door.

Electric Parts Compartment/ Mechanical Parts Compartment Cleaning

Dust buildup in the electric parts compartment or mechanical parts compartment can lead to trouble. Clean the compartments once a year.

Procedure

1. Check the main power switch is in the OFF position.
2. Open the electric parts compartment and mechanical parts compartment.
3. Vacuum up dust with a vacuum cleaner.
4. Close the electric parts compartment and mechanical parts compartment.

Strainer Element Cleaning or Replacement

⚠ CAUTION

- **In cases where the cooling water and cooling tower are shared with other units, close the secondary drain pipe valve.**

  There may be times when back pressure affects the secondary drain pipe system. This may on occasions result in the back flow of cooling water and leakage from the strainer.

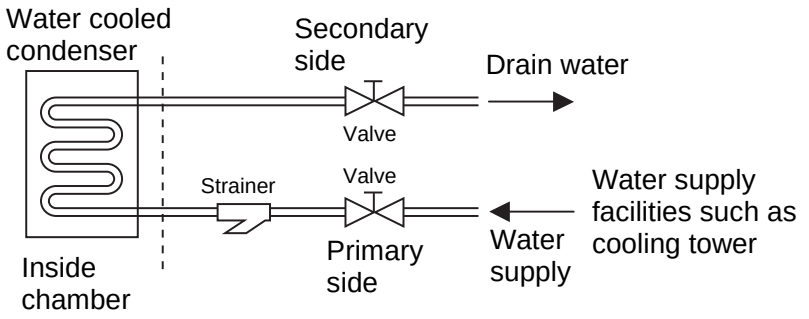


Fig. 6.4 Water circuit for shared cooling water and cooling tower

- **Cooling water may leak from the strainer when the element change unless the circuit is dry.**

There is a tendency for fur and dirt to accumulate on the strainer element which forms part of the strainer fitted inside the cooling water supply piping. This impairs the supply of cooling water and may eventually result in the activation of the water suspension relay which will in turn inhibit the operation of the chamber. The strainer element must therefore be replaced with a spare element once every three month on the average and cleaned ready for reuse.
The need for strainer cleaning will vary according to cooling water quality. Check the strainer and water quality from time to time.

Procedure

1. Shut the primary water supply valve.
   If there is a valve of the secondary side, then should also be closed.

2. Set a container underneath the strainer to catch trapped water.

3. Loosen the cap of the strainer and take out the element.

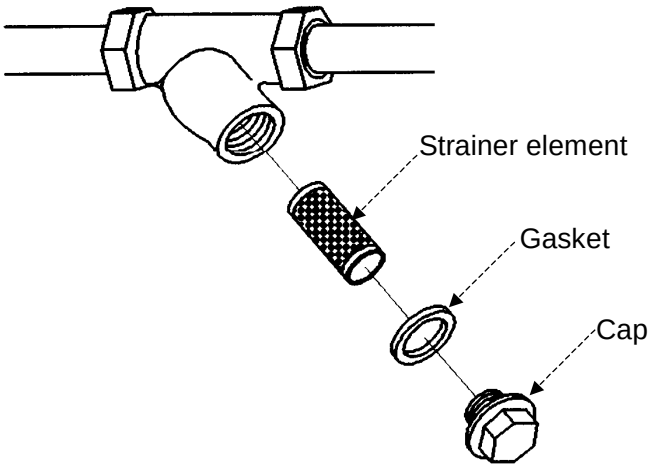


Fig. 6.5 Strainer assembly

4. Clean the strainer element with a brush or something similar.
   If the strainer element cannot be cleaned, replace it with a new one.

Cooling Water Circuit Cleaning

Scale accumulated inside of the piping may decrease the heat exchange capacity resulting that the high pressure switch may trip. Clean the inside of the piping once a year. Otherwise, too much scale may cause condenser malfunction and replacement will be necessary in the worst case. For cleaning, contact the place of purchase or ESPEC CORP. (Cleaning subject to billing.)

