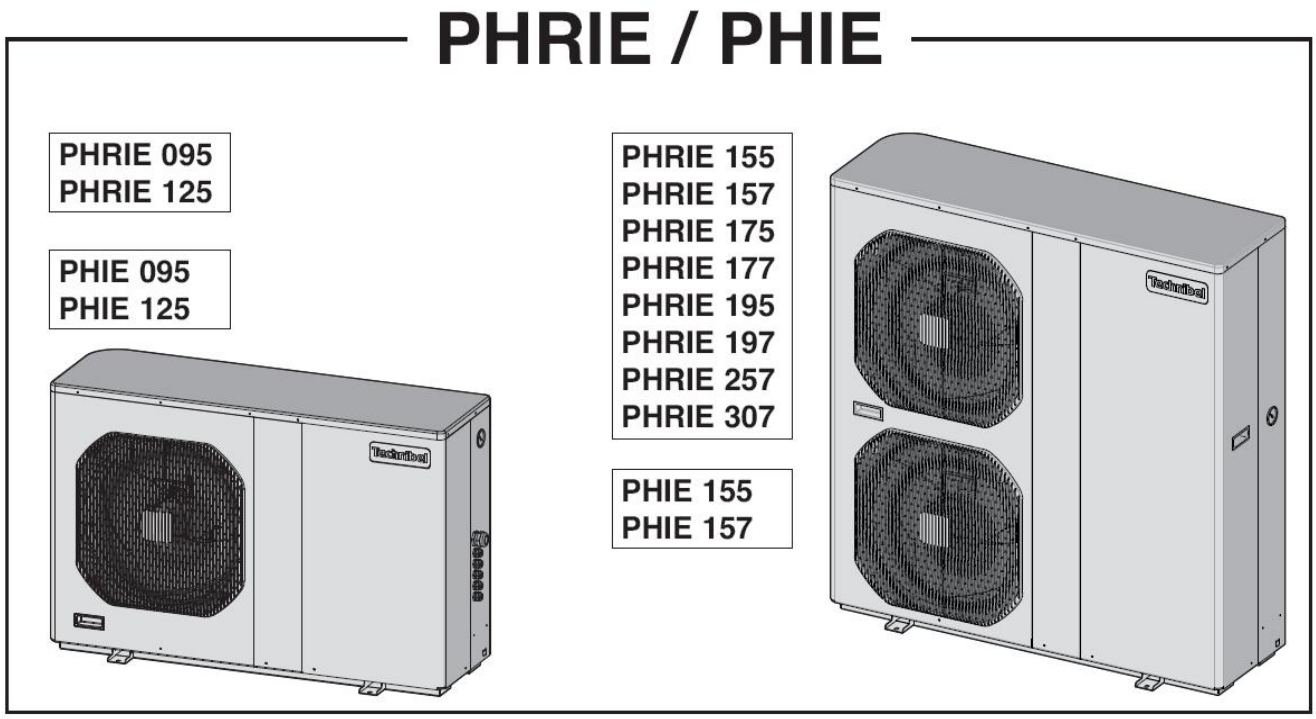
Technibel
UNE AVANCE DANS L'AIR DU TEMPS

SERVICE MANUAL

PHRIE / PHIE

INVERTER MONOBLOCK
AIR TO WATER HEAT PUMP
MEDIUM TEMPERATURE
Refrigerant R410A



For applications with electrical support heater or boiler back-up

Jun. 2015 10 12 211 – GB – 06

IMPORTANT!
Please Read Before Starting

This air conditioning system meets strict safety and operating standards. As the installer or service person, it is an important part of your job to install or service the system so it operates safely and efficiently.

For safe installation and trouble-free operation, you must:

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state, and national electrical codes.
- This product is intended for professional use.

- Pay close attention to all warning and caution notices given in this manual.

This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.

This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

If Necessary, Get Help

These instructions are all you need for most installation sites and maintenance conditions. If you require help for a special problem, contact our sales/service outlet or your certified dealer for additional instructions.

In Case of Improper Installation

The manufacturer shall in no way be responsible for improper installation or maintenance service, including failure to follow the instructions in this document.

SPECIAL PRECAUTIONS

WARNING When Wiring

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY A QUALIFIED, EXPERIENCED ELECTRICIAN SHOULD ATTEMPT TO WIRE THIS SYSTEM.

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause **accidental injury or death.**
- **Ground the unit** following local electrical codes.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.

When Transporting

Be careful when picking up and moving the indoor and outdoor units. Get a partner to help, and bend your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut your fingers.

When Installing...

... In Moist or Uneven Locations

Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the outdoor unit. This prevents water damage and abnormal vibration.

... In an Area with High Winds

Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable air baffle.

... In a Snowy Area (for Heat Pump-type Systems)

Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow vents.

When Connecting Refrigerant Tubing

- Ventilate the room well, in the event that is refrigerant gas leaks during the installation. Be careful not to allow contact of the refrigerant gas with a flame as this will cause the generation of poisonous gas.
- Keep all tubing runs as short as possible.
- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

NOTE

Depending on the system type, liquid and gas lines may be either narrow or wide. Therefore, to avoid confusion the refrigerant tubing for your particular model is specified as either "narrow" or "wide" than as "liquid" or "gas."

When Servicing

- Turn the power OFF at the main power box (mains) before opening the unit to check or repair electrical parts and wiring.
- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.

- Ventilate any enclosed areas when installing or testing the refrigeration system. Escaped refrigerant gas, on contact with fire or heat, can produce dangerously toxic gas.
- Confirm after installation that no refrigerant gas is leaking. If the gas comes in contact with a burning stove, gas water heater, electric room heater or other heat source, it can cause the generation of poisonous gas.

MARKING CE

This product marked CE conforms to the essential requirements of the Directives:

- Low voltage no. 2006/95/EC.
- Electromagnetic Compatibility no. 2004/108/EC.

NOTE: This symbol mark and recycle system are applied only to EU countries and not applied to the countries in the other area of the world.

Your product is designed and manufactured with high quality materials and components which can be recycled and reused.
This symbol means that electrical and electronic equipment, at their end-of-life, should be disposed separately from your household waste.
Please dispose of this equipment at your local community waste collection / recycling centre.
In the European Union there are separate collection systems for used electrical and electronic products.
Please help us to conserve the environment we live in!

APPLIANCES FILLED WITH R 410 A

R 410 A

- R 410 A is a high-pressure refrigerant (+ 50% in relation to R 22 and R 407 C).
- The compressors approved for operation with this fluid are filled beforehand with polyvinyl ether oil.

MAINTENANCE INSTRUCTIONS

1 - Never add oil to the appliance; the compressor is filled with polyvinyl ether (PVE) oil, a special oil which cannot tolerate the presence of other oils.

2 - The instruments used for:
- filling,
- pressure measurements,
- emptying under vacuum,
- recovering the fluid,

must be compatible and only used for the R 410 A fluid.
Note: the pressure taps of the refrigerating circuit are 5/16 SAE (1/2 - 20 - UNF).

3 - In the case of a new charge:
- The charge **must** be undertaken in liquid phase.
- Use a balance and a dip pipe type R 410 A cylinder.
- Charge the weight of R 410 A as per the value indicated on the unit's identification plate (for "split systems", refer to the installation instructions as the charge must consider the length of the connecting lines).

4 - In case of leakage, do not complete the charge: recover the remaining refrigerant for recycling and perform a total charge.
Recovery, recycling or the destruction of the fluid must be done in compliance with the laws in force in the country concerned.

5 - If the refrigerant circuit is opened, you must:
- Avoid the entry of air into the circuit as much as possible.
- Replace or install a drier.
- Perform the "vacuum operation" at a minimum level of **0.3 mbar (static)**.

6 - Do not release R 410 A fluid into the atmosphere. This fluid is a fluorinated greenhouse gases, covered by the Kyoto Protocol with a Global Warming Potential (GWP) = 1975 - (CE Directive 842 / 2006).

WARNING:

Before carrying out any work on the machine, make sure that its power supply is switched off and the access to it is prevented. Any work must be carried out by personnel qualified and authorized to work on this type of machine.

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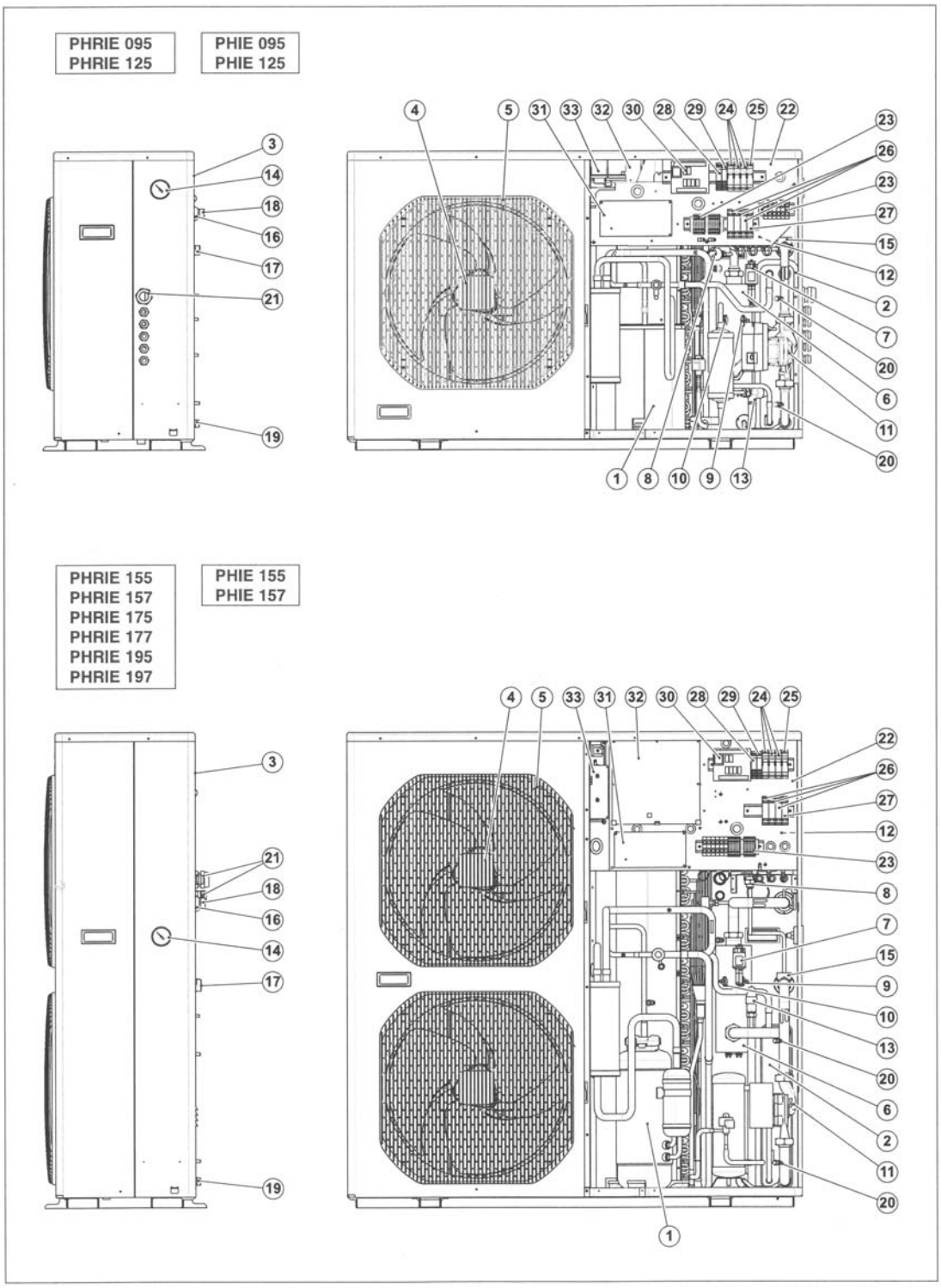
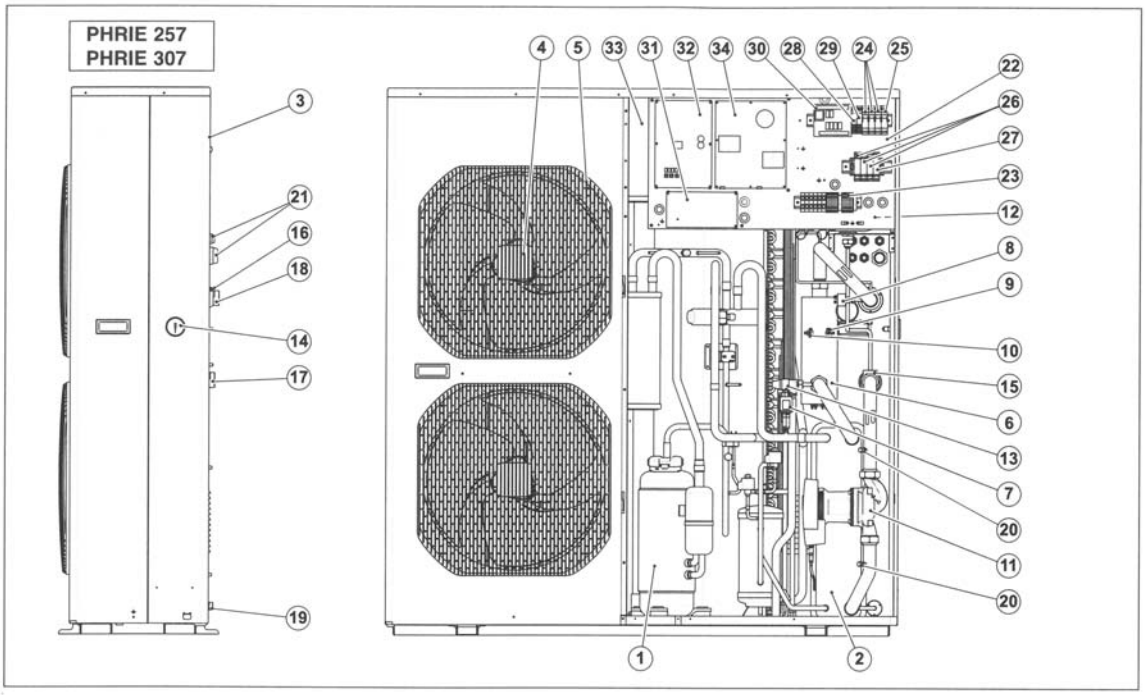
1.1 – APPLICATION - USE

- Hot water generator for residential heating exclusively in the scope of TECHNIBEL systems

1.2 – PRESENTATION & COMPONENTS

1.2.1 DESCRIPTION





1 - Sound-proofed hermetic compressor.
2 - Brazed plate heat exchanger.
3 - "Plate-Fin" air heat exchanger.
4 - Fan motor.
5 - Fan protection grille.
6 - Electric heater:

PHRIE 095 / 125, PHIE 095 / 125:
- 3 kW: 1st stage = 1.5 kW; 2nd stage = 1.5 kW.
- 4.5 kW: 1st stage = 3 kW; 2nd stage = 1.5 kW.

PHRIE 155 / 157 / 175 / 177 / 195 / 197, PHIE 155 / 157:
- 4 kW: 1st stage = 2 kW; 2nd stage = 2 kW.
- 6 kW: 1st stage = 4 kW; 2nd stage = 2 kW.

PHRIE 257 / 307:
- 6 kW: 1st stage = 3 kW; 2nd stage = 3 kW.
- 9 kW: 1st stage = 6 kW; 2nd stage = 3 kW.

7 - Frigorific pressure sensor.
8 - Water pressure switch.
9 - Automatic reset safety thermostat (Heater).
10 - Manual reset safety thermostat (Heater).
11 - Circulating pump.
12 - Expansion vessel.
13 - Safety valve.
14 - Hydraulic system pressure gauge.
15 - Water flow switch.
16 - Hydraulic circuit manual air purge valve.
17 - Water inlet connection.
18 - Water outlet connection.
19 - Hydraulic circuit fill / drain connection.
20 - Water system pressure tap for flow control.
21 - Electrical cable passage.
22 - Electrical box.
23 - Terminal block.
24 - Heating element circuit breakers.
25 - Control circuit circuit-breaker.
26 - Heating element contactors.
27 - Circulating pump contactors.
28 - Fault relays.
29 - Water flow rate relay.
30 - System control board.
31 - CWC2 control board.
32 - Refrigerating circuit control board.
33 - HIC board.
34 - Power filter board (PHRIE 257 and 307 only).

Materials:
- Copper piping.
- Copper / aluminium air heat exchanger.
- Stainless steel water heat exchanger.
- Painted sheet metal cabinet.
- Plastic grille.

Note: The units are supplied with a water filter which is to be installed on the water intake.

1.2.2 ELECTRICAL EQUIPEMENT

- According EN 60 335-2-40.
- INVERTER technology control
- Staged electric support heater (with thermal overload protection and water pressure switch).
- Water flow detector.
- System control board.

1.3 – TECHNICAL CHARACTERISTICS

The specifications are valid for a device in working order with clean heat exchanger.
Note:

- Water circuit pressure: Minimum = 1.5bar,
  Maximum = 2.5Bar.
- Maximum allowable water temperature at the inlet of the heat pump when off is 75°C.
- System water volume: see §. 1.5.
- Available water pressure: see §. 1.7.
- Sound level: see §. 1.8.

1.3.1 SINGLE PHASE MODELS

Model			PHRIE 095 PHIE 095	PHRIE 125 PHIE 125	PHRIE 155 PHIE 155	PHRIE 175	PHRIE 195
Main power supply		V/PH/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
HEATING MODE (HEAT PUMP) WATER OUTLET 25 °C	**Conditions: water inlet / outlet temperature 22/25 and air temperature 7/6 (dry / wet)**						
	Nominal heating capacity	kW	5.30	8.69	10.85	13.95	16.25
	COP	W/W	6.35	5.68	6.38	5.84	5.42
	Nominal water flow	m³/h	1.55	2.43	3.10	4	4.50
	Maximum heating capacity	kW	9.60	11.60	18.35	18.60	19
	COP	W/W	5.15	5.18	5.37	4.44	4.39
	Conditions: water inlet / outlet temperature */25 and air temperature 2/1 (dry / wet)						
	Nominal heating capacity	kW	4.46	6.03	7.57	10.50	12.97
	COP	W/W	4.33	4.28	4.25	4.25	3.61
	Maximum heating capacity	kW	6.34	6.80	11.50	12.80	13.50
	COP	W/W	3.99	3.95	3.70	3.56	3.52
	Conditions: water inlet / outlet temperature */25 and air temperature -7/-8 (dry / wet)						
	Heating capacity	kW	5.57	6.63	10.49	11.60	11.96
	COP	W/W	3.26	3.42	3.45	2.97	3.02
	Conditions: water inlet / outlet temperature */25 and air temperature -15						
	Heating capacity	kW	3.85	4.06	8.69	7.42	9.25
	COP	W/W	2.77	2.67	2.85	2.25	2.57
	Conditions: water inlet / outlet temperature */25 and air temperature -20						
	Maximum heating capacity	kW	2.19	4.54	7.39	7.56	7.76
	COP	W/W	1.87	2.73	2.53	2.40	2.32
	Conditions: water inlet / outlet temperature */25 and air temperature 20						
	Nominal heating capacity	kW	7.05	9.04	13.13	17.30	19.40
	COP	W/W	8.29	8.22	8.36	7.76	6.26

Model			PHRIE 095 PHIE 095	PHRIE 125 PHIE 125	PHRIE 155 PHIE 155	PHRIE 175	PHRIE 195
Main power supply		V/PH/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
HEATING MODE (HEAT PUMP)	WATER OUTLET 35 °C	**Conditions: water inlet / outlet temperature 30/35 and air temperature 7/6 (dry / wet)**					
	Nominal heating capacity	kW	5.30	8.21	10.50	13.60	15.70
	Nominal input power	kW	1.06	1.78	2.10	2.91	3.51
	COP	W/W	5	4.61	5	4.67	4.47
	Nominal water flow	m^3/h	0.92	1.40	1.84	2.32	2.60
	Maximum available pump head (at max. pump speed)	kPa	59	51	45	52	46
	Maximum heating capacity	kW	9	10.60	17	18	20.25
	COP	W/W	4.25	4.11	4.41	4.15	4.17
	Conditions: water inlet / outlet temperature */35 and air temperature 2/1 (dry / wet)						
	Nominal heating capacity	kW	4.70	5.60	8.65	10.20	11.75
	COP	W/W	3.67	3.59	3.57	3.40	3.48
	Maximum heating capacity	kW	6.05	6.70	11.40	12	12.30
	COP	W/W	3.38	3.45	3.53	3.20	3.13
	Conditions: water inlet / outlet temperature */35 and air temperature -7/-8 (dry / wet)						
	Heating capacity	kW	5.57	6.36	10.60	11.10	12.25
	COP	W/W	2.95	2.93	2.86	2.72	2.71
	Conditions: water inlet / outlet temperature */35 and air temperature -15						
	Maximum heating capacity	kW	3.67	5.10	7.88	9	9.10
	COP	W/W	2.37	2.34	2.47	2.20	2.25
	Conditions: water inlet / outlet temperature */35 and air temperature -20						
	Maximum heating capacity	kW	2.09	4.34	6.56	7.60	7.60
	COP	W/W	1.62	2.04	1.99	1.98	1.97
	Conditions: water inlet / outlet temperature */35 and air temperature 10/9 (dry / wet)						
	Maximum heating capacity	kW	10.03	11.90	18.90	19.50	21
	COP	W/W	4.60	4.62	4.71	4.54	4.43
	Conditions: water inlet / outlet temperature */35 and air temperature 20						
	Nominal heating capacity	kW	7.02	8.37	12.92	16.80	18.20
	COP	W/W	6.75	6.39	6.21	6	5.60

