

Technical Manual for Servicing

SANYO ELECTRIC CO., LTD

For natural refrigerant heat pump water heater

Tank Unit SHP-TH90GDN-SW / SHP-TH90GEN-SW / SHP-TH90GHN-SW

Heat Pump Unit SHP-C90GDN / SHP-C90GEN

2008.10



RoHS

• This product does not contain any hazardous substances prohibited by the RoHS Directive.

\land <u>Warning</u>

- You are requested to use RoHS compliant parts for maintenance or repair.
- You are requested to use lead-free solder.

Specifications

1.Product specifications (Heat Pump Unit)

Model	SHP-C90GDN
Refrigerant	R744 / 1.6kg
Dimensions	1,235mm(H) × 930mm(W) × 340mm(D)
Product weight	105kg
*1 Heating capacity / Power input	9.0kW / 2.9kW
COP (Out door temp. 7°C)	3.1
*2 Heating capacity / Power input	9.0kW / 2.2kW
COP (Out door temp. 25°C)	4.1
*3 Heating capacity /Power input	9.0kW / 5.0kW
COP (Out door temp. –15°C)	1.8
Power Source	400V 3N~
Operation sound *1	49.0 dB-A
Design pressure(high/low)	14MPa/8MPa
Maximum current	10A
Type of Compressor	DC Rotary 2 Stage
	Overload protection device
Safety devices	High-pressure switch
	Excessive temperature prevention device

Model	SHP-C90GEN				
Refrigerant	R744 / 1.7kg				
Dimensions	$1,235$ mm(H) \times 930 mm(W) \times 340 mm(D)				
Product weight	109kg				
*1 Heating capacity / Power input	9.0kW / 2.7kW				
COP (Out door temp. 7°C)	3.3				
*2 Heating capacity / Power input	9.0kW / 2.2kW				
COP (Out door temp. 25°C)	4.1				
*3 Heating capacity /Power input	8.0kW / 4.45kW				
COP (Out door temp. –15°C)	1.8				
Power Source	230V ~				
Operation sound *1	49.0 dB-A				
Design pressure(high/low)	14MPa/8MPa				
Maximum current	20A				
Type of Compressor	DC Rotary 2 Stage				
	Overload protection device				
Safety devices	High-pressure switch				
	Excessive temperature prevention device				

*1: Outdoor temperature 7°C, Inlet water temperature 30°C, Outlet water temperature 50°C
*2: Outdoor temperature 25°C Inlet water temperature 30°C, Outlet water temperature 50°C

*3: Outdoor temperature -15°C, Inlet water temperature 40°C, Outlet water temperature 60°C



2. Water heater system chart

3. Main parts specifications

(1) Thermistor temperature and resistance conversion table

<Tank unit>

•Tank sensor, El heater sensor, Primary flow sensor, Room sensor

Temperature(°C)	0	10	20	30	40	50	60	70	80	90	100
Thermistor resistance (k Ω)	66.0	41.8	27.1	18.0	12.2	8.5	6.0	4.3	3.1	2.3	1.8

•Outside sensor

Temperature(°C)	-20	-10	0	10	20	30	40	50	60	70
Thermistor resistance (k Ω)	1.1	0.7	0.4	0.3	0.2	0.1	0.09	0.06	0.04	0.03

<Heat pump unit>

•Outdoor air temp sensor, Outdoor heat exchanger sensor, Water coil inlet sensor,

·Sprit coil inlet sensor, Sprit coil outlet sensor

Temperature(°C)	-10	0	10	20	30	40	50	60	70	80	90	100
Thermistor resistance $(k \Omega)$	23.7	15.0	9.8	6.5	4.4	3.1	2.2	1.6	1.2	0.9	0.7	0.5

 $\mbox{-} Compressor temp sensor$, Water coil outlet sensor

Temperature(°C)	-10	0	10	20	30	40	50	60	70	80	90	100
Thermistor resistance $(k \Omega)$	320	186	112	70.1	45.0	29.7	20.0	13.8	9.7	7.0	5.1	3.8

(2) Compressor winding resistances $<at 25^{\circ}C>$

<SHP-C90GDN>

Parts code	804	280 80
Model	C-C	V303HOW
	red-white	1.271
Winding resistance(Ω)	white-blue	1.271
	blue-red	1.271

<SHP-C90GEN>

Parts code	804 281 80				
Model	C-CV303HOV				
	red-white	0.392			
Winding resistance (Ω)	white-blue	0.392			
	blue-red	0.392			

Users manual

01. Introduction

Welcome Congratulations	!
	You are now the owner of a Sanyo CO2 ECO, an electric boiler which we hope will be very much to your satisfaction.
	If you use and maintain the Sanyo CO2 ECO correctly you will enjoy your boiler for many years.
Concerclinformation	In the following pages you will find the information you look for. Save this manual together with the technical manual.
General Information	The Sanyo CO2 Eco is a complete heat pump system that warms both the
	house and the hot water. The Sanyo CO2 Eco is equipped with a motorized mixing valve which constantly ensures that a correct and even temperature reaches the radiators. The Sanyo CO2 Eco has a built-in circulating pump for connection to the heat pump. The Sanyo CO2 Eco has a micro chip operating system which: • monitors all functions in the product.
	 admits individual adjustments clear text shows the desired values e.g. temperatures operation times
	fault indications and so on.
	• In a simple and structured way facilitates the adjustments and fault localization.
	The Sanyo CO2 Eco has a built-in copper coil which provides domestic hot water
	The Sanyo CO2 Eco has a basement heating function which makes it possible to heat only the basement if needed, i.e. summer time. In case of under floor heating installation it has a electronic controlled temperature limiter. The Sanyo CO2 Eco has a built-in night reduction, where you can change the temperature in the house day by day. The Sanvo CO2 Eco is easy to service with easy access to electrical
	components, and good fault tracing functions in the operating
	The Sanyo CO2 Eco is delivered with a room sensor as standard. The room sensor is equipped with a light-emitting diode which alarms in case of fault. The fault can be read in clear text on the display on the indoor unit (signals window)
	and parts are reserved.
Before taking the equipme	ent in use
	After the installation check together with the installer that the equipment is in perfect condition. Let him show you the switches, controls, fuses etc. so that you have a full understanding of how the equipment functions and must be maintained. Free the air from the radiators after about three days of operation and if necessary fill water.
General safety instructions	
	 The following safety instructions must be observed upon handling of the product. Safety valves (radiator system and primary hot water system) shall regularly be checked, four times a year. Check that water comes out of the waste pipe. Never flush the boiler with water. Never risk your safety by dismantling casings, covers etc that are screwed tight. Never risk your safety by setting safety equipment out of function. Interventions in the electric –or hydraulic systems must be done only by a gualified
	person

02. Main functions

The main functions of the boiler is described below.

- the boiler contains an electronic control system that supervise all functions of the product, and allow you to make personal settings for a comfortable indoor climate.

- room sensor gives continuously information to the control system. Necessary adjustments of the temperatures to the radiator systems are then made.

- for the best performance and lowest temperature losses the water temperature inside the boiler is automatically adjusted to the temperature need of the radiators.

- the control system contains a day by day system that allows you to decrease the indoor temperature, i.e. in nights or when you are working. Two individually decreases a day can be set.

- the boiler can be distance operated via a "Minicall" system.

The indoor temperature can be lowered or set in normal temperature.

Main components



03. Components and Instrument panel

General:

The normal user panel is the Display unit located on the front panel. All settings and values are available from the display unit. Under the front cover are the thermostats for over temperature protection and reserve temperature thermostat located. The thermostats normally don't need to be operated.



Display panel



04. Adjustments and handling

General information

Sanyo CO2 Eco has a modern digital control system, with few buttons and clear text on the display, that makes the adjustments and handling logical and easy to understand. The function of the product is constantly monitored by the controls. If the operating data does not correspond with the allowed values, the product is automatically secured. In case of faults (e.g. fault of the sensors or others which causes the controls to be shut off), the product alarms and specifies on the display what is wrong. A red diode on the room sensor (placed in the apartment) flashes in case of fault. If fault occurs in the heat pump, the tank unit continues to work so that the heat and the hot water are maintained. As a last resource there is even a manual reserve heat to fall back on (behind the front panel)



< SHP-TH90GDN-SW>

It is not necessary for this model to set Maximum thermostat. (It is automatic correspondence.)



< SHP-TH90GHN-SW> < SHP-TH90GEN-SW> The boilers control system is provided with standard settings. At start-up the main functions of the product operates as follow:

- "Stand alone", without heat pump unit (works like an electric boiler).
- 12 kW electrical power
- Operation without room sensor
- Operation without room temperature decrease during nights
- Values for a mid temperature radiator system
- Language: Swedish

All settings can be changed within the control system. For more specific information of standard settings, see table of "Menu explanations".

How to operate the control system: Main screen

The display normally shows the *main screen*. The most important values are shown in the main screen. Room temperature can directly be changed in the main screen by pressing the " \blacktriangle " or " \blacktriangledown " buttons. Confirm by pressing the OK button.

Menus

The control system is subdivided in menus for a logical and easy use. To display the menus choice, just press the "OK" button once. The sub menus are:

- Menu LOGG: logs the long term values, e.g. total operating time and last alarms.

- Menu DIAGNOSE: shows the actual values, options and temperatures in the

system.

- Menu SETTING: in this menu all settings are made, e.g. temperatures, times and options.

- Menu SETTING CODE: requires a code to get access to this menu. Limits are set here.

- Menu MANUAL: a menu for the service man. Functions can here be manually operated.

- Menu TIME SETTING: the time (day, hour, minute) can be changed in this menu. **To access a menu:**

After each menu a flashing mark [] is shown. Step to the wanted menu by pressing the " ∇ " or " Δ " buttons. When the mark is filled (dark), just press the "OK" button. Now you are inside the wanted menu.

To step inside a menu:

Press the " ∇ " or " \blacktriangle " buttons until the mark flashes behind the wanted row. Activate the row by pressing the "OK" button. Change the value by pressing the " ∇ " or " \blacktriangle " buttons, confirm with the "OK" button.

Valid values:

A value is valid after pressing the "OK" button.

Step back:

If no button is pressed for 10 minutes the main screen automatically will be displayed.

You can also step back by pressing the "step back" button. You will end up in the main menu by pressing it several times.

Menu explanations

The MAIN MENU dis	splay	
Display:		Explanation
SANYO CO2	ECO	This is the normal display of the control system, and shows the most
ROOM	(20,5c) 20,3°c	important values in the system.
TANK TEMP	47°c	ROOM 1035°c (20): shows the room temperature if the room sensor is
	13°C	installed and chosen. Room temperature is can be changed in the "Main Menu".
MONDAY	20 [.] 45	Press ▼ or ▲ button to make a change.
MANUAL DEFROST	NO	TANK TEMP : shows the temperature of the upper part of the boiler
		(highest temperature).
		OUT TEMP: shows the out door temperature where the sensor is
		mounted. Note: at quick temperature changes the sensor has some
		delav.
		STATUS: shows status messages of the system if necessary.
		- Without HP heat pump is not chosen. The boiler runs for itself
		- Current reduced: displays when the main fuses in the house have over
		current the electrical heat power in the boiler is reduced
		- Power reduced: after a power interruption maximum 6 kW power is
		allowed in the boiler for two hours
		- Summer limit: displays if the boiler gives Domestic hot water only. The
		radiator circulation pump shuts off if the summer limit temperature
		(outside temp) is exceeded
		Factory setting reset: shows 2 minutes if the factory setting is reset
		MANUAL DEFROST: Possibility to manually start a defrost operation of the
		heat nump. Can be used at extreme weather conditions. The operation is
		automatically interrunted after 20 minutes or manually if the value will be set to
		"NO"
		(It is only a model of ability 0k/W, HP Unit that there is this function)
	dieplay	
	uispiay	
Display:		Explanation
		LOGG: in this menu "long time values" are logged.
SETTING I		DIAGNOS: in this menu actual values are displayed. No changes can be
SETTING CODE []		made.
MANUAL []		SETTING: in this menu all system settings are made, both for the installer
TIME SETTING []		and the user.
		SETTING CODE: This is a menu for the manufacturer and service people.
		A code needs to get access of changing the menu values.
		MANUAL: a menu for service people. In the menu all components in the
		boiler can manually be operated and checked.
		TIME SETTING: if temperature decrease during nights is chosen, time
		has to be set within this menu.
The LOGG MENU d	isplay	
Display:		Explanation
TOT OPER TIME	15351h	General: the LOGG menu is a long time log of the system. The values
COMPR/ 24h	17h	are stored in a memory and not affected of power interrupt.
COMPR STARTS/ 24h	20	TOT OPER TIME: counts the total operating time in hours that the the
LAST ALARMS:		Tank unit has been under power.
1 OUT SENSOR		TOT OP COMPR: counts the total time in hours the compressor has
2		been running.
Ĭ		COMPR/ 24h: stores the time during the last 24 hours that the
		compressor has been running. The value is stored once per day.
		COMPR STARTS/ 24h: counts the numbers of starts the compressor
		has had during the last 24 hours. The value is stored once a day.
		LAST ALARMS: shows the last alarms in order. No 1 is the latest
		Alarm