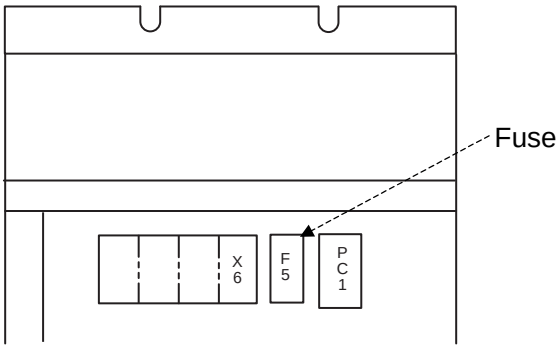
Fuse Replacement

Over prolonged testing, fuses can weaken and blow. When a fuse blows, replace it as explained below.

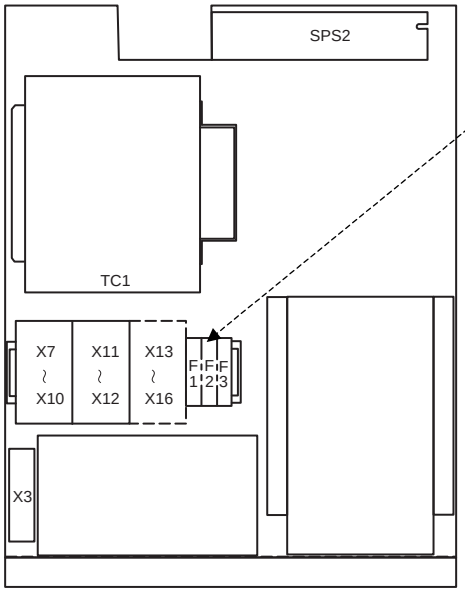
Note If a new fuse blows as soon power is turned back ON, contact the place of purchase or ESPEC CORP.

Procedure

1. Check the main power switch is in the OFF position.
2. Remove the screws that lock the electric parts compartment panel shut, and open the panel.
3. Replace the blown fuse with a new one.



Upper area of chassis



Fuse capacity
F1: 7A
F2: 10A*1
F3: 2A
F5: 1A*2
*1: Excluding 200V AC spec.
*2: TSA-71L and 101L only

Middle area of chassis when panel is detached

Fig. 6.6 Replacing the fuse

4. Close the panel.

Air Filter and Oil Filter Cleaning and Replacement

⚠ CAUTION

- **Check gauge pressure reads 0 MPa. Detaching the bowl guards under pressure is extremely dangerous.**
  If air remains in air circuit, a ball guard separates with sufficient vigor and there is a possibility that it may be injured.

As dirt, tar, carbon, dust or other substances accumulate on the air and oil filters of the air circuit, drainage gets backed up. Incomplete drainage may lead to trouble and even breakdown in air circuit parts.
Clean the air filter or replace the oil filter about once a month.

Procedure

1. Check the main power switch is in the OFF position.
2. Close the primary air supply valve and disconnect the supply tube from the chamber to bleed the circuit.
3. Remove the screws that lock the operating panel shut, and open the panel.
4. Press the Unlock in the direction of the arrow and disconnect the tube from the air cylinder to bleed off trapped air.