Model				PHRIE 095 PHIE 095	PHRIE 125 PHIE 125	PHRIE 155 PHIE 155	PHRIE 175	PHRIE 195
Main power supply			V/PH/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
HEATING MODE (HEAT PUMP)	WATER OUTLET 45 °C	**Conditions: water inlet / outlet temperature 40/45 and air temperature 7/6 (dry / wet)**						
		Nominal heating capacity	kW	4.90	7.70	9.80	12.45	14.90
		Nominal input power	kW	1.33	2.15	2.54	3.59	4.20
		COP	W/W	3.68	3.58	3.86	3.47	3.55
		Nominal water flow	m³/h	0.80	1.36	1.75	2.23	2.55
		Maximum available pump head (at max. pump speed)	kPa	60	52	47	53	48
		Maximum heating capacity	kW	8.50	9.95	13.85	14.65	16.65
		COP	W/W	3.49	3.35	3.53	3.39	3.39
		Conditions: water inlet / outlet temperature */45 and air temperature 2/1 (dry / wet)						
		Nominal heating capacity	kW	4.06	5.30	8.09	9.75	11.32
		COP	W/W	2.78	2.73	2.81	2.64	2.75
		Maximum heating capacity	kW	5.81	6.60	9.75	10.20	11.35
		COP	W/W	2.73	2.74	2.71	2.60	2.68
		Conditions: water inlet / outlet temperature */45 and air temperature -7/-8 (dry / wet)						
		Heating capacity	kW	5.25	6.16	9	9.30	10.15
		COP	W/W	2.31	2.37	2.25	2.22	2.09
		Conditions: water inlet / outlet temperature */45 and air temperature -15						
		Heating capacity	kW	1.88	5	7.14	7.30	7.10
		COP	W/W	1.62	1.96	1.78	1.74	1.77
		Conditions: water inlet / outlet temperature */45 and air temperature 20						
		Nominal heating capacity	kW	6.63	8.20	12.35	12.9	17.30
		COP	W/W	5.02	4.77	4.59	4.61	4.20
	WATER OUTLET 55 °C	**Conditions: water inlet / outlet temperature 47/55 and air temperature 7/6 (dry / wet)**						
		Nominal heating capacity	kW	5.80	7.19	9.35	12.18	12.35
		COP	W/W	2.71	2.82	3.06	2.80	3
		Nominal water flow	m³/h	0.65	0.82	1.03	1.30	1.32
		Maximum available pump head (at max. pump speed)	kPa	61	60	59	64	64
		Maximum heating capacity	kW	6.68	7.90	11.30	12.18	12.50
		COP	W/W	2.64	2.78	2.77	2.70	2.80
		Conditions: water inlet / outlet temperature */55 and air temperature 2/1 (dry / wet)						
		Nominal heating capacity	kW	4.03	5.02	7.15	9.15	8.87
		COP	W/W	2.24	1.97	2.05	2.20	2.26
		Maximum heating capacity	kW	4.16	5.70	7.90	9.15	8.87
		COP	W/W	2.08	2.22	2.06	2.20	2.24
		Conditions: water inlet / outlet temperature */55 and air temperature -7/-8 (dry / wet)						
		Heating capacity	kW	3.88	5.29	7.30	7.40	7.70
		COP	W/W	1.70	1.85	1.83	1.76	1.77
		Conditions: water inlet / outlet temperature */55 and air temperature 20						
		Nominal heating capacity	kW	6.62	7.35	11.60	10	14
		COP	W/W	3.60	3.59	3.57	3.66	3.46
COOLING MODE (PHRIE only)	WATER OUTLET 18 °C	**Conditions: water inlet / outlet temperature 23/18 and air temperature 35**						
		Nominal cooling capacity	kW	4.32	6.64	9	10.60	11.35
		Nominal input power	kW	1.15	2.19	2.31	2.69	3.24
		EER	W/W	3.76	3.03	3.90	3.94	3.5
		Nominal water flow	m³/h	0.73	1.11	1.59	1.79	1.92
		Maximum available pump head (at max. pump speed)	kPa	61	57	49	59	59
		Maximum cooling capacity	kW	5.64	7.45	11.50	13	13.33
		EER	W/W	3.36	2.76	3.59	2.99	2.70
		Water flow	m³/h	0.95	1.26	1.93	2.20	2.26
	WATER OUTLET 7 °C	**Conditions: water inlet / outlet temperature 12/7 and air temperature 35**						
		Maximum cooling capacity	kW	4.14	6.67	8.20	10.20	11.36
		EER	W/W	2.56	2.44	2.62	2.55	2.40
		Water flow	m³/h	0.69	1.10	1.45	1.60	1.90
		Maximum available pump head	kPa	61	57	50	62	59

Model		PHRIE 095 PHIE 095	PHRIE 125 PHIE 125	PHRIE 155 PHIE 155	PHRIE 175	PHRIE 195
Main power supply	V/PH/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Total maximum power consumption						
With 4.5 kW support electric heater	kW	7.07	7.65	-	-	-
With 3 kW support electric heater	kW	5.57	6.15	-	-	-
With 6 kW support electric heater	kW	-	-	10.20	10.60	11.10
With 4 kW support electric heater	kW	-	-	8.20	8.60	9.10
Heat pump only	kW	2.57	3.15	4.20	4.60	5.10
Total maximum current consumption						
With 4.5 kW support electric heater	A	31.30	36.90	-	-	-
With 3 kW support electric heater	A	24.70	30.30	-	-	-
With 6 kW support electric heater	A	-	-	46.10	48.10	52.70
With 4 kW support electric heater	A	-	-	37.40	39.40	44
Heat pump only	A	11.70	17.30	20	22	26.60

1.3.2 THREE PHASES MODELS

Model			PHRIE 157 PHIE 157	PHRIE 177	PHRIE 197	PHRIE 257	PHRIE 307
Main power supply		V/PH/Hz	400/3N/50	400/3N/50	400/3N/50	400/3N/50	400/3N/50
HEATING MODE (HEAT PUMP) WATER OUTLET 25 °C	**Conditions: water inlet / outlet temperature 22/25 and air temperature 7/6 (dry / wet)**						
	Nominal heating capacity	kW	10.80	13.90	16.20	20	22
	COP	W/W	6.17	5.70	5.31	5.52	4.89
	Nominal water flow	m³/h	3.10	4	4.50	5.80	6.30
	Maximum heating capacity	kW	18.30	18.55	18.95	23.80	24
	COP	W/W	5.27	4.38	4.33	4.65	4.72
	Conditions: water inlet / outlet temperature */25 and air temperature 2/1 (dry / wet)						
	Nominal heating capacity	kW	7.52	10.45	12.92	13.50	13.90
	COP	W/W	4.11	4.15	3.55	3.96	3.76
	Maximum heating capacity	kW	11.45	12.75	13.45	14.95	18.05
	COP	W/W	3.62	3.49	3.46	3.59	3.70
	Conditions: water inlet / outlet temperature */25 and air temperature -7/-8 (dry / wet)						
	Heating capacity	kW	10.44	11.55	11.91	13.50	16.13
	COP	W/W	3.38	2.92	2.97	3.10	3.08
	Conditions: water inlet / outlet temperature */25 and air temperature -15						
	Heating capacity	kW	8.66	7.37	9.25	9.35	12.75
	COP	W/W	2.81	2.20	2.57	2.29	2.51
	Conditions: water inlet / outlet temperature */25 and air temperature -20						
	Maximum heating capacity	kW	7.36	7.37	7.76	7.41	10.87
	COP	W/W	2.49	2.37	2.32	1.90	2.23
	Conditions: water inlet / outlet temperature */25 and air temperature 20						
	Nominal heating capacity	kW	13.10	17.27	19.40	19	26.70
	COP	W/W	8.19	7.64	6.26	8.60	7.44

Model			PHRIE 157 PHIE 157	PHRIE 177	PHRIE 197	PHRIE 257	PHRIE 307
Main power supply		V/PH/Hz	400/3N/50	400/3N/50	400/3N/50	400/3N/50	400/3N/50
HEATING MODE (HEAT PUMP) WATER OUTLET 35 °C	**Conditions: water inlet / outlet temperature 30/35 and air temperature 7/6 (dry / wet)**						
	Nominal heating capacity	kW	10.45	13.55	15.65	19.90	23.50
	Nominal input power	kW	2.15	2.96	3.56	4.32	5.30
	COP	W/W	4.86	4.58	4.40	4.61	4.43
	Nominal water flow	m^3/h	1.84	2.32	2.60	3.50	4.09
	Maximum available pump head (at max. pump speed)	kPa	45	52	46	48	81
	Maximum heating capacity	kW	16.95	17.95	20.20	23.90	25.30
	COP	W/W	4.35	4.09	4.11	4.02	4.42
	Conditions: water inlet / outlet temperature */35 and air temperature 2/1 (dry / wet)						
	Nominal heating capacity	kW	8.60	10.15	11.70	13.30	14.15
	COP	W/W	3.51	3.33	3.41	3.30	3.29
	Maximum heating capacity	kW	11.35	11.95	12.25	15.30	18.50
	COP	W/W	3.48	3.14	3.08	3.15	3.25
	Conditions: water inlet / outlet temperature */35 and air temperature -7/-8 (dry / wet)						
	Heating capacity	kW	10.55	11.15	12.20	13.40	17.76
	COP	W/W	2.81	2.70	2.67	2.69	2.87
	Conditions: water inlet / outlet temperature */35 and air temperature -15						
	Maximum heating capacity	kW	7.85	8.97	9.10	10.16	13.84
	COP	W/W	2.44	2.18	2.25	2.16	2.37
	Conditions: water inlet / outlet temperature */35 and air temperature -20						
	Maximum heating capacity	kW	6.53	7.57	7.60	8.08	11
	COP	W/W	1.96	1.96	1.97	1.80	1.96
	Conditions: water inlet / outlet temperature */35 and air temperature 10/9 (dry / wet)						
	Maximum heating capacity	kW	18.85	19.45	20.95	25.40	26.40
	COP	W/W	4.64	4.48	4.37	4.22	4.55
	Conditions: water inlet / outlet temperature */35 and air temperature 20						
	Nominal heating capacity	kW	12.89	16.77	18.20	18.90	26.55
	COP	W/W	6.11	5.93	5.60	6.52	5.63

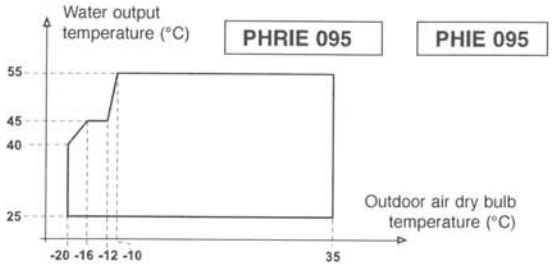
Model				PHRIE 157 PHIE 157	PHRIE 177	PHRIE 197	PHRIE 257	PHRIE 307
Main power supply			V/PH/Hz	400/3N/50	400/3N/50	400/3N/50	400/3N/50	400/3N/50
HEATING MODE (HEAT PUMP)	WATER OUTLET 45 °C	**Conditions: water inlet / outlet temperature 40/45 and air temperature 7/6 (dry / wet)**						
		Nominal heating capacity	kW	9.75	12.40	14.85	18.45	22.65
		Nominal input power	kW	2.59	3.64	4.25	5.20	6.25
		COP	W/W	3.76	3.41	3.49	3.55	3.62
		Nominal water flow	m³/h	1.75	2.23	2.55	3.30	3.91
		Maximum available pump head (at max. pump speed)	kPa	47	53	48	51	84
		Maximum heating capacity	kW	13.80	14.60	16.60	23.10	24.30
		COP	W/W	3.48	3.34	3.37	3.28	3.52
		Conditions: water inlet / outlet temperature */45 and air temperature 2/1 (dry / wet)						
		Nominal heating capacity	kW	8.04	9.70	11.27	12.85	13.67
		COP	W/W	2.74	2.59	2.71	2.63	2.62
		Maximum heating capacity	kW	9.70	10.15	11.30	14.90	17.90
		COP	W/W	2.66	2.55	2.63	2.53	2.60
		Conditions: water inlet / outlet temperature */45 and air temperature -7/-8 (dry / wet)						
		Heating capacity	kW	8.95	9.25	10.10	12.18	15
		COP	W/W	2.21	2.18	2.06	2.08	2.10
		Conditions: water inlet / outlet temperature */45 and air temperature -15						
		Heating capacity	kW	7.11	7.27	7.10	8.70	11.10
		COP	W/W	1.76	1.71	1.77	1.60	1.80
		Conditions: water inlet / outlet temperature */45 and air temperature 20						
		Nominal heating capacity	kW	12.32	12.97	17.30	17.40	25.80
		COP	W/W	4.53	4.55	4.20	4.66	4.43
	WATER OUTLET 55 °C	**Conditions: water inlet / outlet temperature 47/55 and air temperature 7/6 (dry / wet)**						
		Nominal heating capacity	kW	9.30	12.13	12.30	17.95	22.66
		COP	W/W	2.99	2.76	2.95	2.98	2.89
		Nominal water flow	m³/h	1.03	1.30	1.32	2.05	2.46
		Maximum available pump head (at max. pump speed)	kPa	59	64	64	66	99
		Maximum heating capacity	kW	11.25	12.13	12.45	18.40	23.20
		COP	W/W	2.72	2.66	2.76	2.60	2.76
		Conditions: water inlet / outlet temperature */55 and air temperature 2/1 (dry / wet)						
		Nominal heating capacity	kW	7.10	9.10	8.82	11.85	14.40
		COP	W/W	2.01	2.16	2.22	2.09	2.25
		Maximum heating capacity	kW	7.85	9.10	8.82	13	17.20
		COP	W/W	2.02	2.16	2.20	2.07	2.20
		Conditions: water inlet / outlet temperature */55 and air temperature -7/-8 (dry / wet)						
		Heating capacity	kW	7.25	7.35	7.65	10.80	13.80
		COP	W/W	1.79	1.73	1.74	1.63	1.86
		Conditions: water inlet / outlet temperature */55 and air temperature 20						
		Nominal heating capacity	kW	11.57	9.97	14	16.20	25
		COP	W/W	3.53	3.61	3.46	3.63	3.68
COOLING MODE (PHRIE only)	WATER OUTLET 18 °C	**Conditions: water inlet / outlet temperature 23/18 and air temperature 35**						
		Nominal cooling capacity	kW	9	10.60	11.35	21.50	23.15
		Nominal input power	kW	2.31	2.69	3.24	5.58	7.24
		EER	W/W	3.90	3.94	3.50	3.85	3.20
		Nominal water flow	m³/h	1.59	1.79	1.92	3.65	4
		Maximum available pump head (at max. pump speed)	kPa	49	59	59	44	85
		Maximum cooling capacity	kW	11.50	13	13.33	23.80	24.74
		EER	W/W	3.59	2.99	2.70	3.27	3.06
		Water flow	m³/h	1.93	2.20	2.26	4.06	4.25
	WATER OUTLET 7 °C	**Conditions: water inlet / outlet temperature 12/7 and air temperature 35**						
		Maximum cooling capacity	kW	8.20	10.20	11.36	14.70	18.33
		EER	W/W	2.62	2.55	2.40	2.60	2.29
		Water flow	m³/h	1.45	1.60	1.90	2.52	3.16
		Maximum available pump head	kPa	50	62	59	63	92

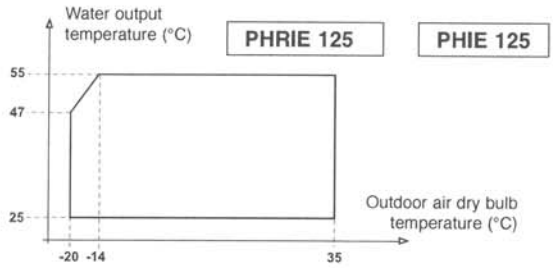
Model		PHRIE 157 PHIE 157	PHRIE 177	PHRIE 197	PHRIE 257	PHRIE 307
Main power supply	V/PH/Hz	400/3N/50	400/3N/50	400/3N/50	400/3N/50	400/3N/50
Total maximum power consumption						
With 9 kW support electric heater	kW	-	-	-	16.40	17.50
With 6 kW support electric heater	kW	10.20	10.60	12.50	13.40	14.50
With 4 kW support electric heater	kW	8.20	8.60	10.50	-	-
Heat pump only	kW	4.20	4.60	6.50	7.40	8.50
Total maximum current consumption						
With 9 kW support electric heater	A	-	-	-	25.70	29.50
With 6 kW support electric heater	A	20	20.90	19.70	21.40	25.20
With 4 kW support electric heater	A	17.10	18	16.80	-	-
Heat pump only	A	11.30	12.2	11	12.70	16.50

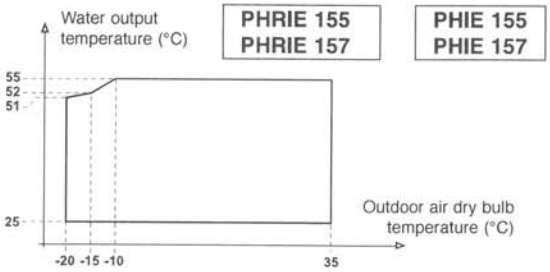
1.3.3 OPERATING LIMITS

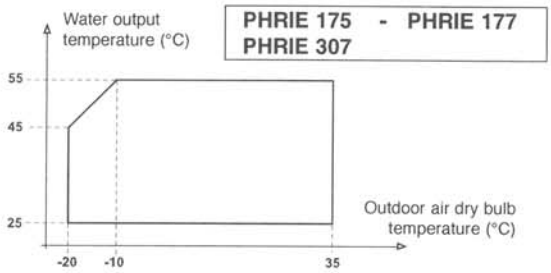
- Automatic devices of the control reduce or prohibit operation of the appliance outside the following limits.

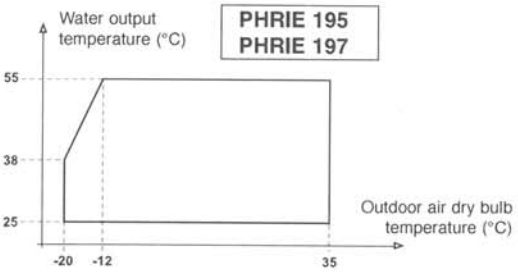
HEATING MODE OPERATING LIMITS:

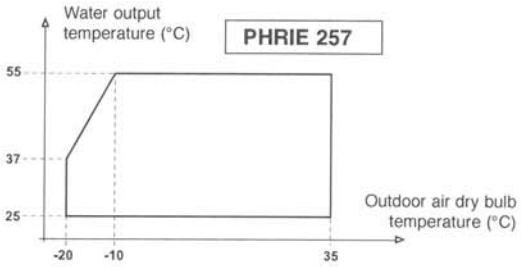




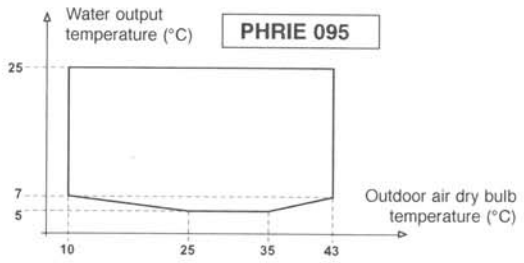


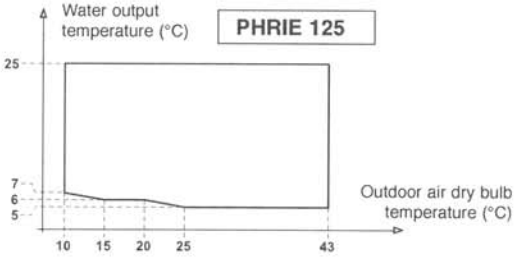


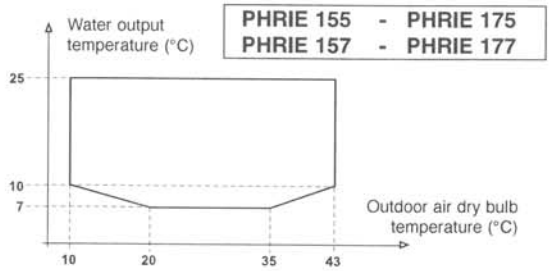


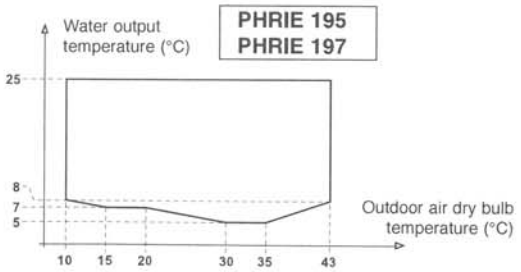


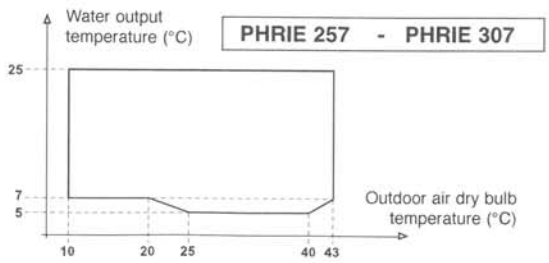
- COOLING MODE OPERATING LIMITS:







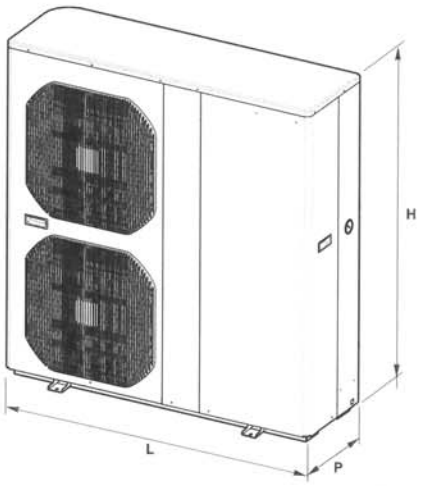




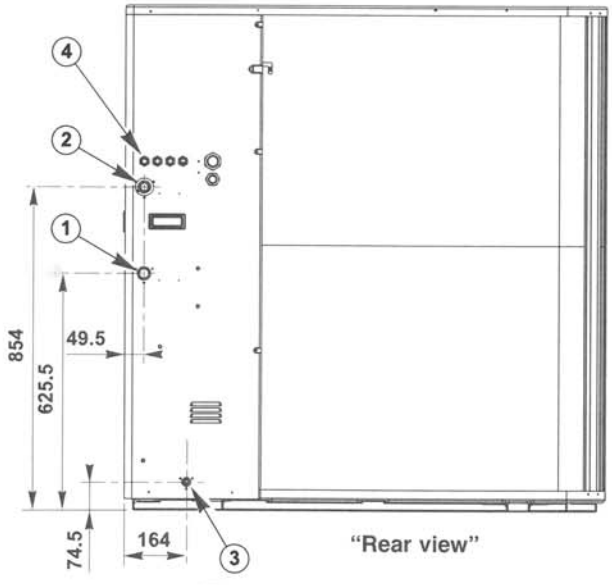
1.4 – PHYSICAL CHARACTERISTICS

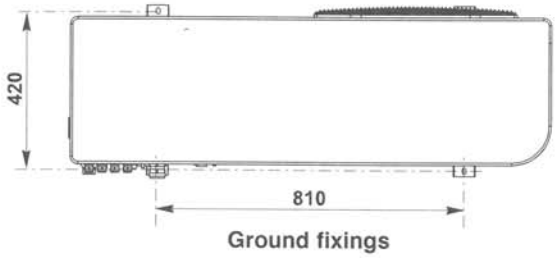
Model				PHRIE 095 PHIE 095	PHRIE 125 PHIE 125	PHRIE 155/157 PHIE 155/157	PHRIE 175/177	PHRIE 195/197	PHRIE 257	PHRIE 307
Dimensions	L	mm		1.270	1.270	1.270	1.270	1.440	1.440	1.440
	H	mm		835	835	1.335	1.335	1.335	1.535	1.535
	P	mm		390	390	390	390	390	390	390
	Weight	kg		90	93	143/142	145/144	151/150	177	180
Dimension packaged	L	mm		1.350	1.350	1.350	1.350	1.520	1.520	1.520
	H	mm		1.000	1.000	1.500	1.500	1.500	1.700	1.700
	P	mm		470	470	470	470	470	470	470
	Weight	kg		105	108	160/159	162/161	170/169	197	200

		PHRIE 095 PHRIE 125 PHIE 095 PHIE 125	PHRIE 155 PHRIE 157 PHRIE 175 PHRIE 177 PHRIE 195 PHRIE 197 PHIE 155 PHIE 157	PHRIE 257 PHRIE 307
1	Water inlet connection (male)	3/4"	1"	1" 1/4
2	Water outlet connection (male)	3/4"	1"	1" 1/4
3	Water circuit fill / drain (male)	1/2"	1/2"	1/2"
4	Holes for electric cables			



