



# Gas Heat Pump Air Conditioner

Periodic Inspections, Periodic Parts Replacement Manual

March 2008

## Applicable Models

### W MULTI

SGP-EW120M2G2W  
SGP-EW150M2G2W  
SGP-EW190M2G2W  
SGP-EW240M2G2W

### 3WAY MULTI

SGP-EZ150M2G2  
SGP-EZ190M2G2  
SGP-EZ240M2G2

SANYO Electric Co., Ltd.

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# 1. Periodic Inspections, Periodic Parts Replacement Work

## (1) Gas Heat Pump Air Conditioner

A gas-fueled engine drives the compressor that is the heart of the gas heat pump air conditioner (GHP) system. The use of a gas engine offers several advantages:

- Because there is no defrost operation, stable heating is possible even when external temperatures are low.
  - As shown below, electric power consumption is relatively low (when heating with 60 Hz power source) and reduces the load on power receiving equipment.
- \* Types 120, 150, 190 : 1.12 kW (approx.)  
\* Type 240 : 1.58 kW (approx.)

However, just like a car engine, periodic inspections by a specialized serviceperson are required to ensure trouble free operation of the system. Make sure all periodic inspections are performed.

## (2) Periodic Inspections and Their Scheduling

### ① Warranty Period

The equipment is covered by warranty for 1 year after completion of test run and delivery. However the engine itself and periodically replaceable parts are covered by warranty for one year or 2,000 hours of operation (whichever is shorter) after completion of test run and delivery.

### ② Inspection Menu for Periodic Inspection Contract

Since periodic inspections are necessary to ensure long-term trouble free use of the gas heat pump air conditioner (GHP) after the warranty term ends, Sanyo has prepared the menu of inspections shown below. Please note that the service contract for periodic inspections only includes the inspections shown in the table below. Service calls for malfunctions will be charged separately.

Itemization and Schedule of Periodic Inspections and Periodic Parts Replacement				Remarks
Number of years passed or total hours of operation		5 years or 10,000 hours	10 years or 20,000 hours	
Maintenance item			Periodic Inspection	Periodic Inspection
1	E/G oil	①Replace	<input type="radio"/>	<input type="radio"/>
		②Leak check	<input type="radio"/>	<input type="radio"/>
2	E/G system inspection	①Valve clearance adjustment	<input type="radio"/>	<input type="radio"/>
		②Start-up check	<input type="radio"/>	<input type="radio"/>
		③Abnormal noise, vibration check	<input type="radio"/>	<input type="radio"/>
		④Harness check	<input type="radio"/>	<input type="radio"/>
3	Coolant	①Check (condition, amount), replenish	<input type="radio"/>	<input type="radio"/>
4	Drain filter	①Replenish, clean, oil absorption sheets change	<input type="radio"/>	<input type="radio"/>
5	Inspect fuel system	①Check for gas leaks	<input type="radio"/>	<input type="radio"/>
6	Inspect refrigeration system	①Check for gas leaks	<input type="radio"/>	<input type="radio"/>
7	Control program version check		<input type="radio"/>	<input type="radio"/>
8	Collect and record operation data		<input type="radio"/>	<input type="radio"/>
9	Periodic replacement parts	①Oil filter	<input type="radio"/>	<input type="radio"/>
		②Air cleaner element	<input type="radio"/>	<input type="radio"/>
		③Spark plugs	<input type="radio"/>	<input type="radio"/>
		④Compressor drive belt	<input type="radio"/>	<input type="radio"/>
		⑤Oil absorbent mat	<input type="radio"/>	<input type="radio"/>
		⑥Oil absorbent tube	<input type="radio"/>	<input type="radio"/>

Note 1: "Periodic inspection" refers to 1 entire inspection of the items marked with in the table, including replacement of periodically replaceable parts. This inspection will be performed at either 10,000 hours of operation or at 5 years, whichever comes first.

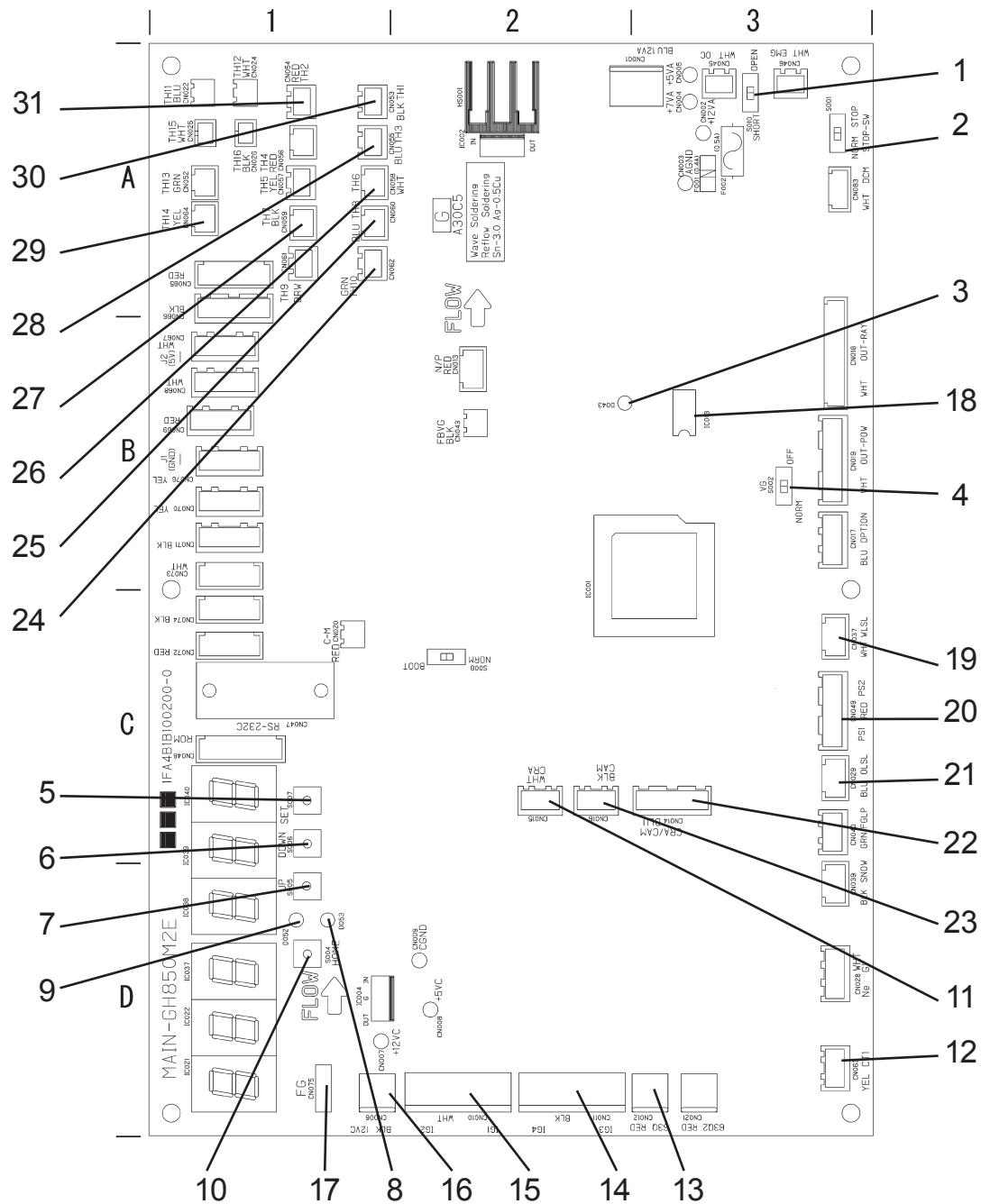
Note 2: The periodic inspection contract is renewable as long as the parts necessary to use the equipment are available. In this case, however, if parts that are not periodically replaceable parts must be replaced, the cost of those parts and the expense of replacement will be charged separately.

Note 3: When the hours of operation reach 30,000 hours, Sanyo will arrange for "refresh maintenance." This may be repeated for up to 13 years (if 13 years are exceeded, the equipment is replaced). Furthermore, a periodic inspection is required either 10,000 hours of operation or 5 years after "refresh maintenance," whichever comes first. For details, contact the person responsible for inspecting the equipment.

### ③ Miscellaneous

Indoor and outdoor heat exchanger cleaning is generally required once every 3 - 4 years. However, this varies according to the level of contamination, type of industry, and installation conditions. If foreign matter or dust adheres to indoor or outdoor heat exchanger fins, it will degrade performance and cause malfunctions. Cleaning must be performed to ensure proper use of the air conditioner. Cleaning costs are estimated separately.

**(3) Outdoor main board switch and LED arrangement diagram**



No.	Name	No.	Name
1	Terminating resistance ON/OFF switch (S010)	17	CN075
2	STOP SW (S001)	18	EEPROM
3	Indoor/outdoor communication monitor (D043)	19	CN037 (white)
4	Fuel gas solenoid valve force close switch (S002)	20	CN049 (red) Compressor outlet/inlet pressure sensors PS1: Inlet, PS2: outlet
5	SET key (S007)	21	CN029 (blue)
6	DOWN key (S006)	22	CN014 (blue)
7	UP key (S005)	23	CN016 (black)
8	LEVEL LED (D053)	24	CN062 (green) Hot water outlet temperature
9	TEST/WARNING LED (D052)	25	CN060 (blue) Clutch coil temperature
10	HOME key (S004)	26	CN058 (white) Coolant temperature
11	CN015 (white)	27	CN059 (black) Outdoor air temperature
12	CN063 (yellow)	28	CN055 (blue) Heat exchanger inlet temperature
13	CN012 (red)	29	CN064 (yellow) Clutch 2 coil temperature
14	CN011 (black)	30	CN053 (black) Compressor inlet temperature
15	CN010 (white)	31	CN054 (red) Compressor outlet temperature
16	CN006 (black)		

#### (4) Basic Operations for Periodic Inspection Work

All work other than when the STOP (all stop) switch (S001) is set to STOP and the VG (fuel solenoid valve forced off switch) switch (S002) is set to OFF should be performed with the HOME (S004), SET (S007), UP (S005), and DOWN (S006) keys.

It is extremely dangerous if the customer performs an operation that runs the engine during a maintenance inspection or when not expected. Make sure you stop operation during work in the way described below.

- \* **Pressing the HOME (S004) key for 1 second or more forcefully returns the state to the initial state. The value of a partially set item will be discarded, and the item number will return to "0000."**
- \* **If there is no operation for 10 minutes when other than the "0000" item number is displayed, the value of a partially set item will be discarded, and the item number will return to "0000."**

##### ① Backup operation during maintenance work (for W MULTI)

- What is backup operation?

In the GHP W MULTI series, multiple outdoor units are connected to the same refrigerant tube. Therefore, even during maintenance work of an outdoor unit, the other outdoor unit not required in maintenance work can be used to keep the indoor operating conditions. This is called a backup operation.

- Backup operation procedure

To perform backup operation, the outdoor unit for maintenance work (hereafter referred to as "target outdoor unit") must be cut off from the system using the following procedure. Review content of the maintenance work and then select the most suitable method. Also, after the maintenance work is finished, always refer to [System recovery procedure] and then return the system to its normal state.

##### [Backup operation procedure]

###### To turn off power of target outdoor unit and then perform maintenance work (basic operation during inspection of outdoor unit)

###### « Important »

This is the basic operation performed during inspection work. If this operation is not performed and the power of the outdoor unit is turned off, this will cause system fault and prevent backup operation to be carried out, and serious malfunction will occur. If this happens, see [System recovery procedure] to recover the system, and then once again use the following procedure to perform setup. Automatic backup operation will kick in.