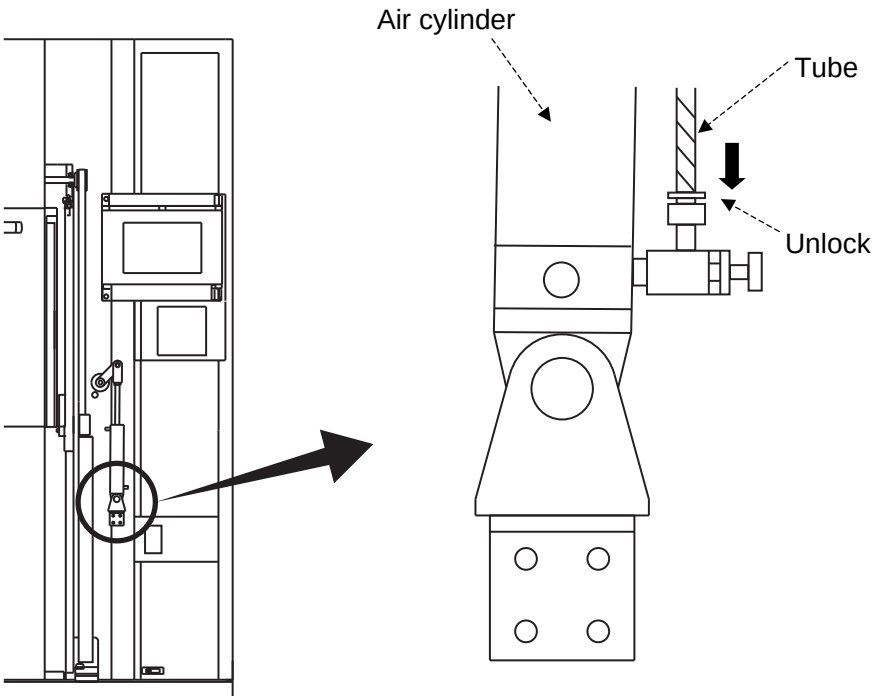


Fig. 6.7 Disconnecting the tube from the air cylinder

5. Open the mechanical parts compartment door.

6. Press on the bowl guard lock and turn to the ▽ mark, and detach the bowl guard.

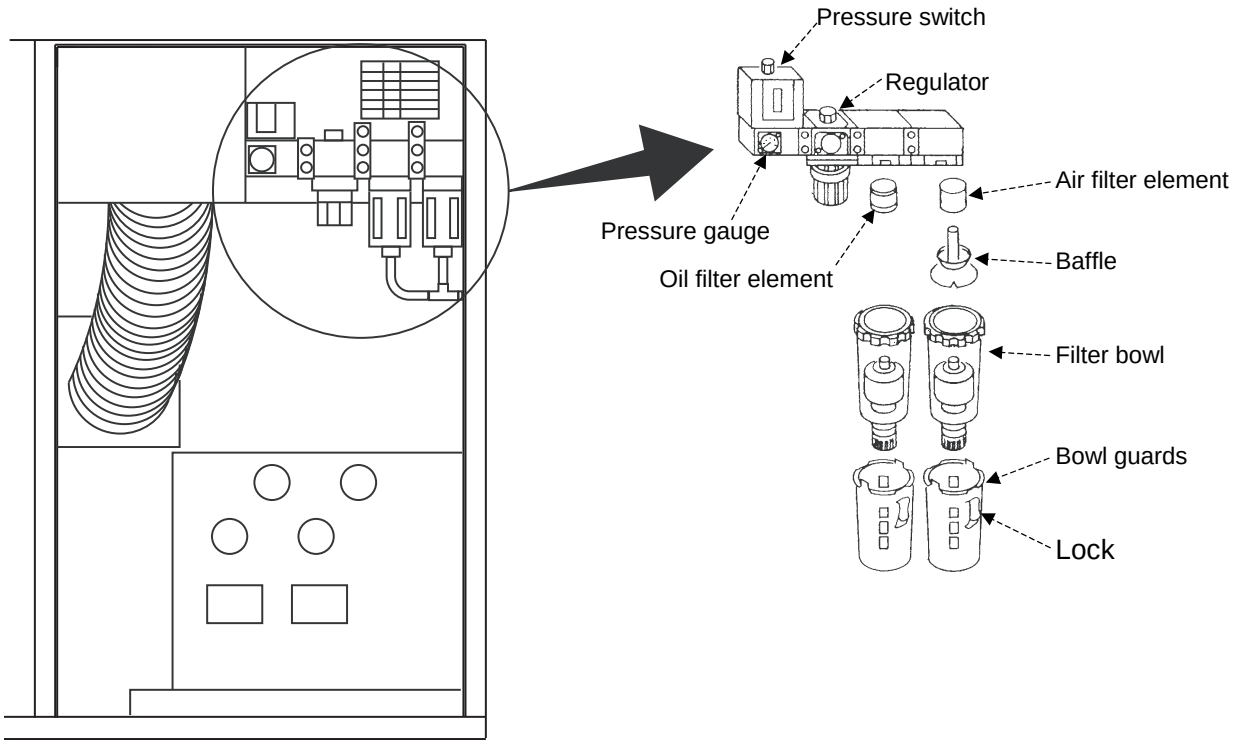


Fig. 6.8 Bowl guard assembly

7. Turn the baffle until loose and remove the air filter element.
   Use an M6 box wrench to remove the oil filter element.

8. Wash the air filter and oil filter bowls and the air filter element with a neutral detergent, and rinse clean.

9. Blot up moisture on the filter bowls and air filter element with a soft dry cloth.

Note

- Do not wash filters with synthetic oils (phosphate base), organic solvents or chemicals (thinner, carbon tetrachloride, etc.).