The DIAGNOS ME	NU display	
Display	:	Explanation
The DIAGNOS MEI Display COMPR SPEED EL HEATER UPPER EL HEAT TEMP UP EL HEAT TEMP LOWER ROOM TEMP OUT TEMP TANK TEMP RAD TEMP CURRENT MIX VALVE CP TANK HP WATER IN HP WATER OUT COMPR TEMP OUT TEMP HP DELAY EL COMM PROGRAM ID XXX PROGRAM DATE XX-	VU display 60Hz 4,5 kW (52) 50°c 3kW 4 45°C (20,5°c) 20,5°c 13°c (50°c) 48°c (20A) 13A + 60% 43°C 48°C 90°C 12°C 3:00 OK (XXX XX-XX	Explanation General: Values within this menu can not be changed. They shows the actual conditions in the system. Values inside the brackets is the wanted values or set values. COMPR SPEED: shows the actual compressor speed EL HEATER UPPER: shows the actual upper electrical heater power. EL HEATER LOWER: shows the actual opper electrical heater power. Under normal conditions the heater is not activated. The heater is automatically activated under shows actual temperature of the upper electrical heater power. Under normal conditions the heater is not activated. The heater is automatically activated under program. EL HEATTEMP LOWER: shows the actual lower electrical heater - when no heat pump fault occurs (alarm). EL HEATTEMP LOWER: shows the actual lower electrical heater temperature. Under normal conditions the heater is not activated, but the temperature is still monitored. ROOM TEMP: shows the wanted room temp (inside brackets) and the actual temperature. OUT TEMP: shows the out door temperature where the sensor is mounted. Note: the sensor has some delay if at quick outdoor temperature change occurs, TANK TEMP: shows the temperature of the tank where the heat pump leaves its energy. The value in the brackets is the value that the system decides as follows: - When the compressor is running, the value show the start temperature. RAD TEMP: shows the outgoing temperature to the radiators. The wanted value in the brackets depends of the room or outdoor temperature. CURRENT: shows the value find the brackets is the head fuse size of the house. MIX VALVE: shows if the mixing valve for the radiator system opens or closes (or neither). Shows the water temperature of the water going in to the heat pump. HP WATER IN: Shows the water temperature of the water going in to the heat pump. HP WATER IN: Shows the water temperature of the water going in to the heat pump. COMPR TEMP: shows the dudy for the radiator system opens or closes (or neither). Shows the water temperature of the water leaving the heat pump. COMPR TEMP: sh
		PROGRAM ID: shows the identity of the program. PROGRAM DATE: shows the "version" or date of the program.
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The SETTING MENU	display	
Display:		Explanation
LANGUAGE	ENG	General: system temperatures, desired night temperatures, main fuse etc. In this menu
HEAT PUMP	YES	the settings for the radiator system is made. Night temperature set back can also be
HEAD FUSE	20A	are settings for the radiator system is made. Night temperature set back can also be
DELAY EL HEATER	3h	the relation temperatures are settings with your instance. It is of high importance that
EL HEAT TEMP UP	50°c	the radiator temperatures are correct adjusted, otherwise the savings from the heat
MAX KW HEAT UP	6kW	pump may be low.
EL HEAT TEMP LOW	45°c	
MAX KW HEAT LOW	6kW	LANGUAGE: SWE FIN ENG (SWE). Make your chose of desired language.
SUMMER LIMIT	17°c	HEAT PUMP: NOYES (NO). When the heat pump is installed and ready to
ROOM SENSOR	YES	be started, change to YES. The boiler is delivered with NO so it can be started
RAD SYSTEM:		without heat pump.
MAX OUT	60°c	HEAD FUSE: 1650 (20). Change the value to the same size as the head fuse
	OFF	of the building. The control system protects the head fuse temporary if needed
	55	by stepping down the el heater power step by step.
		DELAY EL HEATER: 04 (3) Prevent the system to use electrical powered
	NU 0	energy for the radiator system during the chosen time
TIMES	0	EI HEAT TEMP LID: 30° - 80° (50°) Set the desired temperature of the upper part
		(alcostrial powered) of the boiler 50°C is recommended. Warms the outgoing
MONDAY A6V-A	— ▼ 22	(electrical powered) of the boliet. So C is recommended. Warms the outgoing
TUESDAY ▲6 ▼—▲	_₹22	temperature of the primary not water.
WEDNESDAY ▲6 ▼	—▼22	MAX KW HEAT UP: The maximum power of the electrical heater is set here.
THURSDAY ▲6 ▼—▲	_₹22	The power is chosen according to main/group fuse.
	_ ▼ 23	EL HEAT TEMP LOW: 30°80° (45°). Set the desired temperature of the lower part
		(electrical powered) of the boiler. 45°C is recommended. Under normal conditions the
SATURDAY ASV-	_ ₹ 23	lower heater is not activated. The heater is automatically activated under
SUNDAY ▲8 ▼—▲	.—▼22	following circumstances:
		when no heat nump is connected (stand along mode)
		- when the next pump is connected (stand and the hode).
		- when the outside temperature is too low and the heat pump is not operate.
		- when a heat pump fault occurs (alarm).
		MAX KW HEAT LOW: The maximum power of the electrical heater is set here.
		SUMMER LIMIT: -30°35° (17°). Tells the system at what out door
		temperature no need for warming the house. When the temperature is
		exceeded the radiator pump is stopped.
		ROOM SENSOR: NO., YES (NO). If room sensor is installed, chose YES, if
		not chose NO
		MAY OUT: 10° 95° (60°). The temperature to the redictors (house) can
		least of the maximized in page of a floor participation bight temperature can
		demos the system rises
		damage the system pipes.
		MIN OUT: OFF15
		electronically be minimized. The temp, can be set on a basic value e.g. during
		the summer time to become warm floors, or basic heated cellar, although the
		radiator system should be shut off. The function can be "shut off".
		CURVE INCL: 25°85° (50°). Here you tell what type of radiator system you
		have in the house. A low value means a floor type system and a high value
		means a high temperature system. The value means the outgoing temperature
		at -15° outdoor temp. More information in chapter 5.
		CURVE ADJUST: -15°15°(0°). The house temperature curve can be adjusted,
		see more information in chapter 5.
		NIGHT TEMP: NOYES (NO). Here you decide if you want to have night
		temperature reduction during the nights
		ADJUST: -25°25° (0°). If night temperature is chosen, you have to tell the
		system how much you want to decrease the temperature during nights - If the
		room sensor is used tell how much the room temperature shall be channed
		$a = 2^{\circ}$ means that the room terms will decrease -2° - If the room sensor is not
		used tall how much the primary flow temperature shall be changed o.g. 5°
		moone that the primary flow temperature will decrease. 5°
		Theans that the primary now temperature will decrease -> .
		Examples: time settings for night temperature are made.
		Two temperature decreases each day of the week can be made. "Arrow
		up ▲ " before the hour means that the temperature increases that
		hour."Arrow down ▼" before the hour means that the temperature
		decreases that hour

	Example 1:
	$\blacktriangle 6 \lor - \checkmark - \lor 22$ means that the temperature increases at 6 in the
	morning and decreases at 22 in the evening.
	Example 2.
	4.6×12.4 17 \times 22 means that the temperature increases at 6 in the
	A V 12 17 V 22 means that the temperature increases at 0 m the
	morning, decreases at 12, increases at 17 and decreases at 22 in the
	evening.
The SETTING CODE MENU dis	play
Display:	Explanation
SETTING CODE 0.0.0	Ceneral: to get access to this menu a code is needed. Authorized
TANK MAX 65°C	Beneral, to get access to this menu a code is needed. Authorized
TANK MIN A 35	Personnel nave access to the code.
TANK MIN B 35	TANK MAX: 15°85° (65°). Max tank temp allowed not to exceed the
TANK MIN LIMIT 5°c	compressor conditions.
MIN SPEED CP 10%	TANK MIN A: 15°., 65° (35°). Minimum tank temperature when the outside
DIFF START/STOP 5°c	temperature is above the set temperature (0) at "TANK MIN LIMIT"
FREEZE LIMIT 2°c	TANK MIN B: 45° CE° (CE°) Minimum tank temperatura when the outside
	TANK MIN B: 15 05 (35). Minimum tank temperature when the outside
	temperature is below the set temperature (0) at "TANK MIN LIMIT".
	TANK MIN LIMIT: -20°20° (5°).
	MIN SPEED CP: minimum speed (flow) for the circulation pump
	between the boiler and heat nump allowed
	Difference of the party of the
	back a super start and stop of the
	neat pump.
	FREEZE LIMIT: -10°10° (2°). The out door temperature where the
	circulation pump between boiler and heat pump is not allowed to stop.
The MANUAL MENU display (fo	r service purpose only)
	······································
Display:	Explanation
HEAT PUMP II	General: this is a menu for service nurnose. All components can be operated
SPEED CP 10%	manually for evaluation of its function. Sofety devices are still protocting the
RELAY 1.5[] 3[] 3[] 6[] Kw	tranually for evaluation of its function. Safety devices are sun protecting the
RELAY LO 3[] 6[] Kw	tank unit, but normal control of the product is overrided. When a mark is filled,
MIXVALVE []	the component is activated.
RAD CP []	HEAT PUMP: The heat pump unit can be activated to start and stopp. Internal
ROOM ERROR []	functions in the heat pump may override this possibility.
	SPEED CP: The load circulating nump can be activated by setting a speed
	RELAY: the relays for the upper electric heater can be activated one by one (4
	relays).
	RELAY LO: the relays for the lower electric heater can be activated one by one
	2 relays)
	MIXVALVE: possibility to run the mixing valve motor manually. By pressing the
	\blacksquare by the value starts to the mixing value motor manually. By pressing the
	• button, the valve starts to close, indicated by a minus (-) sight by pressing
(In case of "SHP_THOOGDN")	the \blacktriangle button, the value starts to open, indicated by a plus (+) sign.
(III case of SHF-THEODIN)	RAD CP: activats the radiator circulating pump.
	ROOM ERROR: activates the light diod on the room sensor (constant light).
	The purpose is to check the cabel connection between the tank unit and the
	room sensor
The TIME SETTING MENU disp	2V
	ay
Display	Explanation
TIME SETTING	Ceneral: the time is solved in a memory overy 5'th minute. In ease of a
MONDAY	General, the time is saved in a memory every 5 th minute. In case of a
HOUR 00	voltage interruption the control system use the stored time when the
MINUTE 00	voltage returns.
	DAY OF WEEK: set the day of the week.
	HOUR: set the hour
	MINUTE: set the minute

General information

The setting of the temperature need for the house is a central part of the boilers control system, because it's just that setting that tells the control system how much temperature your specific house need at different out door temperatures. The setting for the house is called *curve inclination and curve adjustment*. It is very important that the curve inclination and curve adjustment will be correctly done to get as good function and as good economy as possible.

One building may need e.g. 30 $^{\circ}$ water temperature to the radiators when it is 0 $^{\circ}$ C outdoor temperature, while another building maybe need 40 $^{\circ}$ C. The difference between the buildings depends on e.g. the sizes of the radiators, numbers of radiators and how well insulated the building is.

The setting of the *curve inclination* and the *curve adjustment*

You decide the temperature need for your house yourself by setting two values in the control system of the boiler. You find the values in Menu "SETTINGS". If you don't exactly know the temperature need for your house, it may take some time reach a correct value. The best way to achieve the correct setting is to choose operation without room sensor (see menu "SETTINGS"). The outdoor temperature only decides the temperature to the radiators. It is important during the adjustment period that:

- the night temperature function is not chosen.