PHRIE 155
PHRIE 157
PHRIE 175
PHRIE 177
PHRIE 195
PHRIE 197

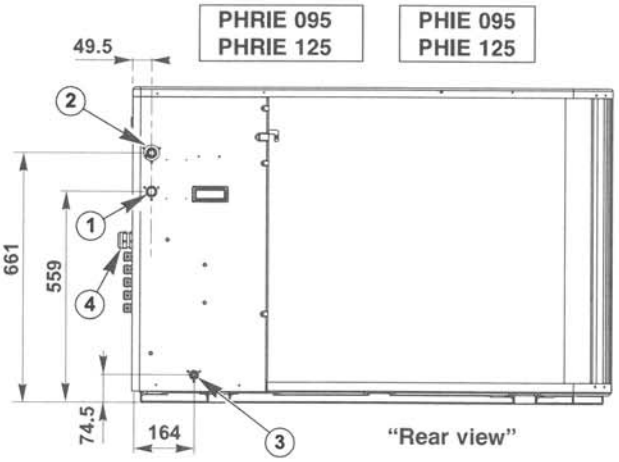


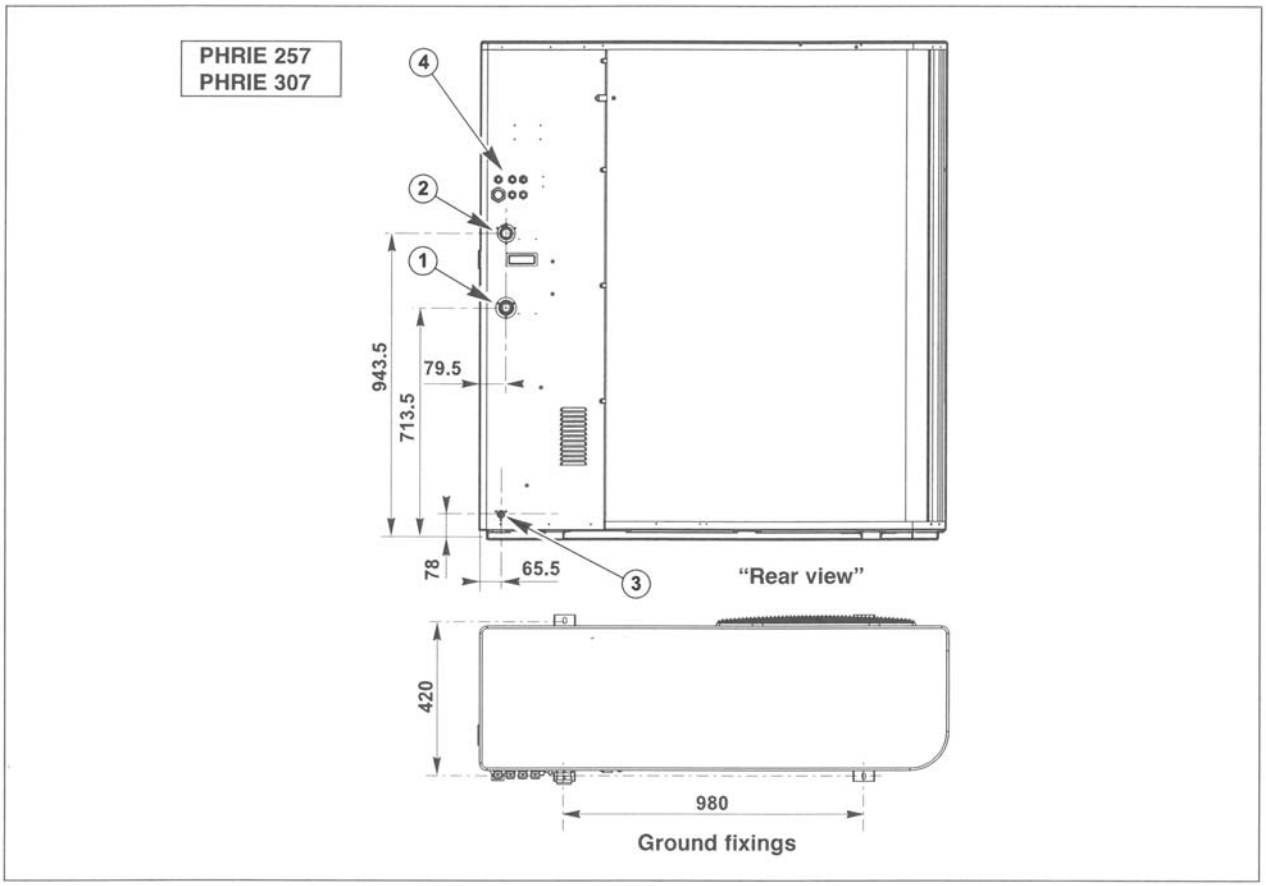


PHIE 155
PHIE 157

PHRIE 095
PHRIE 125

PHIE 095
PHIE 125




PHRIE 257
PHRIE 307
4
2
1
943.5
713.5
79.5
78
65.5
3
"Rear view"
420
980
Ground fixings

1.5 – DESCRIPTION

1.5.1 SINGLE PHASE MODELS

Model		PHRIE 095 PHIE 095	PHRIE 125 PHIE 125	PHRIE 155 PHIE 155	PHRIE 175	PHRIE 195
Hermetic compressor with thermal protection Oil type: Daphne FV68S or equivalent		Rotary twin	Rotary twin	Rotary twin	Rotary twin	Rotary twin
Sound insulation cover		•	•	•	•	•
Main power supply	**230 V / 1 / 50 Hz**	•	•	•	•	•
Start-up current	**A**	3	3	3	3	3
Direct drive propeller **fan motor** with thermal protection, horizontal blowing		1	1	2	2	2
Propeller diameter	**mm**	490	490	490	490	490
Power supply	**230 V / 1 / 50 Hz**	•	•	•	•	•
Rotation speed	**rpm**	770	770	800	800	800
Current input	**A**	0.4	0.4	0.8	0.8	0.8
Power input	**kW**	0.09	0.09	0.18	0.18	0.18
Air exchanger with corrugated fins and water-repellant treatment		•	•	•	•	•
Expansion system (*)	**Electronic regulator**	•	•	•	•	•
Water exchanger plate-type stainless steel water treatment section		•	•	•	•	•
Expansion system (*)	**Electronic regulator**	•	•	•	•	•
Refrigerant circuit		1	1	1	1	1
R 410 A refrigerant - Total charge	**kg**	1.8	1.9	3.5	3.8	4.2
Multi stages electric support heater						
1st stage (selected at installation)	**kW**	1.5 or 3	1.5 or 3	2 or 4	2 or 4	2 or 4
2nd stage	**kW**	1.5	1.5	2	2	2
Circulating pump		•	•	•	•	•
Current input	**A**	0.58	0.58	0.58	1.3	1.3
Power input	**kW**	0.07	0.07	0.07	0.14	0.14
Power supply	**230 V / 1 / 50 Hz**	•	•	•	•	•
Expansion vessel (inflation pressure 0.75 bar)		•	•	•	•	•
Capacity	**Litres**	4	4	6	6	6
Safety valve (pressure: 3 bar)		•	•	•	•	•
Pressure gauge (0 to 6 bar)		•	•	•	•	•
Air vent valve		•	•	•	•	•
Hydraulic system						
Male connections	**Inlet**	3/4"	3/4"	1"	1"	1"
	Outlet	3/4"	3/4"	1"	1"	1"
Water capacity of the unit	**Litres**	4.6	4.8	5.4	5.7	5.9
Water flow switch		•	•	•	•	•
Water filter supplied, uninstalled (female)		3/4"	3/4"	1"	1"	1"
Water volume in system						
Minimum water volume (**)	**Litres**	60	70	125	140	150
Maximum water volume (***) at water outlet 25°C	**Litres**	530	530	800	800	800
Maximum water volume (***) at water outlet 35°C	**Litres**	270	270	400	400	400
Maximum water volume (***) at water outlet 45°C	**Litres**	160	160	245	245	245
Maximum water volume (***) at water outlet 55°C	**Litres**	110	110	165	165	165
Main power supply	**230 V / 1 / 50 Hz**	•	•	•	•	•
Equipment protection index		IP24	IP24	IP24	IP24	IP24

(*) PHRIE units are equipped with a single bi-flow electronic regulator used in both heating and cooling operation.

(**) If the water volume of the system is below the minimum, a buffer tank must be installed.
For the minimum water volume, consider the volume continuously connected to the heat pump (don't consider the volumes which could be isolated by automatic valves).

(***) If the water volume of the system is above the maximum, an additional expansion vessel is required.

1.5.2 THREE PHASES MODELS

Model		PHRIE 157 PHIE 157	PHRIE 177	PHRIE 197	PHRIE 257	PHRIE 307
Hermetic compressor with thermal protection Oil type: Daphne FV68S or equivalent		Rotary twin	Rotary twin	Rotary twin	Rotary twin	Rotary twin
Sound insulation cover		•	•	•	•	•
Main power supply	400 V / 3N / 50 Hz	•	•	•	•	•
Start-up current	A	3	3	3	3	3
Direct drive propeller **fan motor** with thermal protection, horizontal blowing		2	2	2	2	2
Propeller diameter	mm	490	490	490	490	490
Power supply	230 V / 1 / 50 Hz	•	•	•	•	•
Rotation speed	rpm	800	800	800	860	860
Current input	A	0.8	0.8	0.8	1.1	1.1
Power input	kW	0.18	0.18	0.18	0.24	0.24
Air exchanger with corrugated fins and water-repellant treatment		•	•	•	•	•
Expansion system (*)	Electronic regulator	•	•	•	•	•
Water exchanger plate-type stainless steel water treatment section		•	•	•	•	•
Expansion system (*)	Electronic regulator	•	•	•	•	•
Refrigerant circuit		1	1	1	1	1
R 410 A refrigerant - Total charge	kg	3.5	3.8	4.2	5.8	6.5
Multi stages electric support heater						
1st stage (selected at installation)	kW	2 or 4	2 or 4	2 or 4	3 or 6	3 or 6
2nd stage	kW	2	2	2	3	3
Circulating pump		•	•	•	•	•
Current input	A	0.58	1.3	1.3	1.3	1.37
Power input	kW	0.07	0.14	0.14	0.14	0.31
Power supply	230 V / 1 / 50 Hz	•	•	•	•	•
Expansion vessel (inflation pressure 0.75 bar)		•	•	•	•	•
Capacity	Litres	6	6	6	8	8
Safety valve (pressure: 3 bar)		•	•	•	•	•
Pressure gauge (0 to 6 bar)		•	•	•	•	•
Air vent valve		•	•	•	•	•
Hydraulic system						
Male connections	Inlet	1"	1"	1"	1"1/4	1"1/4
	Outlet	1"	1"	1"	1"1/4	1"1/4
Water capacity of the unit	Litres	5.4	5.7	5.9	6.5	7
Water flow switch		•	•	•	•	•
Water filter supplied, uninstalled (female)		1"	1"	1"	1"1/4	1"1/4
Water volume in system						
Minimum water volume (**)	Litres	125	140	150	220	380
Maximum water volume (***) at water outlet 25°C	Litres	800	800	800	1.060	1.060
Maximum water volume (***) at water outlet 35°C	Litres	400	400	400	530	530
Maximum water volume (***) at water outlet 45°C	Litres	245	245	245	325	325
Maximum water volume (***) at water outlet 55°C	Litres	165	165	165	220	220
Main power supply	400 V / 3N / 50 Hz	•	•	•	•	•
Equipment protection index		IP24	IP24	IP24	IP24	IP24

(*) PHRIE units are equipped with a single bi-flow electronic regulator used in both heating and cooling operation.

(**) If the water volume of the system is below the minimum, a buffer tank must be installed.
For the minimum water volume, consider the volume continuously connected to the heat pump (don't consider the volumes which could be isolated by automatic valves).

(***) If the water volume of the system is above the maximum, an additional expansion vessel is required.

1.6 – HEAT PUMP CAPACITIES

1.6.1 HEATING / COOLING CAPACITIES

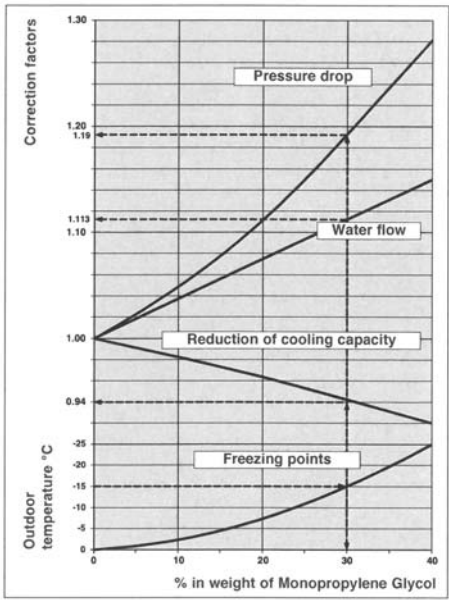
See technical manual 10 12 202

1.6.2 CAPACITY CORRECTION ACCORDING GLYCOL RATIO

IMPORTANT: Use monopropylen glycol. A minimum rate of 15 to 20% is needed to avoid any risk of corrosion.

Curves use principle:
Choose the percentage of glycol according to the minimum temperature in order to protect the hydraulic circuit against frost and then determine the coefficients to be applied to the capacity of the unit, the water flow rate and the pressure drop.

Cooling Mode:



Example:

-Protection at a outdoor temperature of -15°C gives 30% glycol ("freezing point curve").

-This percentage of glycol induces:

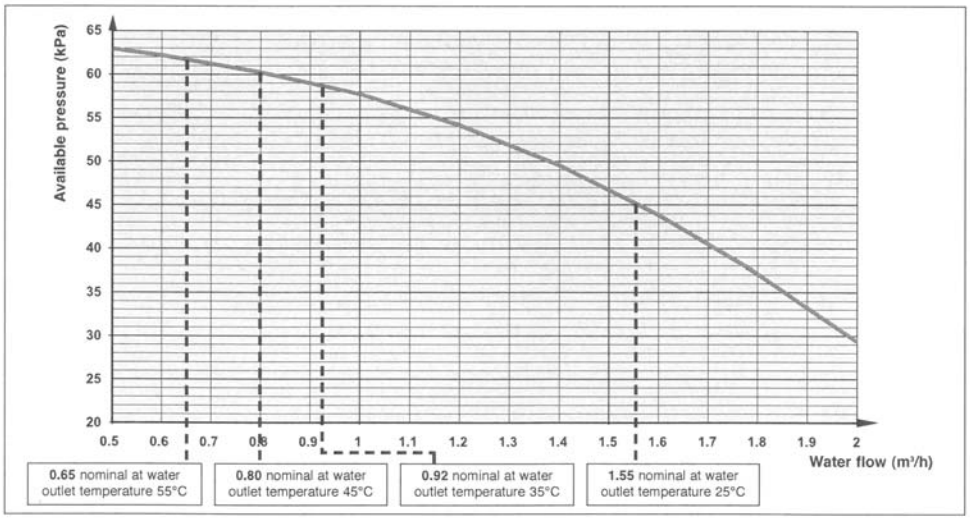
- A reduction coefficient of cooling capacity of 0.94.
- A water flow rate coefficient of 1.113 (flow must be increased).
- A water pressure drop coefficient of 1.19 to be applied for pressure drop calculation.

Heating mode:
For current applications, the impact of glycol ratio can be ignored.

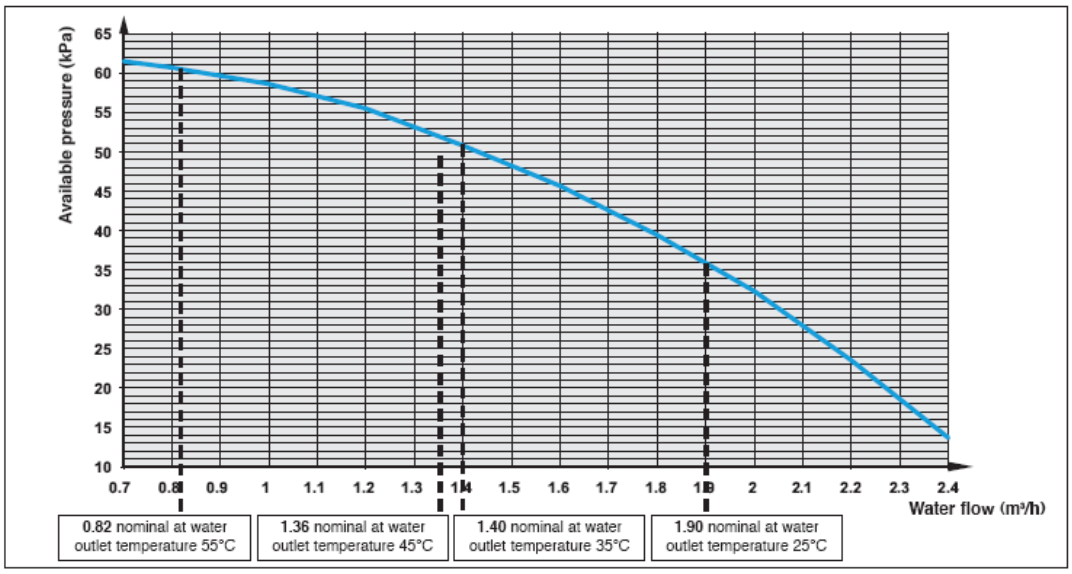
1.7 – AVAILABLE PRESSURES ON WATER CIRCUIT

These available pressures are indicated for the water flow to be set at the installation, according to the maximum water outlet temperature (which is determined according to the application).
Please refer to part 3 for water flow setting.