###### « Step 1 »

On the outdoor main board of the target outdoor unit, set the STOP switch (S001) to "STOP". \*1

###### « Step 2 »

(After confirming that the engine of the target outdoor unit is stopped) close the valves of refrigerant gas tube, refrigerant gas liquid tube, and balance tube.

###### « Step 3 »

On the outdoor main board of the target outdoor unit, set the STOP switch (S001) to "STOP". Wait for three minutes or more and then turn off the circuit breaker of the target outdoor unit. \*2

Start maintenance work.

\* 1) Sometimes all outdoor units may stop. If there is operation input, outdoor units other than the target one will start operation again after approximately five minutes. (For details on the settings, see the next item.)

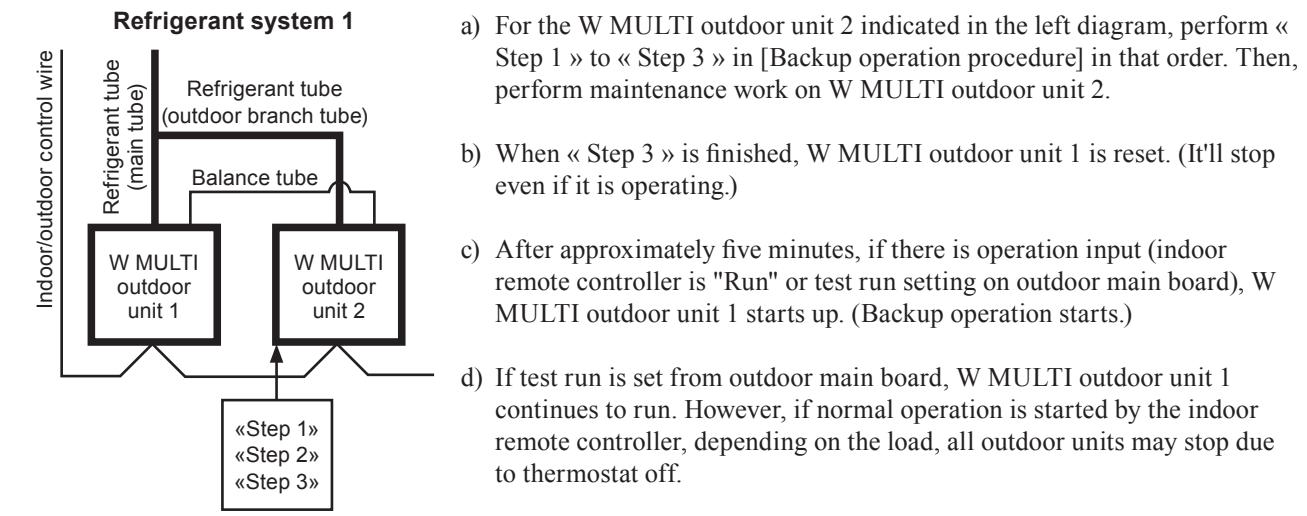
\* 2) Always carry out the following three tasks.

① **Check to make sure « Step 2 » is finished.** If the shut-off valve is opened, refrigerant will flow from the other outdoor unit to the target outdoor unit, causing serious malfunction.

② **After 3 minutes has elapsed from completion of « Step 1 »,** check to make sure the outdoor main board displays "P F F" and then perform this operation. If you turn off the power immediately after performing "STOP" setting, the entire system will stop. (Backup operation cannot be performed.) If this happens, see [System recovery procedure], recover the system, and then start over again starting from « Step 1 ».

③ There will not be any problem whether the circuit breaker of the outdoor unit in « Step 3 » is ON or OFF. Select one of them according to the work required.

[Work example] Perform maintenance on W MULTI outdoor unit 2 in refrigerant system 1.



#### [System recovery procedure]

If backup operation has been performed, by all means check the following items after the maintenance work, and then perform settings again to return the system to its normal state.

- 1) Check to make sure all shutoff valves of refrigerant gas tube, refrigerant liquid tube, and balance tube of the outdoor unit are opened.
- 2) Check to make sure the STOP switch (S001) on the outdoor main board is set to "NORM".
- 3) If the power of the outdoor unit has been turned off, turn on the circuit breaker.
- 4) If "Test run" (No.4 テ E ハ E - C o o L / H E R E ) is set, cancel it.  
\* When adjusting to No.4 テ E ハ E - C o o L / H E R E , if TEST/WARNING LED (D052) lights, this means "Test run" is being set. In this state, press the SET (S007) key for one second or more. The setting will be canceled (TEST/WARNING LED (D052) goes off.)

#### ② Engine Stop

Forcibly turns off the thermostat of all operating indoor units, and stops outdoor units.

(STOP SW (S001) is normally set to "NORMAL".)

- 1) Move STOP SW (S001) from "NORMAL" to "STOP" (Figure 1). "P R u ハ E" will appear on the 7-segment LED display (Figure 2).

On a W MULTI, the 7-segment LED display shown in Figure 3 ("P R u ハ E") replaces that shown in Figure 2 ("P o F F") when 3 minutes have elapsed.

- 2) The all stop operation starts.

Note: During all stop, the outdoor unit will not start even when directed to do so by the indoor unit.

- 3) Turn off the power supply circuit breaker for the outdoor unit.

#### ③ Canceling Engine Stop

- 1) Move the STOP SW (S001) from "STOP" to "NORMAL".
- 2) Turn on the power supply circuit breaker for the outdoor unit. The all stop will be canceled, and the engine will start.



S001  
NORM STOP  
STOP-SW  
Figure 1

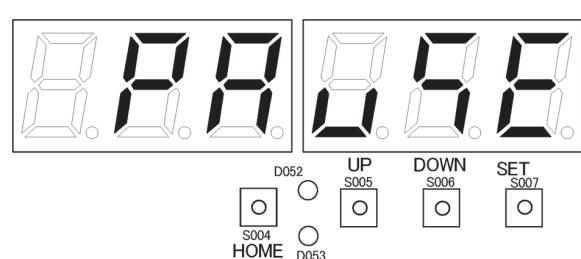


Figure 2

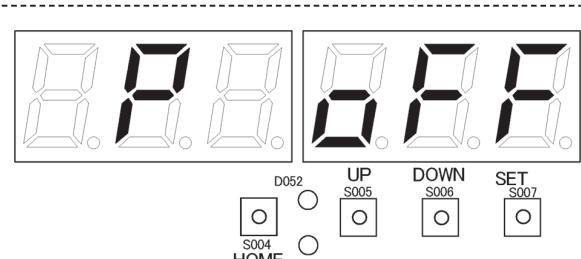


Figure 3

#### ④ Engine Oil Use Time Reset Method

Make sure to perform this procedure after checking (replenishing, changing) the engine oil.

- 1) Press the HOME (S004) key for one second or more.  
The menu display will show item number “ **¤ ¤ ¤ ¤** ”
- 2) Next, press the UP (S005) and DOWN (S006) key, displaying the menu item numbers. Go to menu item “ **¤ ¤ ¤ 2.** ”
- 3) After menu item number “ **¤ ¤ ¤ 2.** ” appears, the oil use time will be displayed. Press the SET (S007) key.
- 4) When the SET (S007) key is pressed with the oil use time displayed (Figure 3), the next display appears. By pressing the UP (S005) key or DOWN (S006) key in this mode, the oil use time display clear setting or the forced oil replenishment setting can be selected. Select the setting to clear oil use time display (“ **¤ 1 0 1 0 0** ” on the 7-segment LED display).

	Display	Function
↑DOWN ↓UP	<b>¤ 1 0 1 0 0</b>	Oil use time display clear setting
	<b>¤ 1 L R d d</b>	Forcible oil replenishment setting

#### 5) Clearing the Oil Use Time Display

When the SET (S007) key is pressed for 1 second or more while the oil use time display is selected, “ **£ £ r** ” will appear on the 7-segment LED display (Figure 4).

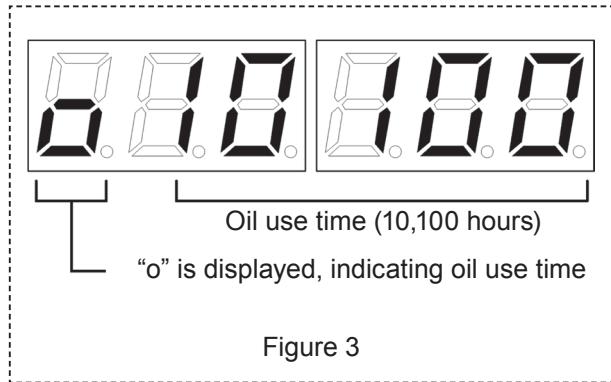


Figure 3

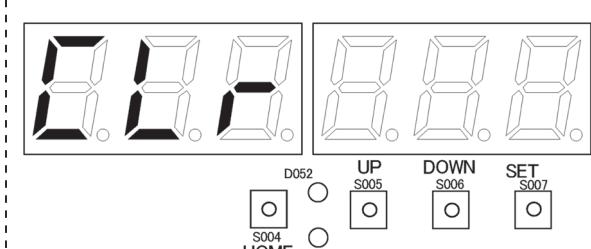


Figure 4

- 6) Release the SET (S007) key once “ **£ £ r** ” is displayed, then quickly hold it down again. “ **E n d** ” will be displayed (Figure 5), and the oil use time will be reset to 0 hours. Next the oil use time will be displayed and can be checked.

Note: If the oil use time does not return to 0 hours, perform the procedure again.

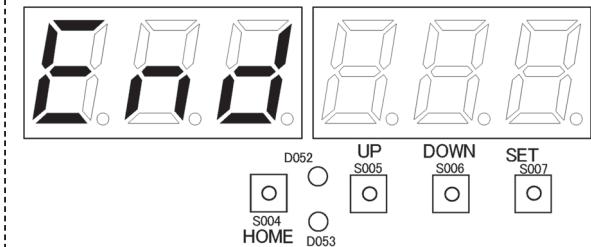


Figure 5

#### ⑤ Operating the Fuel Gas Solenoid Valve Forced Off Switch

This VG switch (S002) is used to forcibly close the gas solenoid valve (Figure 6).

«This switch should normally be set to “NORMAL”. »

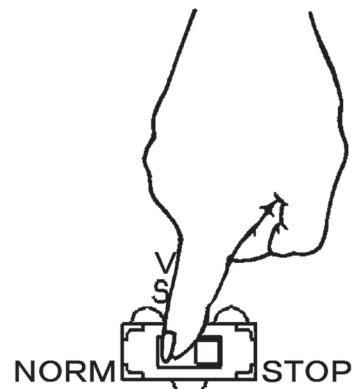


Figure 6

## ⑥ Coolant Circulation Operation

This operation forcibly drives the coolant pump and the coolant electric three-way valve. It is used for refilling coolant and for removing air from the coolant circuit.

Note: Check that the coolant circuit contains some coolant before performing this operation. The pump may be damaged if forced operation is started without any coolant.

1) Press the HOME (S004) key for 1 second or more. The menu item number “**¤ ¤ ¤ ¤**” will be displayed.

2) Next press the UP (S005), DOWN (S006) keys to display menu item number “**¤ ¤ ¤ ¶**”

3) After “**¤ ¤ ¤ ¶**” the test run/forced setting display

“**£ E 5 £**” will appear (Figure 7). Press the SET (S007) key while “**£ E 5 £**” is displayed.

