

# Chapter 6

## Checks and maintenance

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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

### 6.1.1 Check list

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

If any of the following checks result is 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 a month<br>-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                     |

### 6.1.2 Maintenance list

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

Table 6.2 Maintenance list

| Maintenance item  | When to perform  |
|---|--|
| Water circuit leak check  | Once a day   |
| Test area cleaning  | -Before starting tests<br>-After every test  |
| Electrical/machinery compartment cleaning                             | Once a year  |
| Strainer element cleaning and replacement (Water-cooled chamber only) | -Once every 3 months (cleaning)<br>-When high stage high pressure ( $G_{11}$ ) exceeds 2 MPa. Read on gauge. |
| Cooling water circuit cleaning  | Once a year  |
| Fuse replacement  | Whenever a fuse blows  |
| Air filter cleaning and replacement                                   | -Once a month (cleaning)<br>-Once every 10,000 hours (replacement)   |
| Oil filter cleaning and replacement                                   | -Once a month (cleaning)<br>-Once every 10,000 hours (replacement)   |
| Door drive belt check   | Once a year  |
| Refrigerator oil check  | Once every 6 months  |
| Take-down before long periods of disuse                               | Before long periods of disuse  |
| Compressor pressure check   | Once a month   |
| Cleaning the air cooled condenser (Air-cooled chamber only)           | Once a month   |

### 6.1.3 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

| <b>Adjustment item</b>                                       | <b>When to adjust</b>                                 |
|--|---|
| 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 a year<br>Replacement: Once every 5 years |
| Chamber door opening/closing speed (optional automatic door) | Once every 2 years                                    |

## 6.2 Checks

### 6.2.1 Main power switch (breaker) trip test

Once a month and before long test runs, test trip of the main power switch (breaker) is necessary.

With the main power switch ON, press the test button. If the switch's lever falls to the middle position, the breaker is working properly.

200, 220 V AC specs.

380, 400, 415 V AC specs.

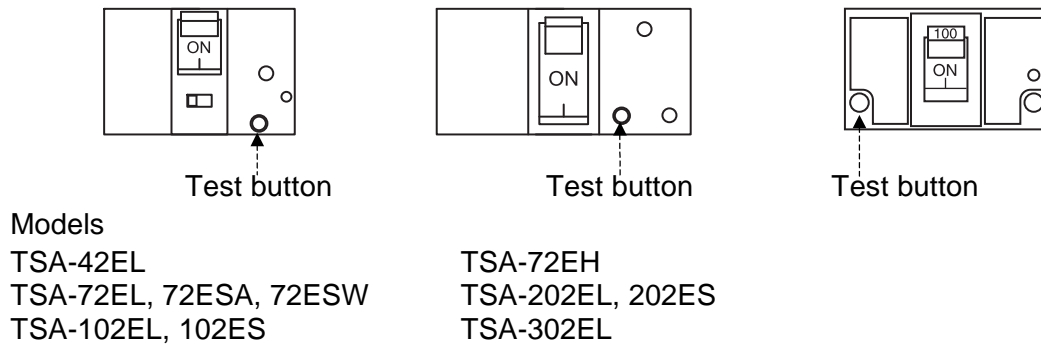


Fig. 6.1 Test button



#### 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.

### 6.2.2 Overheat protector trip test

Before every test, test trip of the overheat protector is necessary.

#### Procedure



1. Check the main power switch is ON.
2. Press the  key on the operation panel to activate power to the instrumentation.  
The starting screen will appear. Touch it anywhere to display the main menu.
3. Press the  key on the operation panel or the operating status box in the top left-hand corner of the screen. When the Operation Mode Selection screen appears, press the **START TEST** button below Operation Mode and, when the message appears to confirm your choice, press **Yes**.  
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 pop up when temperature inside the test area reaches the overheat protector setting.  
If no alarm triggers, 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 OFF and return the overheat protector to its usual setting.