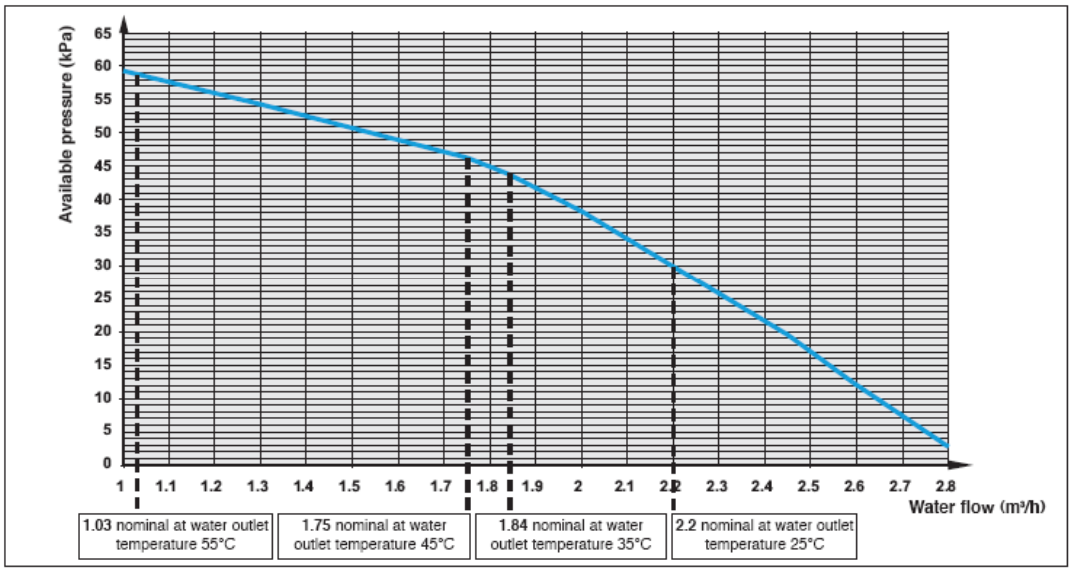
PHRIE 095
PHIE 095



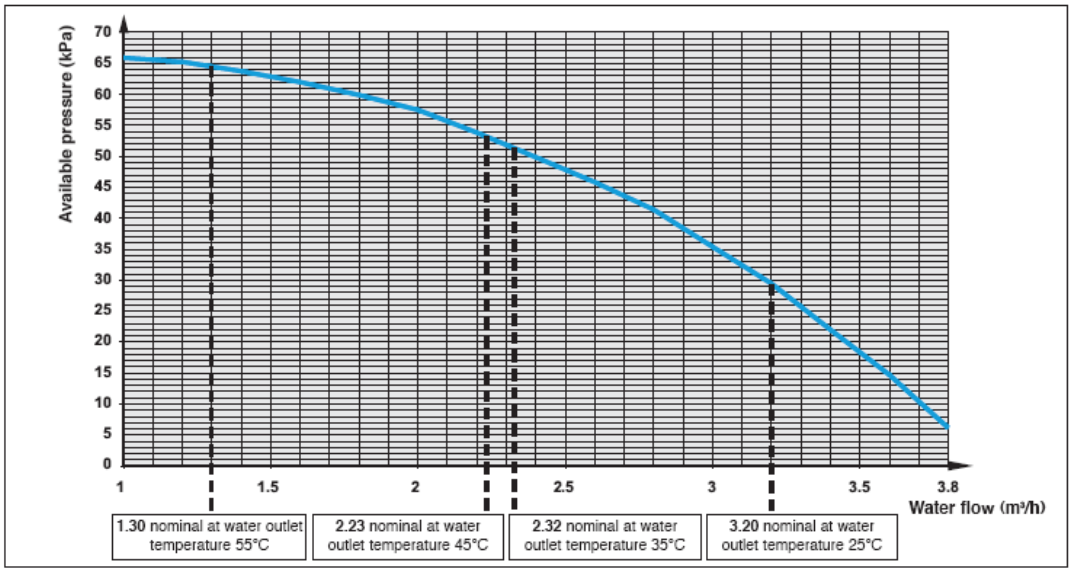
PHRIE 125
PHIE 125



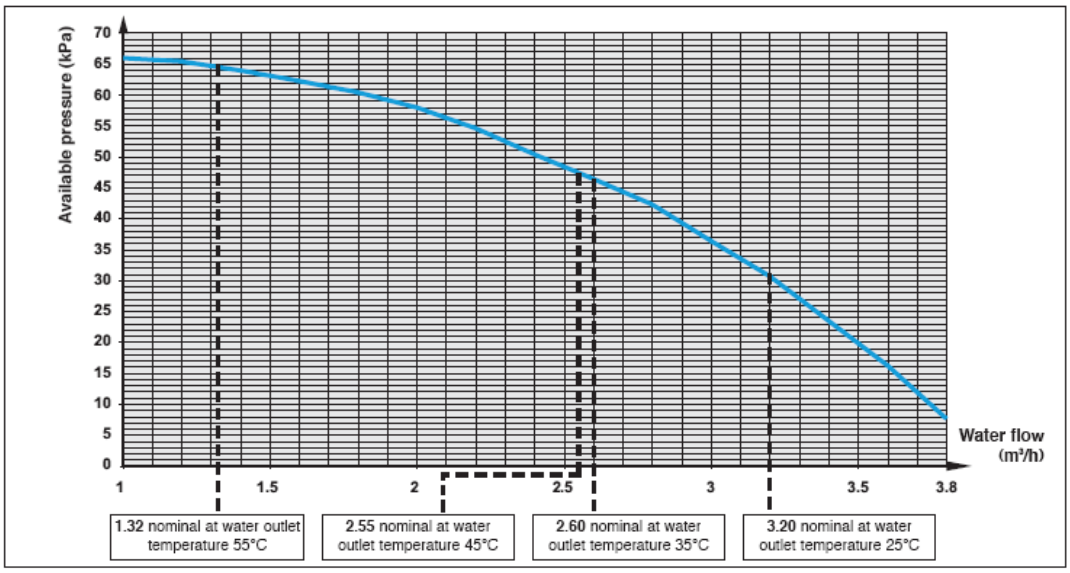
PHRIE 155
PHIE 155
PHRIE 157
PHIE 157



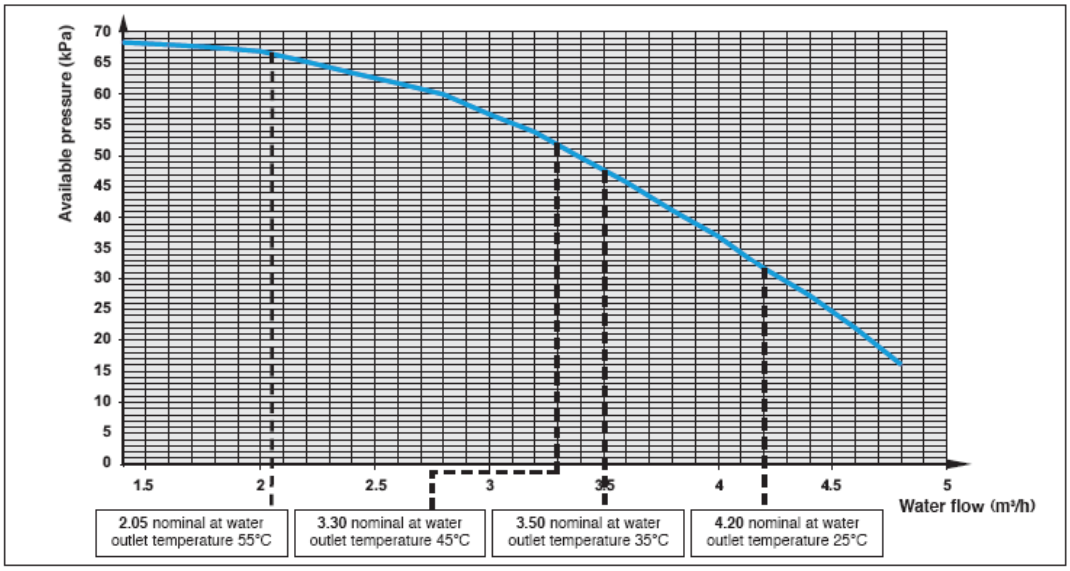
PHRIE 175
PHRIE 177



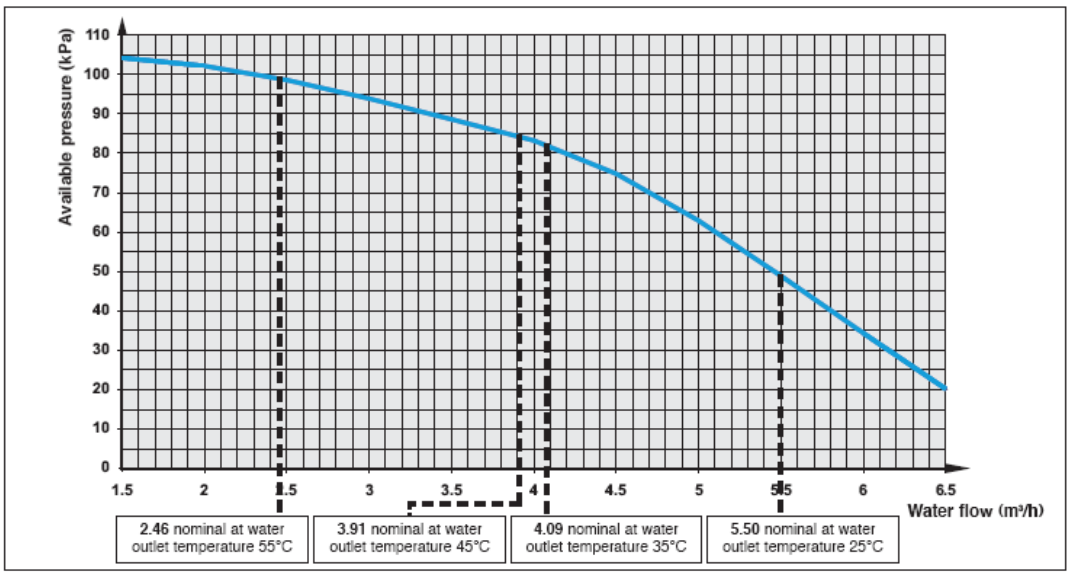
PHRIE 195
PHRIE 197



PHRIE 257



PHRIE 307



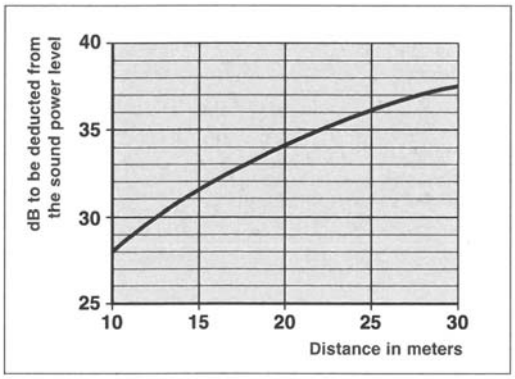
1.8 – SOUND LEVELS

Model	Power level Lw (dBA)		Sound-pressure level (dBA)	
	Max. capacity	Puissance maximum	Nominal capacity	Max. capacity
PHRIE 095 PHIE 095	65	67	37	39
PHRIE 125 PHIE 125	65	67	37	39
PHRIE 155 PHIE 155	66	70	38	42
PHRIE 157 PHIE 157	66	70	38	42
PHRIE 175 PHRIE 177	68	72	40	44
PHRIE 195 PHRIE 197	70	74	41	45
PHRIE 257 PHRIE 307	68	72	40	44

Reference standard:
Measurements as per standard EN 12 102.
Measuring method: reverberating chamber

Sound-pressure level:
Unit installed outdoors (free field) on a reflective surface.
Measurement carried out at a distance of 10m.

Silent mode:
It is possible to activate a silent-mode on the unit. In this case, the compressor speed is limited for the nominal capacity of the unit.
For details, see part 4.



Sound power level spectrum:

Tests conditions:

-Unit at nominal capacity
-Air temperature: 7°C (DB)
-Water inlet temperature: 47°C
-Water outlet temperature:55°C

PHRIE 95

frequency (Hz)	Lw dB(A)
100	38,3
125	35,6
160	48,4
200	51,4
250	46,3
315	59,2
400	53,2
500	48,6
630	51,1
800	55,6
1000	55,8
1250	55,3
1600	51,2
2000	45,7
2500	52,8
3150	48,2
4000	48,7
5000	46,6
6300	42,2
8000	37,5
10000	36,7

Sound power level	65,0

PHRIE 125

frequency (Hz)	Lw dB(A)
100	44,4
125	41,5
160	42
200	50,5
250	51,3
315	47,7
400	62,3
500	54,2
630	51,5
800	54,5
1000	50,4
1250	47,8
1600	46,4
2000	44,5
2500	46,6
3150	49,8
4000	42,3
5000	38,6
6300	37,3
8000	33,9
10000	28,3

Sound power level	65,0

PHRIE 155

frequency (Hz)	Lw dB(A)
100	52,4
125	49,7
160	53,3
200	55,8
250	46,7
315	46,8
400	49,2
500	54,9
630	60,7
800	59,3
1000	53
1250	48,2
1600	43,2
2000	46,9
2500	46,5
3150	48,1
4000	46,8
5000	47,2
6300	44,5
8000	39
10000	37,7

Sound power level	66,0

PHRIE 175

frequency (Hz)	Lw dB(A)
100	57,6
125	52,6
160	53,5
200	54,4
250	51,2
315	50,5
400	52,9
500	56,1
630	62,2
800	61,6
1000	55,2
1250	51,6
1600	48,3
2000	50,0
2500	49,4
3150	51,0
4000	49,8
5000	48,5
6300	45,6
8000	39,5
10000	38,1

Sound power level	68,0

PHRIE 195

frequency (Hz)	Lw dB(A)
100	62,4
125	55
160	53,3
200	52,6
250	55,2
315	53,7
400	56,1
500	56,9
630	63,3
800	63,4
1000	56,9
1250	54,5
1600	53
2000	52,7
2500	51,9
3150	53,5
4000	52,4
5000	49,3
6300	46,3
8000	39,5
10000	38

Sound power level	70,0

PHRIE 257

frequency (Hz)	Lw dB(A)
100	52,7
125	44,3
160	50,1
200	48,5
250	50,2
315	57,8
400	55,8
500	56,3
630	62,4
800	61,9
1000	54,2
1250	53,5
1600	53,7
2000	51,3
2500	49,3
3150	50,8
4000	49,7
5000	44,2
6300	43,1
8000	38,4
10000	37,4

Sound power level	68,0

PHRIE 307

frequency (Hz)	Lw dB(A)
100	51,1
125	50,8
160	52,9
200	53,7
250	52,4
315	54,4
400	56,3
500	57,5
630	61,1
800	60,3
1000	57,7
1250	55,9
1600	54
2000	53,1
2500	51,5
3150	50,9
4000	49,4
5000	47,9
6300	44,7
8000	39,9
10000	37,5

Sound power level	68,0

1.9 – SYSTEM CONTROL SOLUTIONS

It features 2 parts:

- Monitoring / control assembly with INVERTER technology, for the thermodynamic device. Built into the heat pump, it controls:
  - The variable-speed compressor.
  - The variable-speed fan.
  - The electronic expansion valve and the cycle inversion valve.
  - The water circulating pump (with frost protection and anti-sticking functions).
- System monitoring and control assembly. It ensures:
  - Thermodynamic heating control with permanent control of the required capacity based on the needs of the installation.
  - Control of the supplementary support heating.
  - Control of the circulators.
  - Management of the installation safeties and alarms.

A system control kit must be ordered separately - 2 possibilities:

- For standard applications with **integrated electric support heater** : system control kit **K60D070Z**
- For applications with **boiler back-up**: system control kit **K60D071Z**

✓ **System control kit K60D070Z**

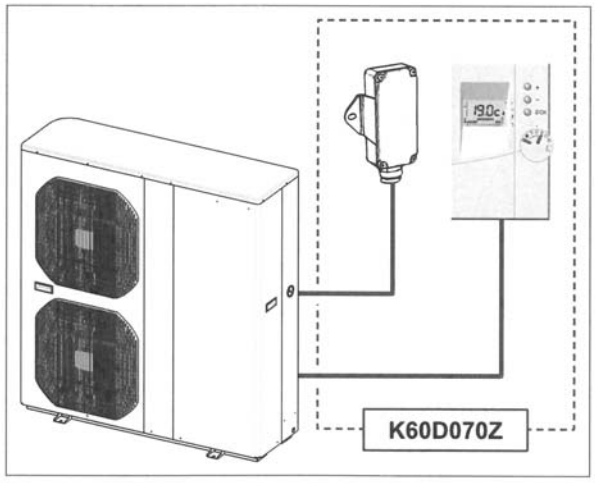
For standard applications using heat pump with integrated electric heater:

APPLICATIONS	
K60D070ZA.	**K60D070ZB.**
- 1 Floor Zone - 2 floor Zones - 1 Terminal Units Zone - 1 Radiators Zone - 2 Mixed Zones; Floor + Terminal Units - 2 Mixed Zones; Floor + Radiators - 1 Radiators zone + Domestic Hot Water tank Until mid 2012	- 1 Floor Zone + Domestic Hot Water tank - 1 Radiators Zone + Domestic Hot Water tank Since mid 2012, extension B has been dedicated to applications with Domestic Hot Water

For all details concerning system control operation, please refer to the corresponding technical manuals:

Technical manual 10 12 200	**Technical manual 10 12 204**

System control kit includes:
- system remote control box,
- outdoor temperature sensor,
- system control manuals.



✓ **System control kit K60D071Z**

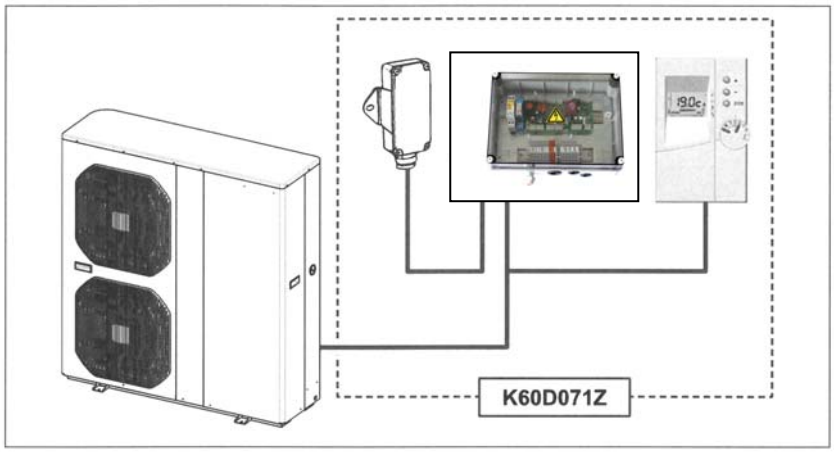
For applications with **boiler back-up:**

- 1 Floor Zone

- 1 Radiators Zone

System control kit includes:
- system remote control box,
- outdoor temperature sensor,
- system control cabinet,

(to be installed in a sheltered technical room)
- system water temperature sensors,
- system control manuals.



For all details concerning system control operation, please refer to the corresponding **technical manual 10 12 201**

Note: With both system controls, for 1 Zone applications, possibility to activate a 2nd zone with electric convectors. These appliances must be equipped with an electronic thermostat (out of supply) able to receive controls signals by means of a 230Vac pilot wire (according standard GIFAM 4).

PART 2 – FRIGORIFIC & HYDRAULIC

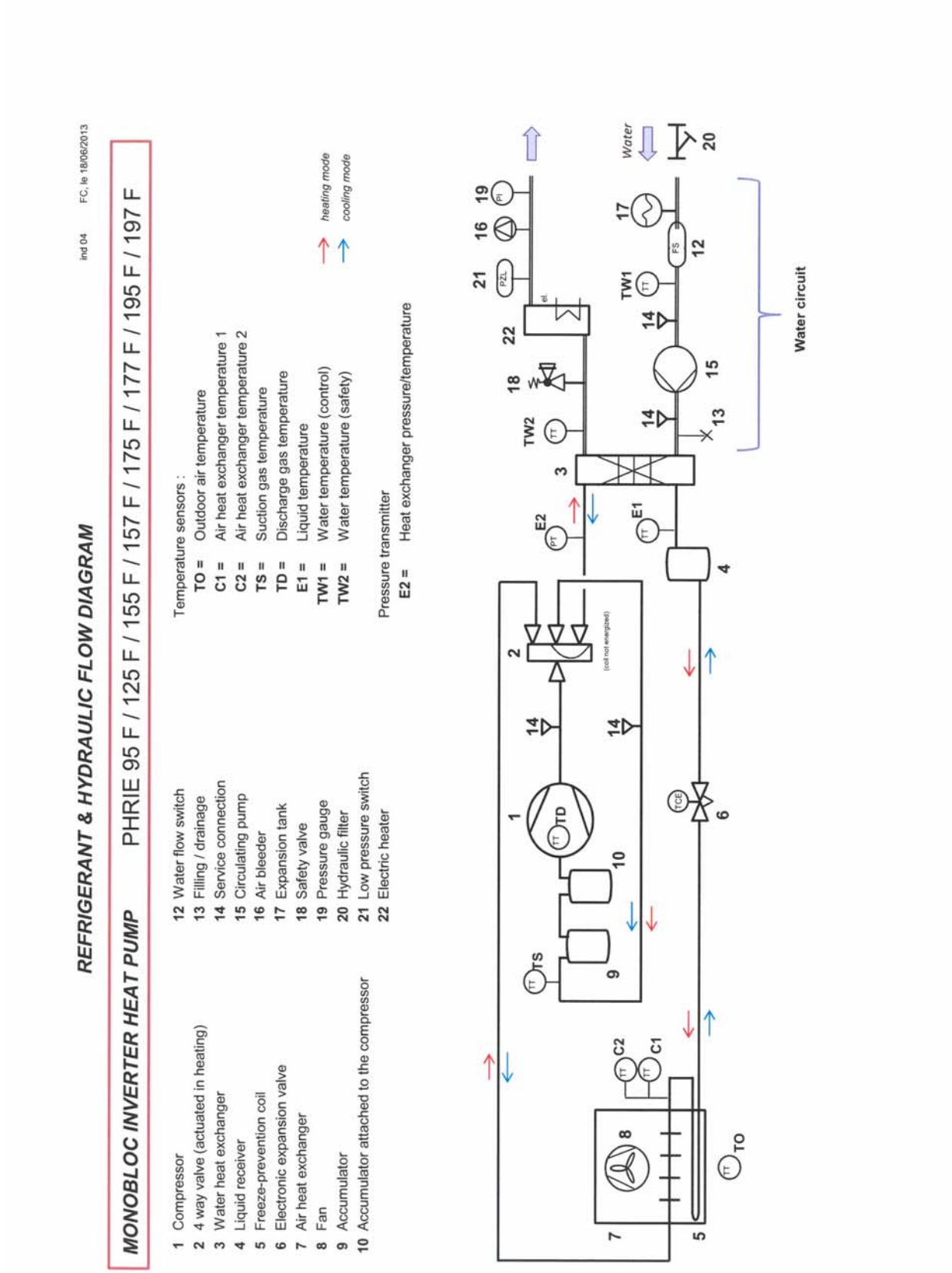
2.1 Frigorific / Hydraulic diagrams

2.2 Frigorific circuit – Main components description
- 2.2.1 Compressor
- 2.2.2 Electronic expansion valve
- 2.2.3 Four way valve
- 2.2.4 Fan motor
- 2.2.5 Pressure sensor

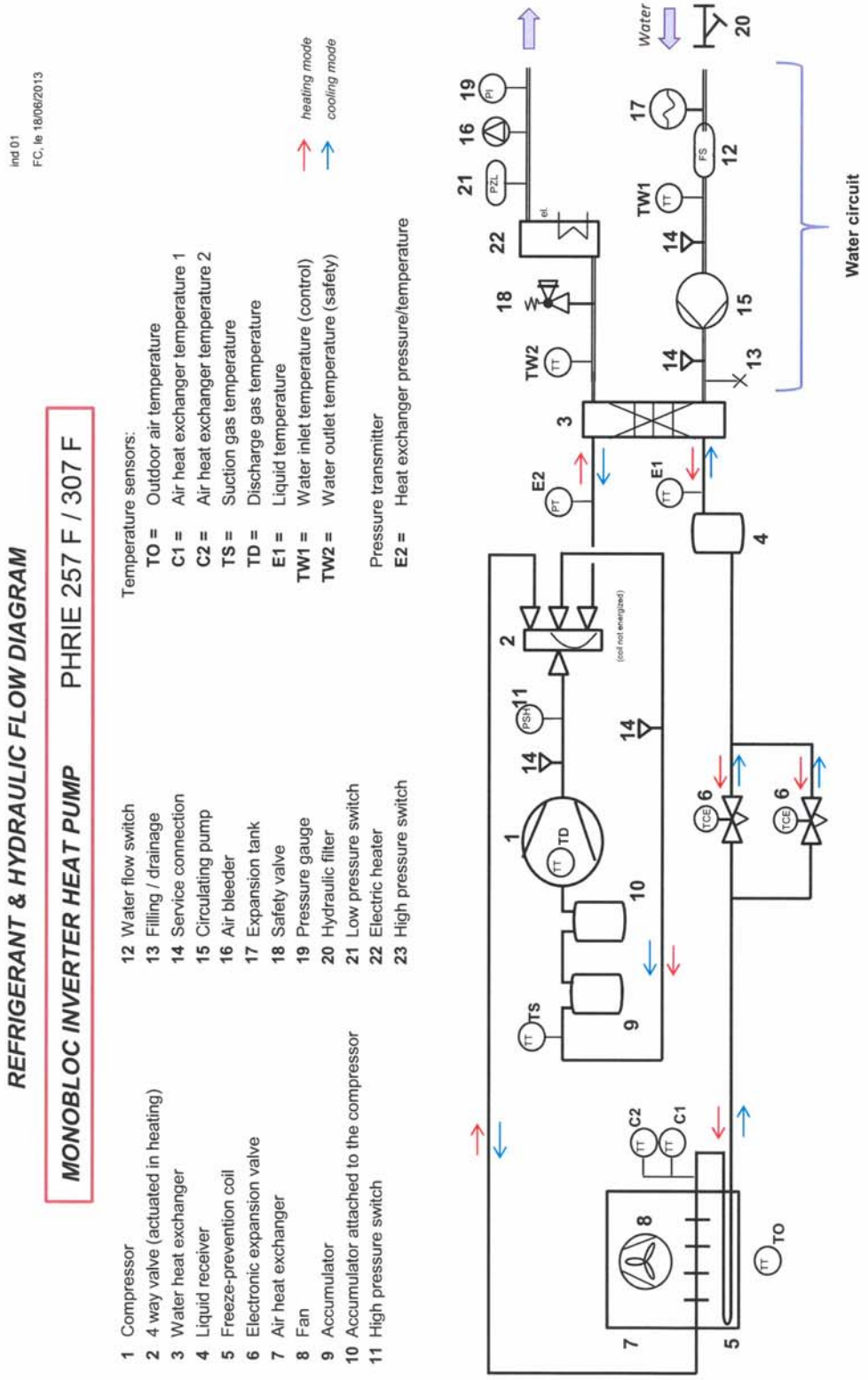
2.3 Hydraulic circuit – Main components description
- 2.3.1 Water circulating pump
- 2.3.2 Water flow switch
- 2.3.3 Pressurized expansion vessel
- 2.3.4 Safety relief valve