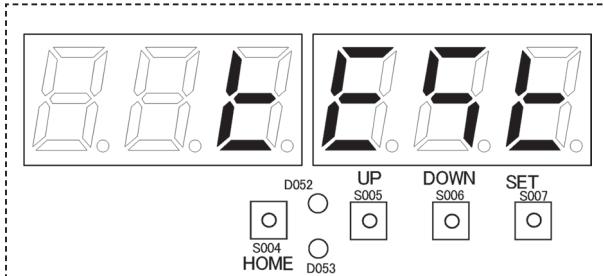


Figure 7

4) Press the SET (S007) key in the forced cooling test run setting mode to select one of the displays shown in the table below. Press the UP (S005) or DOWN (S006) key to select “**P u n P**” (forced coolant circulation setting). (Figure 8)

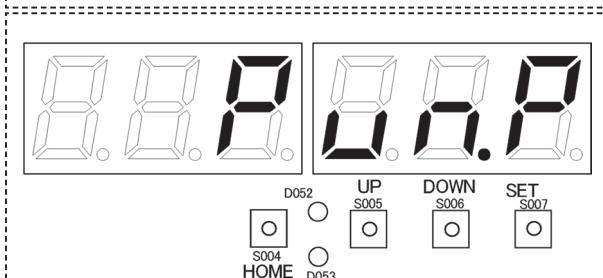


Figure 8

	Display	Function
↑DOWN ↓UP	<b>C o o L</b>	Forced cooling test run setting
	<b>H E A R t</b>	Forced heating test run setting
	<b>U o P E n</b>	Forced valve opening setting
	<b>P u n P</b>	Forced coolant circulation setting
	<b>B E L o S E</b>	Forced bypass valve closing
	<b>£ E A i r</b>	Coolant air bleed mode
	<b>E £ P A r</b>	Forced engine distributor mode
	<b>E F E E d</b>	Forced engine feedback
	<b>E E L o S E</b>	Forced engine adjustment valve closing
	<b>o i L O E E</b>	Forced compressor oil replenish (W MULTI)
	<b>o i L O . U</b>	Forced compressor oil supply (W MULTI)
	<b>o U r d E F</b>	Forced outdoor defrosting
	<b>d . 5 P 5</b>	Ignore pressure sensor
	<b>G R 5 o F F</b>	Force fuel gas solenoid valve off

## 5) Setting and Canceling Forced Coolant Circulation Operation

Press the SET (S007) key for 1 second or more while forced coolant circulation setting is selected. The coolant pump will operate and the coolant electric three-way valve will cycle repeatedly through closing completely for 3 minutes, then opening completely for 1 minute and 15 seconds. During this time, the forced setting in progress display will appear (the TEST/WARNING LED (D052) will light). To cancel the forced coolant circulation setting, press the SET (S007) key for 1 second or more. The forced setting in progress display will be cleared (the TEST/WARNING LED (D052) will go out) and the display will return to the forced setting selection operation.

## ⑦ Forced Rotational Speed Setting Operation

This setting is used to forcibly fix the revolution of engine when doing test runs.

- 1) Press the HOME (S004) key for one second or more. The menu item number “ **8.8.8.8.** ” will be displayed.
- 2) Next press the UP (S005) and DOWN (S006) keys to display menu item number “ **8.8.8.8.** ”
- 3) Press the SET (S007) key while “ **8.8.8.8.** ” is displayed. The forced engine revolution setting display “ **TEST** ” will appear (Figure 9).
- 4) When the SET (S007) key is pressed in this mode, the following displays will cycle in sequence at 1-second intervals.

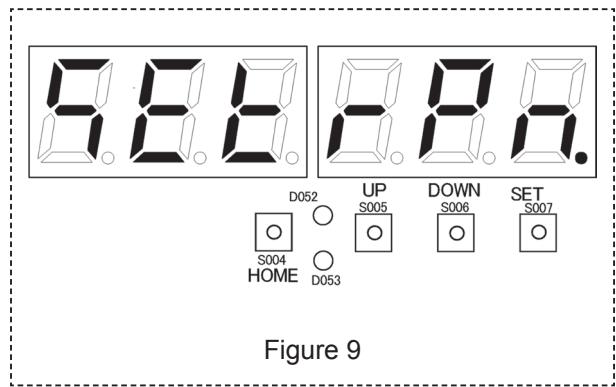


Figure 9

Display	Function
<b>8.8.8.8.</b>	Forced engine revolutions (example: 1400 min <sup>-1</sup> )
<b>8.8.8.8.</b>	Engine revolutions (example: 1400 min <sup>-1</sup> )
<b>8.8.8.8.</b>	Compressor inlet pressure (example: 0.56 Mpa)
<b>8.8.8.8.</b>	Compressor outlet pressure (example: 0.56 Mpa)
<b>8.8.8.8.</b>	Compressor outlet temperature (example: 85.0°C)

## 5) Setting and Canceling Forced Rotational Speed

Select forced engine revolutions using the UP (S005) and DOWN (S006) keys.

The speed can be set within the range from the minimum speed to the maximum speed of the engine, in units of 100 revolutions. With the speed selected, press the SET (S007) key for 1 second or more. The selected speed will be fixed as the forced engine revolutions. During this time, the forced setting in progress display will appear (the TEST/WARNING LED (D052) will light).

To cancel the forced engine revolution setting, press the SET (S007) key for 1 second or more. The forced setting in progress display will be cleared (the TEST/WARNING LED (D052) will go out) and the display will return to the forced setting selection operation.

## ⑧ Test Run Procedure

This setting is used to perform a test run from the outdoor unit.

- 1) Set all remote controller switches to “Stop”.
- 2) Select “ **C. O. O. L.** ” (forced cooling test run) or “ **H. E. R. E.** ” (forced heating test run). For details see steps 1) to 4) on page I-7.
- 3) Setting and Canceling a Forced Test Run  
When “ **C. O. O. L.** ” (forced cooling test run) or “ **H. E. R. E.** ” (forced heating test run) is selected, holding down the SET (S007) key 1 second or longer causes the forced setting to appear (TEST/WARNING LED (D052) before a test run starts. To cancel forced test run operation, hold down the SET (S007) key for 1 second or longer. This clears the forced setting (TEST/WARNING LED (D052) goes off) and the forced setting selection reappears.

## 2. Periodic Inspection and Periodic Replacement Work Manual

Periodic inspections and replacements are very important for ensuring that users can enjoy long and trouble-free service from Sanyo gas heat pump air conditioners.

### (1) Engine Oil Replenishment and Oil Filter Replacement



#### Safety Precautions

**Stopping only the indoor unit is extremely dangerous because the engine may suddenly start if the customer operates the remote controller on the indoor unit side. Before carrying out work on the inside of the outdoor unit, make sure you turn off the power supply circuit breaker of the outdoor unit. (However, if a system controller or other centralized control device is being used, an abnormal communications error may be generated.) Alternatively, perform the STOP operation for the outdoor unit.**

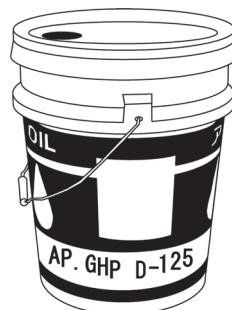
- Engine and model number relationship

Engine name	Model No.
K25 (Nissan engine)	SGP-EW120/150/190/240M2G2W (W MULTI) SGP-EZ150/190/240M2G2W (3WAY MULTI)

For details on how and when to perform engine oil inspection, replenishment and replacement, see attached table Chapter [2 (2)].

- ① Use Sanyo genuine oil for the engine oil.

- Idemitsu Kosan (Co., Ltd.)  
Sanyo Genuine AP. GHP D-125
- Nippon Oil Corporation  
Sanyo Genuine GHP Oil 10TH
- COSMO OIL LUBRICANTS Co., Ltd.  
Sanyo Genuine GHP Oil 10W30C2



- ② Engine oil and oil filter replacement period

Replace the engine oil and oil filter every five years or 10,000 operating hours, whichever comes first.

Figure 1 SANYO genuine gas engine oil

- ③ The following tools, parts, and materials are required for doing this work. Prepare them before starting:

	Name	Specification	Q'ty	Remarks
Parts, Materials	Sanyo genuine oil	D-125 10TH 10W30C2	46 liters	·Sanyo Genuine AP. GHP D-125 ·Sanyo Genuine GHP Oil 10TH ·Sanyo Genuine GHP Oil 10W30C2
	Oil filter	For models with a K25 engine 638-012-7993	1	
	Waste Oil container		As needed	
	Rags		As needed	
Tools	Screwdrivers	No-3 Phillips, No-2 flat	1 each	
	Closed wrench	19mm	1	
	Oil pump or hand pump		1	
	Filter wrench		1	
	Oil container with narrow spout	5 liters	1	
	Tray (Oil drain basin)		1	
	Pliers		1	

④ Replace oil filter

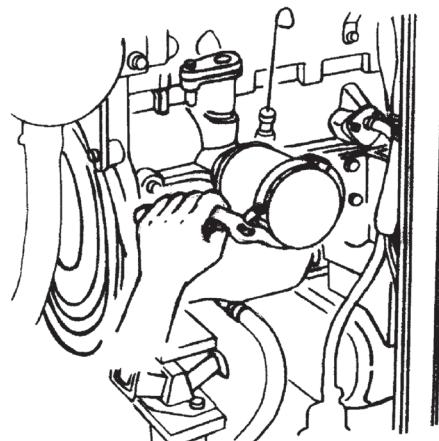
Replace the oil filter when the oil is changed.

1) Remove the oil filter

- Because oil remaining in the filter will spill when the filter is removed, position a tray (oil drain basin) below the filter when removing it.

- Use a filter wrench to remove the oil filter (Figure 2).

Take care not to damage the stud bolts that hold the filter in place when using a screwdriver or other tool to turn the oil filter during filter removal.



For models with a K25 engine

Figure 2 Detaching the oil filter

2) Install the new oil filter

- Apply fresh engine oil thinly and evenly to the O-ring of the new filter (Figure 3).

- During oil filter installation, turn the filter two, three or more times after the packing is seated in the engine to tighten it. (See Figure 4.)

- Use a rag to wipe up spilled oil.

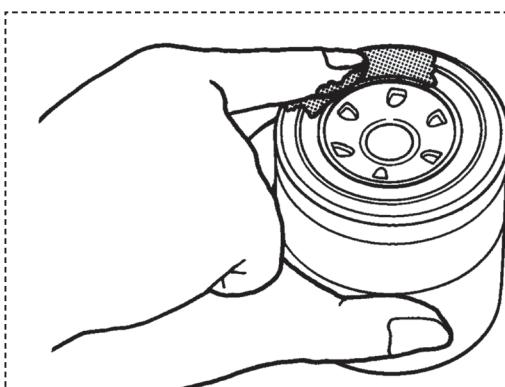
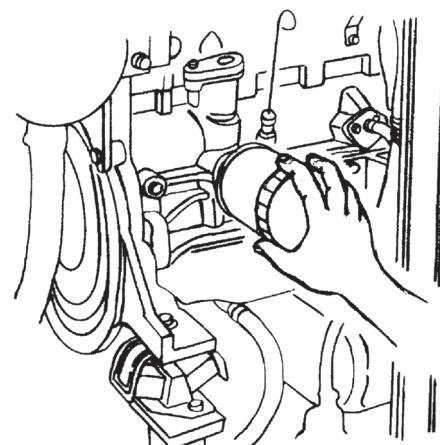


Figure 3 Applying Sanyo genuine oil



For models with a K25 engine

Figure 4 oil filter install

Tightening torque : 14.7 – 20.6N•m

**Caution**

Never use a filter wrench to install the oil filter. If the filter is overtightened, the O-ring will be damaged, resulting in oil leaks.