### 6.2.3 Overcool protector trip test

Before every test, test trip of the overcool protector is necessary.



#### Procedure

1. Check the main power switch is ON.
2. Press the  key on the operation panel to activate power to the instrumentation.  
The starting screen will appear. Touch it anywhere to display the main menu.
3. Press the  key on the operation panel or the operating status box in the top left-hand corner of the screen. 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 **Yes**.  
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 pop up when temperature inside the test area reaches the overcool protector setting.  
If no alarm triggers, 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 OFF and return the overcool protector to its usual setting.

## 6.2.4 Water suspension relay trip test

Test the water suspension relay once every 3 months.

### Procedure

1. Check the main power switch is ON.
2. Press the  key on the operation panel to activate power to the instrumentation.  
The starting screen will appear. Touch it anywhere to display the main menu.
3. Press the  key on the operation panel or the operating status box in the top left-hand corner of the screen. 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 **Yes**.  
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 pop up. If no alarm triggers, 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 OFF and reopen the primary water supply valve.

## 6.3 Maintenance

### 6.3.1 Cleaning the air cooled condenser (air-cooled chamber only)

#### ⚠ WARNING

#### ❗ Set the main power switch OFF BEFORE detaching the rear panels.

The machinery compartment contains rotating and drive parts. Detaching the rear panels with power ON can be extremely dangerous.

#### ⚠ CAUTION

#### ⊘ Never touch the condenser fins with bare hands.

There is a risk of cutting your finger.

The air cooled condenser is clogged due to the dusty fins of the air cooled condenser on the rear. In this case, enough cooled air cannot enter the condenser. This reduces the performance and activates the security device to disable operations. In addition, if the condenser operates for a long time without any actions, the refrigerator might fail. Clean the condenser fins once per month.

- Procedure**
1. Set the main power switch off to stop the chamber, and then detach the rear panels.
  2. Vacuum up the dust on the slits of the rear panels and on the condenser fins with a vacuum cleaner.  
If dust cannot be removed, pour water on the condenser to clean it.

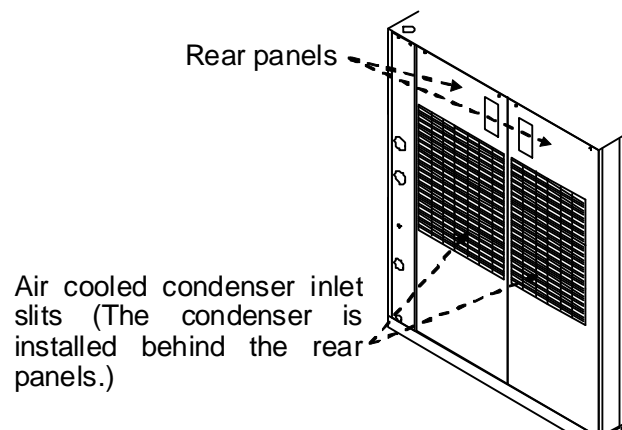


Fig. 6.2 Cleaning the slits of the rear panels and the condenser fins

3. Reattach the rear panels where they were.

**Note:** Do not bend the condenser fins. If the condenser fins are bent, heat cannot be normally exchanged and the performance of the chamber is reduced.

### 6.3.2 Water circuit leak check

If water has leaked from the water circuit, the installation place may become damaged, and the cause of troubles. Check for potential leaks once a day.

- Procedure**
1. Check for potential leaks from drain port.
  2. Check for potential leaks from the connection portions of strainer or nipple.