2.1 – FRIGORIFIC / HYDRAULIC DIAGRAMS

2.1.1 DIAGRAMS FOR MODELS 095/125/155/157/175/177/195/197



2.1.2 DIAGRAMS FOR MODELS 257/307



2.2 – FRIGORIFIC CIRCUIT – MAIN COMPONENTS DESCRIPTION

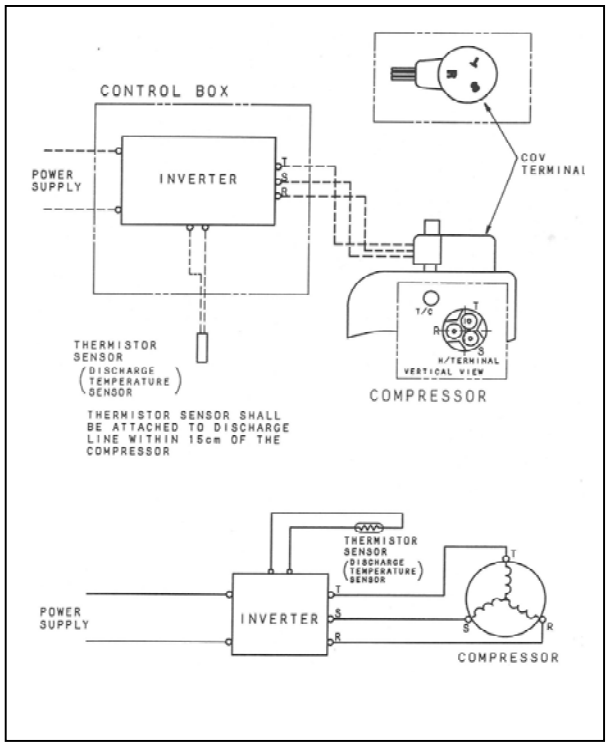
2.2.1 COMPRESSOR

CONTENT	Unit	095	125	155	157	175	177	195	197	257	307
Type		***SANYO*** Hermetic rotary compressor									
Reference		C-6RVN93 H0R	C-6RVN103 H0S	C-9RVN273 H0M	C-9RVN273 H0K	C-9RVN273 H0M	C-9RVN273 H0K	C-9RVN273 H0M	C-9RVN273 H0K	C-9RVN273 H0K	C-9RVN393 H0U
Rated output	W	900	1000	2700	2700	2700	2700	2700	2700	2700	3900
Comp. Cooling		natural									
Power source		DC inverter									
Voltage	V	132V	124V	150V	246V	150V	246V	150V	246V	246V	282V
Refrigerant		R410A									
Oil type		DAPHNE FV68S or equivalent									
Oil volume	L	0.35	0.6	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.9
Motor type		DC Brushless motor									
Number of poles		4									
Insulation class		E									
Coil resistance T-R (*)	Ω	0.482	0.452	0.169	0.552	0.169	0.552	0.169	0.552	0.552	0.608
Coil resistance T-S (*)	Ω	0.482	0.452	0.169	0.552	0.169	0.552	0.169	0.552	0.552	0.608
Coil resistance T-S (*)	Ω	0.482	0.452	0.169	0.552	0.169	0.552	0.169	0.552	0.552	0.608
Thermistor sensor		Discharge temperature sensor									
Cranckase heater		–	–	–	–	–	–	–	–	28W 240V	28W 240V

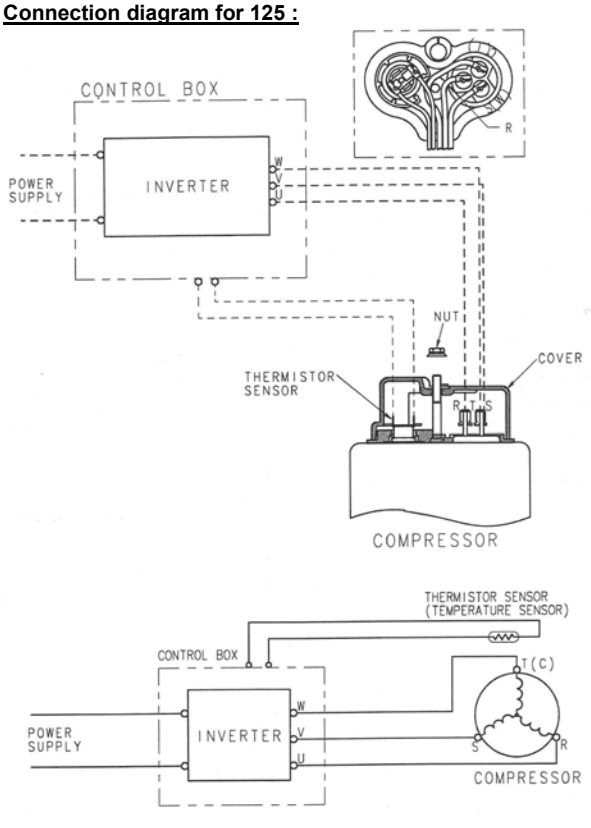
(*) at 25°C

Refrigerant charge In the heat pump	Kg	1.8	1.9	3.5	3.5	3.8	3.8	4.2	4.2	5.8	6.5

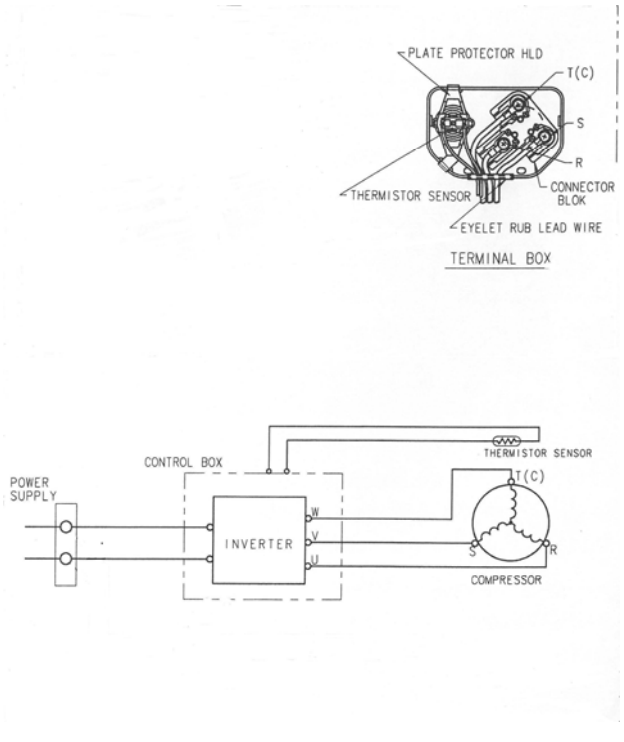
Connection diagram for 095 :



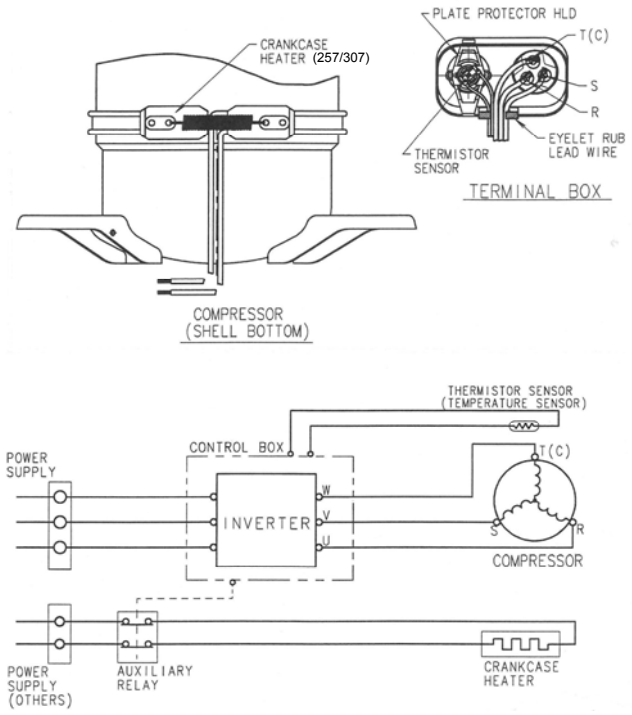
Connection diagram for 125 :



Connection diagram for 155/175/195 :



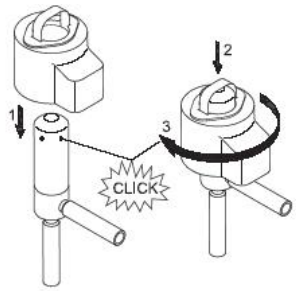
Connection diagram for 157/177/197/257/307 :

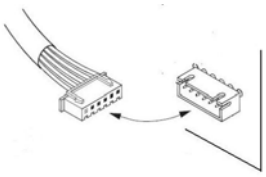


2.2.2 ELECTRONIC EXPANSION VALVE

CONTENT	UNIT	095	125	155	157	175	177	195	197	257	307
Type		SAGINOMIYA type KV Electronic Expansion Valve – bi-flow									
Reference		UKV 18D		UKV 25D							
Motor		Permanent magnet type direct operating stepper motor – 480 steps									
Coil supply	V dc	12 Vdc									
Insulation class		E									
Enclosure		IP 66									
Motor reference		UKV A053		UKV U030	UKV A053	UKV U030	UKV A053	UKV U030	UKV A053	UKV A053	

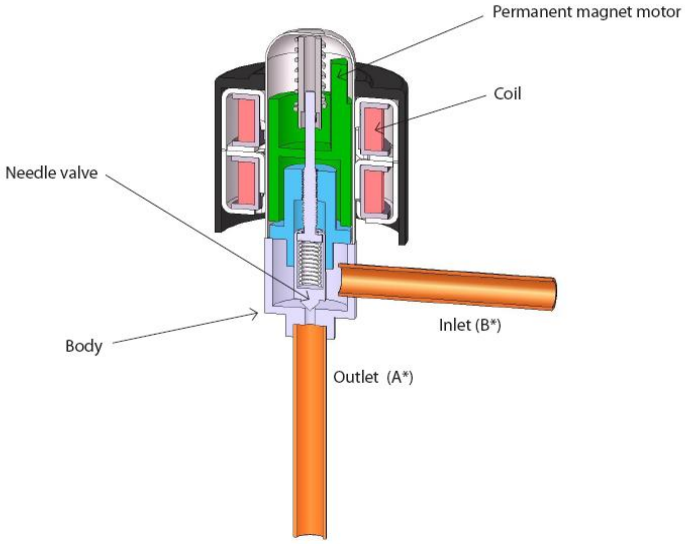
Assembling





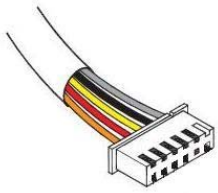
The electronic expansion valves open and close to regulate refrigerant flow by means of a screw structure which has linear motion. This occurs by the rotation of a magnet-needle valve assembly which moves when electrical signals are applied to the surrouding coil.

Within the coil structure, there are different winding configurations, and the polarities are changed by the electrical signals applied. By application of the appropriate combination of signals, in the form of pulses, the coil forces the rotor of the valve to move in a stepwise fashion. Application of multiple pulses will make the valve mechanism move through a series of steps in the direction of choice, in order for the valve to adopt the required position.



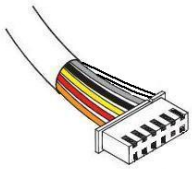
Motor checking – to be done with ohmmeter on motor disconnected

Motor UKV-A053



5 wires connection

Motor UKV-U030



6 wires connection

Between wires		Resistance
Grey (common)	Orange (A)	46 +/-3 Ω
Grey (common)	Yellow (non A)	46 +/-3 Ω
Grey (common)	Red (B)	46 +/-3 Ω
Grey (common)	Black (non B)	46 +/-3 Ω

Between wires		Resistance
Grey (common A)	Orange (A)	46 +/-3 Ω
Grey (common A)	Yellow (non A)	46 +/-3 Ω
White (common B)	Red (B)	46 +/-3 Ω
White (common B)	Black (non B)	46 +/-3 Ω

2.2.3 FOUR WAY VALVE

CONTENT	UNIT	095	125	155	157	175	177	195	197	257	307
Type		SAGINOMIYA 4 – Way valve STF									
Reference		STF-0306G		STF-0401G						STF-0712G	
Coil type		STF									
Coil supply	V ac	220 – 240V 50Hz 6W									
Insulation class		Class B									

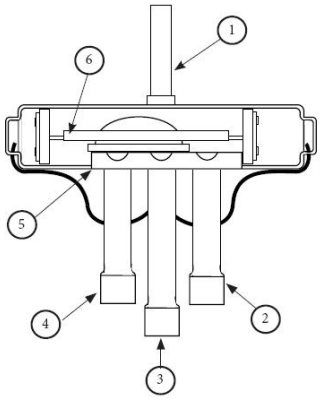
CONSTRUCTION

1. discharge connection
2. connection to evaporator/ condenser
3. suction connection
4. connection to condenser/ evaporator
5. valve body
6. slider

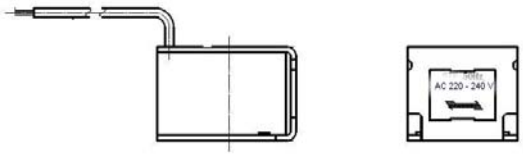
The valve is composed of three basic components:

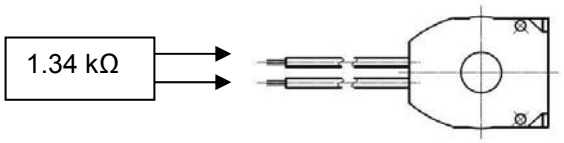
- pilot valve
- main valve body, including valve slider
- solenoid coil

The 4-way valve slider is shifted by changes in differential pressure in the valve which is actuated by the pilot solenoid valve. The valve slider is specially designed to prevent incomplete changeover and movement with minimum pressure differential.



Coil presentation:



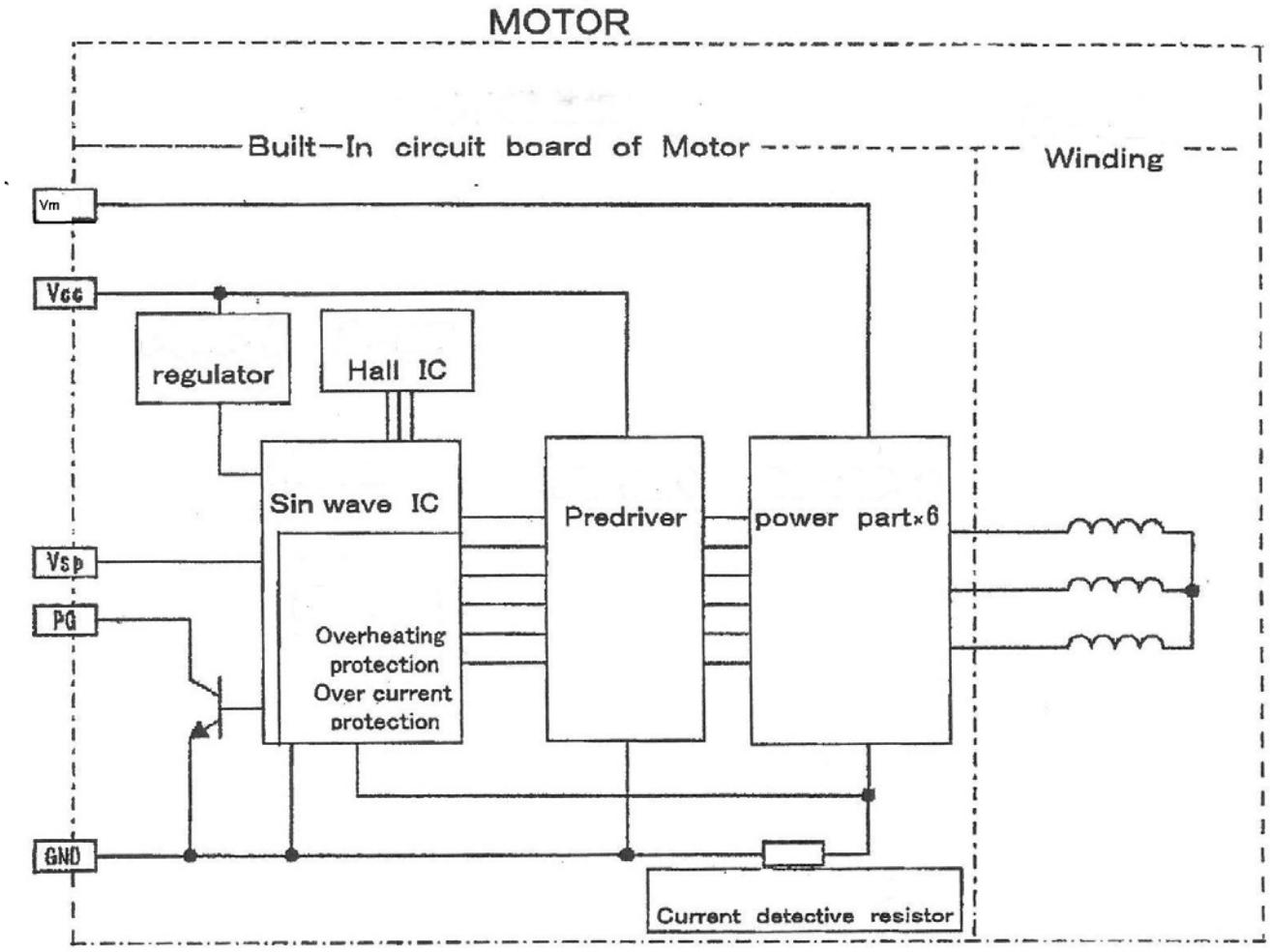


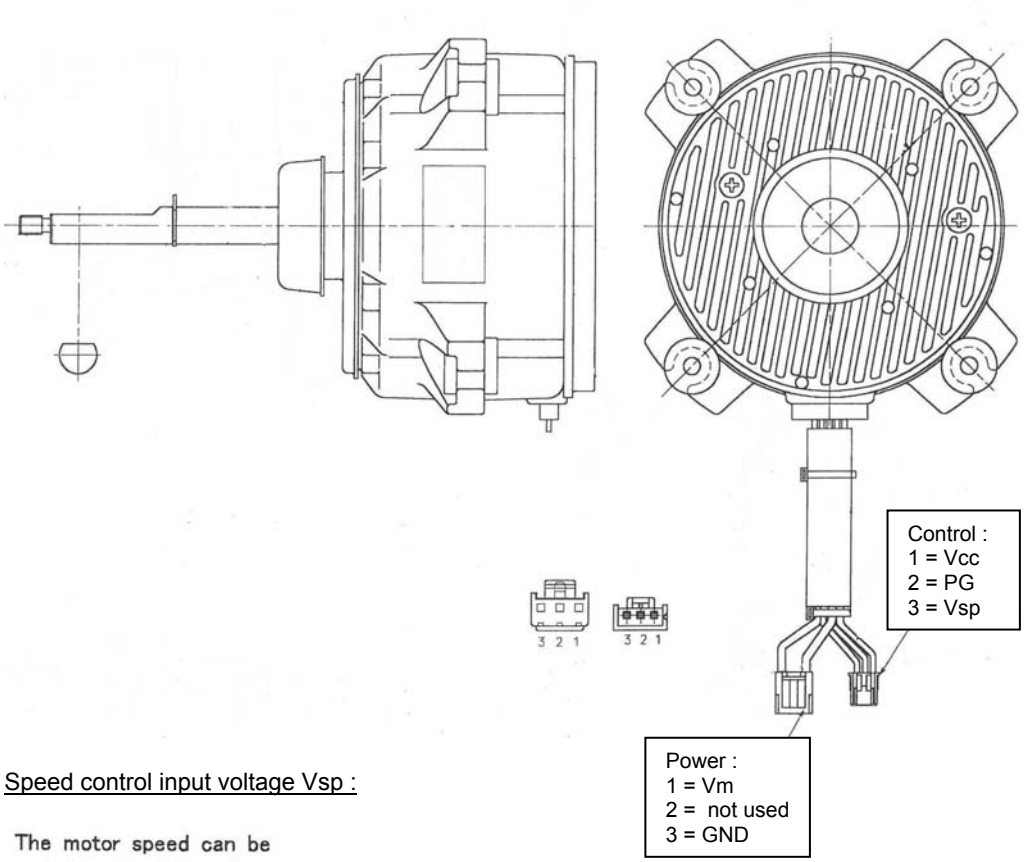
Actuated in Heating mode

2.2.4 FAN MOTOR

CONTENT	UNIT	095	125	155	157	175	177	195	197	257	307
Type		SANYO DC brushless fan motor									
Reference		SIC-71FW-D890-3		SIC-71FW-D890 - 1A (lower) / 2A (upper)						SIC-71FW-D8120-5 (lower)/ 6 (upper)	
Rated output	W	90								142	
Voltage (nominal)	V dc	**Vm** = 280 Vdc									
Current limit (nominal)	A	Im (lim) = 2.1A									
Speed (nominal)	Rpm	800								860	
Pole number		8P									
Electronic control & supply		Built in electronic driver									
Control power supply		**Vcc** = 15 Vdc									
Speed control input voltage	V dc	**Vsp** = 0 to 6.5 V dc max – see diagram									
Revolution pulse output		**PG** = 12 pulses per round – see diagram									
Motor protection		Integrated over current and over heating protection									
Elec insulation		E									

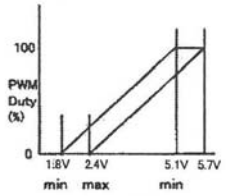
Schematic diagram:





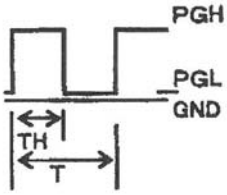
Speed control input voltage Vsp :

The motor speed can be varied by the Vsp voltage.



Revolution pulse output :

Supplied voltage: PGmax=Vcc
Supplied current: IPGmax=10mA
Output voltage: PGH=supplied voltage
Output voltage: PGL≦1.0V
TH/T=0.3 to 0.7



2.2.5 PRESSURE SENSOR

Note:
Used to measure refrigerant circuit pressure on water heat exchanger (sensor “E2P”).
The pressure signal is converted by A2 board in equivalent temperature.

2.3 – HYDRAULIC CIRCUIT – MAIN COMPONENTS DESCRIPTION

2.3.1 WATER CIRCULATING PUMP

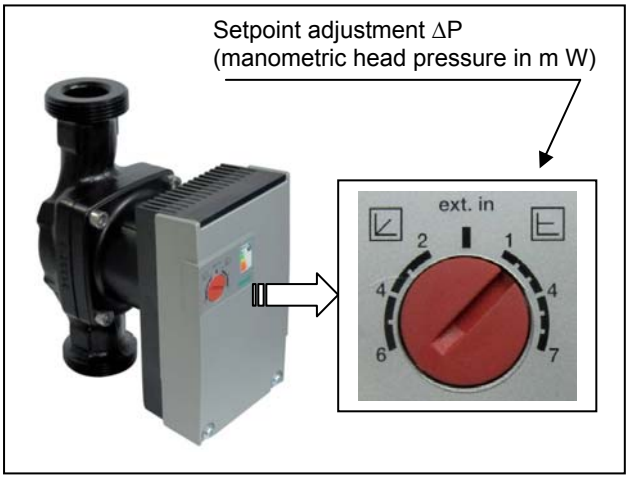
CONTENT	Unit	095	125	155	157	175	177	195	197	257	307
Type		WILO – STRATOS PARA									
Reference		25/1-7				25/1-8					25/1-12
Control		High Efficiency electronically commutated brushless motor – Control module integrated									
Power supply	Vac	230 V / 1 / 50Hz									
Protection class		IP 44									
Insulation class		H									
Protection		Full integrated motor protection									
Power consumption	W	4-38				8-140					16-310
Max head pressure (*)	m										
Max flow rate (*)											
Pipe connection		Threaded – 1''1/4 G									

(*) See curves

Flow rate adjustment:
The heat pump is fitted with an high efficiency electronically controlled water circulating pump ensuring optimum efficiency according to the different installations.
The adjustment is made using the red knob on the front panel of the circulating pump.
It is advised to perform this adjustment according to the "constant pressure control" model :

symbol 

In this mode, the circulating pump electronic control maintains the differential pressure produced by the circulating pump at a constant level equal to the setpoint pressure ΔP adusted with the red knob (see characteristic curves below)

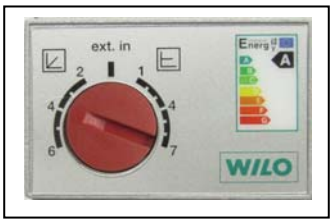


Note:

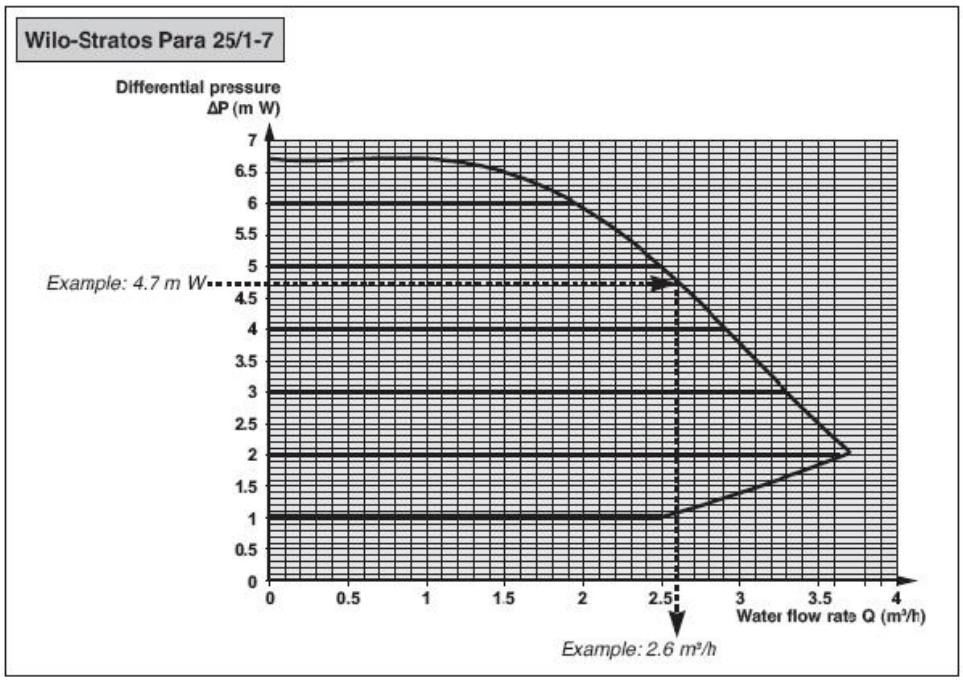
- For our applications, the adjustment according the "variable pressure control" (symbol ) is not recommended.
- Selection of the position "ext in" corresponds to an external control which is not used on the heat pump. In this condition, water pump operates at a minimum speed.