- all thermostatic valves on the radiators are maximum opened.

- the out door temperature is lower than +5°C (use the factory settings if the

temperature outside is higher than +5°C until the temperature decrease to a low level).

- the radiator system is correctly functioning and adjusted.

Basic adjustment

The first setting tells how much temperature the radiator system need at

 15°C out door temperature to achieve a correct indoor temperature inside the house. The setting is called "CURVE INCL" and found in the menu
 "SETTINGS". If you don't know the value, use the crib next page.
 Next value to set is the "CURVE ADJUST" in menu "SETTINGS". Some buildings need a parallel "push up" or "pull down" of the curve inclination. The setting "0" means that the curve is not pushed or pulled at all. +5° means that the temperature out to the radiators is always +5°C higher at all outdoor temperatures, and -5°C lower if -5° is chosen.

3) Let the settings be valid for one or some days, check the room temperature. Follow the instructions below If it's too warm or cold.

Adjustment (if the out door temperature is *lover* than 0°C)

- if the room temperature is too low: Increase the value "CURVE INCL" a couple of degrees. Wait another day to feel the improvement before next adjustment.

If the room temperature is to high: Decrease the value "CURVE INCL" a couple of degrees. Wait another day to feel the improvement before next adjustment.

Adjustment (if the out door temperature is higher than 0°C)

- if the room temperature is too low: Increase the value "CURVE ADJUST" a couple of degrees. Wait another day to feel the improvement before next adjustment.

- If the room temperature is too high: Decrease the value "CURVE ADJUST" a couple of degrees. Wait another day to feel the improvement before next adjustment

Examples of curves

Below you find two diagrams, where you can see how the curve changes at different settings. The inclination of the curve tells how much the temperature to the radiators changes at different outdoor temperatures. A lower outdoor temperature automatically gives a higher temperature to the radiators. In diagram two you can see how a specific curve is "pushed up" or "pulled down" by +5°C or -5°C setting of the value "CURVE ADJUST". By using the method above the need for the house finally will result in a specific curve that is valid for your building.



Use this adequate basic settings after the installation if you don't know the specific values for the house.

Type of system	CURVE INCL	CURVE ADJUST
Floor heating system only:	35°C	0°C
Low temperature system:	40°C	0°C
Normal temperature system:	50°C	0°C
High temperature system (elderly houses, small radiators, unsufficient insulated):	60°C	0°C

06. Night temperatures

Night temperatures are used to decrease the indoor temperature at nights (or when desired).

By programming the control system you have the possibility to:

- decrease the temperature two times a day

- decrease the temperature at different times each day of the week

The programming is made in menu "SETTINGS".

07. The structure of the menus



08. Maintenance

General information

After the installation; check together with the installer that everything work correctly. Let the installer show you buttons, valves, pressure release valves and fuses so you know how to maintenance your new boiler. Vent the air after a couple of days from the system, and if necessary, fill with more water.

Pressure release valve

Check the pressure release valves for domestic water and boiler water every four times a year by turn the knob on the valves till it "click". Check that water is coming from the waste pipe.



Mixing valve

The mixing valve motor is automatically controlled from the control system for correct temperature to the radiators at every outside temperature. In case of a failure it's possible to manually operate the valve by pressing the knob on the motor and then turn.

- Turn counter clockwise for higher temperature to the radiators.

- Turn clockwise for lower temperature to the radiators.



Draining and shut off valves

The boiler shall be disconnected from voltage when draining. The draining valve for the radiator system is placed behind the plastic front panel. When draining *the whole system*, set the mixing valve to full open position (maximum counter clockwise). Don't forget that air need to be added to the system from a high level.

After the heat pump has been connected the shut off valves shall stay open.



When the boiler is not being used

If the boiler is not used, turn it off with the main switch. If there is a risk for freezing, all water has to be drained from the product and from the radiator system. Also the domestic hot water coil inside the boiler must be drained. Put a hose to the bottom of the cold water connection and empty with siphon method.



09. If errors occur

General information	The Sanyo CO2 Eco is constructed for high comfort, good reliability and long life length. Below you find hints how to solve different problems if they occur. If something goes wrong, contact your installer that was responsible for the installation. He will contact the dealer if he judges it to be a material or factory error. Use the serial number for this product in every contact with the dealer or manufacturer.
Sanitary hot water	 check if the outgoing sanitary hot water temperature from the tank unit is ok or not (before the thermostatic temperature limiter). check the thermostatic temperature limiter for the sanitary hot water mounted on the tank unit. check the thermostatic temperature valve in the shower. check the tank temperature in the control system (display). Value "EL HEAT TEMP UP" in menu "DIAGNOSE"
Radiator system	The room sensor is an important component in the system to get correct temperature in the house. To work in a correct way, it is important that the radiator thermostatic valves are open in the room where the room sensor is placed. Always adjust the system with all thermostatic valves on the radiators full open. Afterwards the temperature in the different rooms can be adjusted with the thermostatic valves. <i>If the room temperature is too low, please check:</i> - that the radiator thermostatic valves are full open, and that the radiator surface temperatures are even. It is important that the radiator system works correctly for an optimal operation. Take the air out of the radiator system. - that no errors are shown in the display. - that enough power has been installed. Increase if necessary. - that high enough temperature at "curve inclination" is chosen. - that the function "night temperature" is correct programmed. - that the function "night temperature" is correct programmed. - that the mixing valve isn't pushed in manual position. <i>If the room temperature is uneven, please check:</i> - that the room sensor is representative placed. - that the no sensor is representative placed. - that the no sensor is representative placed. - that memory avelve isn't pushed in manual position.
Reset an error	Push the reset button. If the error still remains you can't reset the error.
Cut off thermostat	If the water inside the tank is overheated, a security function shut off the electric heaters. The reason may be e.g. lack of tank water (leak), sensor failure, or other reason making the temperature to high. The system has to be reset manually after such failure: shut off all voltage to the tank unit with the main switch, and put it on again. If the failure appears repeated times, search for the reason of the failure.
Current sensor system	The Sanyo CO2 Eco includes a current sensor system. The control system supervises the main fuses if the current sensors are correctly mounted. If an over current occurs, one or more electrical power step(s) on the boiler will

automatically be disconnected. Especially one phase power sources in the house e.g. engine heater for the car, coffee machine, or a washing machine, dryer or cooking place may make the boiler to be power reduced. Temperatures on radiators or sanitary hot water may be too low. The "status row" in the display shows if the boiler is power reduced. Talk to the installer if the problem is disturbing. The main fuse may have to be increased.

Air problems

If a murmur sound occurs inside the boiler it may have to be air vented. Check by turning the pressure release valve for the radiator system on the top of the boiler until it "clicks". Pure water shall be drained. Fill up with water if necessary. Let the installer check the reason of the problem.

Reserve heat thermostat

If the control system (display) breakes (e.g. by lighthening) you can manually set the reserve heat thermostat behind the plastic front panel to the recommended value, see label. Do not forget to manually operate the mixing valve by pressing its knob and turning to the desired opening.

10. Alarms and information status messages

General information

The control system continuously supervises the operation of the system. Two types of messages can appear:

Alarms:

if an error occurs that may cause problems to maintain correct operation, such as sensor errors, the error diode on the panel and room sensor starts to flash. The error shows in the dispaly directly in clear text.

Status messages:

the system shows status messages in the main menu when they occur, such as the product is power reduced, the summer limit is reached etc. Status messages are no errors, the diode don't start to flash.

Alarm texts

SENSOR PRIMARY FLOW SENSOR TANK TEMP SENSOR ROOM (room temp) SENSOR EL UP. (electric heater up temp) SENSOR EL LO. (electric heater low temp) SENSOR OUT (out door temp) All sensor error messages: check the cables to the sensor, check the connection -both on sensor and on tank, check that outside sensor is not reached by the sun. COMM ERROR (communication error) Indicates hat the communication between the boiler and the heat pump don't work correctly. - check that the heat pump have tension and in operation mode - check the connection cable between the boiler and the heat pump (230V. for qualified people) - check that the heat pump and the boiler are connected to the same neutral system in the building

- try to reset the error.

If an error occurs,cut off Power supply once, and please run again. But if an error occurs again, please call service. (Write the error message down.)

Status messages:

Status messages are shown in the normal display window. WITHOUT HP: the tank is operated without heat pump. The heat pump is not chosen in menu "settings". CURRENT REDUCED: when the main fuses are protected by reducing the power in the boiler this message is shown. POWERS REDUCE: after a voltage interruption (or when starting the tank unit), the electrical immersion heaters are reduced to maximum 6 kW load for approximately 2 hours. This helps to keep the load on power supply net down.

SUMMER LIMIT: the heat to the radiators is automatically stopped during summer. The circulating pump stops. You can choose summer limit temperature in menu "settings".

11. More useful information

The room sensor

You can choose "NO" in menu settings at "ROOM SENSOR" if the room sensor is difficult to install, place, if there are more than one apartment, if there is a floor heating system with separate room sensors or if you often heat in an open fire place. The alarm diode is still functioning when alarms occur.

If you heat in an open fire place or oven, the temperature can affect the room sensor. It may be cold in other parts in the house. You can then temporarily operate the system without room sensor during the time you fire. The system operates towards the outside temperature (heat curve). The thermostatic radiator valves will reduce the temperature where you fire.

Out door temp sensor error

The system simulates -5°C outside temperature if the sensor doesn't work. An alarm will appear.

My settings

Use this table to write down your own settings. Use a pencil so that you can erase and write down new settings.

Head fuse(A)	Delay el heater	El heat temp up	El heat temp low	Max kW heat up
	(H min)	(°C)	(°C)	(°C)
Max kW heat low	Summer limit (°C)	Room sensor	Max out (°C)	Min out (°C)
(°C)		(Yes/No)		
Curve incl (°C)	Curve adjust (°C)	Night temp	Adjust (°C)	
		(Yes/No)		

Night temperature times

	↑ Increase	↓ Decrease	↑ Increase	↓ Decrease	
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					
Saturday					
Sunday					
Notes:					

Maintenance

(How to remove the electrical box)

(1) Remove the eleven screws securing the top cabinet and lift the top cabinet to remove it .







- (2) Remove the three screws securing the rightside panel (the panel with the SANYO mark) and push down the rightside panel to remove it.
- (3) Remove the six screws securing the leftside panel and lift a little bit the leftside panel to remove it .



- (4) Remove the four screws securing the electrical box(5) Disconnect the nine connectors and remove
- the two screws securing the protect earth terminal. then lift the electrical box to remove it . [Shown in the next page]









(6) Remove and replace the electrical box. After replacing the electrical box, attach all the parts in their original positions by reversing the procedure in steps (5) to (1) above.

(5) Disconnect the nine connectors and remove the two screws securing the protect earth terminal.



Position of the nine connectors



A : Remove the outdoor sensor holder



B : Disconnect the three wires from the compressor



<u>C : Remove the two screws securing the protect</u> <u>earth terminal.</u>



SHP-C90GDN



SHP-C90GEN



Outdoor temperature versus operating current characteristics

 $\ensuremath{\cdot}$ The current level drops when the capacity limiting device is activated by the inverter.

•The unit is operating properly if the operating current is within the shaded area.

Troubleshooting

Trouble display table

First check the details of the trouble display, and then be absolutely sure to turn off the power.