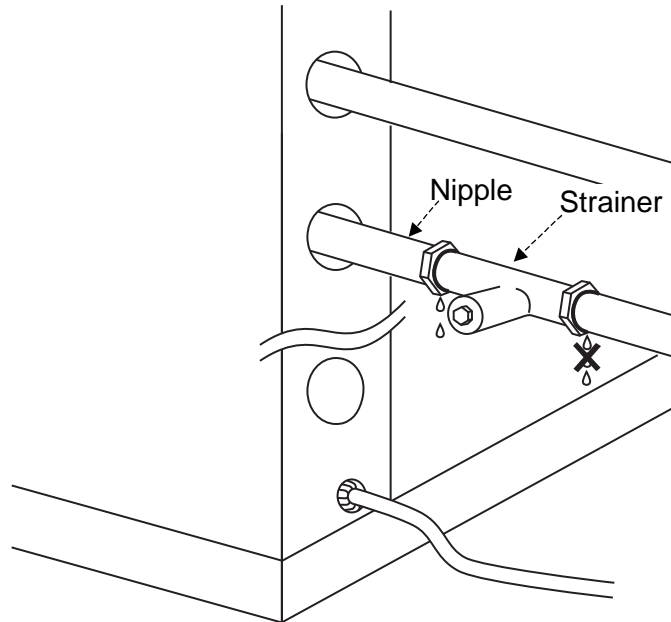


Fig. 6.3 Water circuit leak check

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

### 6.3.3 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 distort test results. Clean the test area before and after tests.

- Procedure**
1. Open the chamber door.
  2. Wipe the test area with a soft cloth.
  3. Close the chamber door.



### 6.3.4 Electrical/machinery compartment cleaning

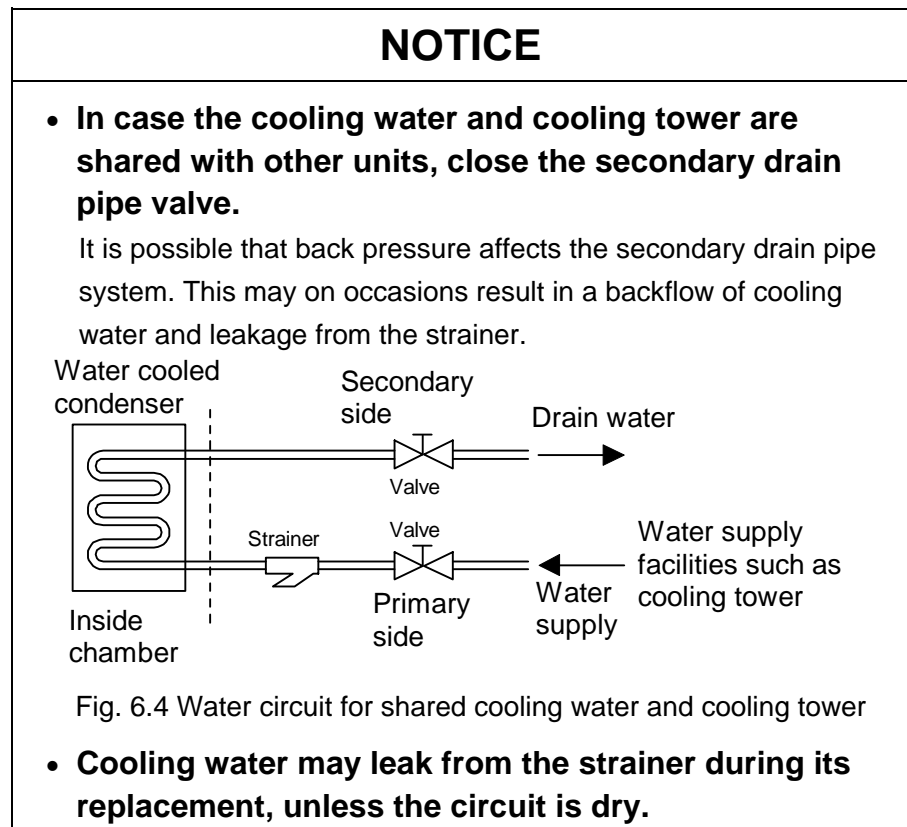
Dust deposits in the electrical or machinery compartment can lead to trouble. Clean compartments once a year.