⑤ Change engine oil

Replace all oil in the oil pan and the sub tank.

- 1) Prepare the designated amount of oil.

Amount of oil for 10,000 hours

Oil tank: 43 liters

Engine: 3 liters

- 2) Stop the engine after warming up for between 10 and 15 minutes.

(Refer to Section 1. (4) “② Stopping the Engine”.)

- 3) Open the cap of the oil tank (Figure 5).

- 4) Remove oil using the oil pump.

First, insert the pump in the narrow side of the oil tank aperture to remove oil from the external tank.

Next, insert the pump in the wider side of the oil tank to remove the oil from the internal tank (Figure 6).

\* Caution: For the narrow side, a tube of ø16 mm or below is required.

- 5) Remove the caps that are inserted at the ends of the discharge hose (2 in total) attached to the oil tank to remove the remaining oil in the oil tank (Figure 7).

- 6) Once the oil discharge is complete, use a waste cloth to wipe off the old oil from the outlet of the oil drain hose. After this, insert the caps that were removed during Step 5). Bring the oil drain hose back to its original position.

- 7) Use the oil container to slowly fill 43 liters into the oil tank from the oil tank aperture and 3 liters into the engine via the engine head. When doing so, fill the oil from the wider side of the oil tank aperture (Figure 6).

- 8) Close the oil tank cap and the engine head cap.

⑥ Operation check

- 1) If oil spilled while adding it, wipe it up.

- 2) Cancel the engine stop. (Refer to Section 1. (4) “③ Canceling Engine Stop.”) Operate the engine for 10 - 15 minutes and make sure there are no oil leaks around the oil filter or oil drain hose.

⑦ Oil level gauge check

Make sure that the oil is filled up till the divider is not visible from the oil tank aperture.

⑧ Engine oil use time reset

Refer to Section 1. (4) “④ Engine Oil Time Reset Method.”

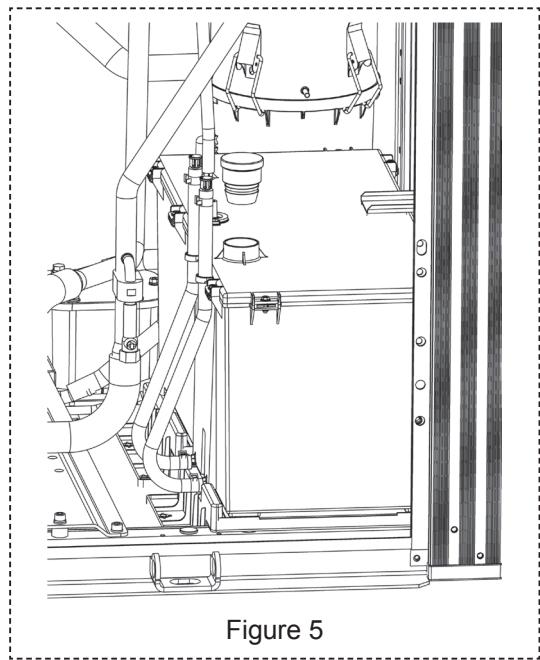


Figure 5

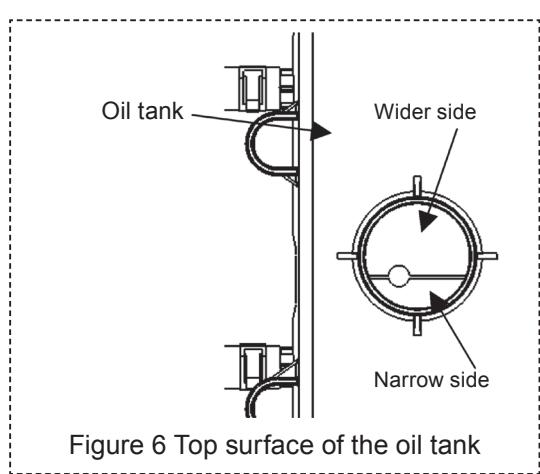


Figure 6 Top surface of the oil tank

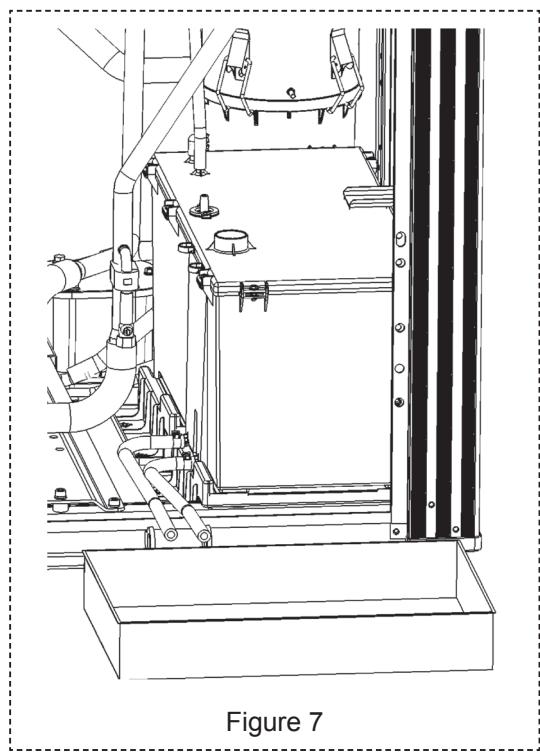


Figure 7

## (2) Engine oil Inspection, Replenishment, Replacement Work List

① Engine oil inspection, replenishment and replacement schedule

1) Engine oil replacement interval

Maintenance item	Year number Hours of operation $\times (1,000 \text{ hours})$	1	2	3	4	5	6	7	8	9	10	11	12	13
		2	4	6	8	10	12	14	16	18	20	22	24	
Periodic inspection (5 years or 10,000 hours)	Replace							○ (Replace)						○ (Replace)

2) When delivered there is enough oil for 10,000 hours of operation.

3) Oil replacement are performed every 10,000 operating hours.

4) The amount of oil sufficient for 10,000 operating hours is as follows:

Tank location	Engine:	Oil tank	Total Oil
Types 120, 150, 190, 240	3 liters	43 liters	46 liters

### (3) Valve Clearance Adjustment

#### Safety Precautions

**Stopping only the indoor unit is extremely dangerous because the engine may suddenly start if the customer operates the remote controller on the indoor unit side. Before carrying out work on the inside of the outdoor unit, make sure you turn off the power supply circuit breaker of the outdoor unit. (However, if a system controller or other centralized control device is being used, an abnormal communications error may be generated.) Alternatively, perform the STOP operation for the outdoor unit.**

#### ① Pre-adjustment check items

- 1) The valve clearance adjustment must be performed every 10,000 hours or 5 years, whichever comes first.
- 2) The valve clearance adjustment is also required whenever the rocker arm shaft is removed for parts replacement or other reason.
- 3) Perform the valve clearance adjustment when the engine is warm.
- 4) Stop the engine after warming it up for 10 to 15 minutes.  
(Refer to the safety precautions and Section 1. (4) “② Engine Stop”.)

#### Caution

- Perform the valve clearance adjustment within 10 minutes of stopping the engine.
- The engine will be hot immediately after stopping. Take appropriate precautions.

#### ② The following tools and gauges are required for doing this work. Prepare them before starting.

	Name	Specification	Q'ty	Remarks
Tools	Thickness gauge	0.45mm	1 each	
	Ratchet wrench	1/2 inch drive (12.7 mm)	1 each	
	Socket or closed wrench	22mm, 14mm	1 each	
	Screwdriver	No-3, No-2 Phillips (+), No-2 flat (-)	1 each	
	Torque wrench	31.4 N·m 20.6 N·m 4.9 N·m 2.25 N·m	1 each	

#### ③ Remove the engine rocker arm cover

- 1) Remove the 2 engine rocker arm cover cap nuts (22 mm) (Figure 1).
- 2) To release the grip of the gasket adhesive, move the engine rocker arm cover forward and back lightly while pressing on it (Figure 2).

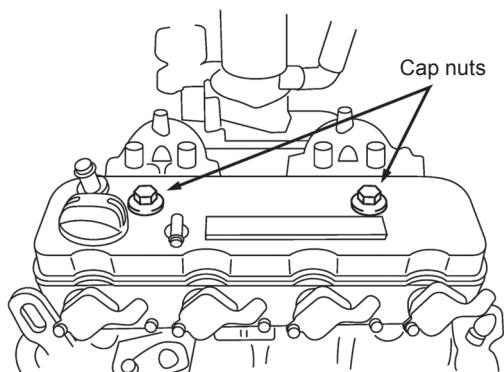


Figure 1

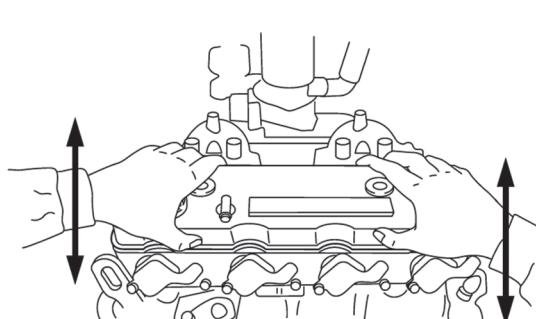


Figure 2

- 3) Remove the engine rocker arm cover from the cylinder head (Figure 3).

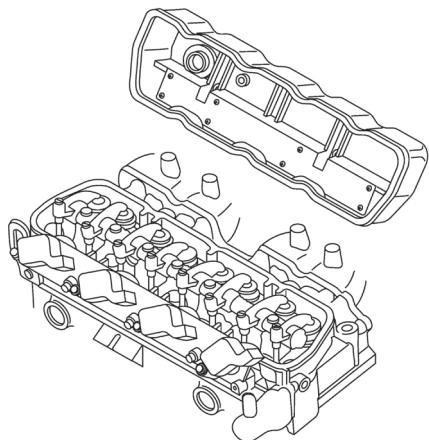


Figure 3

- ④ Position the first or fourth cylinder at compression top dead center.

- 1) Remove the ignition coil and sparkplugs for all cylinders.
- 2) Rotate the crankshaft with a socket wrench (ratchet) (Figure 4) until the top mark (orange) on the camshaft pulley is aligned with the timing pointer (Figure 5).

The cylinders are numbered 1, 2, 3, 4 in sequence from the compressor side.

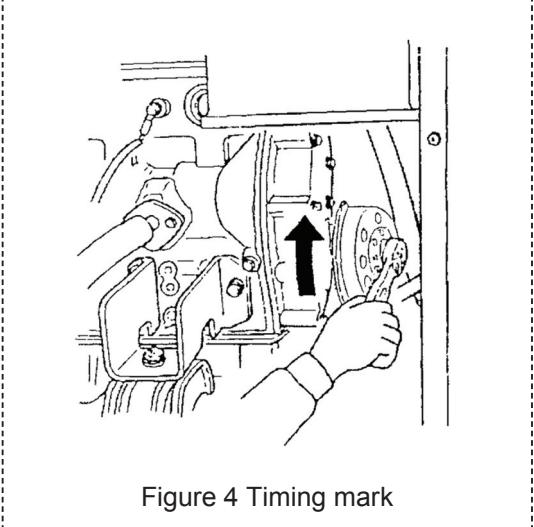


Figure 4 Timing mark

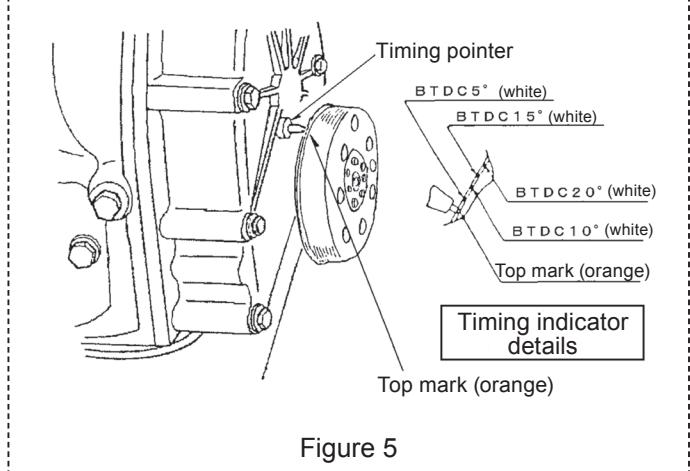


Figure 5

- 3) Rotate the intake and discharge side pushrods for the first cylinder with your fingers, checking that they move easily (Figure 6). If they move easily, it means that the first cylinder is at compression top dead center. Perform the valve clearance adjustments that are marked ● in Table 1 below (Figure 7).