<Tank unit>

Display	Trouble	Criteria and diagnosis
SENSOR PRIMARY FLOW	Primary flow sensor trouble	Open-circuit or short-circuit in sensor itself or lead wires
SENSOR TANK TEMP	Tank temperature sensor trouble	Defective contact of connector or defective crimping of terminal
SENSOR ROOM	Room sensor trouble	• Defective tank unit PCB
SENSOR EL UP	Electric heater Sensor trouble	
SENSOR EL LO		
SENSOR OUT	Outdoor sensor trouble	
COMMERROR	Serial communication error	 Serial communication error <diagnosis></diagnosis> Inadequate power supply due to incorrectly plugged in connector or Incorrectly wired power cable or communication cable Defective in the current fuse in heat pump unit Defective PCB in tank unit or heat pump unit

Trouble display table <Heat pump unit>

Display	Trouble	Criteria and diagnosis
H01	Trouble in coil temperature sensor of heat pump unit	Open-circuit or short-circuit in sensor itself or lead wires
H02	Trouble in compressor temperature sensor	 Defective contact of connector or defective crimping of terminal
H03	Trouble in outdoor temperature sensor	Defective heat pump unit PCB
H04	Trouble in current sensor	When a current of 0.8A or more does not flow at an operating frequency of 43 Hz.
		High pressure switch confirmed after 8 retries. (When refrigerant pressure is 16 MPa or more)
H05	Trouble in high pressure switch	>Diagnosis> Blocked refrigerant circuit pipe Defective high pressure switch or heat pump unit PCB Trouble in hot water storage circulation system (such as trapped air or blockage) Defective hot water storage circulation pump When there is no water in the tank unit Improper installation of unit
H06	Trouble in water coil inlet sensor	Open-circuit or short-circuit in sensor itself or lead wires
H07	Trouble in water coil outlet sensor	Defective contact of connector or defective crimping of terminal
H09	Trouble in split coil inlet sensor	Derective neat pump unit PCB
H0A	Trouble in split coil outlet sensor	
		PAM overcurrent, PAM overvoltage or FET overheating confirmed after 8 retries
H11	Trip input (PAM overcurrent, PAM overvoltage)	<diagnosis> Abnormal voltage and current protection in PAM circuit Blocked refrigerant circuit pipe Instantaneous power failure caused by lightning Defective high pressure switch or heat pump unit PCB Trouble in hot water storage circulation system (such as trapped air or blockage) Defective hot water storage circulation pump Defective electric expansion valve in heat pump unit When there is no water in the tank unit Improper installation of unit </diagnosis>

Display	Trouble	Criteria and diagnosis
H12	Trip input (HIC current or temperature)	 HIC trouble confirmed after 8 retries <diagnosis></diagnosis> HIC protection activated by abnormal current or temperature Blocked refrigerant circuit pipe Instantaneous power failure caused by lightning Defective HIC or outdoor fan motor shutdown Defective high pressure switch or heat pump unit PCB Trouble in hot water storage circulation system (such as trapped air or blockage) Defective electric expansion valve in heat pump unit When there is no water in the tank unit Improper installation of unit
H13	Abnormal compressor temperature	 When the compressor temperature is too high and this is confirmed after 8 retries <diagnosis></diagnosis> Defective electric expansion valve in heat pump unit Blocked refrigerant circuit pipe or escaping refrigerant
H14	Current peak cutoff Value of the cutoff SHP-C90GDN: 12A SHP-C90GEN: 25A	When the current is too high and this is confirmed after 8 retries <diagnosis></diagnosis> • When an operating current of 12A or more has flowed
H15	Trouble in EEPROM (heat pump unit PCB)	Outdoor unit OTP trouble confirmed after 8 retries Diagnosis> • Defective EEP-ROM data or EEP-ROM installation
H16	DC compressor operation trouble	 Trouble in DC compressor speed confirmed after 8 retries <diagnosis></diagnosis> Open-phase operation, defective compressor Blocked refrigerant circuit pipe or defective heat pump unit PCB
H17	DC fan motor operation trouble	 Trouble in DC fan motor speed confirmed after 8 retries Oiagnosis> Defective DC fan motor or defective connector contact Defective heat pump unit PCB
H23	Water heating (for the tank unit) trouble	 When the failure of the outlet water temperature from the heat pump unit to reach the rating is sustained for 10 minutes after the compressor temperature reached its target CDiagnosis> Trouble in circulation system (problem with escaping air) Defective circulation pump No water supplied to tank unit Refrigerant escaping from heat pump unit Defective PCB in tank unit or heat pump unit Defective electric expansion valve in heat pump unit Defective compressor
H27	Incorrect piping connection between units	When the inlet water temperature is +10°C higher than the outlet water temperature continuously for 3 minutes in the test run mode

How to display the errors

The error screen is displayed by returning the tank unit's display to the initial screen. The display alternates between the initial screen and error display screen every 4 seconds while an error is displayed.

<Initial screen>



<Error screen for tank unit>

(Example: Outdoor sensor trouble)



<Error screen for heat pump unit>

(Example: Compressor temperature sensor trouble)



Displaying the error history

The display switches to the LOGG MENU screen when the 🗰 button is pressed twice while the initial screen is displayed. A history of the last three errors appears in the bottom part of the screen. (Error #1 is the most recent error.) The initial screen is restored from the error screen when either the 🗩 button is pressed or 10 minutes have passed.

<LOGG MENU screen>

5351h
'350h
17h
20st

Troubleshooting procedures

1. H05 (Trouble in high pressure switch)

This trouble is confirmed after repeated 8 retries when the refrigerant pressure has exceeded the pressure setting. **[Checkpoints]**

- (1) Is the circulation pump locked?
- (2) Is any air trapped in the connecting pipes between the heat pump unit and tank unit?
- (3) Has water been poured into the tank unit?
- (4) Have you forgotten to open the tank unit's shut-off valves?

[Remedial action]

- (1) Unlock the circulation pump by referring to the test run section in the heat pump unit's installation instructions.
- (2) Turn off the power and disconnect the pipes. Thoroughly purge the air from the pipes, and then re-connect the pipes.
- (3) Pour water into the tank unit.
- (4) Refer to page 34 in the tank unit's Technical Manual, and open the shut off valves.

2. H23 (Water heating (for the tank unit) trouble)

[Checkpoints]

When the water temperature heated by the heat pump unit for the tank unit is too low (this kind of trouble occurs when it is not possible to provide the circulation flow required)

- (1) Is the water failing to circulate between the tank unit and heat pump unit?
- (2) Is a pipe diameter too small?

When the boil-up temperature is too low (this kind of trouble occurs when the circulation flow is too high or heat quantity is insufficient)

- (3) Is a pipe whose diameter does not satisfy the rating (which is larger than the rating) being used?
- (4) Have the pipes been insulated properly?

[Remedial action]

(1) Turn off the power, and replace the circulation pump.

- (2)(3)Use pipes with the rated diameter and length in accordance with the installation instructions.
- (4) Insulate the pipes and areas where the units are connected.

3. H27 (Incorrect water circuit piping connection)

The pipes between the heat pump unit and tank unit are crossed and connected in reverse. **[Checkpoint]**

• Is the circulation pump side of the tank unit connected to the water side (B) of the heat pump unit? [Remedial action]

• Turn off the power, close the shut-off valves of the tank unit, and change over the connecting pipes.

4. COMM ERROR (Serial communication error)

This occurs when there is a failure in the communication between the heat pump unit and tank unit. **[Checkpoints]**

- (1) Have both of the COMM connectors on the heat pump unit and tank unit been connected?
- (2) Have both of the power connectors on the heat pump unit and tank unit been connected?

[Remedial action]

• Turn off the power, and reconnect the wires while referring to the wiring diagrams of P65 or 66.

Before replacing the heat pump unit

Be absolutely sure to check the following points before diagnosing a trouble in the refrigerant circuit.

- (1) Do the outdoor temperature and current levels stand in their proper relationship? (See page 27 or 28) (If the levels are within the reference values, there is no trouble in the closed circuits.)
- (2) Is power supplied to the heat pump unit?
- (3) Is there any trouble with the thermistors? (Check the error history.) See pages 30 32.
- (4) Is the fan running?
- (5) Are the electrical wires plugged into the terminal board securely?

Installation

Tank Unit

01. Introduction

The Sanyo CO2 Eco is a complete heat pump system that warms both the house and the hot water.

The Sanyo CO2 Eco is equipped with a motorized mixing valve which constantly ensures that a correct and even temperature reaches the radiators.

The Sanyo CO2 Eco has a built-in circulation pump for connection to the heat pump.

The Sanyo CO2 Eco has an micro chip operating system which:

• monitors all functions in the product.

admits individual adjustments

• clear text shows the desired values, e.g. temperatures, operation times, fault indications and so on.

• in a simple and structured way facilitates the adjustments and fault localization.

The Sanyo CO2 Eco has a built-in copper coil which provides domestic hot water abundantly.

The Sanyo CO2 Eco has a basement heating function which makes it possible to heat only the basement if needed, i.e. summer time. In case of under floor heating installation it has a electronic controlled temperature limiter.

The Sanyo CO2 Eco has a built-in night reduction, where you can change the temperature in the house day by day.

The Sanyo CO2 Eco is easy to service with easy access to electrical components, and good fault tracing functions in the operating program. The Sanyo CO2 Eco is delivered with a room sensor as standard. The room sensor is equipped with a light-emitting diode which alarms in case of fault. The fault can be read in clear text on the display on the indoor unit (signals window).

Due to the quick development the right to changes in specifications and parts are reserved.

02. Important points

General information	
General information	 Upon delivery and installation carefully check the following important points: Unpack the product and check before installation that it has not been damaged during transport. Report eventual transport damage to the transporters. The Sanyo CO2 Eco must be transported in upright position. When moving the tank unit to the inside of the house, it can temporarily be laid down on its back. If the product is placed in a room with soft carpeting, bottom plates to be be placed under the adjusting feet of the product is recommended. Make sure that the product stands straight. Check with a water level. Check that waste water pipe from the mounted safety valve is drawn to the floor drain.
Note	The current sensors shall always be mounted. The boiler detects what
	phase the heat pump is mounted, and adjusts the step sequence of the
	Use this installation manual together with the users manual where the
	control system functions are described.
	Important :
	1. When the heat pump unit is connected and the system has been water filled, please allow the heat pump operation by setting the value "HEAT PUMP" to "YES" in "SETTING MENU" display to allow the load circulation pump to run. Otherwise there may be a water freeze risk if the ambient temperature is below 0°C.
	2. If the heat pump unit is not connected: be sure the value "HEAT PUMP" is set to "NO" in "SETTING MENU". Otherwise the load circulation pump will be run without water and therefore damaged.
Safety instructions	The following apparty instructions must be absorved upon handling installation
	and use of the product.
	Install a safety valve 9 bar on the cold water connection, see chapter "Plumbing system"
	Fit the mixing value to the hot tap water to prevent scalding, see chapter
	 Plumbing system". Ensure that the product is currentless before any interventions.
	• Do not flush the boiler with water.
	tackle, eyes etc are not damaged. Never place yourself under the lifted up
	 product. Never risk your safety by dismantling casings, covers etc that are screwed
	 Never risk your safety by setting safety equipment out of function. Interventions in the electric or the cooling system must be done only by a qualified person.

03. Technical data

Tank unit name:	SHP-TH90GDN-SW
Dimensions without packaging HxWxD:	1574x596x630 mm
Dimensions with packaging HxWxD:	1736x700x747 mm
Electrical data:	3phase-400V
Electrical heater power	0 15 kW
Upper electrical heater power in steps:	0 15 3 45 6 75 9 kW
I ower electrical heter power in steps:	0.3.6 kW
Input power max:	15 kW
Amperage max:	22 5 A
Max nower supply cable dimension:	6 mm2
Water content boiler:	2231
Max boiler operation pressure:	25 Bar
Water content domestic hot water coil:	571
Max hot water coil operation pressure:	10 Bar
Pressure release valve bot water coil:	0 Bar
Load circulation nump/ adjustment:	Position 3 (highest speed)
Weight:	155 Kg
Weight.	100 Kg
Tank unit name:	SHP-TH90GEN-SW
Dimensions without packaging HxWxD	1574x596x630 mm
Dimensions with packaging HxWxD:	1736x700x747 mm
Electrical data	1nhase-230\/
Electrical heater power:	
Lipper electrical heater power in steps:	0.2.4.6 kW
l ower electrical heter power in steps:	
Input power max:	
	52 Δ
Max nower supply cable dimension:	16 mm2
Water content boiler:	2231
Max boiler operation pressure:	2.5 Bar
Water content domestic hot water coil	571
Max hot water coil operation pressure:	10 Bar
Pressure release valve hot water coil:	9 Bar
Load circulation pump/ adjustment:	Position 3 (highest speed)
Weight:	155 Kg
Tank unit name:	SHP-TH90GHN-SW
Dimensions without packaging HxWxD:	1574x596x630 mm
Dimensions with packaging HxWxD:	1736x700x747 mm
Electrical data:	3phase-230V
Electrical heater power:	014.1 kW
Upper electrical heater power in steps:	0 1.175 2.35 3.525 4.7 5.875 7.05 kW
Lower electrical heter power in steps:	0 3.5 7.05 kW
Input power max:	14 kW
Amperage max:	35.4 A
Max power supply, cable dimension:	10 mm2
Water content boiler:	223 L
Max boiler operation pressure:	2,5 Bar
Water content domestic hot water coil:	5,7 L
Max hot water coil operation pressure:	10 Bar
Pressure release valve hot water coil:	9 Bar
Load circulation pump/ adjustment:	Position 3 (highest speed)
Weight:	155 Kg

04. Measurements



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05. Principal boiler design



06. Plumbing system

General information

The installation must be carried out in accordance with local regulations. The boiler must be connected to an expansion vessel in an open or closed system.