Water flow rate adjustment:

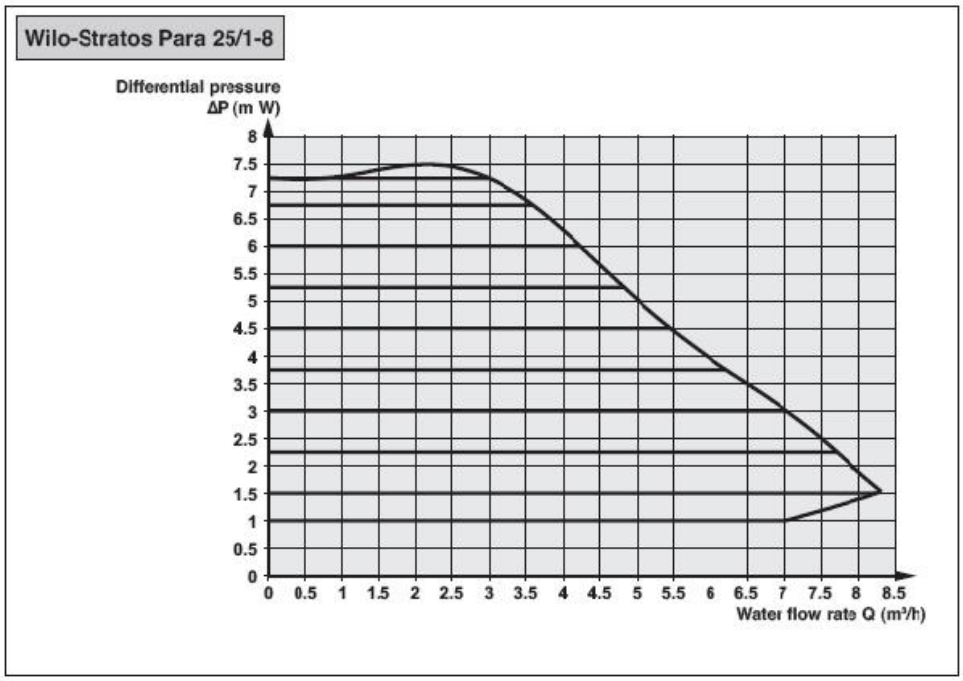
- Connect a hydraulic pressure gauge to the ¼'' SAE pressure taps at the inlet and the outlet of the circulating pump in order to measure the differential pressure.
- Adjust the red knob to the maximum pressure
- Take the differential pressure measurement ΔPm and record The corresponding flow rate value Qm on the envelope curve of the circulating pump



Units :
095
125
155
157

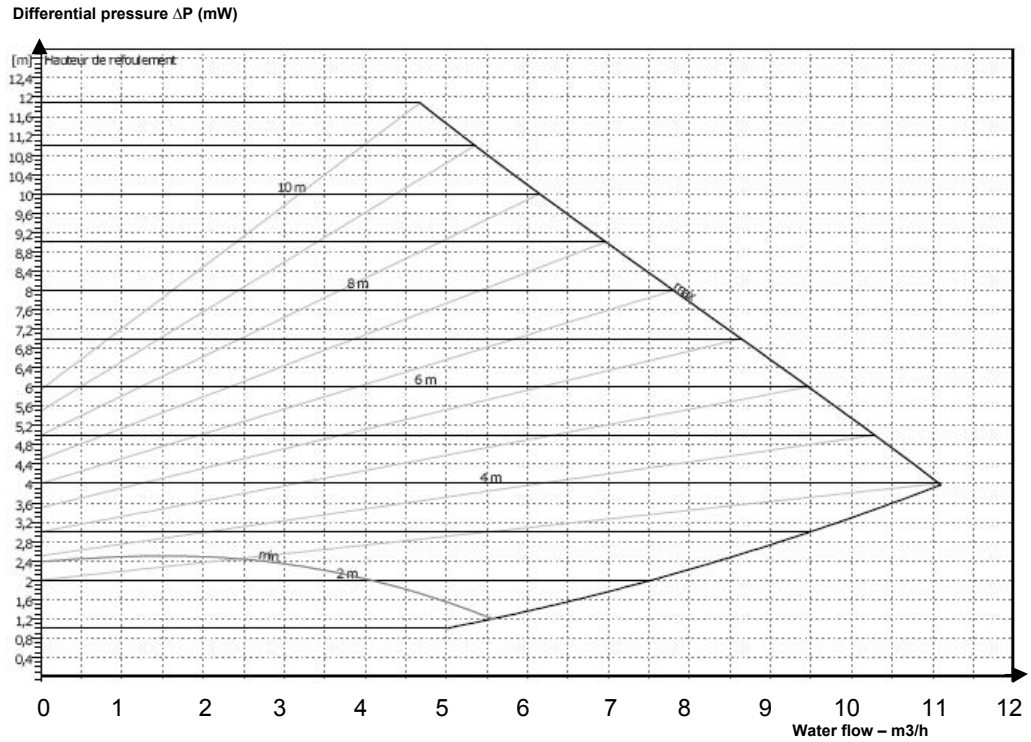


Units :
175
177
195
197
257



Unit :
307

Wilo-Stratos Para 25/1-12

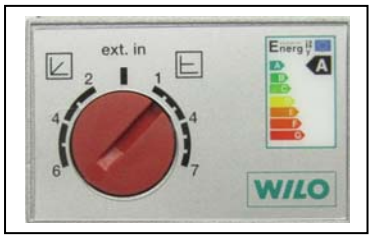


- Then adjust the red knob to the value ΔP for the requested water flow rate Q as per the following formula:

  $\Delta P = (Q / Qm)^2 \times \Delta Pm$

For example:
With unit type 155 – fitted with Stratos Para 25/1-7, the requested water flow Q is 1.75 m3/h (see tables below).
For an adjustment in the maximum position (7 m w),if the measured water pressure is ΔPm = 4.7 m, according circulating pump curve, it relates to a flow rate of Qm = 2.3 m3/h.
Then, for a requested water flow of 1.75 m3/h, the adjustment will be :

$\Delta P = (1.75 / 2.3)^2 \times 4.7 =$ ***2.1m w***



Requested water flow (nominal): in m3/h

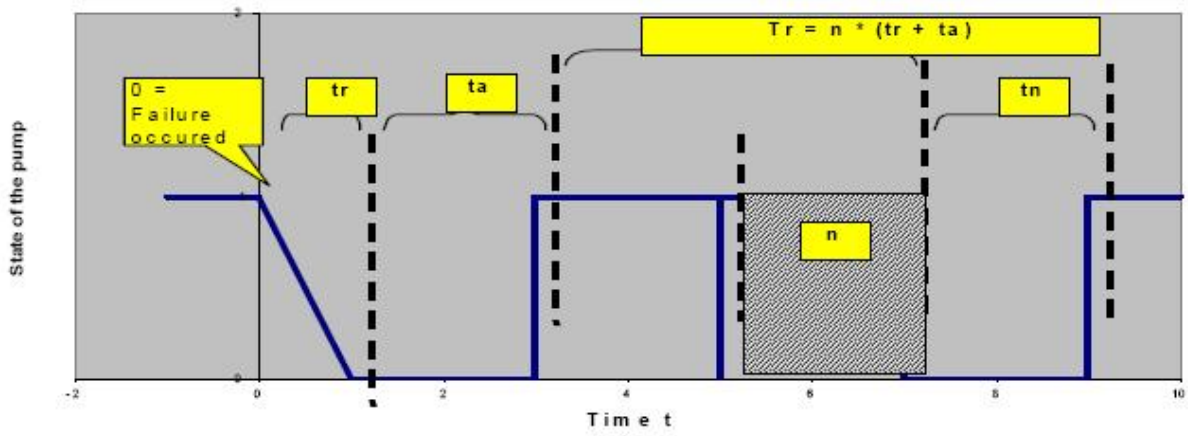
CONTENT	095	125	155	157	175	177	195	197	257	307

Pump reference	25/1-7			25/1-8			25/1-12
Water temp. 35°C	0.92	1.40	1.84	2.32	2.60	3.50	4.09
Water temp. 45°C	0.80	1.36	1.75	2.23	2.55	3.30	3.91
Water temp. 55°C	0.65	0.82	1.03	1.30	1.32	2.05	2.46

Failure matrix:

Failure	Reaction time, tr	Delay, ta	Allowed number of failures, n	Auto-reset			Comment
line undervoltage	≤20ms	≤20ms	unlimited	yes			Off: 165V AC / On: 195V AC
line overvoltage	≤20ms	≤20ms	unlimited	yes			Off: 265V AC / On: 245V AC
blocked pump	≤10s	30s	5	no			
lost of sync	£10s	5s	25	no			
overload motor	60s	30s	5	no			
short circuit	< 6µs	30s	5	no			I = 3 A DC
contact failure, winding failure	<10s	30s	5	no			
Dry running	<60s	30s	5	no			
overtemp. modul	<1s	30s	5	no			
Cable break on extern 0-10V	<1s	<1s	unlimited	no			Pump runs at minimum speed

Definition of the reaction time



Reaction time (tr) - time until failure is detected

Delay (ta) - time until pump restarts

Auto reset - yes-> number of allowed errors has no limit ->
-> software restarts pump after delay

no -> number if allowed erros is limited ->
-> interruption of mains is necessary to restart pump

Allowed failures - In case of limited allowed failures error counter will be reset, if no failure occurs within 2 minutes (tn).
Otherwise after the maximum allowed errors is reached, the mains has to be interrupted to restart the pump.

Failure handling:

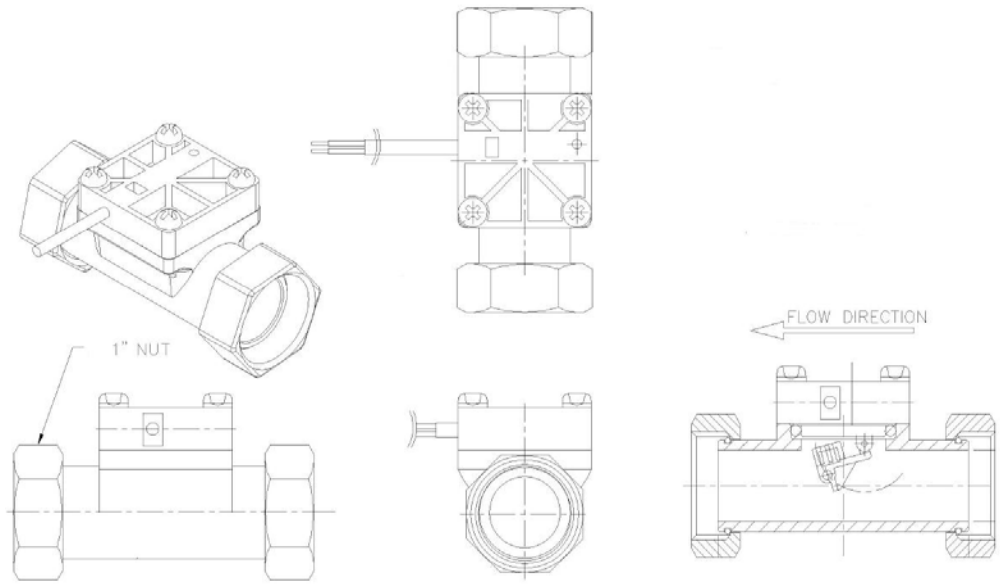
Failure	Handling	Description
Dry-Run	Motor restarts after delay. After 5 unsuccessful starts, motor will be switched off permanently	After a certain time limit under dry-run condition the motor will be switched off. After a delay of 30s it restarts. If no dry-run occurs within the next 2 minutes the internal failure counter will be reset. Otherwise the motor will be switched off permanently after 5 unsuccessful starts. This state can only be reset by turning mains supply off for longer than 30 seconds.
Overload	Motor restarts after delay. After 5 unsuccessful starts, motor will be switched off permanently	**If power consumption of motor exceeds the limit for longer than 60 seconds, failure „overload" will be set. Motor is stopped then and will be started again after a delay of 30 seconds.** If no overload occurs within the next 2 minutes the internal failure counter will be reset. Otherwise the motor will be switched off permanently after 5 unsuccessful starts. This state can only be reset by turning mains supply of for longer than 30 seconds.
Mains over-/under voltage	Turn off motor, restart motor	In case of mains under-/over-voltage the motor is switched off. It restarts automatically when mains voltage is within valid limits.
Blocked motor	Motor restarts after delay. After 5 unsuccessful starts, motor will be switched off permanently	If motor is blocked a maximum of three restarts at intervals of 15 seconds will be done. If the motor is still blocked the motor will be switched off permanently. This state can only be reset by turning mains supply off for longer than 30 seconds. The de-blocking routine is done with every start.
Short circuit	Motor restarts after delay. After 5 unsuccessful starts, motor will be switched off permanently	After a short circuit event the motor will be switched off. After a delay of 30s it restarts. The motor will be switched off permanently after 5 short circuit events. This state can only be reset by turning mains supply of for longer than 30 seconds.
Loss of contact	Motor restarts after delay. After 5 unsuccessful starts, motor will be switched off permanently	After a loss of contact between motor and module the motor will be switched off. After a delay of 30s it restarts. The motor will be switched off permanently after 5 events. This state can only be reset by turning mains supply of for longer than 30 seconds.
Loss of synchronism	Motor restarts after delay. After 25(!) unsuccessful starts, motor will be switched off permanently	After a loss of synchronism the motor will be switched off. After a delay of 5 seconds it restarts. The motor will be switched off permanently after 25(!) events. This state can only be reset by turning mains supply of for longer than 30 seconds.

2.3.2 WATER FLOW SWITCH

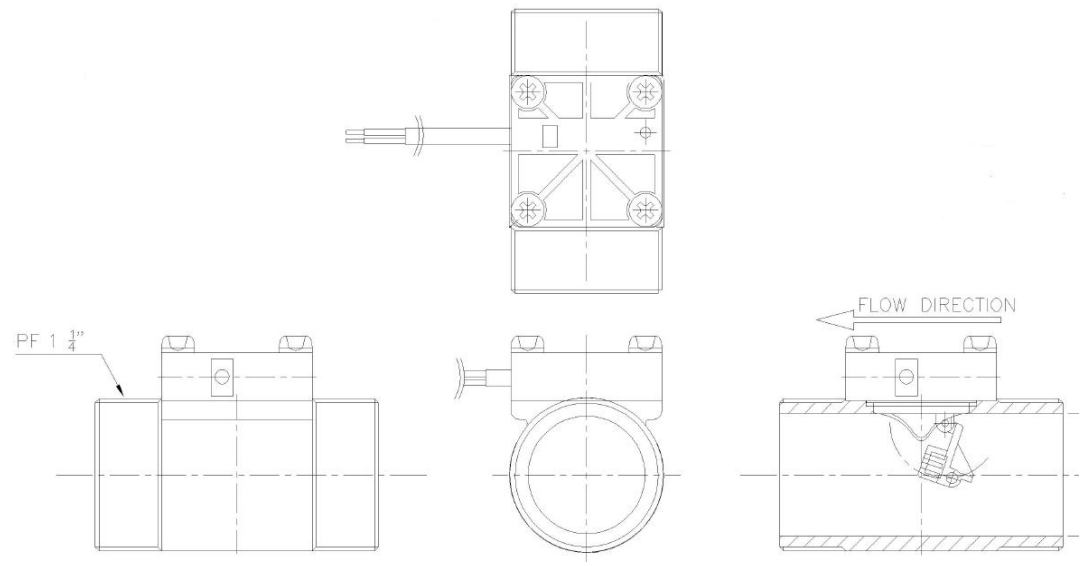
Factory mounted:

CONTENT	Unit	095	125	155	157	175	177	195	197	257	307
Type		IMIT / ALCO – AFS									
Reference		AFS 72		AFS 72						AFS 81	
Setting – ON point	l/mn	9		9						30	
Setting – OFF point	l/mn	7		7						27	
Body		Plastic – Nylon 66 GF30%								Brass	
Pipe connection		1'' G nut								PF 1''1/4 G	
Contact rating		250Vac – 0.2A max.									
Protection		IP 56									

AFS 72 – 9l/mn



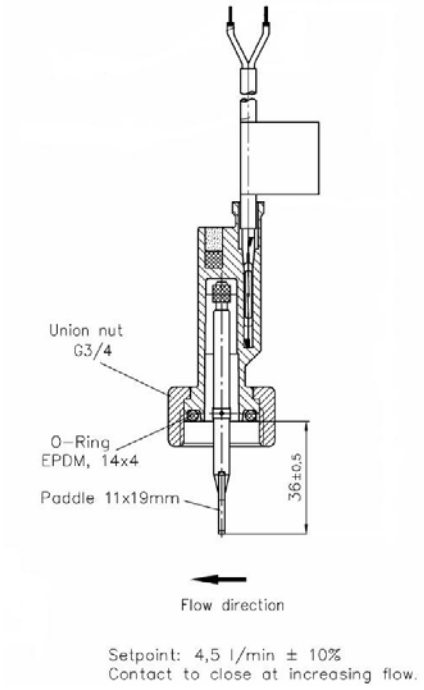
AFS 81 – 30l/mn



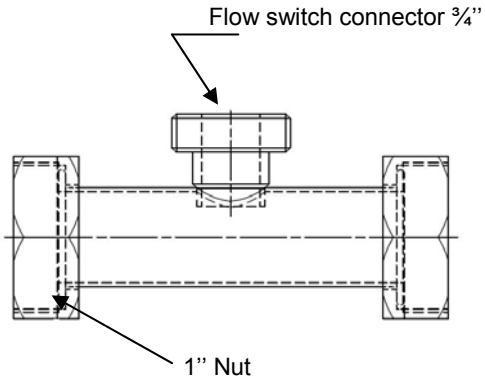
After sales kit 9901280 for models 095 & 125:

CONTENT	Unit	095	125
Type		**SIKA** / VKX	
Reference		VKX 20M	
Setting – ON point	l/mn	4.5	
Setting – OFF point	l/mn	4	
Body		PPO Noryl GFN3	
Connection		¾"G	
Pipe connection			
Contact rating		230Vac - 26 VA max.	
Protection		IP 65	

Flow switch SIKA VKX 4.5 l/mn

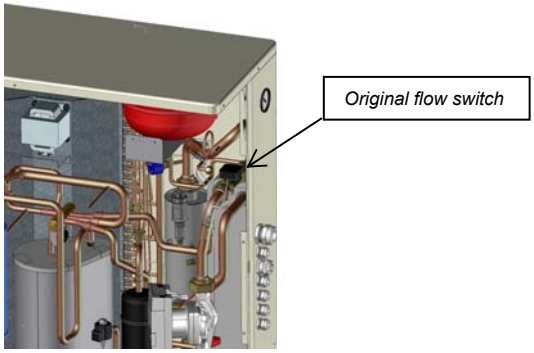


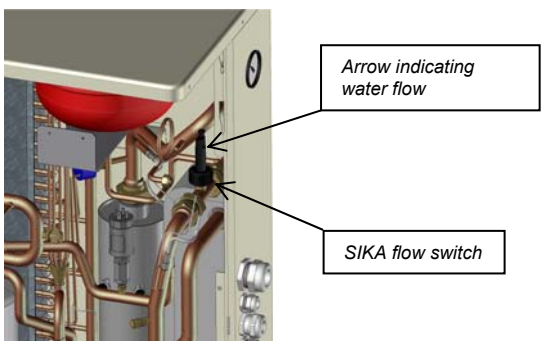
Pipe connection



Installation of the kit on heat pumps 095 and 125:

- Remove the original water flow switch (9 l/mn IMIT model).
- Put in place the new water flow switch (4,5 l/mn SIKA model).
  - Respect the water direction (see the arrow on the top of the flow switch).
  - Use the two supplied gaskets.
- Connect the two wires on the terminals 24 and 25 of the terminal block XA in the electrical box.



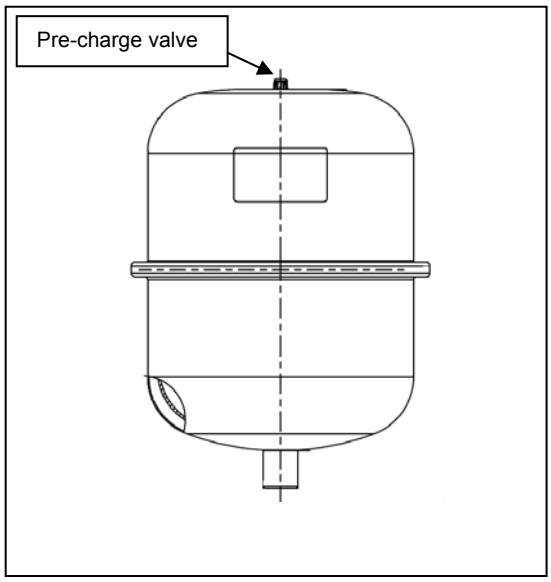


2.3.3 PRESSURIZED EXPANSION VESSEL

CONTENT	Unit	095	125	155	157	175	177	195	197	257	307
Volume	L	4		6						8	
Max. operating pressure (water)	Bar	5		4						4	
Pre-charge pressure (air)	Bar	0.5		0.75						0.75	

Maintenance:

- Before maintenance or control, make sure that:
  -the system is off, cooled and not pressurized,
  -power supply is off,
  -vessel is empty.
- Every 6 months, expansion vessel is verified by checking pre-charge pressure.
- Expansion vessel must be changed by a new one in case of excessive deterioration and, anyway, at the latest 5 years later from the installation date.