- 4) If the check above is not successful, rotate the intake and discharge side pushrods for the fourth cylinder with your fingers, checking that they move easily. If these rods move easily, it means that the fourth cylinder is at compression top dead center. Perform the valve clearance adjustments that are marked ○ in Table 1 below (Figure 7).

Table 1

Cylinder Number	4		3		2		1	
Valve	Discharge	Intake	Intake	Discharge	Discharge	Intake	Intake	Discharge
1st cyl. at compression TDC				●		●	●	●
4th cyl. at compression TDC	○	○	○		○			

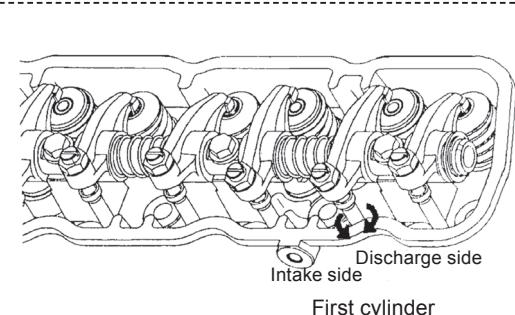


Figure 6 Check the compressor top dead point

5) After adjustment 3) and 4), turn the flywheel 1 revolution, and again align the top mark (orange) on the camshaft pulley with the timing pointer. If the valves were adjusted first at the first cylinder TDC position, adjust the remaining valves with the ○ mark in Table 1. If the valves were adjusted first at the fourth cylinder TDC position, adjust the clearance of the remaining valves with the ● mark in Table 1 (Figures 5, 6, 7).

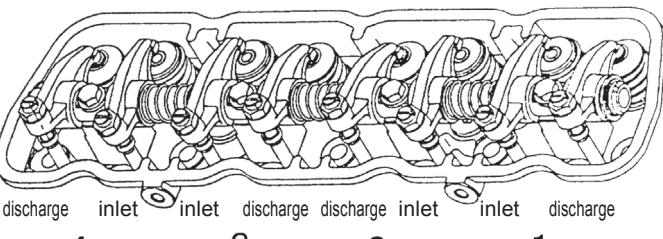


Figure 7 Location of each valve

#### ⑤ Adjust valve clearances

1) Rotate the pushrod with the fingers, and check that the rod moves easily. If it does, loosen the valve lock nut (14 mm). Slightly loosen the adjusting bolt with a flat (-) screwdriver, and insert the thickness gauge. Turn the adjusting bolt to adjust the valve clearance. When the adjustment is finished, secure the adjusting bolt with the flat screwdriver so that it does not turn, then tighten the lock nut (Figure 8).

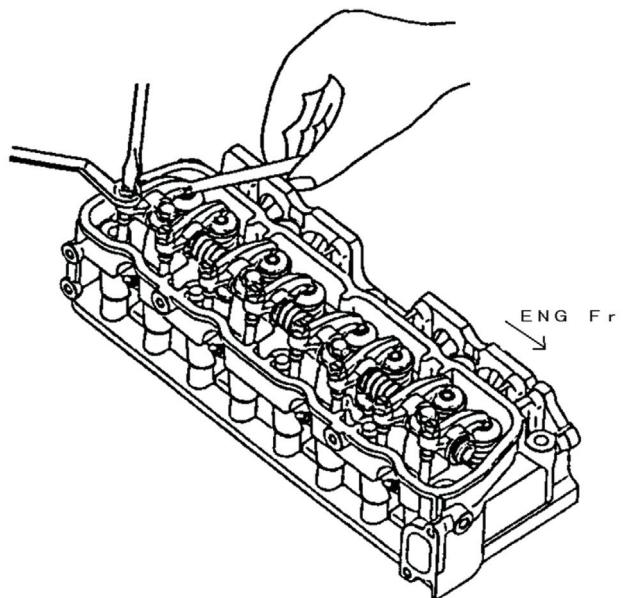


Figure 8 Valve clearances adjustment

2) Adjust the valve clearance while the engine is warm.

	Intake valves	Discharge valves
When warm		0.45 mm

3) When finished adjusting the valve clearance, tighten the lock nut to the specified torque.

Lock nut	Tightening torque : 27.4 - 34.3 N·m
----------	-------------------------------------

#### ⑥ After adjustment

1) Reinstall the engine rocker arm cover and sparkplugs, and tighten to the specified torques. First tighten the 2 nuts for the engine rocker arm cover evenly on the left and right by hand, then tighten to the specified torque with a torque wrench.

Engine rocker cover nut	Tightening torque : 13.7 - 15.7 N·m
Sparkplug	Tightening torque : 19.6 - 29.4 N·m

2) Install sparkplug coil brackets for all cylinders

Sparkplug coil bracket	Tightening torque : 15.7 - 17.7 N·m
------------------------	-------------------------------------

#### ⑦ Operation check

- Cancel the engine stop. (Refer to the safety precautions and Section 1. (4) “③ Canceling Engine Stop.”)
- Make sure there are no abnormal noises (clicking or clattering sounds). If abnormal noises are present, the valve clearances must be readjusted.

#### (4) Sparkplug Replacement

##### Safety Precautions

**Stopping only the indoor unit is extremely dangerous because the engine may suddenly start if the customer operates the remote controller on the indoor unit side. Before carrying out work on the inside of the outdoor unit, make sure you turn off the power supply circuit breaker of the outdoor unit. (However, if a system controller or other centralized control device is being used, an abnormal communications error may be generated.) Alternatively, perform the STOP operation for the outdoor unit.**

- ① The sparkplug replacement must be performed every 10,000 hours or 5 years, whichever comes first.
- ② Make sure to use genuine parts for the replacement sparkplugs (Figure 1).
- ③ The following tools, gauges, and parts are required for doing this work. Prepare them before starting.

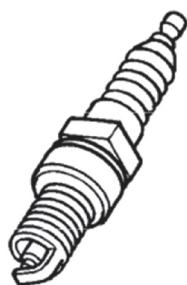


Figure 1

##### ■ Preparation for work

	Name	Specification	Q'ty	Remarks
Tools	Sparkplug wrench		1	
	Torque wrench	9.8 - 29.4N•m	1	
	Screwdriver	No-3 Phillips (+), No-2 Phillips (+)	1 each	
	Wire brush		1	
	Spark plug	623-194-7664 (638-018-9588 can also be used)	4	

- ① Engine Stop  
Stop the engine. (Refer to the safety precautions and Section 1. (4) “②Engine Stop.”)
- ② Remove the panel.  
Remove the front panel of the unit.
- ③ Removing the wire harness plugs  
Remove the wire harness plugs from the sparkplug coils (Figure 5).

④ Sparkplug coil bracket

Remove the 2 bolts shown in Figure 6, and remove the sparkplug coil bracket.

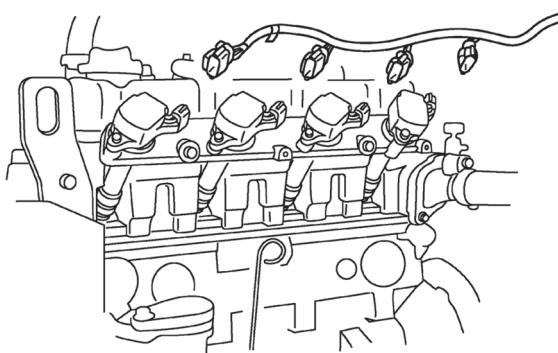


Figure 5 Removing the wire harness plugs

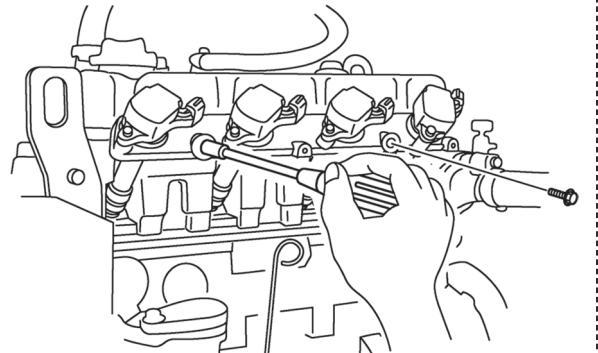


Figure 6 Removing the sparkplug coils

⑤ Sparkplugs

Use a sparkplug wrench (16 mm) to remove the sparkplugs (Figure 7).

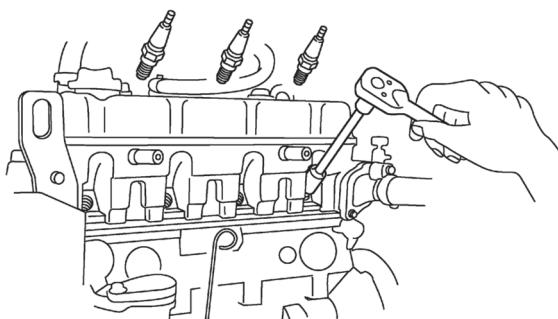


Figure 7 Removing the sparkplug cover bolts

⑥ Installation

Install new sparkplugs by following the reverse of the removal procedure (from ③ to ①).

Sparkplugs	Sparkplug coils bracket : 19.6 - 29.4 N•m
Sparkplug coils bracket	Sparkplug coils bracket : 15.7 - 17.7 N•m

■ Operation check

① Move the STOP SW to “NORMAL.” (Refer to Section 1. (4) “③Canceling Engine Stop.”)

② Operate the unit, and perform an engine startup check.

③ Reinstall the removed unit panel in its original position.

## (5) Air Cleaner Element Replacement



### Safety Precautions

**Stopping only the indoor unit is extremely dangerous because the engine may suddenly start if the customer operates the remote controller on the indoor unit side. Before carrying out work on the inside of the outdoor unit, make sure you turn off the power supply circuit breaker of the outdoor unit. (However, if a system controller or other centralized control device is being used, an abnormal communications error may be generated.) Alternatively, perform the STOP operation for the outdoor unit.**

#### ① Prework check items

- 1) A dry-type air cleaner element is used. The intake port cover removes coarse particles. As the intake air is guided into the body of the air filter, a vortex is created by a cyclone device. The currents within the vortex cause particles in the air to collect in a dust cup, while finer particles are filtered out by folded paper filter elements.
- 2) If the air cleaner element becomes clogged, the quantity of air will be reduced, causing the engine to stall.
  - Make sure to replace the element periodically.
  - Replace the element more frequently in dusty or oily environments.

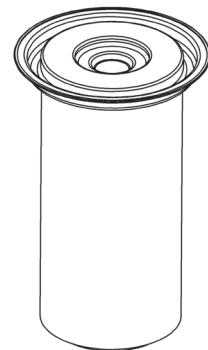


Figure 1 air cleaner element

#### ② Replacement Period

Replace the air cleaner element every 5 years or 10,000 operating hours, whichever comes first.