Carry out installation adjustments in accordance with the descriptions in Chapter 10 "First start-up" before starting up the equipment.

Inform the user of the handling and maintenance, show him the knobs, the handles etc to make sure he clearly understands how the equipment works and must be maintained.

The radiator system must be rinsed before connecting the product.

Important! Before starting up the heat pump system (Heat Pump "YES" in menu settings), be sure to water fill the heat pump pipe system to avoid the load circulation to run dry.

Pipe connections



Operation without heat put	np
	Sanyo CO2 Eco can be started without the heat pump being installed.
	The product works then like a common electric boiler with full function of the
	regulation. Make sure the heat pump is blocked in the control system, see user Manual.
Transport	
	To avoid transport damages, do not unpack the boiler until it has been
	transported to its installation site in the boiler room. The boiler can be handled
	• Fork truck
	Lifting eve to be fitted to the lifting sleeve on top of the boiler (extra
	sleeve can be found on top of the boiler in the centre under the
	insulation).
	Lifting band around the pallet. Note! Only with the wrapping on.
	Remember that the boller has a high gravity point, handle with caution.
Unpacking	
	To avoid damages by handling, unpack the boiler first when it is located in
	its installation place. After the unpacking check:
	I hat the boiler has not been damaged during transport. Report eventual damages to the forwarding agent.
	• Ensure that the delivery is complete, see below
Standard delivery	
	• Boiler Sanyo CO2 Eco, including load circulation pump between tank unit and heat pump.
	Enclosed bag with: room sonsor
	primary flow sensor
	outdoor sensor
	installation and maintenance instruction
	safety valve for domestic hot water, 9 bar
	current sensors, 3 pcs
Basement heating for sum	mer period
	The boiler can be programmed for "basement heating", if a certain basic
	heating, e.g. in the basement or in the log house, is desired during the
	summer to avoid raw and damp air. Under the "SETTING MENU" in the control
	system "MIN OUT" (=min. allowed flow temp) can be selected.
	temperature does not go below the set value, even if the room sensor or
	the heating curve desires a lower temperature.
	The function demands that radiator thermostats or shut-off valves
	are mounted in the other parts of the house.
	This function can also be used for floor heating installed in e.g. a bathroom.
	< Domestic hot water >
Temperature limiter valve	for domestic water
·	A temperature limiter valve for the domestic water must be mounted on the hot water tap to
	avoid the risk of scalding.
Safatu valvo hot ton water	
Salety valve not tap water	Mount the enclosed valve to the incoming cold water connection. The waste
	pipe must be connected to the drain gutter directly, or if the distance is
	more than 2 m, to the waste funnel. The waste pipe must lean toward the
	drain gutter.
Non-roturn valvo	
Non-return valve	Mount a non-return valve at the incoming domestic cold water connection

< Radiator system >

Circulation pump radiator system

The circulation pump must be mounted on the primary flow of the boiler and is electrically connected from the boiler, see"Electric installation".

Pressure release valve for the boiler

A pressure release valve for the boiler is factory mounted. The waste pipe has to be connected to a drain gutter directly, or if the distance is more than 2 m, to the waste funnel. The waste pipe must lean toward the drain gutter.

Fillet valve radiator system

To be mounted between the cold water connection and the radiator return pipe (alternative: between the cold water and the expansion connection).

Pressure gauge, system pressure

A pressure gauge must be mounted on the expansion pipe, alternatively on the return pipe of the radiator.

Connection of the expansion vessel

The boiler can be connected to a closed expansion vessel (closed system is recommended) or to an open vessel. The boiler is ready for assembly to an 18 I closed vessel, placed compact on top of the boiler. The expansion vessel, with required angle connection, can be bought as an accessory.

Connect a system pressure gauge to the return pipe of the radiator. If another expansion vessel is chosen, the pressure gauge is often included. With an open system, the height between the highest placed radiator and the expansion vessel must not be less than 2,5 m to avoid air getting into the system.

Top view

Assembly of 18 I expansion vessel





Angular coupling

Principle sketch for pipe connection

The *principle sketch* shows the main connection of the boiler to the radiator and hot water system of the house, and the connection to the heat pump.

Different systems may look different, e.g. single or double pipe systems, which can make the final installation to be different.



Filling:

The valve for the filling (11) must be mounted to the return pipe of the radiator. Alternatively the valve can be installed in direction of the expansion pipe. When filling the boiler, the mixing valve (02) must be wide open. Press the knob on the valve and turn maximum counter clockwise.

07.Connection to the heat pump unit

For connection to the heat pump, please follow the instructions in the heat pump manual. Be sure to water fill the system before starting the product.



Connection of the current sensors

The three current sensors, one for each phase, are installed inside the group fuse central as follows:

Every phase from the electricity meter feeding the electricity group central unit is led through a current sensor before being fitted on the respective bar. Wiring to the boiler is done according to the picture on the terminal block. In this way the total phase current is constantly being checked and compared with the amperage set on the loading monitor on the boiler. If the current is higher, the control unit disconnects one electrical power stage. If it is still too high, it disconnects yet another power stage etc. When the current again sinks below the set value, the stages will be reconnected. The current detectors together with the electronics thus prevent more power to be connected than the main fuses can stand.



< S H P - T H 9 0 G E N - S W >

 $1\,\times 230\,{\rm V}\,{\rm is}$ not possible to use the sensor because the maximum 35 ${\rm A}.$ The power on single phase unit will be a lot more.

Outdoor sensor

The sensor must be placed in the most suitable place on the wall of the house facing north-west or north to avoid exposure to the morning sun. **Protect the sensor from the sun if there is a risk the sensor will be affected by it.** The sensor must be placed on about 2/3 height of the wall. Be sure not to place the sensor over the ventilation ducts, doors, windows or where it can be exposed to other things than the important outdoor temperature.

Terminal block

The terminal block for electric connection is shown below. Top view of the tank unit



Electric box behind the plastic front cover



No	Information	Installation of:	
65 64 63	Common Sensor 1 Sensor 2 Sensor 3	Current sensors. Connection of 1, 2 and 3 can be mixed (no importance)	
61 60		Primary flow sensor. Free polarity of cables	ge
59 58		Outdoor sensor. Free polarity of cables	olta
57 56 55	RG-4 RG-2 RG-1	Room sensor. RG-1RG-4 are the marked poles inside the room sensor housing.	
54 53		Night temp / External control. See description.	
52 51	Black (5) Black (4)	Mixing valve position switch. Factory mounted.	
N	Neutral		
115 13 14	Blue Black (open) Brown (close)	Mixing valve signal. Factory mounted.	<u> </u>
119 18	PE N L1	Radiator circulation pump	V 1 V
6 5 4 3 2 1	WP-tarif WP-tarif	Detection of tariff-connection for some markets	53(
21 PE N L3 L2 L1	Communication with heat pump Power supply		400V 3N~

<Power supply 400V 3N $\sim>$

<Power supply 230V 3 \sim >

No	Information	Installation of:	
65 64 63 62	Common Sensor 1 Sensor 2 Sensor 3	Current sensors. Connection of 1, 2 and 3 can be mixed (no importance)	ltage
61 60		Primary flow sensor. Free polarity of cables	N VO
59 58		Outdoor sensor. Free polarity of cables	Γογ

57 56 55 54 53	RG-4 RG-2 RG-1	Room sensor. RG-1RG-4 are the marked poles inside the room sensor housing. Night temp / External control. See description.	w voltage
52 51	Black (4)	Factory mounted.	L ₀
N 115 13	Neutral Blue Black (open)	Mixing valve signal. Factory mounted.	۷ 1N~
119 18	PE N L1	Radiator circulation pump	230
21 PE L3 L2 L1	Communication with heat pump Power supply		230V 3~

<Power supply 230V 1N \sim >

No	Information	Installation of:	
61 60		Primary flow sensor. Free polarity of cables	
59 58		Outdoor sensor. Free polarity of cables	age
57 56 55	RG-4 RG-2 RG-1	Room sensor. RG-1RG-4 are the marked poles inside the room sensor housing.	v volt
54 53		See description.	Γo
52 51	Black (5) Black (4)	Mixing valve position switch. Factory mounted.	
N	Neutral		,
115 13 14	Blue Black (open) Brown (close)	Mixing valve signal. Factory mounted.	0 V 1N
119 18	PE N L1	Radiator circulation pump	23
21 PE N	Communication with heat pump		0V 1N~
L1			23(

Room sensor

The room sensor must be centrally placed in the most open place in the
house to enable it to feel the average temperature. E.g. in the hall between
many rooms or central in the stair case. Draw a 3-leader cable (min 0,5 mm2)
between the boiler and the room sensor. Fasten the room sensor to the wall
at about 2/3 height with screws. The room sensor terminal can be disconnected
from the print board when connecting the cable. Connect the cable to the
room sensor terminal and to the boilers terminal.
IMPORTANT! The wires must be connected correctly for accurate function.
Markings RG-1, RG-2 and RG-4 on the tank unit terminal must correspond with the markings
on the room sensor terminal 1, 2 and 4.
SUGGESTION: To ensure the best result, set up the cable of the sensor
temporarily and try out different locations before installing it permanently.

Primary flow sensor

The sensor shall be mounted to the primary flow pipe, preferably after the circulation pump. The sensing element is located in the front part of the sensor (see picture).

- Fasten the sensor with the enclosed clamps.
- Make sure that the sensor has good contact to the pipe surface.
- **IMPORTANT!** Insulate the sensor, e.g. with pipe insulation.
- · Connect the cables on the terminal block of the boiler.



Radiator circulation pump

The radiator circulation pump is electrically connected to the terminal block according to the picture on the previous page. Electrical data 230V 1N~. Internal fuse 10A, see panel.

< Information and check >

Adjustments to be made by the electrician

After the connection the electrician must make the following adjustments.

• Choice of power limiter for the upper and lower electric heater (max. output electrical boiler) (menu "SETTINGS" in the control unit).

Check the connected sensors If any of the sensors are wrongly connected it will be shown on the display e.g. "ERROR OUTSIDE SENSOR" (=outdoor sensor alarm).

If several sensors are wrongly connected, the alarm shows them sequent. If no alarm is shown the sensors are correctly connected.

Note: the room sensor has to be chosen in menu "SETTINGS", otherwise the boiler don't errors a wrong connection. The connection of the current sensor has no alarm but the current value of the house can be read in the menu "DIAGNOS" (=diagnosis).

09. Electrical wiring diagram

< S H P - 9 0 G D N - S W >











10. First start-up

General information	Please note! The Sanyo CO2 Eco can be connected and started without the room sensor and current sensors or heat pump being installed. The room sensor is always recommended to be installed. If the current sensors are chosen not to be installed, the internal sequence steps of the electrical heater will not be optimized. IMPORTANT: Before starting up the heat pump system (Heat Pump "YES" in menu settings), be sure to water fill the heat pump pipe system to avoid the load circulation to run dry.
Before the first start-up	 Check that the product and the system are filled with water and the air is taken out of the radiator system. Check that all the hydraulic connections are sealed and have no leakage. Check that sensors, radiator pump etc. are connected to the electricity.
First start	 Turn the main switch on and the display lightens up. To prevent damages on the product the control system asks if the system has been filled up with water. Press the RESET button to confirm. This sequence is taking place at every start up at the first operating hour of the product. Now the boiler starts to operate according to the manufacturing settings. <i>Main manufacturing settings:</i> operation without room sensor operation without temperature decrease during nights If the heat pump unit is properly installed, water filled and conected, be assolutely sure to conduct the "Test Run"(described bellow). Then change the factory settings according to the actual system requirements and customers demands.