2.3.4 SAFETY RELIEF VALVE

Setting: 3 Bar

Maintenance:

- **Checking:**

Every year, safety valve must be checked by turning the red knob, so that the medium is discharged, thus cleaning the seal seat.

- **Leaks:**

If the valve leaks, with the medium flowing out constantly or dripping, it should be checked by a qualified technician and replaced if necessary.

PART 3 – ELECTRIC

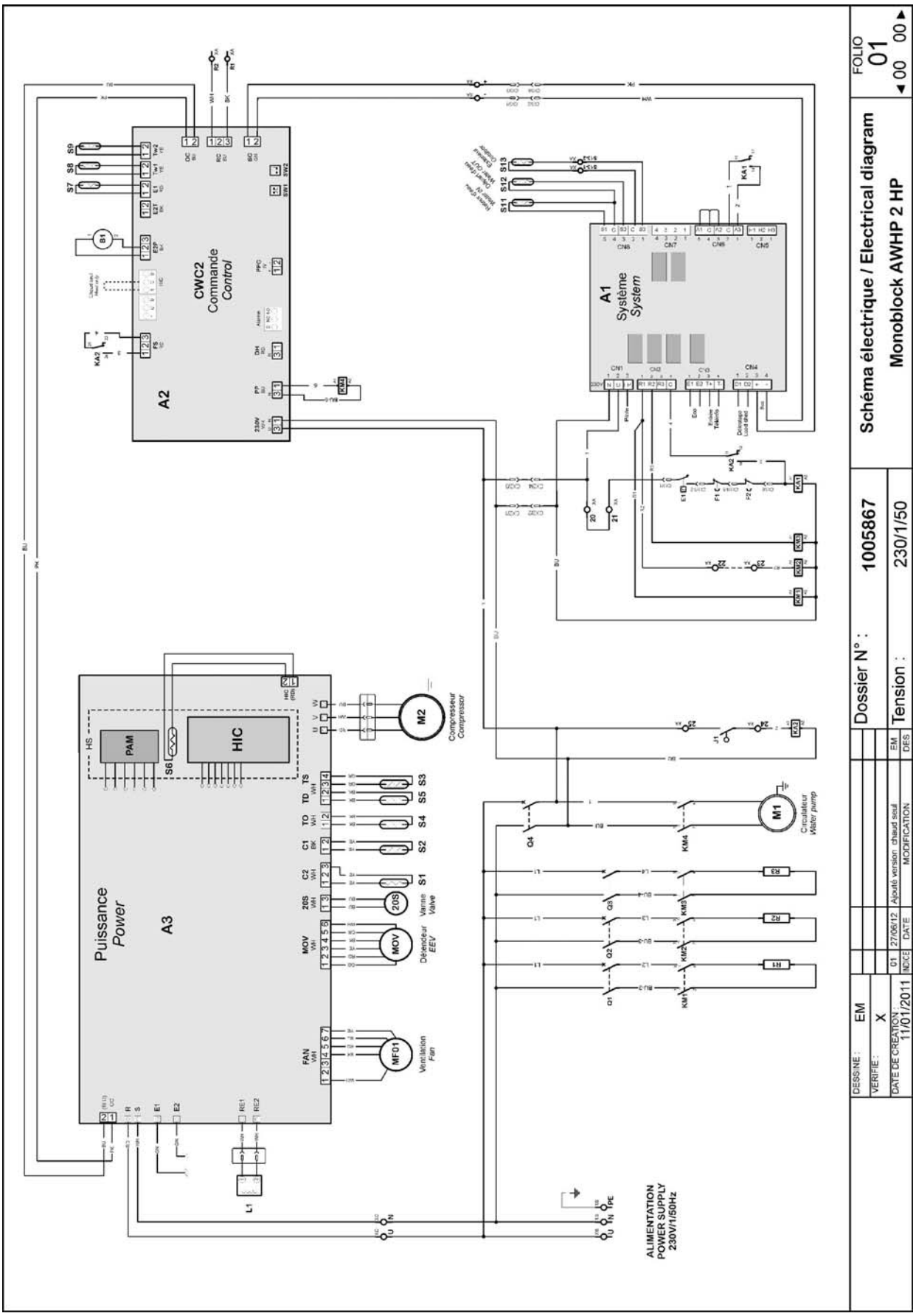
3.1 Electrical diagrams

3.2 Main components description

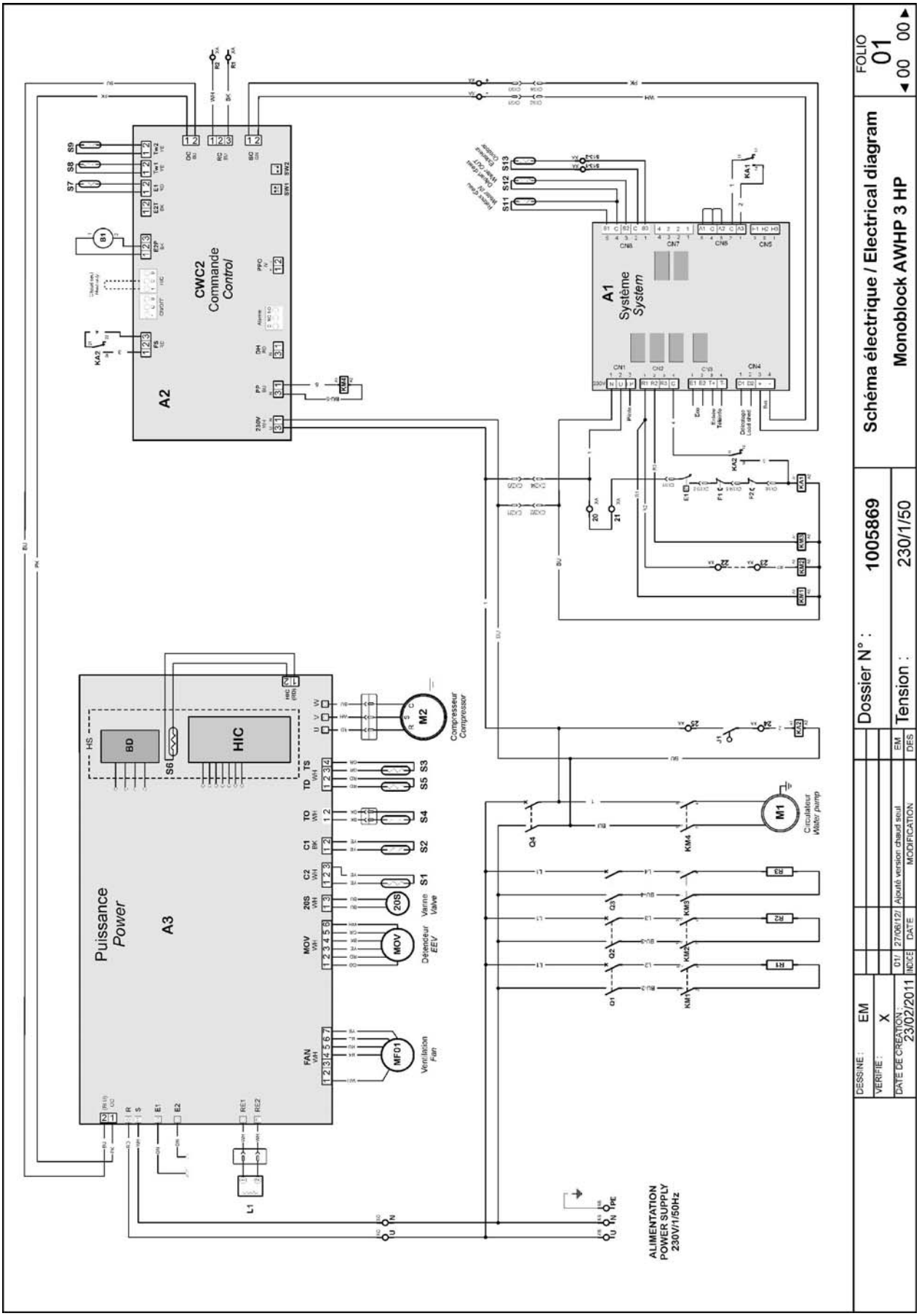
- 3.2.1 Control synoptic – heat pump with electrical support heater
- 3.2.2 Control synoptic – heat pump in boiler back up
- 3.2.3 System control board - A1
- 3.2.4 Communication & control board CWC2 – A2
- 3.2.5 Refrigerant circuit power board for units 095 / 125 – A3
- 3.2.6 Refrigerant circuit power boards for units 155 / 175 / 195 – A3 + HIC
- 3.2.7 Refrigerant circuit power boards for units 157 / 177 / 197 – A3 + HIC
- 3.2.8 Refrigerant circuit power boards for units 257 / 307 – A3 + HIC + A4
- 3.2.9 Electric support heater

3.1 – ELECTRICAL DIAGRAMS

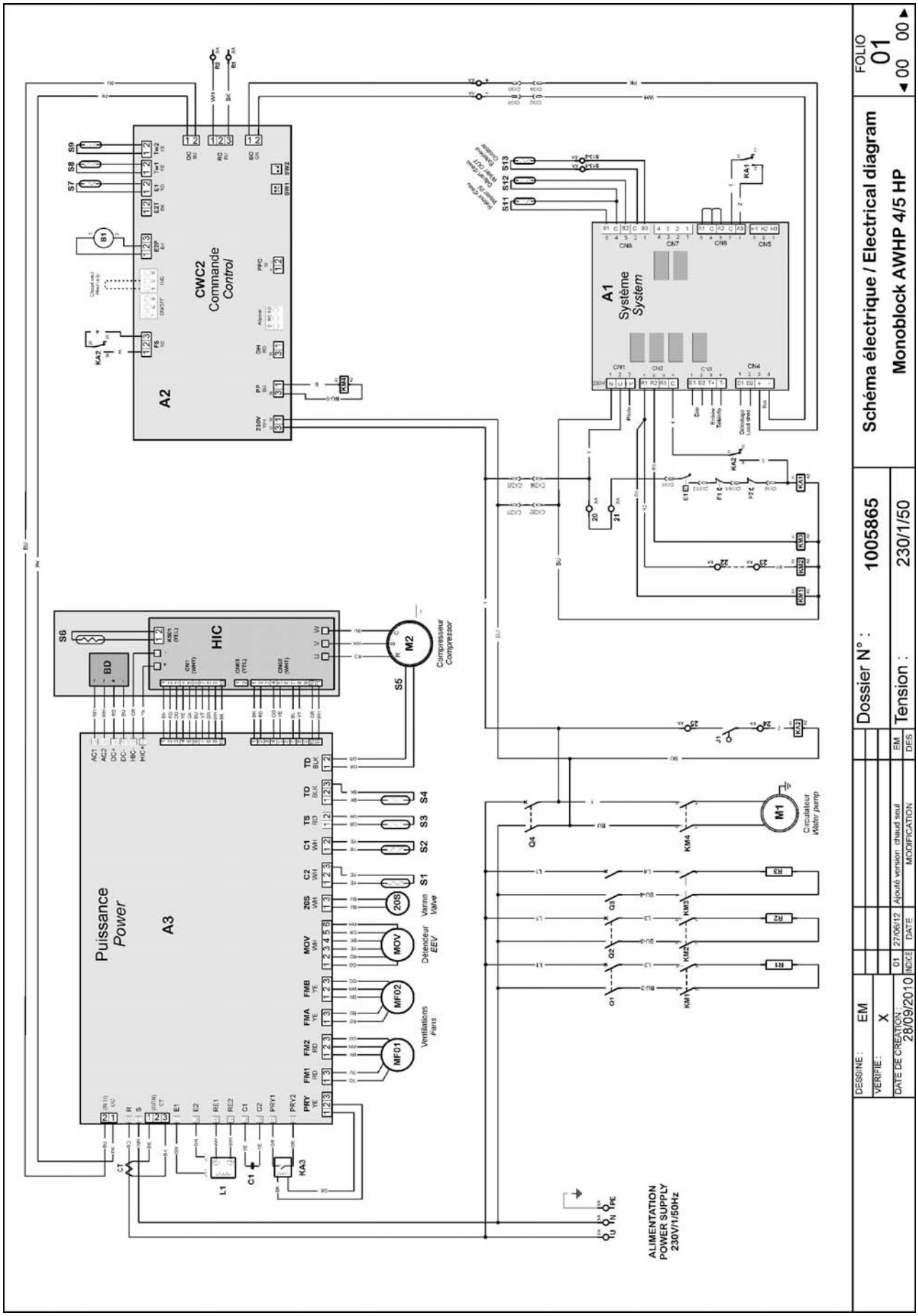
3.1.1 MODEL 095 (2 HP) – 230V Single phase



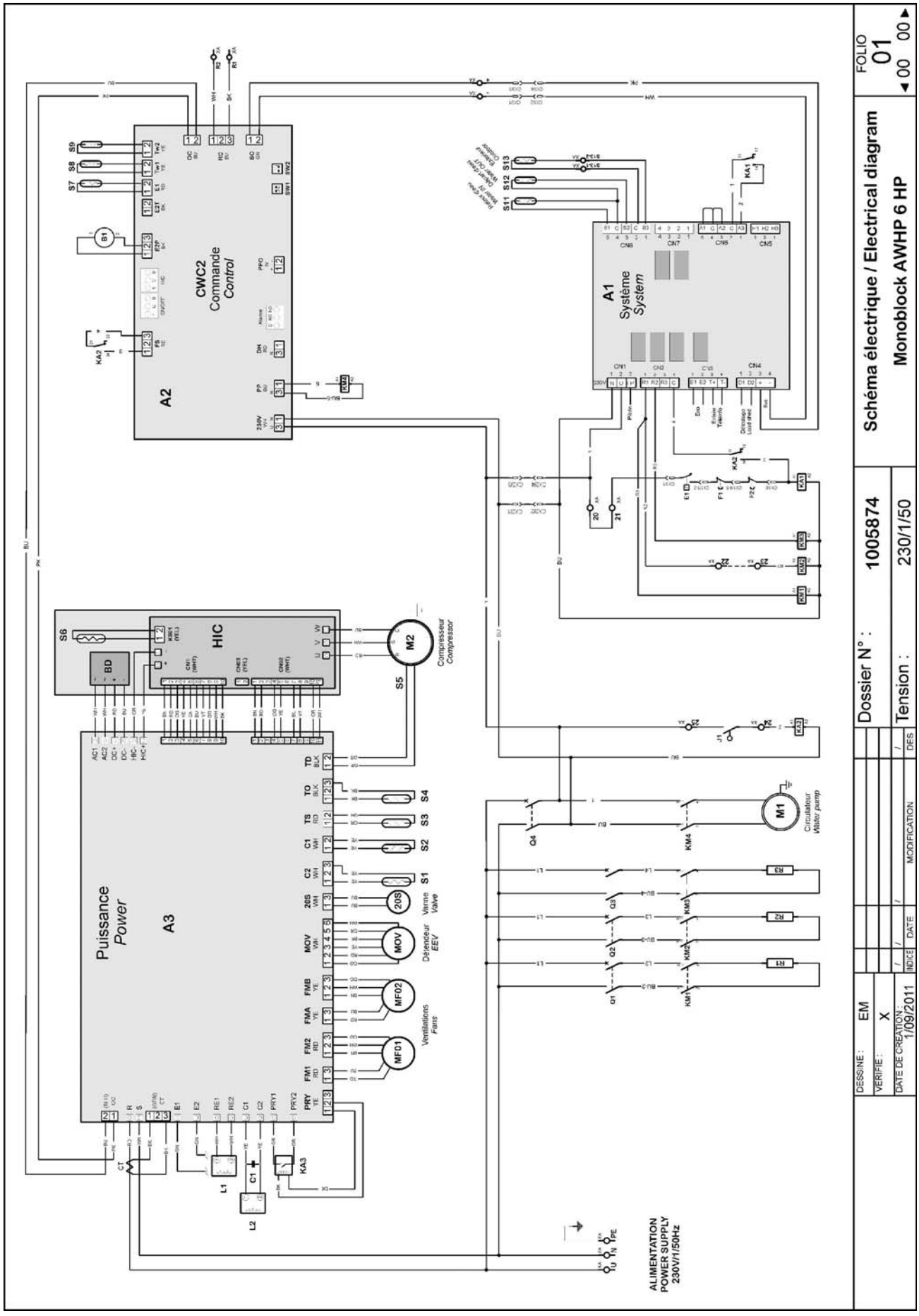
3.1.2 MODEL 125 (3 HP) – 230V Single phase



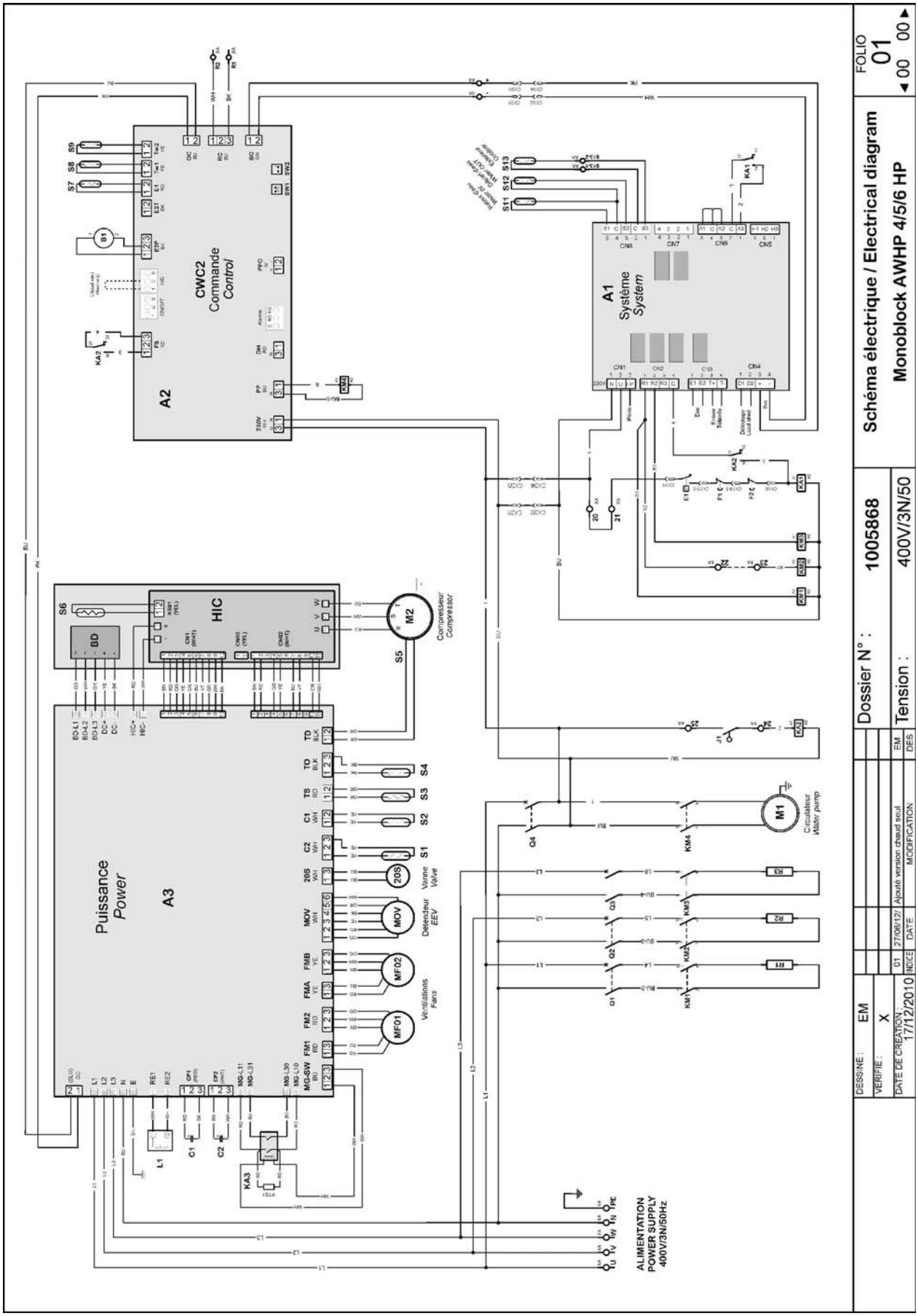
3.1.3 MODELS 155/175 (4/5 HP) – 230V Single phase



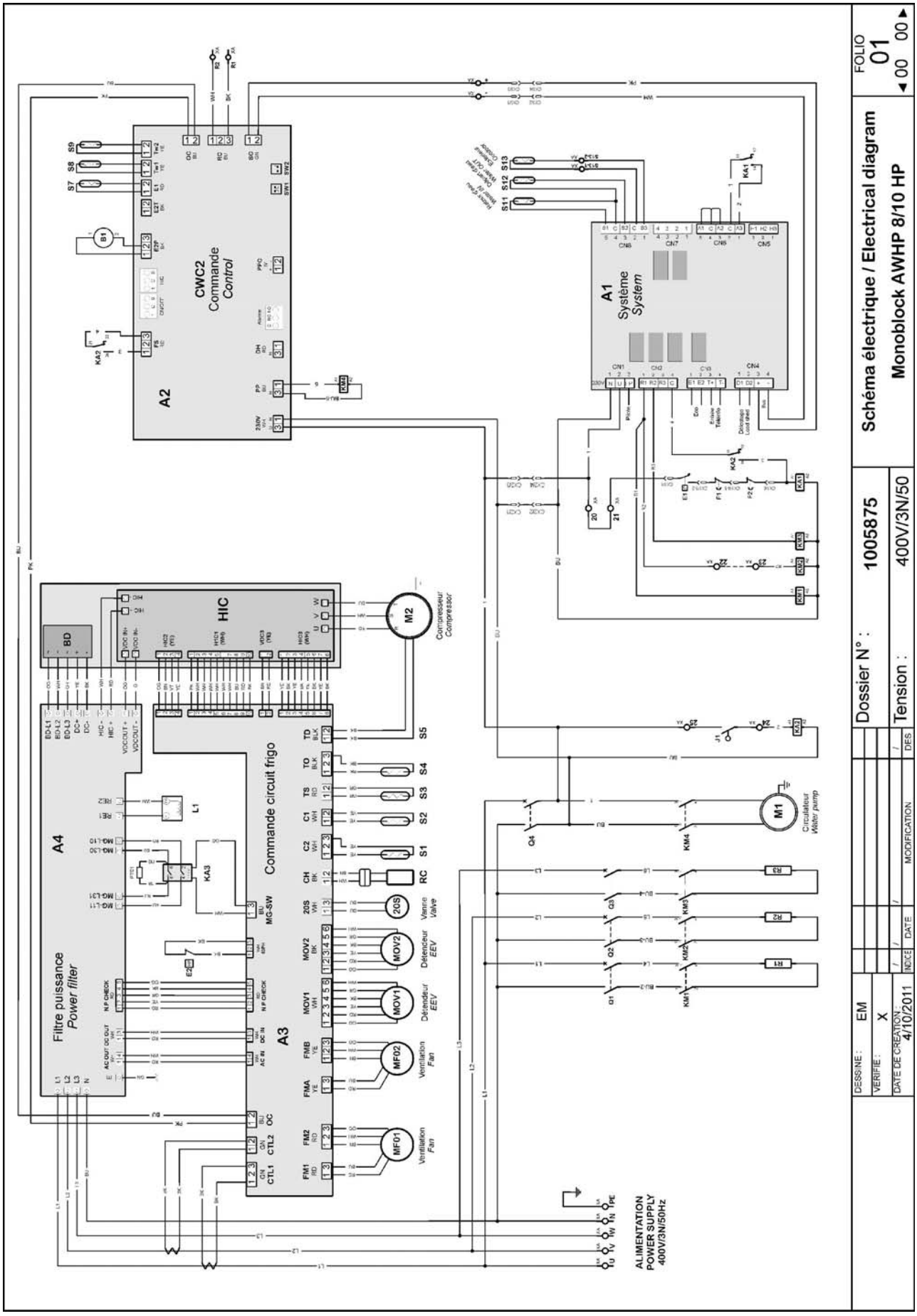
3.1.3 MODEL 195 (6 HP) – 230V Single phase