- Do not expose filter elements to direct sunlight.

Reference

If badly soiled, the oil filter cannot be reused even when washed. In such case replace the element. (Replace the element once every 10,000 hours.)

Door Drive Belt Check

Check the door drive belt once a year.

Procedure

1. Check the main power switch is in the OFF position.

2. Remove the screws that lock the front right and left panels closed, and open the panels.

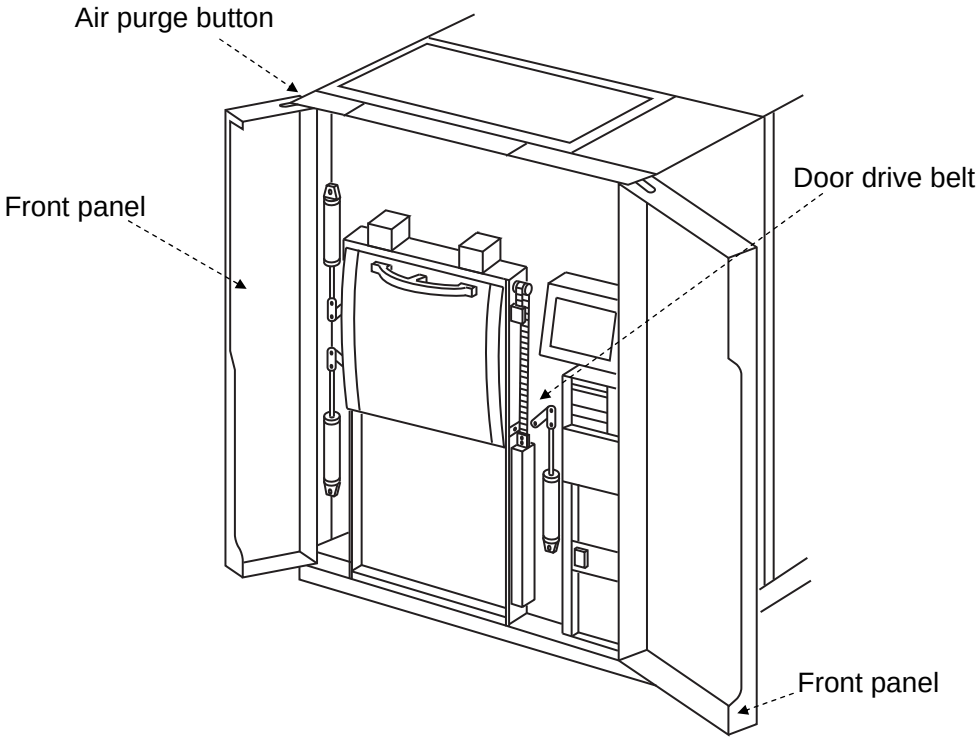


Fig. 6.9 Door drive belt

3. Press the air purge button in the front upper left-hand corner of the chamber.

4. Slide the door up and down, checking there are not cracks in either of the belts. If anything strange is detected, contact the place of purchase or ESPEC CORP.