Note: if the heat pump is not power connected, the boiler will display communication error.

Test run

- (1) Turn on the power: Be absolutely sure to provide the adequate voltage.
- (2) Operate the heat pump unit
 - ① Press the OK button on the "Main menu display" to display the menus choice.
 - ② Press the ▼ button twice to select "SETTING," and then press the OK button to access.
 - ③ Press the ▼ button once, to make the first row active to be changed. Then check that "LANGUAGE" blinks.
 - ④ Press once the OK button to step down and make "HEAT PUMP" active to be changed.
 - 5 Press the \blacktriangle button once to change "NO" to "YES."
 - 6 Check that the HP unit starts operating within 3 minutes.

A) Proceed to (3) if the HP unit has started operating.

B) If the HP unit fails to start operating within 3 minutes, press the Step back button several times to return to the "Main menu display.

" If "COMM ERROR" appears on the display at this time, it means that there is something wrong in the wiring connections. Be absolutely sure to turn off the power, and then refer to "08. Electric installation" and recheck the wiring connections.

- (3) Stop the heat pump unit operation
 - ① Press the Step back button twice to return to the "MENUS" display.

- ② Press the ▼ button twice to select "MANUAL," and then press the OK button to access.
- ③ Inside the "MANUAL" display, press the ▼ button once to change the mark of "HEAT PUMP" (from a filled mark to []). → Then the Heat pump unit stops.
- (4) Operate the circulation pump
 - Inside the "MANUAL" display, press the OK button once to make "SPEED CP" active to be changed.
 - ② Press the ▲ button several times and select the 60% setting.
- (5) Start the test run
 - ① Inside the "MANUAL" display, make the mark of "HEAT PUMP" active to be changed by pressing the OK or Step back button.
 - 2 Then change mark of "HEAT PUMP" filled and operate the heat pump unit.
 - 3 The test run would be end about 10 minutes after the operation in step 2.
 - In this case, the "Main menu display" is automatically displayed.
 - \rightarrow The test run is now completed.
 - The operations in (6) and (7) need not be performed.
- (6) Test run problems

If the red light on the display blinks before the test run ends, press the Step Back button twice to return to the "Main menu display".

- If "H27" appears on the error display, it means that there is something wrong in the piping connections. Check the piping between the boiler unit and heat pump unit and if the shut off valves are open.
- If a display other than "H27" appears on the error display, check the circulation pump by following the procedure described below in (7).
- ③ If there are no problems in the circulation pump, refer to the "Service Manual", and contact your vendor.
- Note : It may not be possible to perform the test run when the temperature inside the boiler unit is high. In this case, reduce the temperature inside the boiler unit.
- (7) Circulation pump checks
 - ①Turn off the power.
 - O Remove the screw in the center of the circulation pump.
 - ③The pump bearing is located below the screw that was Removed.
 - Use a slot-head screwdriver to turn it.
 - (4)Put the screw that was removed in step (2) back, And conduct the test run again.
- Note ·Check that the "speed selector switch" of the circulation pump is set to STEP III.
 - Check that the shutoff valves for the inlet and outlet of the circulation pump and for the return pipe from the heat pump unit are open.

Later check-ups

After the start, when the system has been warmed up, check that all connections for leakages, that the system is free of air (vented), that heat reaches the radiator system and that domestic hot water reaches the taps. Make necessary heat pump checkups according to the heat pump manual. Go through the installation, system and handling of the products together with the customer so that he clearly understands necessary maintenance, and how to use the system.

Installation Instructions

For natural refrigerant heat pump water heater

SHP-C90GDN SHP-C90GEN (heat pump unit)

Our advice to installer

- The installation work must be done correctly in order to derive the maximum from the product's functions and performance and to ensure safety. Prior to proceeding with the installation, read through the section entitled "IMPORTANT !".
- Upon completion of installation, be absolutely sure to hand over the warranty and installation instructions to the customer and ask that they be kept in a safe place.
- We will not be responsible for any accidents, failures or malfunctioning if the product has been installed according to any methods which are not described in these instructions or in a manner which is not consistent with the terms and conditions of the warranty or if the product has been installed without using the designated optional parts.
- Noise will be heard from this product while it is operating. Do not install it where operating noise and vibration will be a nuisance.
- The product's performance cannot be guaranteed at locations where the minimum temperatures is –15°C or below.
- Since the temperature of the water will drop, you must install additional heat insulating materials (and also joints) to ensure that the product will be kept warm.



IMPORTANT ! Please read before starting

The safety issues indicated in these instructions fall into the category of a \triangle WARNING or \triangle CAUTION.		
	This indicates the possibility of death or serious injury for the installer if mistakes have been made in carrying out the work or for other individuals if trouble occurs as a result of the installation work.	
CAUTION:	This indicates the risk of serious injury for the installer if mistakes have been made in carrying out the work or for other individuals if trouble occurs as a result of the installation work or it indicates the risk only of damage to property.	

Meaning of graphic symbols



denotes an action which is prohibited;

denotes an action which is mandatory.

WARNING



Do this!	 Set the power supply circuit breaker to OFF before proceeding with the power supply work. Otherwise, you may receive an electric shock. 	Prohibited.	 Do not sit on the unit or apply force to the pipes. An accident may occur or you may burn yourself as a result. 	
Do this!	 Check the operation of the ground-fault circuit interrupter. You may receive an electric shock if the unit is operated while the interrupter is malfunctioning. 	Check this out!	 Take the distance to the neighboring homes into account when selecting a location to install the unit. Select a location where the operating noise and vibration will not be readily transmitted and which will not 	
0	 Check the voltage, and use the adequate voltage for the unit. Otherwise, there is a risk of combustion 		inconvenience the neighbors.	
Do this!	or a fire.	0	When snow has piled up, remove it from and around the unit. • Snow allowed to pile up on and around	
Do this!	 Properly insulate the heat pump pipes and joints. You may burn yourself if the insulation peels away. The unit's functions may be degraded. 		the heat pump unit and tank unit may cause malfunctioning and/or failures.	
Prohibited.	 Do not use water from a well or hot spr Depending on its quality, water from a we effectiveness of the heat exchanger may these minerals end up clogging the pipes 	ing. ell or hot spi be reduced s.	ring may corrode the pipes or the I if the water has a high mineral content and	
Prohibited.	 these minerals end up clogging the pipes. Do not install the unit in the following locations. Failure to do this may cause a fire, electric shocks and/or unexpected accidents. -Locations which are not flat and level or which are unstable -Very humid locations -Locations failing to satisfy the installation restrictions -Locations with poor drainage -Locations where operating noise and/or vibration will be a nuisance -Locations where the minimum temperature is -25°C or below -Locations where inflammable gases may leak -Do not install the unit onboard a ship or in a vehicle. -Locations with inadequate spaces for servicing, repairs, etc. -Do not install the unit on a stand suspended from the ceiling. 			

Checking the parts packed with the unit

Name of part	Shape	Quantity
Installation instructions		1
rubber		4

Outline drawings





1. Selecting the installation location and restrictions on installation

1-1 Selecting the installation location

Select a location which will ensure that the restrictions on installation described in 1-2 will be complied with. Also, make the selection while giving due consideration to providing enough space (for removing the front panel, etc.) for subsequent servicing and repairs.

- Install the unit on a flat, level surface.
- Provide the openings required for replacing parts (and even the unit) and the space required for the inspections.
- Do not install the unit in an area where the minimum temperature may drop to -25°C or below since the unit may not run properly under these conditions.
- Do not install the heat pump unit indoors.
- Do not install the unit in a very humid or damp place such as a bathroom.
- Do not install the unit where water will pool and flood the unit when rain or snow has fallen.
- Do not install the unit onboard a ship or in a vehicle since the shaking and vibration may cause the unit to fail.
- Take steps to prevent snow from entering the air intake and outlet by, for example, installing the heat pump unit on a stand. Also, put a roof over the unit to keep the snow off.
- Do not install the unit near sources of inflammable gases or objects which may ignite or catch fire.
- Install the heat pump unit in a location where the air blown out and operating noise will not inconvenience the neighboring homes, where there are adequate clearances from the walls, where servicing can be performed, etc.
- Install the area with the thermistor at the back of the outdoor unit in a location where it will not be exposed to direct sunlight, reflected light, etc.
- If the unit may be relocated (or dismantled and discarded) at a future point in time, ensure that the surrounding environment (buildings, water drainage ditches and gutters, etc.) will not be adversely affected.

Disconnection procedure (*Before proceeding, turn off the power and shut off the valves between the HP and tank unit.)

- Electrical work: Disconnect the wires in the areas described in the installation instructions.
- Water pipes: Disconnect the pipes in the areas described in the installation instructions.

1-2 Restrictions on installation

- (1) Installation restrictions for heat pump unit
- (View as seen from above)



(View as seen from side)





*All the dimensions shown are required to maintain the unit's performance.

(2) Restrictions on pipes between heat pump unit and tank unit

(View as seen from side)



2. Installing the heat pump unit

2-1 Installing the heat pump unit

Use a stand, etc. to install the unit outdoors. Do not install it directly on the ground: otherwise, the water will not drain off easily.

- Be absolutely sure to install the unit on a flat, level surface.
- Be absolutely sure to install the unit where its operating noise and vibration will not be a nuisance.
- Depending on the humidity and other factors, large amounts of water may drain off.



3. Piping work

3-1 Standard piping diagram

Pipe connections between the tank unit and heat pump unit



3-2 Checkpoints

- Use water which meets quality standards of the Water Supply Law.
- The hot water supply pipes are subject to expansion and contraction. Therefore, when running them through concrete walls or slabs, use sleeves, and when burying them, place them inside sleeves or sheaths, and then seal them at both ends to prevent the rain from entering. Do not fix or clamp the pipes. **Be absolutely sure to insulate them.**
- Take care not to apply too much sealant to the pipe joins since the excess may clog the pipes.
- When the piping materials are threaded or cut, oil and dirt will adhere to the pipes. After threading or cutting them, therefore, clean the pipes using a neutral detergent, and then connect the pipes. (Otherwise, trouble or malodors may arise.)
 Chamfer the pipes to eliminate scratches and burrs.
- Copper pipes with an outside diameter of 22 mm are recommended for use as the pipes which connect the heat pump unit with the tank unit.

3-3 Piping materials and work precautions



- Be absolutely sure to use 1/2PT screws to connect the heat pump unit and pipes.
- Cover the ends of the pipes with tape, etc. until they are attached to the equipment so as to prevent small stones, dirt and other foreign matter from entering.
- Insulate the cold water and hot water copper pipes with heat-insulating materials which are at least 10 mm thick.

4. Electrical work

4-1 Precautions

- Use the prescribed power supply circuit breaker and cable thickness (see table below).
- Be absolutely sure to have the electrical work done by a qualified electrician.
- Be absolutely sure to have the equipment grounded by a qualified electrician. (Leave a distance of at least 2 m from the ground of a lightning rod.)

4-2 Lead-in wiring work

The figure below shows how the circuit is configured from the Distribution board to the hot water heater.



< SHP-C90GDN >

Voltage	400V 3N ~
Current	10A
Cable thickness	2.0mm ²

< SHP-C90GEN >

Voltage	230V ~
Current	20A
Cable thickness	3.5mm ²

* Maximun length of the Unit cable : 15m

< SHP-C90GDN : POWER SUPPLY 400V 3N ~ >

4-3 Electrical wiring connections to heat pump unit

Connect the heat pump unit and tank unit as follows.



- (1) Be absolutely sure to connect the L1, L2, L3, N terminals on the tank unit with its respective terminal on the HP unit (L1-L1, L2-L2, L3-L3, N-N).
- (2) Connect the COM terminals on the tank unit and on the heat pump unit using a 1-conductor cable. from the same system.
- (3) Use Ring Terminals to do the power cable connection.

<Terminal block connections>

- (1) Remove the two screws of the wiring clamp (in both place).
- (2) Following the figure on the right connect the cables to the terminals block. First crimp Ring Terminals onto the ends of the cables, and then connect them.
- (3) Secure the 4 wires for the Power Supply using the wiring clamp on the left, and secure the COM wire and grounding wire using the wiring clamp on the right. Secure the wires where the cables are covered.



wiring clamp

4-4 Grounding work

- Be absolutely sure to ground the tank unit and heat pump unit from their respective terminal block.
- Do not ground the tank unit and HP unit to a water pipe or gas pipe and do not use other appliances' ground.