- Procedure**
1. Check the main power switch is OFF.
  2. Open the electrical compartment and the machinery compartment.
  3. Vacuum up dust with a vacuum cleaner.
  4. Close both compartments.

### 6.3.5 Strainer element cleaning or replacement

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 3 months on the average and cleaned ready for reuse.

The need for strainer cleaning will vary according to cooling water quality, therefore check the strainer regularly.



- Procedure**
1. Shut off the primary water supply valve.  
If there is a valve on the secondary side, shut off this one as well.
  2. Place a container underneath the strainer to receive trapped water.
  3. Loosen the cap of the strainer and take out the element.

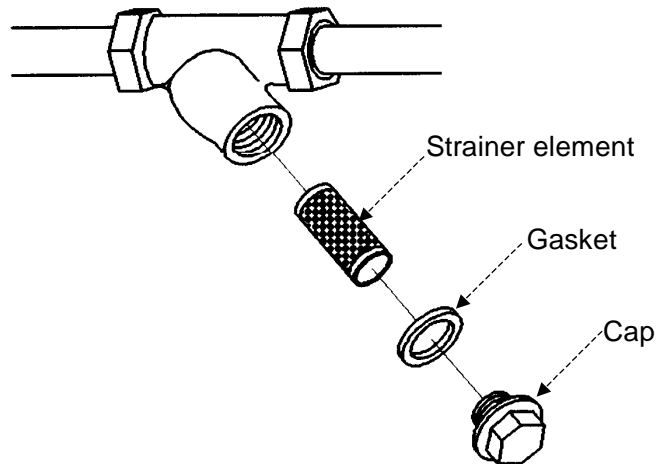


Fig. 6.5 Strainer assembly

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

### 6.3.6 Cooling water circuit cleaning

Scale accumulated inside of the piping may decrease the heat exchange capacity, leading to the high pressure switch tripping. Too much scale may cause condenser malfunction and replacement will be necessary in the worst case; therefore, clean the inside of the piping once a year. For cleaning, contact the place of purchase or ESPEC CORP. (Cleaning subject to billing.)

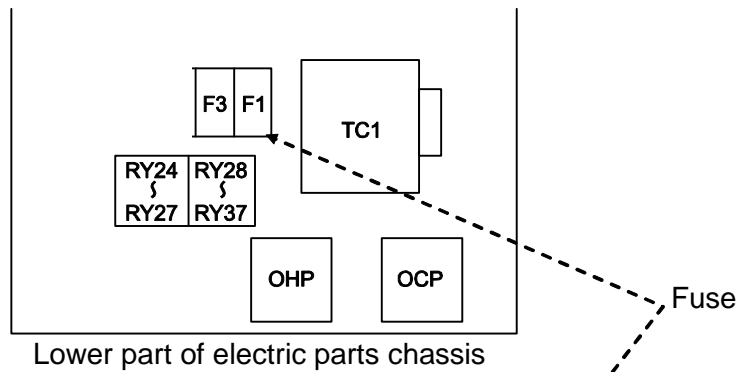
### 6.3.7 Fuse replacement

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 as power is turned back ON, contact the place of purchase or ESPEC CORP.

- Procedure**
1. Check the main power switch is OFF.
  2. Remove the screws that lock the electrical compartment panel, to open it.
  3. Replace the blown fuse by a new one.