5. Close the front right and left panels, and lock shut with the screws.

Refrigerator Oil Check

⚠ DANGER

- **Set the main power switch in the OFF position BEFORE detaching the rear panels.**
  The mechanical parts compartment contains rotating and drive parts. Detaching the rear panels with power ON can be extremely dangerous.

Check refrigerator oil once every 6 months, to maintain chamber functioning and performance.

Procedure

1. Check the main power switch is in the OFF position.
2. Detach the rear panels.
3. Check refrigerator oil on the level gauge at the bottom of the refrigerator.
   ・Oil level should appear within the gauge.
   ・The oil should not be discolored.
   If anything strange is detected in refrigerator oil, contact the place of purchase or ESPEC CORP.
4. Reattach the rear panels as before.

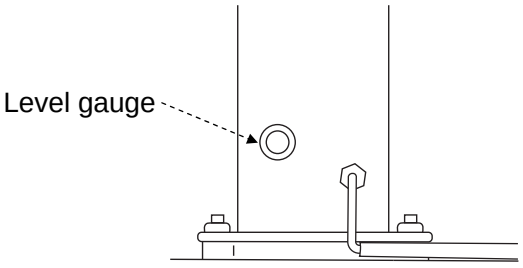


Fig. 6.10 Level gauge

Take-Down Before Long Periods of Disuse

Before long periods of disuse, do the following. Failure to do so can affect testing and shorten equipment service-life.

- Dry the test area (run the chamber).
- Set the main power switch in the OFF position and shut OFF primary power supply.

■Manual drying

Dry the test area and the low temperature chamber periodically.

Procedure

1. Check the main power switch is in the ON position.
2. Press the ○POWER key on the operating panel to activate power to the instrumentation.
   An opening screen will appear. Touch it anywhere to get the main menu.
3. Press the ○OPER/STOP key on the operating panel or the operating status box in the upper left-hand corner of the display. When the Operation Mode Selection screen appears on the display, press the [DRY MODE] button under Operation Mode and, when the message appears to confirm your choice, press the [Yes] button.
   Testing will start.
4. Start a dry cycle. The chamber will automatically stop when the time set for Dry Time on the Recovery Conditions screen (Chamber setup) elapses.
5. Press the ○POWER key on the operating panel.
   When the message appears to confirm your choice, press the [Yes] button. Power to the instrumentation will turn OFF.

■To shut OFF power

Set the chamber's main power switch in the OFF position and then shut OFF the primary power supply.

■To shut down cooling water supply (Water-cooled chambers only)

Stop cooling water supply at the source.

Procedure

1. Close the cooling water supply valve.
2. Shut OFF power to the cooling water supplier (cooling tower).

Compressor Pressure Check

Abnormal pressure of the compressor can lead to pressure switch trip and refrigeration circuit trouble. Check the pressure once a month.

Procedure

1. Check the main power switch is in the ON position.
2. Press the ○POWER key on the operating panel to activate power to the instrumentation.
   An opening screen will appear. Touch it anywhere to get the main menu.
3. Press the ○OPER/STOP key on the operating panel or the operating status box in the upper left-hand corner of the display. When the Operation Mode Selection screen appears on the display, press the [START TEST] or [SETUP ONLY] button under Operation Mode and, when the message appears to confirm your choice, press the [Yes] button.
   Operation will start.
4. Check the pressure is within the normal range 30 minutes after starting operation with the pressure gauge in the mechanical parts compartment.

Table 6.4 Pressure normal range

Pressure gauge	Normal range (MPa)
Low stage low pressure	-0.06 to +0.3
Low stage high pressure	+0.7 to +2.4
High stage low pressure	0 to +0.3
High stage high pressure	+0.7 to +2.6

5. Stop operation.
   Press the [STOP] button under ＜Stop Ope.＞.

Note Try correcting the trouble as explained in "HIGH STAGE REFRIG. PRESSURE" or "LOW STAGE REFRIG. PRESSURE" of "Table 7.1 Alarm Table".