< SHP-C90GEN : POWER SUPPLY 230V ~ >

4-3 Electrical wiring connections to heat pump unit

Connect the heat pump unit and tank unit as follows.



- (1) Be absolutely sure to connect the L1, N terminals on the tank unit with its respective terminal on the HP unit (L1-L1, N-N).
- (2) Connect the COM terminals on the tank unit and on the heat pump unit using a 1-conductor cable.
- (3) Use Ring Terminals to do the power cable connection.

<Terminal block connections>

- (1) Remove the two screws of the wiring clamp (in both place).
- (2) Following the figure on the right connect the cables to the terminals block. First crimp Ring Terminals onto the ends of the cables, and then connect them.
- (3) Secure the 2 wires for the Power Supply using the wiring clamp on the left, and secure the COM wire and grounding wire using the wiring clamp on the right. Secure the wires where the cables are covered.



4-4 Grounding work

- Be absolutely sure to ground the tank unit and heat pump unit from their respective terminal block.
- Do not ground the tank unit and HP unit to a water pipe or gas pipe and do not use other appliances' ground.

5. Preparing for operation

The steps described in this section must be taken without fail in order to confirm whether the piping work has been completed correctly.

5-1 Supplying the water

- (1) Fill the tank unit with water.
- (2) Drain off some water to remove air from the heat pump unit.
- (3) Check that no water is leaking from the pipe connections.
- (4) Open the combination faucet by turning it to the hot water side, and check that water comes out.
 - Be absolutely sure to do this before operating the power switch.
 - If no water comes out or if it does not come out properly, check the connections for leaks and the pipes for clogging with dirt or foreign matter.

5-2 Insulation work

- Do this work after inspecting the pipe connections for leaks.
- The hot water supply and cold water supply pipes as well as the pipes between the units must be insulated without fail.
- Provide the appropriate water-proofing for the insulated parts of the pipes such as the buried or outdoor pipes which are exposed to the rain and dew.

Note

Pipes which are to be buried in the ground must be insulated properly without fail.

5-3 Test run

Upon completion of the preparations for operation described above, be absolutely sure to conduct a test run. Please refer to the construction manual of the tank unit for the method of the test run.

6. Post-installation inspections, and instructions for the customer

Request to Installer

- Upon completion of the installation work, be absolutely sure to conduct checks again based on the "Post-installation inspections (checklist)".
- Hand over installation instructions to the customer and ask that they be kept in a safe place.

Post-installation inspections (checklist)

	Checkpoint	
	Have the installation restrictions on the heat pump unit been met? (See pages 5 and 6)	
Installation work	Has enough space been provided for maintenance around the heat pump unit?	
	Is the outside of the heat pump unit marked, scratched or deformed?	
	Have copper pipes been used for the heat pump pipes?	
	Is the pipe length within 15 meters with no more than 6 bends?	
Dining work	Is the vertical interval of the pipe within 3 meters? Is the tube-shaped pipe length within 3 meters?	
	Have the pipes and joints been insulated properly, and has the proper additional heat insulation been provided?	
	Has the work to protect the equipment from freezing been done properly?	
	Is any water leaking from the pipe?	
	Does the power cable have the correct thickness?	
Electrical wiring	Are the circuit breakers adequate?	
work	Has the equipment been grounded properly?	
	Are any of the wires loose and unsecured?	

Periodic inspections (The customer is charged for this service.)

Periodic inspection once every 3 or 4 years recommended

• This unit's constituent parts will deteriorate over the course of time. Depending on the operating environment and operating conditions, the unit's performance may be adversely affected, making it impossible for it to function to the best of its ability. A periodic inspection once every 3 or 4 years is therefore recommended. (For details on the charges for this inspection, consult the vendor of the unit.)

Troubleshooting

Before requesting repairs

The symptoms listed in the table below are not indications that something is wrong with the unit.

Symptom	Cause
During operation, the heat pump unit's heat exchanger turns white.	Frost may form on the heat exchanger during operation in the winter months. When the layer of frost reaches a certain thickness, the unit will perform the defrosting operation automatically.
The heat pump unit's fan repeatedly starts up and shuts down.	This happens because the unit is automatically performing a defrosting operation in order to remove the layer of frost that has built up on the heat exchanger.
Water runs out from the bottom of the heat pump unit during operation.	What happens is that the moisture in the air condenses on the heat exchanger during operation, and this runs out as water.



Parts List SHP-TH90GDN-SW SHP-TH90GEN-SW SHP-TH90GHN-SW

Kev No	Part No	Description	Q`tv
2	912327402	Mixing valve motor	1
3	581578301	Insulation top	1
4	582503348	Plate leftside	1
5	Reference of next page	Electric cabinet complete 3x400V	1
6	0011412606	Screw M6S 10x20	4
7	581974001	Gasket 60x75x2	2
8	Reference of next page	Immersion heater 9kW	2
9	0011412804	Nut M6M 8 F7B	3
10	0011412904	Washer hrh 8 4x16 F7B	2
11	913136401	Adjustable foot sf3225m1045s	<u> </u>
12	913191401	Distance socket dbnf M3060v10	4
13	909600415	Screw ST 6 3x25 F7B	1
14	558113401	Pipe $G3/A''$ 179 1G	1
15	581702301	Insulation around the tank	1
16	579449401	Hold for pipes	1
17	580272401	Pine copper 22 bend 1300	1
18	580782401	Pine copper 22 with drain conn	1
10	581951001	Ballyalve $2x^{3/4}$	1
20	583173401	Ballvalve 363V G20/25	1
20	Reference of next page	cirkulationnumn	1
21	583172401	ballyalve angle 572y $G20/25 i/u$	1
23	912645401	Shut off valve	1
20	912365401	Angle connection 22 R20	1
25	908544401	Protectionsocket SCI 22x1	6
26	Reference of next page	Immersion heater 6kW	2
20	582130001	accessoriespack	1
28	Reference of next page	Sign data 3x400V	1
20	Reference of next page	Sign data 1x230V	1
30	Reference of next page	Sign data 3x230V	1
31	578689401	Sign serial number	1
32	581627401	Sign pipe connection	1
33	913034403	Protectiontube pp pw 23	2
34	912873402	Straps I =200 mm	3
36	909558002	Strans	1
37	912691401	PVC-tube 12x0 47 black 105	2
38	912869002	Sensor tank	3
39	907805001	Spring for sensor	3
40	912879402	Insulation 3 mm B=25 mm	1
41	909600412	Screw ST 4 2x32 F7B	2
42	912520401	Nut 8 FS	1
43	910984413	Screw M6S 8x45 F7B	1
44	909042001	Eastener for insulation	2
45	912375410	Gasket Ø30/21x2	2
46	0016150550	Installation and Maintence User	1
47	0016150551	Installation and Maintence Installer	1
48	581579301	T-pipe.return 22mm	1
49	581708301	Pipe flow 22mm	1
50	583112401	OVERLAY SANYO 2008	1
51	583113301	Display panel	1
52	581243313	Printed circuit card.display	1
53	583114301	Front, plastic	1
54	583160301	Cover cap, plastic	1
55	582402301	Plate,backside	1
56	582502348	Plate rightside	1
57	581815301	Insulation lower	1
58	578366401	Insulation stand, top	1
60	581962348	top plate	1
			•

 $\ensuremath{\mathsf{\Gamma}\mathsf{Part}}$ No.] by the model difference

madal	SHP-	SHP-	SHP-
model	TH90GDN-SW	TH90GEN-SW	TH90GHN-SW
Key No.	power supply $(3 \times 400V)$	power supply $(1 \times 230V)$	power supply $(3 \times 230V)$
5	583167301	583168301	583169301
8	913238301	913238301	—
21	583161401	583161401	583161401
26	_	_	578213302
28	583178304	_	_
29	_	583178305	_
30	_	_	583178306



ATTENTION !

To ensure correct parts supply,please let us know followings, when you make service parts order: 1.Part No. 2.Description 3.Q'ty 4.Volts-Hz-Ph 5.Product Model No.

SHP-C90GDN OUTDOOR UNIT

Ke	ey o	Part No.	Description	Q'ty	Reference No.
*	1	623 307 0001	Magnetic Coil HPV-MOAI056B1	1	1FA-4-I 8A0-45400
	2	623 306 9999		1	8FA-0-5286-34600
*	2	623 306 9982	Fan Motor, DA 112-551 171 VA	1	1FA_4_M4A0_16100
*	1	623 306 9975	Fan Motor, DA 112-551 71VB	1	1EA_4_M4A0_16200
	5	623 306 9973	Angle Mounting Plate Fan Motor	2	852_2_2517_17011
	5	622 192 2755		2	952.2.2317-17911
	7	023 103 27 33	Evolot	<u> </u>	2 0041 01901
	0	923 000 0774	Cover	1	952 2 2260 42904
	0	023 307 0049	Cover Dreneller Fen Aselv	1 0	052-2-2309-42001
	9	936 019 4507	Weeker Cresiel, CLIC204, CD	2	004-2-2009-10001
	10	923 095 4961		2	2 0275 06010
	11	938 012 6706		2	3-9275-06010
	12	928 026 7899		2	731-2-4230-10300
	13	623 307 0032		1	852-0-5317-17501
	14	623 307 0025		1	852-0-5317-17601
	15	623 307 0018	PI Mtg Elec J-B	1	852-2-5310-35800
	16	623 307 0124	Sheet	1	852-2-5328-51600
* '	17	623 307 0117	Controller Ass'y CR-C90GDN	1	8FA-0-5282-04700
	18	623 307 0285	Packing	1	852-2-2528-49900
	19	623 307 0278	Packing	1	852-2-2528-54700
* 4	20	623 307 0391	Magnetic Coil	1	1FA-4-L8A0-44900
* 4	21	623 307 0407	Magnetic Coil	1	1FA-4-L8A0-44800
2	22	923 148 5877	Mounting Thermostat SUS301-CSP	6	852-2-5303-22401
2	23	623 307 0384	Insulation	1	852-2-2476-82200
	24	623 307 0377	Insulation	1	852-2-2476-82300
	25	623 307 0360	Insulation	1	852-2-2476-83900
	26	623 307 0353	Insulation	1	852-2-2476-84000
	27	923 186 1886	Label	1	852-6-4169-78700
	28	623 307 0445	Label	1	852-6-4169-92500
2	29	623 307 0438	PI Name	1	852-2-1345-75800
	30	623 307 0148	Cooler A6063S-T5	1	852-2-4127-26301
	31	623 307 0131	S Tite Screw SWCH18A	4	3-9204-61602
* (32	623 307 0261	Controller Ass'y CR-HIC-C90GDN	1	8FA-0-5282-04900
* (33	623 307 0254	Controller Ass'y CR-FIL-C90GDN	1	8FA-0-5282-10300
* (34	623 307 0247	Thermistor KTEC-35D-S4-2	1	1FA-4-V2E0-44700
* (35	623 307 0230	Thermistor PT2M-D51H-S3-2	1	1FA-4-V2E0-44800
*	36	623 307 0223	Thermistor PB2M-D41E-S2-2	1	1FA-4-V2E0-44900
*	37	623 307 0216	Thermistor PB2M-D41E-S6	1	1FA-4-V2E0-45000
*	38	623 307 0209	Terminal Base KT15-6J(EN) Rot No.0001-1000	1	1FA-4-J3A0-37400
* :	38	623 308 4183	Terminal Base TxM20 06 Rot No.1001-	1	1FA-4-J3A0-39800
	39	923 140 7596	Clip Wire	2	852-2-5304-16700
	40	623 183 2564	Packing	1	852-2-2380-76300
	41	623 307 0339	Mounting Thermostat	1	852-2-5303-33201
	42	623 307 0322	l abel	1	852-6-4169-94000
	43	623 307 0315	Core REC-13	3	1FA-4-I 1A0-10400
	44	623 307 0313	Packing	1	852-2-2528-/0700
	45	623 307 0300	Packing	1	852-2-2528-49100
	TU	623 307 0292	Ton Plate Ass'v	1	852-2-2020-49000 852-2-1103-170H1
A		623 307 0421	Top Plate	1	852-2-1103-17001
		622 192 2210	Packing	1	852 2 2290 76500
		622 202 0227	Vibration Inculation	1	852 2 2475 40500
1		1023 302 3337			002-2-24/0-40000

NOTE: Metal and plastic parts will be supplied basically with necessary heat insulation pads or packing. Each key number with an asterisk (*) means the recommended service parts.
ATTENTION !