<For TSA-42EL, 72EL, 72ES, 102EL, 102ES>



<For TSA-72EH, 202EL, 202ES, 302EL>

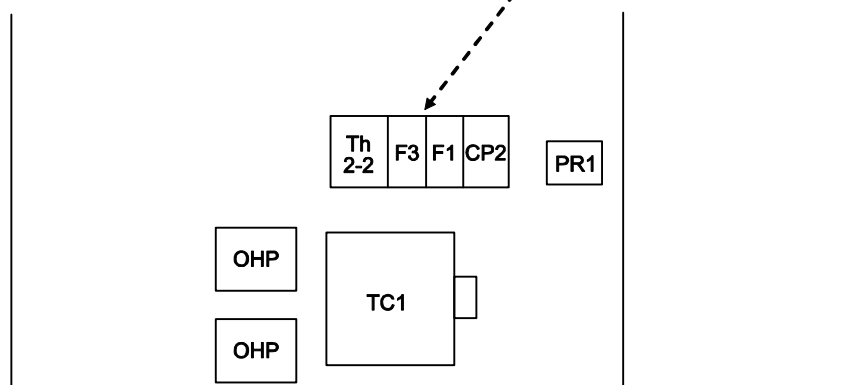


Fig. 6.6 Fuse replacement

4. Close the panel.

### 6.3.8 Air filter and oil filter cleaning and replacement

As dirt, tar, carbon, dust or other substances accumulate on the air and oil filters of the air circuit, drainage gets obstructed. Incomplete drainage may lead to trouble and even breakdown in air circuit parts.

Clean or replace the air filter and oil filter about once a month.

|   |
|---|
| <b>⚠ CAUTION</b>  |
| <ul style="list-style-type: none"><li>• <b>Check gauge pressure reads 0 MPa before detaching the bowl guards. Doing it under pressure is extremely dangerous.</b></li></ul> <p>If air remains in the air circuit, bowl guards can separate with sufficient vigor to injure someone.</p> |

- Procedure**
1. Check the main power switch is OFF.
  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 operation panel, to open it.
  4. Press the unlock part in the arrow direction and disconnect the tube from the air cylinder to bleed off trapped air.