#### ③ Preparations

The following parts and tools are required for doing this work. Prepare them before starting.

	Name	Specification	Q'ty	Remarks
Parts	Air cleaner element	623-196-0564 (826-2-1245-11300)	1	Figure 1
Tools	Nut driver	Across flats 17mm		

#### ④ Preparation for work

- 1) Stop the engine. (Refer to Section 1. (4) “② Engine Stop.”)
- 2) Remove the rear panel of the unit.

#### ⑤ Remove the element and clean

- 1) Remove the screw that secures the air cleaner element, slide the fastener to the left to remove it and the element. (Figure 2.)
- 2) Clean the inside of the air cleaner case.

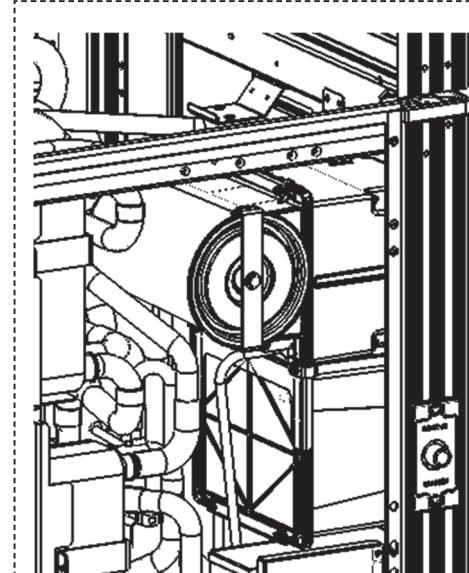


Figure 2

⑥ Replace Element

Slide in the new element as far as it will go. Make sure the seal does not prevent insertion. (Figure 3.)

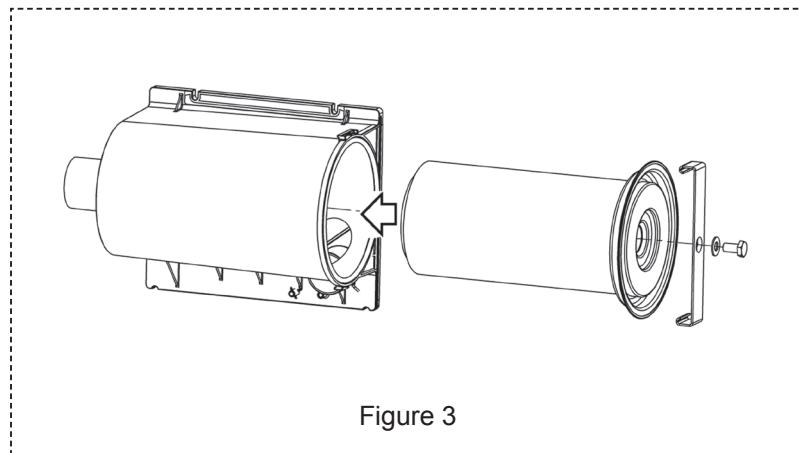


Figure 3

**Caution**

- This is a dry element. Do not use oil.
- Replace the element earlier in dusty or oily environments.

⑦ Fastener attachment

Move the fastener on the air cleaner from the left to the right and secure it in the center using a securing screw. (Figure 2.)

⑧ Operation check

- 1) Move the STOP SW to “NORMAL.” (Refer to Section 1. (4) “③ Canceling Engine Stop.”)
- 2) Recheck the air cleaner installation.
- 3) Operate the engine for 10 - 15 minutes and make sure there are no changes in the revolutions per minute, no abnormal noises, and no abnormal exhaust smell or color.

## (6) Coolant Level Check, Replenishment

### Safety Precautions

**Stopping only the indoor unit is extremely dangerous because the engine may suddenly start if the customer operates the remote controller on the indoor unit side. Before carrying out work on the inside of the outdoor unit, make sure you turn off the power supply circuit breaker of the outdoor unit. (However, if a system controller or other centralized control device is being used, an abnormal communications error may be generated.) Alternatively, perform the STOP operation for the outdoor unit.**

- ① Perform the coolant check and replenishment every 10,000 operating hours or 5 years, whichever comes first.
- ② Use Sanyo Genuine Coolant solution (Figure 1).
- ③ The specified concentration for coolant solution is  $50 \pm 5\%$ .

#### Caution

- Take care that the coolant solution does not enter the eyes or mouth during work.



Figure 1

#### ④ Preparations

The following tools, gauges, and materials are required for doing this work. Prepare them before starting.

	Name	Specification	Q'ty	Remarks
Parts, Materials	Sanyo genuine coolant	3-9509-1040 826-2-4521-10100	As needed	SS Part code: 1743020
	Rags			SS Part code: 1743030
Tools	Dispensing container	2 liters	1	For coolant (free from oil)
Gauges	Brine tester			For ethylene glycol

#### ⑤ Check and replenish coolant

- 1) Check the coolant level inside the reserve tank from the cutout of the side panel on the filler neck side of the unit. (Figure 2)  
<Suitable Levels>

When warm : L level to maximum level during operation  
When cold : L level to H level

- 2) If the level within the reserve tank is low, replenish the coolant with the specified concentration of genuine Sanyo coolant ( $50 \pm 5\%$ ) up until the H level position.
  - a) Remove the coolant replenishment port cover on the top panel, and then remove the rubber cap of the reserve tank. (Figure 3)
  - b) Use the jug to replenish the coolant until the H level in the reserve tank.
  - c) Reattach and tighten the rubber cap of reserve tank.
- 3) Wipe up any spilt coolant with a rag or the like.
- 4) Reattach the coolant replenishment port cover to the top panel.

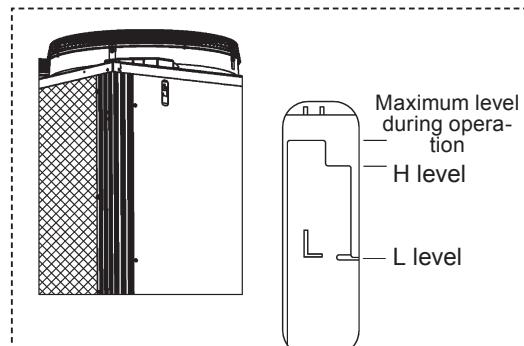


Figure 2 Checking the coolant level

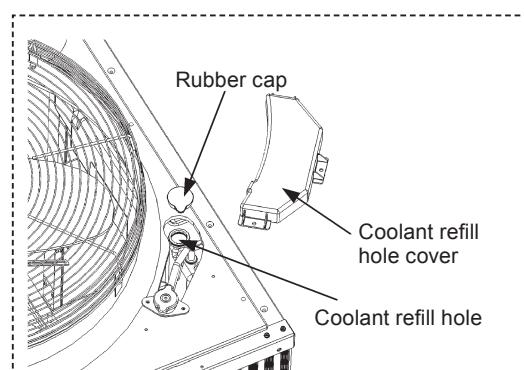


Figure 3 Remove the rubber cap of the reserve tank

## (7) Compressor Drive Belt Replacement

### Safety Precautions

**Stopping only the indoor unit is extremely dangerous because the engine may suddenly start if the customer operates the remote controller on the indoor unit side. Before carrying out work on the inside of the outdoor unit, make sure you turn off the power supply circuit breaker of the outdoor unit. (However, if a system controller or other centralized control device is being used, an abnormal communications error may be generated.) Alternatively, perform the STOP operation for the outdoor unit.**

#### ① Replacement Period

Replace the compressor drive belt every 5 years or 10,000 operating hours, whichever comes first.

#### ② Preparations

The following tools, gauges, and parts are required for doing this work. Prepare them before starting.

Name		Specification	Q'ty	Remarks
Parts	Compressor drive belt	638-018-9625	1	
Tools, Gauges	Open end or closed wrench	19mm	1	
	Socket wrench	10mm, 19mm	1	
	Torque wrench	450QL and 900QL	1	
	Linear scale		1	
	Tension meter		1	

#### ③ Preparation

- 1) Stop the engine. (Refer to Section 1. (4) “① Engine Stop.”)
- 2) Remove the front and rear panels of the unit.

#### ④ Belt removal

- 1) Loosen the compressor bracket securing bolts. (3 locations indicated by arrows in Figure 1)

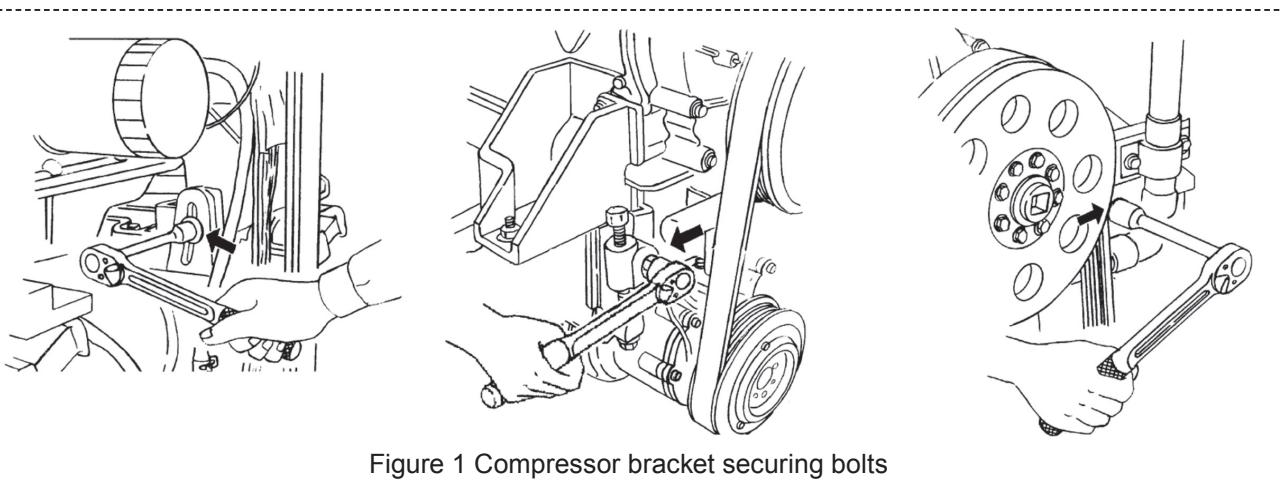


Figure 1 Compressor bracket securing bolts

2) Remove the tube securing bracket (Figures 2 and 3).