To ensure correct parts supply,please let us know followings, when you make service parts order:

SHP-C90GDN OUTDOOR UNIT

1.Part No.	2.Description	3.Q'ty	4.Volts-Hz-Ph	5.Product	Model No.

Key No.	Part No.	Part No. Description		Reference No.
В	623 307 0490	Front Panel Ass'y	1	852-2-1118-264H0
	623 307 0483	Front Panel	1	852-2-1118-26402
	923 161 9388	Knob	1	854-2-1311-13114
	623 176 6326	Badge	1	854-2-1354-31603
	623 307 0476	Elec. Wiring Diagram	1	8FA-2-5250-39700
	623 302 9337	Vibration Insulation	1	852-2-2475-40500
С	623 307 0469	Rear Panel Ass'y	1	852-2-1120-331H0
	623 307 0452	Rear Panel	1	852-2-1120-33102
	923 161 9388	Knob	1	854-2-1311-13114
	623 307 0513	Packing	1	852-2-2528-51600
	623 302 9337	Vibration Insulation	3	852-2-2475-40500
	623 307 2876	Packing	1	852-2-2528-55900
D	623 307 2852	Front Panel Ass'y Rot No,0001-1000	1	852-9-9536-09002
	623 189 3374	Front Panel Rot No,0001-1000	1	854-2-1101-90405
	923 161 9388	Knob	1	854-2-1311-13114
D	623 308 4206	Front Panel Ass'y Rot No,1001-	1	852-9-9536-09050
	623 308 4190	Front Panel Rot No,1001-	1	854-2-1116-26201
	923 161 9388	Knob	1	854-2-1311-13114
E	623 307 2869	Guard Ass'y	2	852-9-9536-09012
	923 173 9987	Guard	1	854-2-1113-21901
	623 307 0551	Packing	1	852-2-2380-94000
	623 307 0544	Packing	3	852-2-2380-94100
F	623 307 3248	Cov Elec J-B Ass'y Rot No,0001-1000	1	852-9-9536-09016
	623 307 3231	Cov Elec J-B Rot No,0001-1000	1	852-2-5315-34603
	923 152 1483	Packing Rot No,0001-1000	1	852-2-2380-37900
	623 307 3224	Packing Rot No,0001-1000	2	852-2-4210-22400
F	623 308 4220	Cov Elec J-B Ass'y Rot No,1001-	1	852-9-9536-09051
	623 308 4213	Cov Elec J-B Rot No,1001-	1	852-2-5315-51001
	623 308 4244	Packing Rot No,1001-	1	852-2-2528-57400
	623 308 4299	Packing Rot No,1001-	2	852-2-2528-57300
* G	623 308 3124	Elec System Ass'y	1	8FA-0-5296-262E2
* H	623 308 3117	Controller Ass'y	1	8FA-0-5282-048E1
	928 015 1877	Bag Polyethylene Ind	1	731-6-2519-15000
	623 183 2861	Cushion Rubber	4	852-2-2390-29700
	623 307 0537	Construction Notes	1	852-6-4190-46100
	623 307 0520	Bottom Box Assy	1	852-6-1239-22810
	923 083 2023	Bag Polyethylene Exp	1	854-6-2119-35600
	623 307 0612	Pad Upper	1	852-6-3109-64300
	623 307 0605	Pad Upper	1	852-6-3109-67200
	623 307 0599	Pad Upper	1	852-6-3109-67300
	623 307 0582	Print Box Ass'y	1	852-6-1180-20100
	623 307 0575	Sheet4	1	852-6-4939-39100
	623 307 0568	Bar Code Label	1	852-6-4761-94900
	923 004 4464	PP Band	3	7-2511-19001

NOTE: Metal and plastic parts will be supplied basically with necessary heat insulation pads or packing. Each key number with an asterisk (*) means the recommended service parts.



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SHP-C90GEN



ATTENTION !

To ensure correct parts supply,please let us know followings, when you make service parts order:

1.Part No. 2.Description 3.Q'ty 4.Volts-Hz-Ph 5.Product Model No.

SHP-C90GEN OUTDOOR UNIT

Key		Part No.	Description		Reference No.
*	4	000 007 0001	Magnetia Cail LIDV MOAI050D1	-	
		623 307 0001		- 1	1FA-4-L8A0-45400
*	2	623 306 9999	VIIE K	- 1	15A 4 M4A0 16100
*	3	023 300 9982	Fail Motor DAJ12-550711A	- 1	1FA-4-WI4A0-10100
	4	623 306 9975	Angle Mounting Dista Fan Mater	1	1FA-4-IVI4AU-16200
	<u> </u>	623 306 9968	Angle Mounting Plate Fan Motor	2	852-2-2517-17911
	0	623 183 2755		2	852-2-2380-90300
	/	923 000 0774	Eyelet		3-9041-01801
	8	623 307 0049		1	852-2-2369-42801
	9	938 019 4507	Propeller Fan Ass'y	2	854-2-2539-10601
	10	923 095 4961	Washer Special SUS304-2B	2	854-2-1355-13300
	11	938 012 6706	Funa SUS305-WSA	2	3-92/5-06010
	12	928 026 7899	Сар	2	/31-2-4230-10300
	13	623 307 0032	PI Elec J-B Ass'y	1	852-0-5317-17501
	14	623 307 0025	PI Elec J-B Ass'y	1	852-0-5317-17601
	15	623 307 0018	PI Mtg Elec J-B	1	852-2-5310-35800
	16	623 308 9584	Packing	1	852-2-2528-59700
*	17	623 308 9607	Controller Ass'y CR-C90GEN-A	1	8FA-0-5282-12400
	18	623 307 0285	Packing	1	852-2-2528-49900
	19	623 307 0278	Packing	1	852-2-2528-54700
*	20	623 307 0391	Magnetic Coil	1	1FA-4-L8A0-44900
*	21	623 308 4176	Magnetic Coil HPM-MD12ST-1	1	1FA-4-L8A0-46000
	22	923 148 5877	Mounting Thermostat SUS301-CSP	6	852-2-5303-22401
	23	623 307 0384	Insulation	1	852-2-2476-82200
	24	623 308 9591	Elec.Component Box	1	852-2-5307-74500
	25	623 307 0360	Insulation	1	852-2-2476-83900
	26	623 307 0353	Insulation	1	852-2-2476-84000
	27	923 186 1886	Label	1	852-6-4169-78700
	28	623 307 0445	Label	1	852-6-4169-92500
	29	623 308 9638	PI Name	1	852-2-1346-00800
	30	623 308 9621	Cooler A6063S-T5	1	852-2-4127-26401
	31	623 307 0131	S Tite Screw SWCH18A	4	3-9204-61602
*	32	623 308 9614	Controller Ass'y CR-C90GEN-B	1	8FA-0-5282-12500
*	33	623 308 9652	Controller Ass'y CR-C90GEN-D	1	8FA-0-5282-12900
*	34	623 307 0247	Thermistor KTEC-35D-S4-2	1	1FA-4-V2E0-44700
*	35	623 307 0230	Thermistor PT2M-D51H-S3-2	1	1FA-4-V2E0-44800
*	36	623 307 0223	Thermistor PB2M-D41E-S2-2	1	1FA-4-V2E0-44900
*	37	623 307 0216	Thermistor PB2M-D41E-S6	1	1FA-4-V2E0-45000
*	38	623 308 9645	Terminal Base TXM20 04	1	1FA-4-J3A0-39700
	39	923 140 7596	Clip Wire	2	852-2-5304-16700
	40	623 183 2564	Packing	1	852-2-2380-76300
	41	623 307 0339	Mounting Thermostat	1	852-2-5303-33201
*	42	623 308 9683	Controller Ass'y CB-C90GEN-C	1	8FA-0-5282-12600
	43	623 308 9676	Core TB-28-16-13	1	1FA-4-I 1A0-10500
	44	623 307 0308	Packing	1	852-2-2528-49700
	45	623 307 0292	Packing	1	852-2-2528-49800
*	46	923 183 3593	Beactor B552CH30-T-F-B	2	1FA-4-1 5C:0-11700
*	47	923 183 2054	Power Belay, G7L-14-RLIR	1	1FA-4-S2A0-10000
*	48	623 308 9669	Thermistor Ass'v K	1	8FA-0-5250-42000
*	<u>40</u>	923 170 0035		1	1FA-4-9239-42000
	50	923 170 9935	Fuse Holder BM-I Q-I-15	1	1FA-412A0-00800
	00				

NOTE: Metal and plastic parts will be supplied basically with necessary heat insulation pads or packing. Each key number with an asterisk (*) means the recommended service parts.

ATTENTION !

To ensure correct parts supply,please let us know followings, when you make service parts order:

1.Part No. 2.Description 3.Q'ty 4.Volts-Hz-Ph 5.Product Model No.

SHP-C90GEN OUTDOOR UNIT

Key No.	Part No. Description		Q'ty	Reference No.
51	923 189 3719 Screw Special SWCH18A		8	852-2-2396-15402
Α	623 307 0421	Top Plate Ass'y	1	852-2-1103-170H1
	623 307 0414	Top Plate	1	852-2-1103-17002
	623 183 3318	Packing	1	852-2-2380-76500
	623 302 9337	Vibration Insulation	1	852-2-2475-40500
В	623 308 9690	Front Panel	1	852-2-1118-264H1
	623 307 0483	Front Panel	1	852-2-1118-26402
	923 161 9388	Knob	1	854-2-1311-13114
	623 176 6326	Badge	1	854-2-1354-31603
	623 308 9706	Elec. Wiring Diagram	1	8FA-2-5250-51300
	623 302 9337	Vibration Insulation	1	852-2-2475-40500
С	623 307 0469	Rear Panel Ass'y	1	852-2-1120-331H0
	623 307 0452	Rear Panel	1	852-2-1120-33102
	923 161 9388	Knob	1	854-2-1311-13114
	623 307 0513	Packing	1	852-2-2528-51600
	623 302 9337	Vibration Insulation	3	852-2-2475-40500
	623 307 2876	Packing	1	852-2-2528-55900
D	623 308 4206	Front Panel Ass'v	1	852-9-9536-09050
	623 308 4190	Front Panel	1	854-2-1116-26201
	923 161 9388	Knob	1	854-2-1311-13114
	623 307 0506	Packing	1	852-2-2528-51500
E	623 307 2869	Guard Ass'v	2	852-9-9536-09012
	923 173 9987	Guard	1	854-2-1113-21901
	623 307 0551	Packing	1	852-2-2380-94000
	623 307 0544	Packing	3	852-2-2380-94100
F	623 308 4220	Cov Elec J-B Ass'v	1	852-9-9536-09051
	623 308 4213	Cov Elec J-B	1	852-2-5315-51001
	623 308 4244	Packing	1	852-2-2528-57400
	623 308 4299	Packing	2	852-2-2528-57300
* G	623 308 9713	Elec System Ass'v	1	8FA-0-5296-383E1
			-	
	928 015 1877	Bag Polvethylene Ind	1	731-6-2519-15000
	623 183 2861	Cushion Rubber	4	852-2-2390-29700
	623 307 0537	Construction Notes	1	852-6-4190-46100
	623 307 0520	Bottom Box Assy	1	852-6-1239-22810
	923 083 2023	Bag Polyethylene Exp	1	854-6-2119-35600
	623 307 0612	Pad Upper	1	852-6-3109-64300
	623 307 0605	Pad Upper	1	852-6-3109-67200
	623 307 0599	Pad Upper	1	852-6-3109-67300
	623 308 9744	Print Box Ass'v	1	852-6-1180-33600
	623 307 0575	Sheet4	1	852-6-4939-39100
	623 308 9737	Bar Code Label	1	852-6-4762-15300
	923 004 4464	PP Band	3	7-2511-19001
	623 308 9720	Pad Corner	3	852-6-3609-29800
	020 000 0120		- U	332 0 0003-23000

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