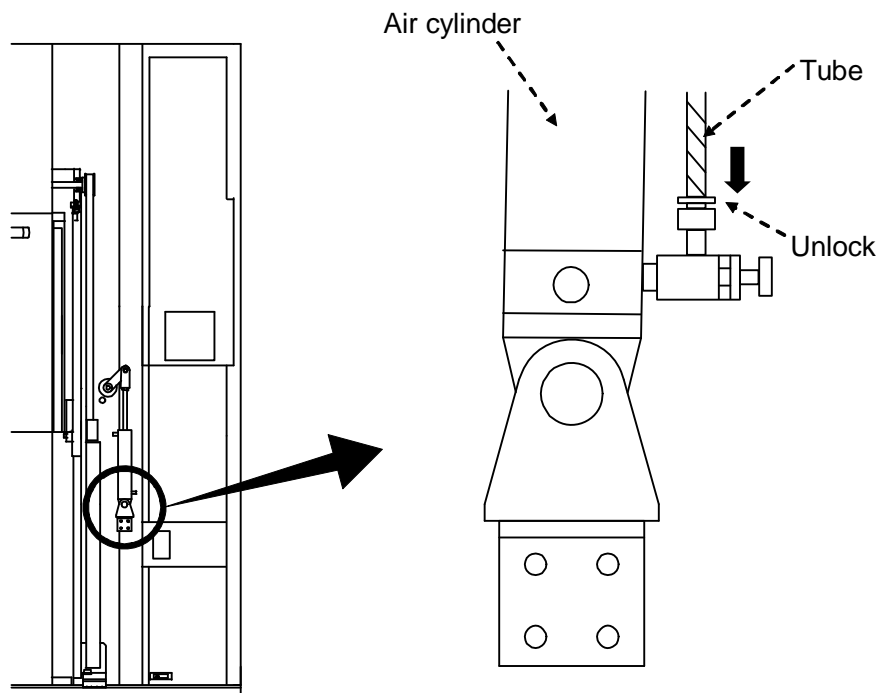


Fig. 6.7 Disconnection of the tube from the air cylinder

5. Open the machinery compartment door.
6. Press on the bowl guard lock and turn to the ▽ mark; detach the bowl guard.

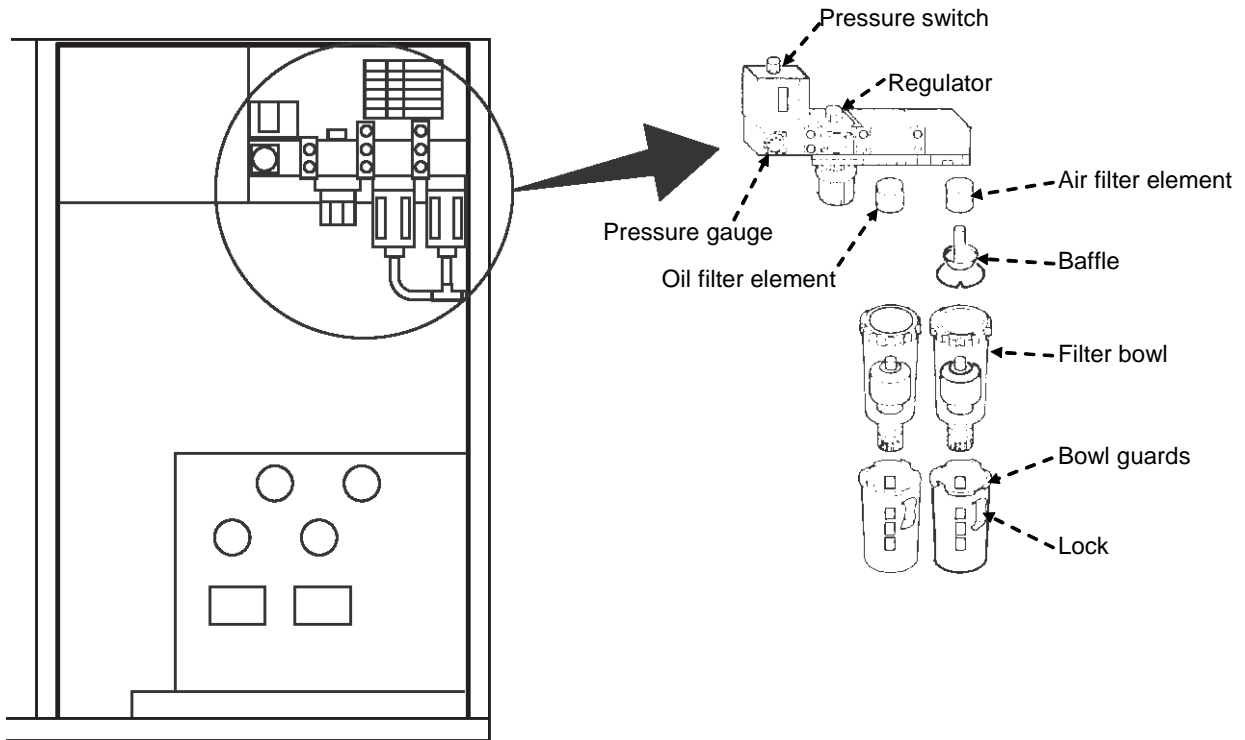


Fig. 6.8 Bowl guards assembly

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, oil filter bowls and the air filter element with a neutral detergent; 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.)

### 6.3.9 Door drive belt check

Check the door drive belt once a year.

- Procedure**
1. Check the main power switch is OFF.
  2. Remove the screws that lock the front right and left panels to open them.