**CAUTION**

**There is also tube-fixing plate on the rear panel side of the unit (Figure 2). Do not forget to remove that plate.**

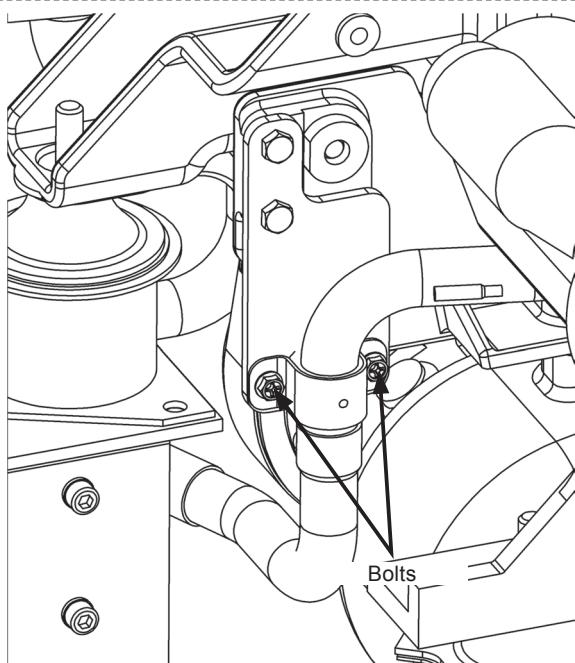


Figure 2 Removing tube fastener (rear side)

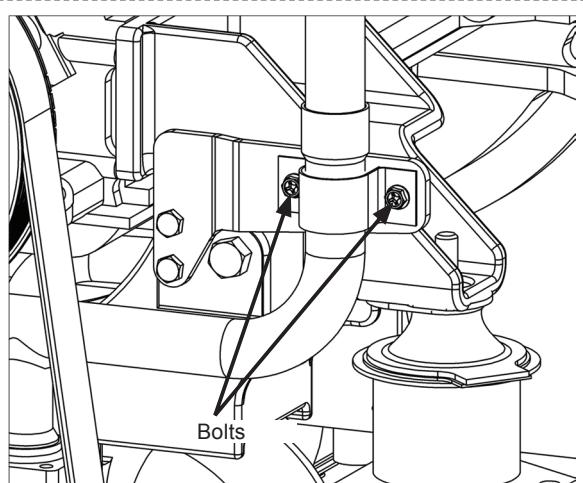


Figure 3 Removing tube fastener

3) Turn the tension adjustment bolt (counterclockwise), and raise the bracket.  
(Figure 4, 19 mm bolt indicated by arrow)

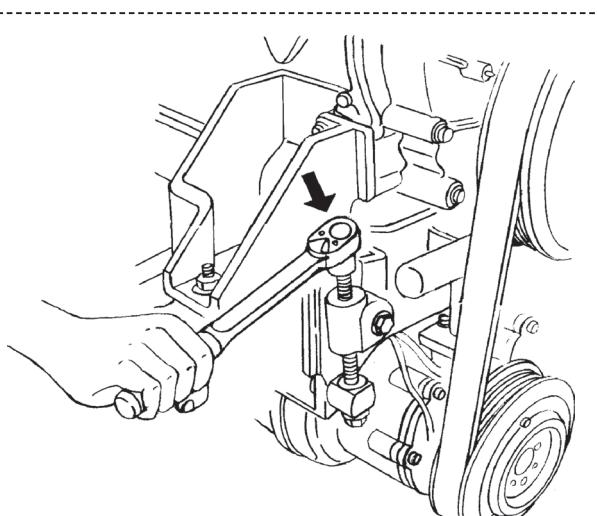


Figure 4 Raising bracket

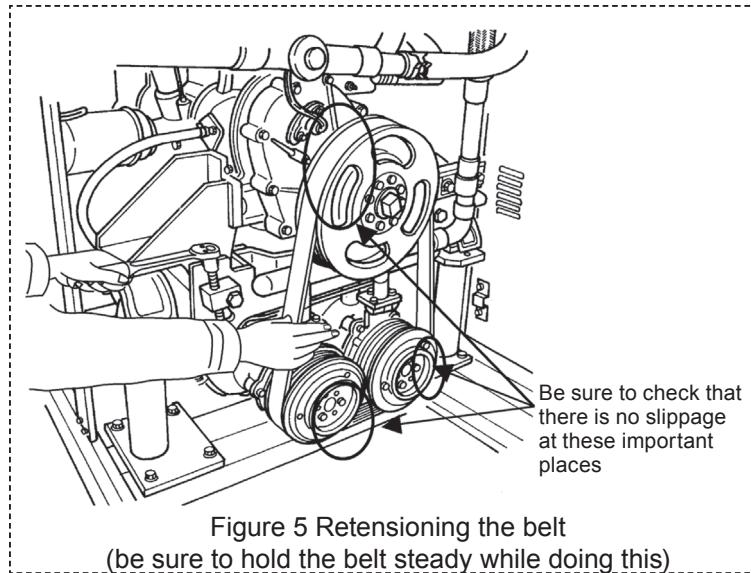
4) Rotate the tension adjustment bolt until the compressor drive belt can be removed, then remove the belt.

⑤ Compression drive belt tension adjustment

- 1) Install the new compressor drive belt when the bracket ④ has been raised.
- 2) Loosen the belt tensioning bolt to adjust belt tension. Press the belt as shown in Figure 5 to prevent it from coming off the wheels while loosening the adjusting bolt. Maintain pressure on the belt until the required amount of tension has been obtained.

**CAUTION**

**Do not grasp the belt as your fingers may then be caught in it.  
Adjust belt tension by applying pressure to it without grasping it.**



- 3) Tighten the tension adjustment bolt so that the belt tension is at the specified deflection value.

Belt tension	1670 - 1720 N (New Belt)
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Doctor Tension setup procedure

Span	290 mm tension measurement location
Density	0.018 kg/m, rib
Number of ribs	10

Doctor Tension : A product manufactured by Mitsubishi Belting Ltd. that measures tension based on the vibrating sound produced when tension is measured. Press a finger against the belt at the measurement location and the Doctor Tension microphone picks up the sound to measure tension.

- 4) A tension measurement made after a belt tension adjustment by rotating the engine pulley by hand will show that tension has dropped. Then tighten the tension adjustment bolt further to adjust tension. Repeat this procedure until desired tension is achieved.

- 5) Make sure that the belt is not shifting or coming off from the pulley.

- 6) Fasten the compressor bracket securing bolt.

Fastening torque	78 - 90N•m
------------------	------------

- 7) Reinstall the tube fixing plate (See the item ④).

⑥ Operation check

- 1) Move the STOP SW to "NORMAL." (Refer to Section 1. (4) "③ Canceling Engine Stop.")
- 2) After starting the engine, make sure the belt does not slip or make abnormal noises. If the belt does slip or make abnormal noises, readjust the tension.



**CAUTION**

**If there is belt deflection when you tighten the tension adjustment bolt to adjust the belt tension, the ribs of the belt will be offset from the pulley, which may result in the belt slipping off. In particular, there is a high risk of the belt slipping off if the ribs are offset at the locations indicated by the circles in Figure 5 because of the rotation direction after operation starts. Be sure to support the belt with a hand while tightening the tension adjustment bolt. Furthermore, make sure you check that the belt has not come off before performing a test run.**

## (8) Drain Filter Filling Stone Inspection, Replenishment

### **⚠ Safety Precautions**

**Stopping only the indoor unit is extremely dangerous because the engine may suddenly start if the customer operates the remote controller on the indoor unit side. Before carrying out work on the inside of the outdoor unit, make sure you turn off the power supply circuit breaker of the outdoor unit. (However, if a system controller or other centralized control device is being used, an abnormal communications error may be generated.) Alternatively, perform the STOP operation for the outdoor unit.**

#### ① Inspection and replacement

Perform drain filter filling stone inspection and replacement every 5 years or 10,000 operating hours, whichever comes first.

#### ② Preparations

The following tools, gauges, and parts are required for doing this work. Prepare them before starting.

Materials, Tools	Name	Specification	Q'ty	Remarks
	Drain filter filling stones	CHEMICAL 638-007-4860	As needed	Calcite 5 kg. (inside plastic bag)
	Gasket	638-012-6149	1	For repairing
	Rags		Small q'ty	
	Nut driver	Across flats 10mm	1	
	Oil absorbent mat	623-200-4601	10	
	Oil absorbent tube	623-300-8660	1	

#### ① Removing the drain filter A

1) Remove the drain hoses (2 hoses) that are attached to the drain filter A (Figure 1).

\* Be careful of the drain discharge fluid that sometimes comes out at this stage.

2) Remove the four bolts and two nuts in drain filter A to remove the filter from the outdoor unit. (Figure 2.)

#### ② Replenish the drain filter A filling stones

Remove the upper lid of the case and replace the old filling stones with new stones. Add stones until the case is completely full.

\* Fill the case with stones evenly taking care not to overfill the case, which could deform the upper lid, and making sure that stone fragments get into the grooves of the case.

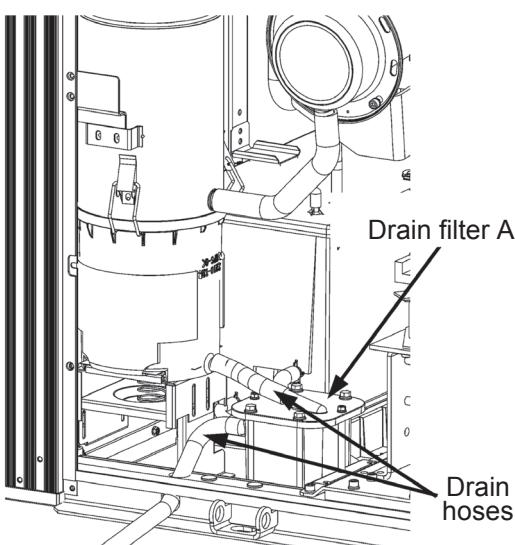


Figure 1 Removing the drain house

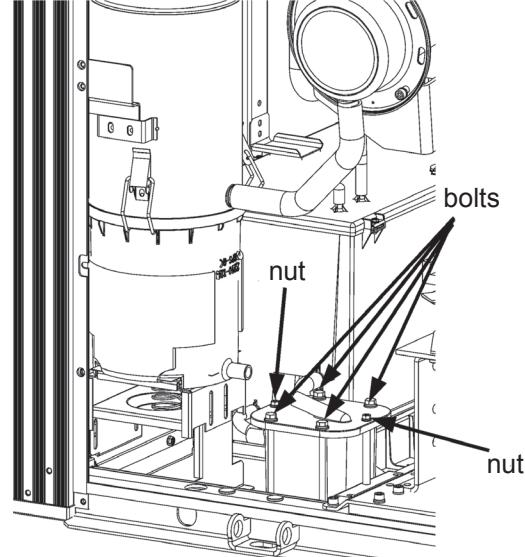


Figure 2 Removing the drain filter A

③ Removing the drain filter B

- 1) Remove the connector of the drain filter heater that is attached to the drain filter.
- 2) Loosen the securing screw A (4 screws) of the stand upon which the drain filter B is placed.
- 3) Remove the fastening brackets (in three places) that hold the muffler and the drain filter B together.
- 4) Slide the drain filter B and the stand downward.
- 5) Tighten the two foremost securing screws A to secure the stand.
- 6) Remove the drain filter B from the outdoor unit.

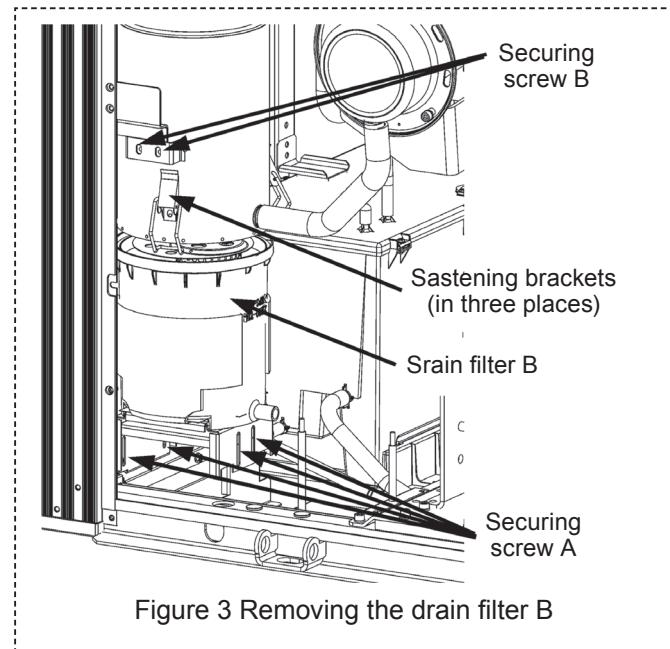


Figure 3 Removing the drain filter B

④ Replenish the drain filter B filling stones

- 1) Remove the securing screws, the fastener of the oil absorbent mats and the oil absorbent mats.
- 2) Replace the old oil absorbent mats with new ones (10 pcs)
- 3) Remove the filling stone case and take the stones and oil absorbent tube out of the case.
- 4) Insert the oil absorbent tube and add the filling stones.  
Add filling stones up to 1/3 of the case and place the oil absorbent tube on the stones. Then add more stones on top of the oil absorbent tube to fill the case completely.
- 5) Replace the filling stone case in the drain filter case, place the new oil absorbent mats on top and use the securing screws to attach the fastener of the oil absorbent mats.