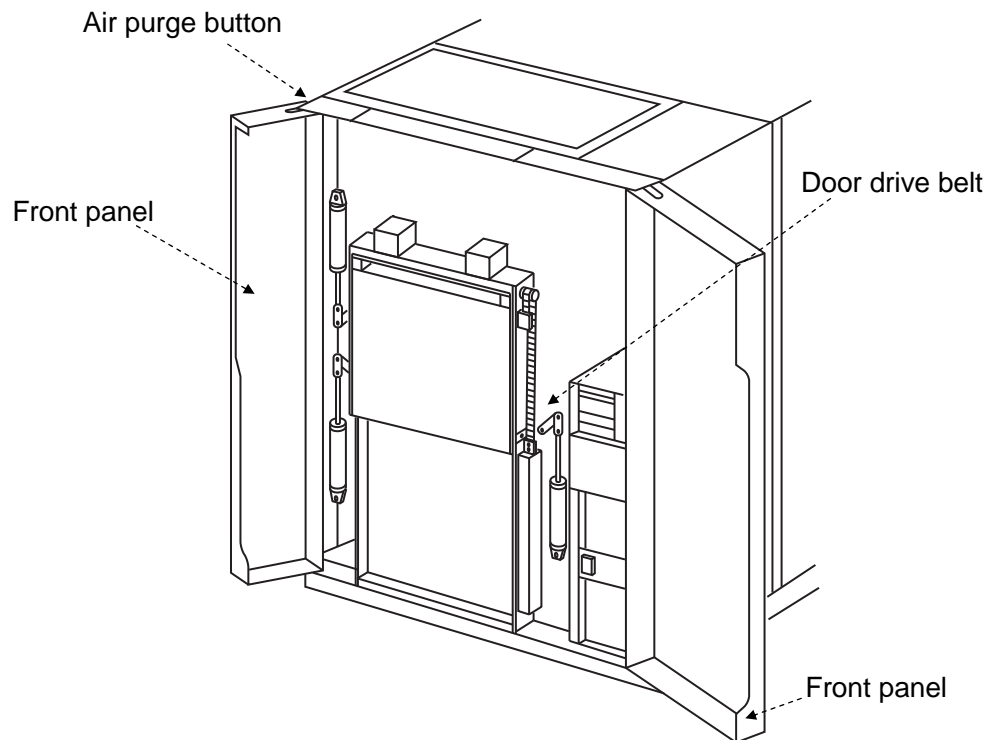



Fig. 6.9 Door drive belt

3. Press the air purge button in the top left-hand corner of the chamber front.
4. Slide the door up and down, checking there are no 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 with the screws.

### 6.3.10 Refrigerator oil check

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

#### **WARNING**

 **Set the main power switch OFF BEFORE detaching the rear panels.**

The machinery compartment contains rotating and drive parts. Detaching the rear panels with power ON can be extremely dangerous.

- Procedure**
1. Check the main power switch is OFF.
  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.

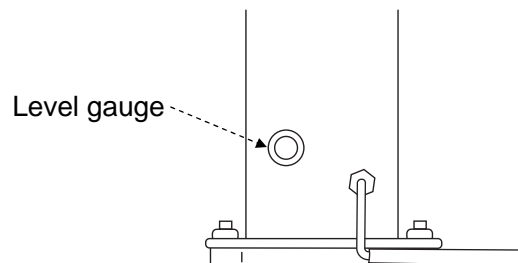


Fig. 6.10 Level gauge

### 6.3.11 Arrangement before long periods of disuse




Before long periods of disuse, follow below procedure. Failing to do so can affect testing and shorten equipment service-life.

- Dry the test area (run the chamber).
- Set the main power switch OFF, shut OFF the primary power supply and prevent the main power switch from being accidentally operated by using the breaker handle stopper.

#### (1) Manual drying

Dry the test area and the cold chamber periodically.

#### Procedure

1. Check the main power switch is ON.
2. Press the  key on the operation panel to activate power to the instrumentation.  
The starting screen will appear. Touch it anywhere to display the main menu.
3. Press the  key on the operation panel or the operating status box in the top left-hand corner of the screen. When the Operation Mode Selection screen appears on the display, press the **DRY MODE** button below Operation Mode. A screen will pop-up to confirm your selection. Press **Yes**.  
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  key on the operation panel.  
A screen will pop-up to confirm your selection. Press **Yes**. Power to the instrumentation will turn OFF.

#### (2) To shut power OFF

#### Procedure

1. Set the main power switch OFF.
2. Prepare the breaker handle stopper.

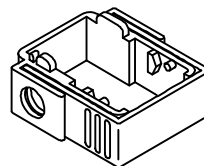


Fig. 6.11 Breaker handle stopper



3. Pull the tab to open the breaker handle stopper, and then fit over the main power switch lever.

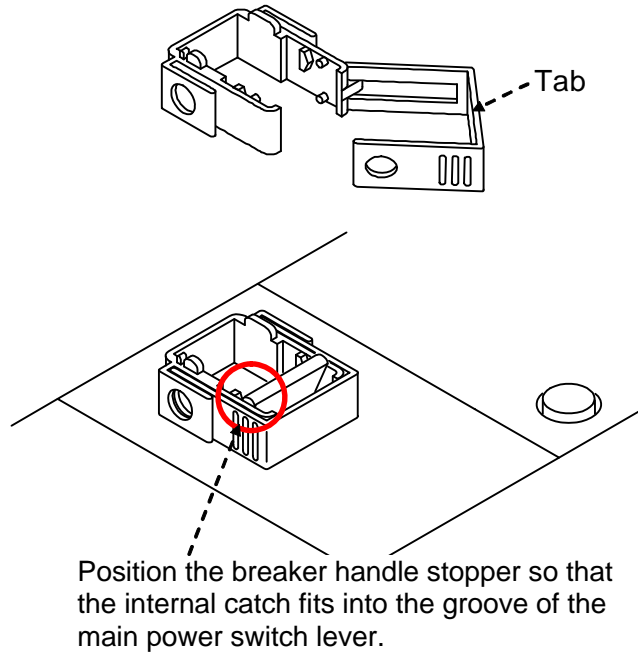


Fig. 6.12 Attaching breaker handle stopper - 1

4. Return the tab to its original position.

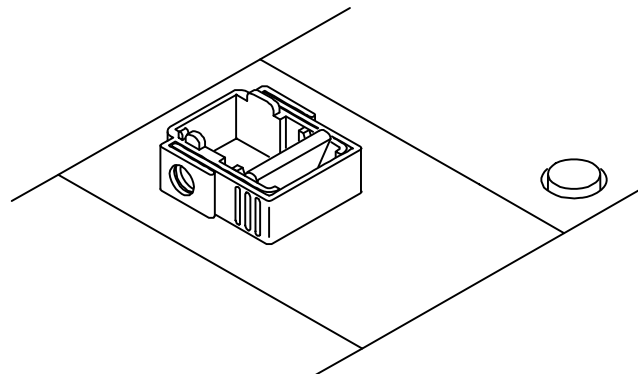


Fig. 6.13 Attaching breaker handle stopper - 2

5. Shut OFF the primary power supply.
6. Close the cooling water supply valve.
7. Shut OFF the power supply to the water supply system (cooling tower).

### 6.3.12 Compressor pressure check

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


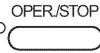
- Procedure**
1. Check the main power switch is ON.
  2. Press the  key on the operation panel to activate power to the instrumentation.  
The starting screen will appear. Touch it anywhere to display the main menu.
  3. Press the  key on the operation panel or the operating status box in the top left-hand corner of the screen. When the Operation Mode Selection screen appears on the display, press the **START TEST** or **SETUP ONLY** button below Operation Mode. A screen will pop-up to confirm your selection. Press **Yes**.  
Operation will start.
  4. Check the pressure is within the normal range 30 minutes after starting operation, by verifying the pressure gauge in the machinery compartment.

Table 6.4 Pressure normal range

| Pressure gauge           | Normal range (MPa) |               |
|--------------------------|--------------------|---------------|
|                          | Air-cooled         | Water-cooled  |
| Low stage low pressure   | -0.04 to 0.60      | -0.04 to 0.60 |
| Low stage high pressure  | 0.40 to 2.10       | 0.50 to 2.10  |
| High stage low pressure  | -0.04 to 0.80      | -0.04 to 0.70 |
| High stage high pressure | 0.70 to 2.60       | 1.00 to 2.10  |

5. Stop operation.  
Press the **STOP** button below <Stop Ope.>.

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