Fastener of the oil absorbent mats

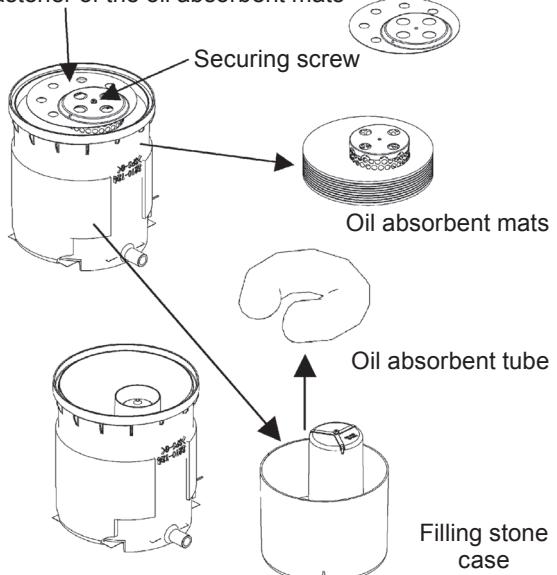


Figure 4 Drain filter B

⑤ Attach the drain filter A

- 1) Place the drain filter A on the stand and use the four bolts and two nuts to secure it to the stand.
- 2) Attach the drain hoses (2 hoses).

⑥ Attach the drain filter B

- 1) Place the drain filter B on the outdoor unit stand and loosen the foremost securing screws A.
- 2) Slide the stand and the drain filter B upwards to join with the muffler, and fasten in three places using the fastening brackets.
- 3) Hold the stand so that it is placed horizontally. While doing so, tighten the securing screws A (4 screws).
- 4) Attach the drain hose and the connector of the drain filter heater to the drain filter.
- 5) Loosen the screws B (2 screws) and automatically drop the muffler so that the top surface of the stand and the bottom surface of the drain filter are in close contact. Tighten the screws B (2 screws).

## (9) Gas Leak Inspection

### Safety Precautions

**Stopping only the indoor unit is extremely dangerous because the engine may suddenly start if the customer operates the remote controller on the indoor unit side. Before carrying out work on the inside of the outdoor unit, make sure you turn off the power supply circuit breaker of the outdoor unit. (However, if a system controller or other centralized control device is being used, an abnormal communications error may be generated.) Alternatively, perform the STOP operation for the outdoor unit.**

- ① Check for leaks in the fuel line connections
  - 1) Open the main valve for the gas line.
  - 2) Using a gas leak detector (Figure 1) or soapy water, make sure there are no leaks in the fuel line connections of the outdoor unit.

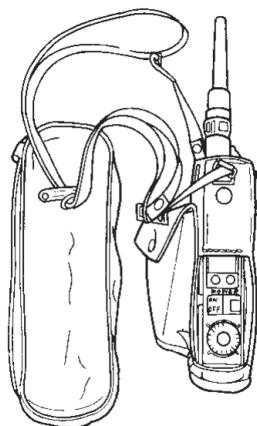
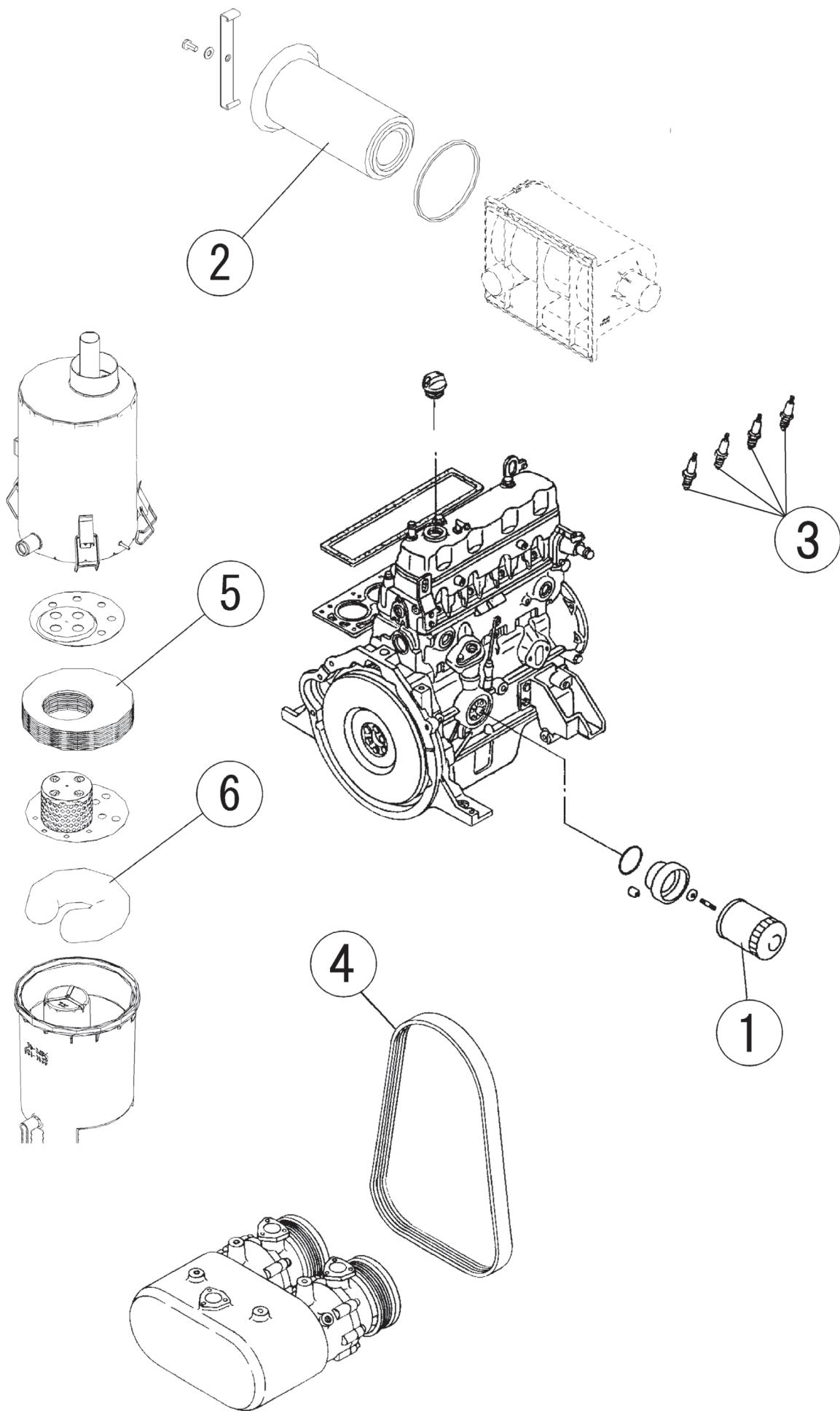


Figure 1

## (10) Control program version check

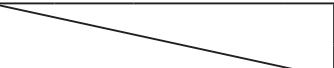
Check the version of the control program. Update the program if required.

### 3. Periodic Replacement Parts List



Replacement rank (Replacement time)	Maintenance kit	Part code	Part name	Q'ty
C-5 (10,000 hours or 5 years)	SGP-MTK560M	638-012-7993	Oil filter	1
		923-196-0565	Air cleaner element	1
		623-194-7664	Spark plugs	4
		938-018-9626	Compressor operation belt	1
		923-200-4602	Oil absorbent mat	10
		623-300-8660	Oil absorbent tube	1
C-10 (20,000 hours or 10 years)	SGP-MTK560M	638-012-7993	Oil filter	1
		923-196-0565	Air cleaner element	1
		623-194-7664	Spark plugs	4
		938-018-9626	Compressor operation belt	1
		923-200-4602	Oil absorbent mat	10
		623-300-8660	Oil absorbent tube	1

## GHP Periodic Inspection, Periodic Replacement Checklist (Type M2)

Delivery Destination - (        ) -		Inspection, Replacement	Company name - (        ) -									
Delivery Address			Address									
Part No.	Outdoor	SGP- M2 (No. )										
	Indoor	(1) SGP- M2	(6) SGP- M2	(11) SGP- M2	(16) SGP- M2	(21) SGP- M2	(2) SGP- M2	(7) SGP- M2	(12) SGP- M2	(17) SGP- M2	(22) SGP- M2	
		(3) SGP- M2	(8) SGP- M2	(13) SGP- M2	(18) SGP- M2	(23) SGP- M2	(4) SGP- M2	(9) SGP- M2	(14) SGP- M2	(19) SGP- M2	(24) SGP- M2	
		(5) SGP- M2	(10) SGP- M2	(15) SGP- M2	(20) SGP- M2							
		Gas company name						Inspection date	(        /        /        )			
		Gas type used										
Check items									Work	Conclusion		
1. Operating hours									Hours			
2. No. of times ON/OFF									Times			
3. Check, replace												
① Coolant level check, replenishment ② Drain filter filling stone check, replenishment ③ Sparkplug replacement ④ Engine oil change ⑤ Oil filter replacement ⑥ Air cleaner element replacement ⑦ Compressor drive belt replacement ⑧ Valve clearance adjustment ⑨ Oil absorbent mat ⑩ Oil absorbent tube												
				Intake valve		Exhaust valve						
				Before adjustment	After adjustment	Before adjustment	After adjustment					
				1st cylinder								
				2nd cylinder								
				3rd cylinder								
				4th cylinder								
4. Replacement parts									Q'ty	Remarks		
(Code) <input type="radio"/> :Ok <input type="radio"/> :Cleaned <input checked="" type="checkbox"/> :Dismantled <input type="radio"/> :Adjusted <input type="radio"/> :Replenish <input type="checkbox"/> :Changed <input type="radio"/> :Tightened <input type="radio"/> :-Not applicable												

Check items				Measurement	Conclusion	
5. Engine system checks						
6. Control program version		Version update available? <input type="checkbox"/> Yes Version <input type="checkbox"/> No				
7. Operation data collection						
① Data collection time (Time after starting operation) Note: Operate all indoor units and measure.				Min.		
② Abnormal vibration, noise checks				OK/ not Ok		
Outdoor unit operational data	Data Code	Measurement item (sensor name)		Unit	Measurement	Conclusion
	11	Engine revolution speed		min <sup>-1</sup>		
	12	Compressor inlet pressure		MPa		
	13	Compressor outlet pressure		MPa		
	14	Compressor inlet temperature		°C		
	15	Compressor outlet temperature		°C		
	19	External air temperature		°C		
	31	Outdoor fan output		%		
	34	Outdoor unit electrical valve 1 output		Step		
-	Compressor intake superheat/2 outputs		Deg	/		
Indoor unit operating data	Operation mode (cool, heat)					
	Type	Electric valve degree of opening	Intake temperature	Discharge temperature	Coil input temp.	Coil output temp.
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
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	21					
	22					
23						
24						
Special comments						



**SANYO**