3.1.3 MODELS 157/177/197 (4/5/6 HP) – 400V Three phases



3.1.3 MODELS 257/307 (8/10 HP) – 400V Three phases



3.1.4 SYMBOLS

Symbols of the components

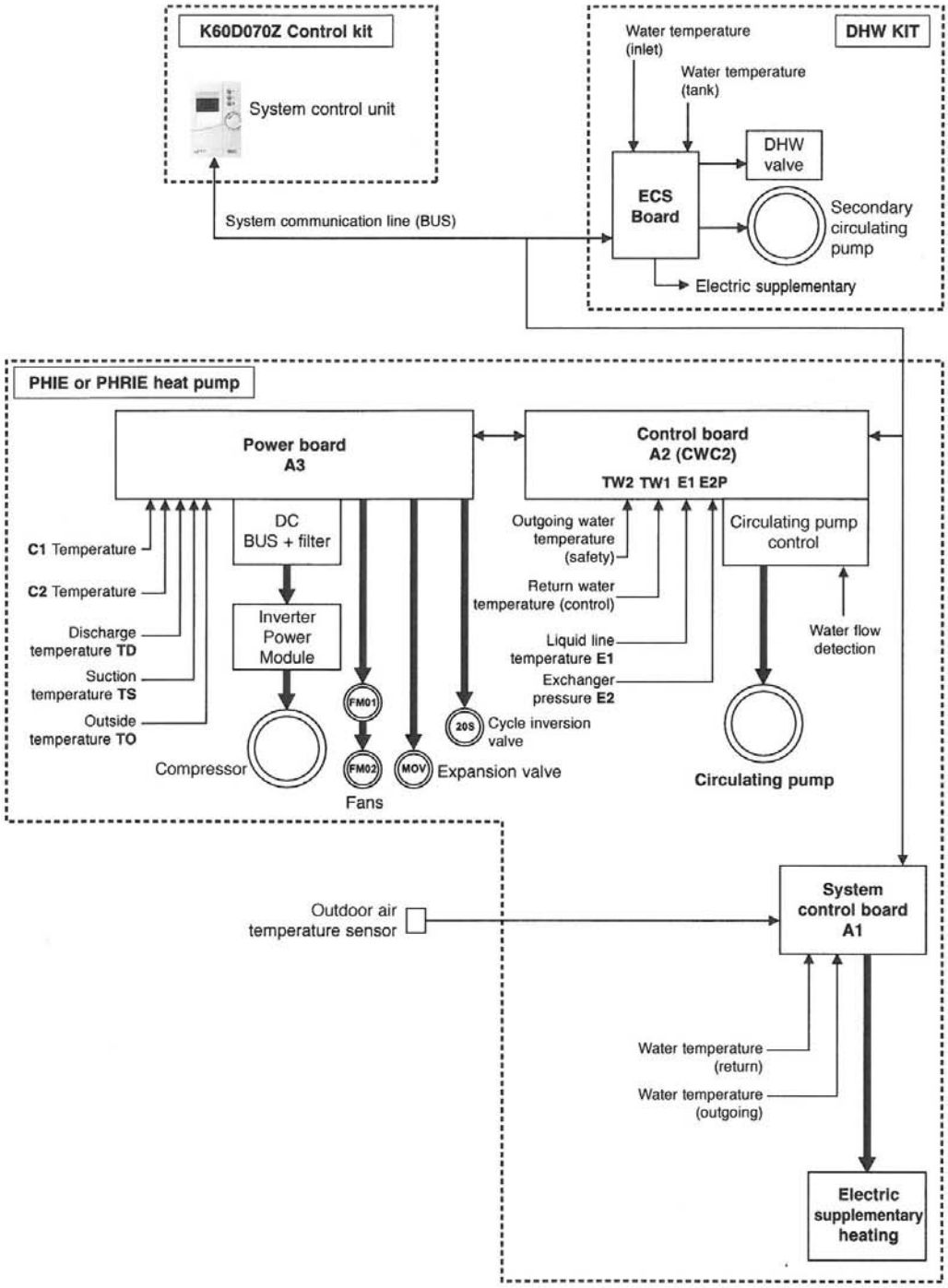
A1	System control board	**MOV**	Electronic regulator
A2	Control board	**MOV1**	Electronic regulator
A3	Refrigerating circuit control board	**MOV2**	Electronic regulator
A4	Power filter board	**Q1**	R1 circuit breaker
B1	Pressure sensor	**Q2**	R2 circuit breaker
BD	Diode bridge	**Q3**	R3 circuit breaker
C1	Capacitor	**Q4**	Control circuit breaker
C2	Capacitor	**RC**	Compressor housing heating element
CT	Current transformer	**R1**	Support heating element
E1	Water pressure switch	**R2**	Support heating element
F1	Automatic - Heater safety thermostat	**R3**	Support heating element
F2	Manual - Heater safety thermostat	**S1**	High battery temperature sensor (C2)
HIC	Hybrid integrated circuit	**S2**	Low battery temperature sensor (C1)
J1	Water flow switch	**S3**	Suction temperature sensor (TS)
KA1	Fault relay	**S4**	Outdoor air temperature sensor (TO)
KA2	Water flow relay	**S5**	Discharge temperature sensor (TD)
KA3	Power relay	**S6**	Radiator temperature sensor HIC board
KM1	R1 contactor	**S7**	Liquid line temperature sensor
KM2	R2 contactor	**S8**	Water temperature sensor (blue identifying mark)
KM3	R3 contactor	**S9**	Water temperature sensor (red identifying mark)
KM4	M1 contactor	**S11**	Water return temperature sensor (System)
L1	Inductance	**S12**	Water outlet temperature sensor (System)
L2	Inductance	**S13**	Outdoor air temperature sensor (System)
M1	Circulating pump	**XA**	Terminal block
M2	Compressor	**XB**	Terminal block
MF01	Fan motor	**XC**	Terminal block
MF02	Fan motor	**20S**	Cycle inversion valve

Colours of the wires

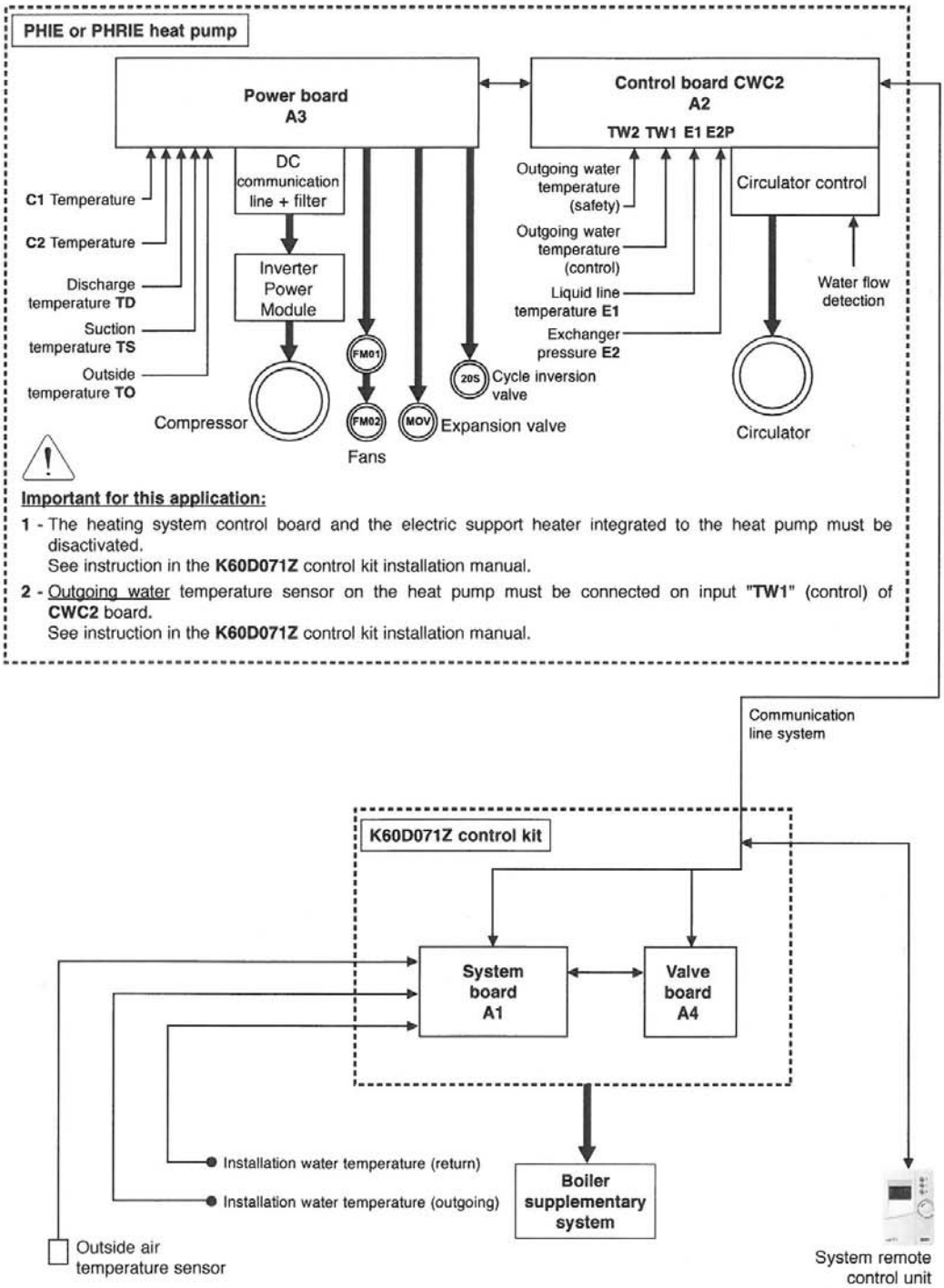
BK	Black	**PK**	Pink
BN	Brown	**RD**	Red
BU	Blue	**VT**	Violet
GN	Green	**WH**	White
GR	Grey	**YE**	Yellow
OG	Orange		

3.2 – MAIN COMPONENTS DESCRIPTION

3.2.1 CONTROL SYNOPTIC FOR HEAT PUMP + ELECTRICAL SUPPORT HEATER APPLICATIONS



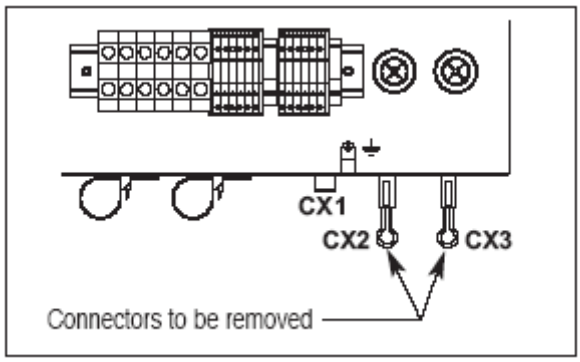
3.2.2 CONTROL SYNOPTIC FOR HEAT PUMP IN BOILER BACK UP APPLICATIONS



Important:

For "Boiler back up" applications, 2 modifications have to be performed on the heat pump:

1) The system control board A1 (and the electric support heater) included in the heat pump must be de-activated. To do this (with power supply switched off), remove the connectors CX2 and CX3 at the bottom of the electrical plate.

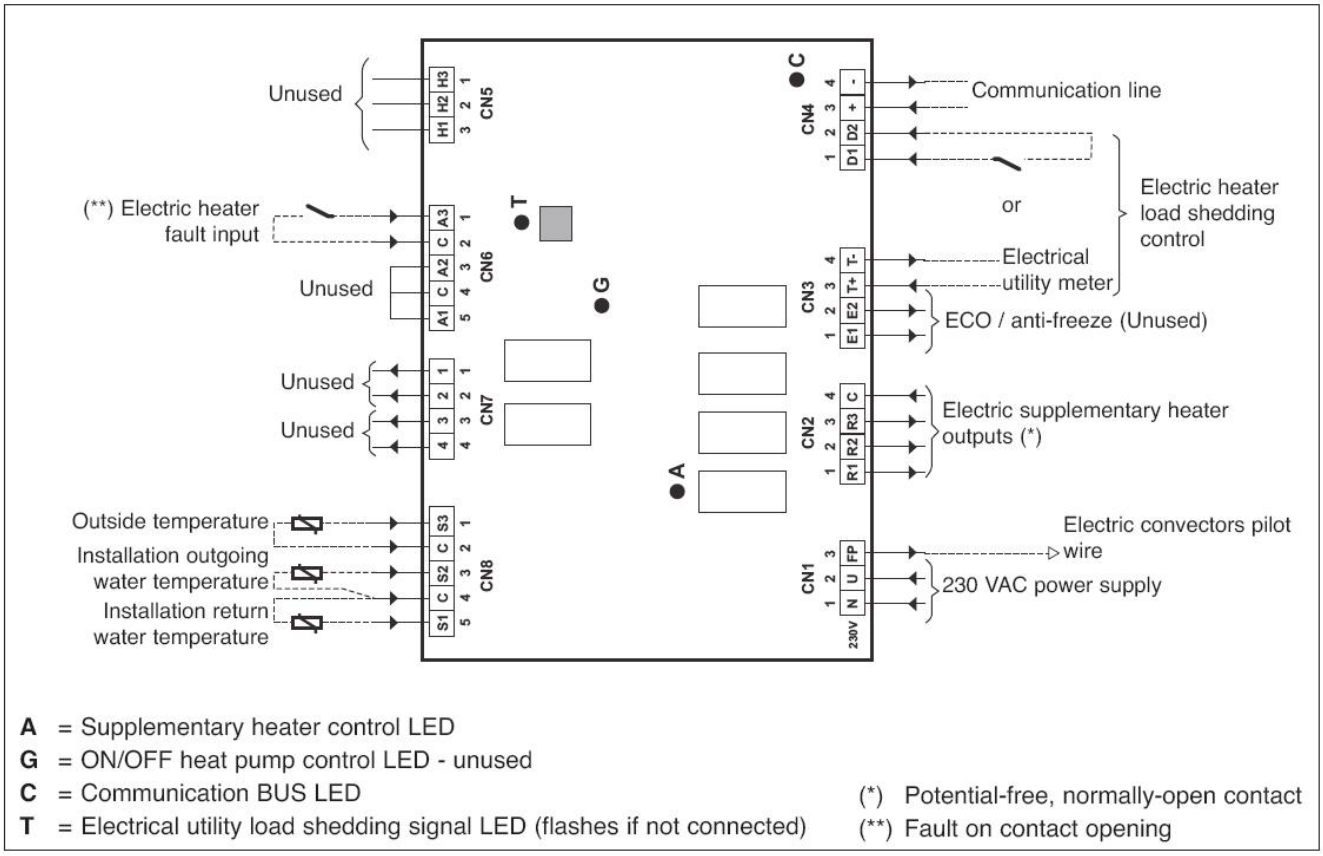


2) The heat pump water temperature control sensor is connected to the input "TW1"of A2 (CCWC2) control board. Considering that water temperature of the system is controlled according outgoing water temperature, this sensor connected to "TW1" must be placed on the heat pump water outlet.
To do this, remove this sensor from its housing on the heat pump water inlet (factory mounted) and put it into the housing provided for this purpose on the water outlet pipe of the heat pump.
Use thermal paste and place correctly the insulating material in order to have a good thermal contact between the sensor and the pipe.

3.2.3 SYSTEM CONTROL BOARD A1

- Mounted in the heat pump, it controls the heat pump and its electric heater.
- It is connected to the system remote control by the communication line (BUS).

Note: please refer to specific system control service manual for system operation details.



Software versions for units in “FA” version:

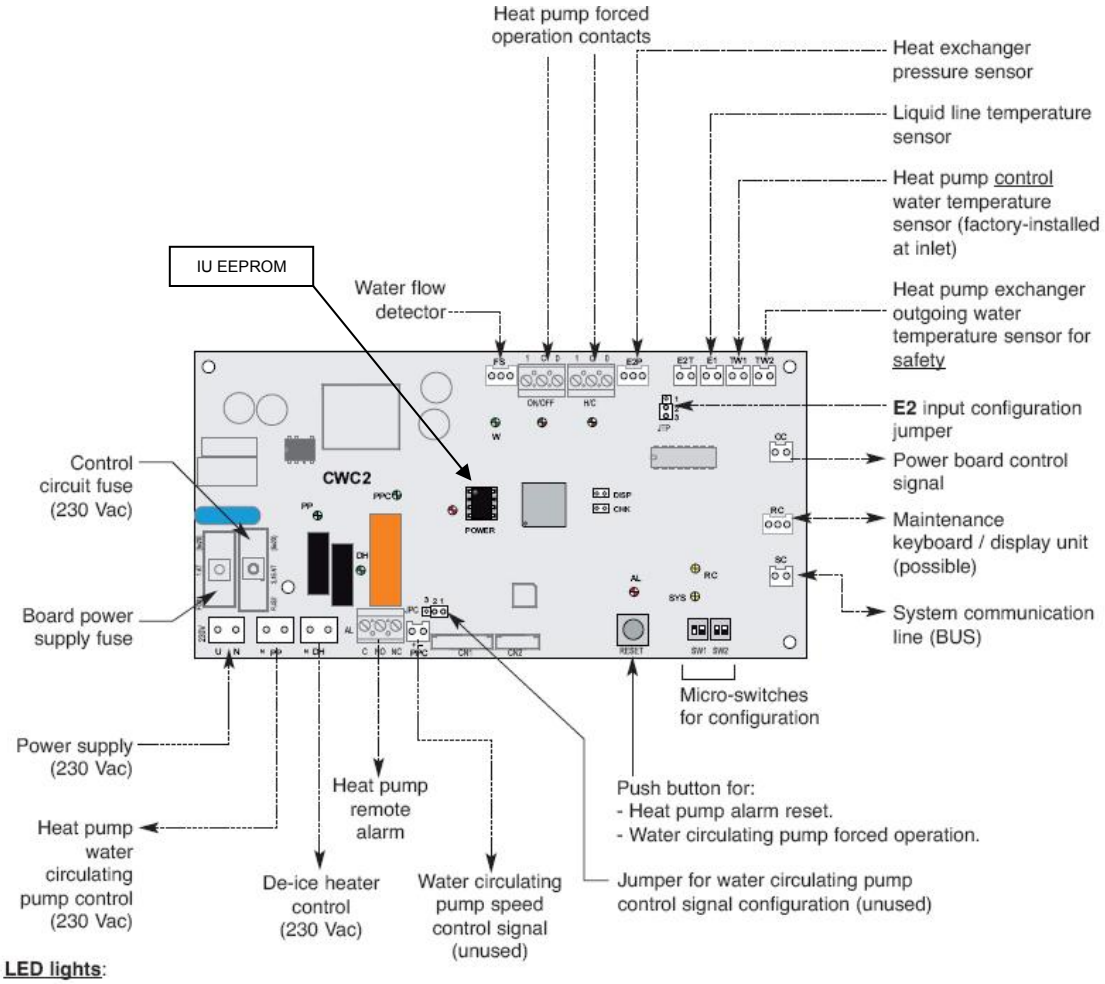
Version	A1 Board code	Date	Modification	*System remote control box – Elec support heater solution*		
				Version	***Code***	***Date***
V3.01	2220126	Dec. 2010		*V3.01*	*2220125*	*Dec. 2010*
				V3.02	*2220125-02*	*Mar. 2013*

Software versions for units in “FB” version:

Version	A1 Board code	Date	Modification	*System remote control box – Elec support heater solution*		
				Version	***Code***	***Date***
V4.01	2220171	Jul. 2012	First issue	*V4.01*	*2220170*	*Jul. 2012*
				V4.02	*2220170*	*Nov.2012*
				V4.03	*2220170-02*	*Mar.2013*

3.2.4 COMMUNICATION & CONTROL BOARD FOR HEAT PUMP A2 (CWC2)

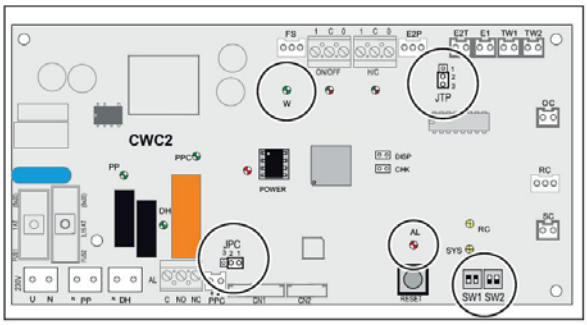
• It ensures 3 functions:
- Communication interface between system control and heat pump control.
- Management of the heat pump heat exchanger and water circulating pump.
- Possible base de-ice electric heater control.



LED lights:

Power : Supply.
PPC : Water circulating pump speed control signal.
PP : Water circulating pump control.
DH : De-ice heater control.
W : Water flow.
ON/OFF : Forced operation status.
H/C : Forced operation status.
AL : Heat pump alarm.
SYS : System communication line (BUS).
RC : Maintenance keyboard / display.

PCB switches / configuration & alarms:



• This board is fitted out with 2 "**SW1**" and "**SW2**" microswitches as well as "**JTP**" and "**JPC**" jumpers for the configuration:

- **SW1 - 1 Micro-switch**:
In "**ON**" position (factory setting), the circulating pump starts automatically if the outdoor temperature is below 0°C to prevent the hydraulic circuit from freezing.
Caution: In the "**oFF**" position, this function is deactivated.

- **SW1 - 2 Micro-switch**:
The "**ON**" position (factory setting) activates the "**FL**" alarm (heat pump water flow rate) at the system.
Caution: For heat pump with electric support heater applications, this micro-switch must be in the "ON" position.
For heat pump in boiler back-up applications, the micro-switch must be placed in the "**OFF**" position.

- **SW2 - 1 micro-switch**:
The "**ON**" position activates the "Circulating pump speed variation" function.
The function is not available on this version.
The **SW2-1** micro-switch is left in "**OFF**" position (factory setting).

- **SW2 - 2 micro-switch**:
To select the circulating pump speed variation control algorithm.
SW2-2 in "**OFF**" position (factory setting) = "**PWM**" control.
SW2-2 in "**ON**" position = "**0/10V**" control.
The function is not available on this version.

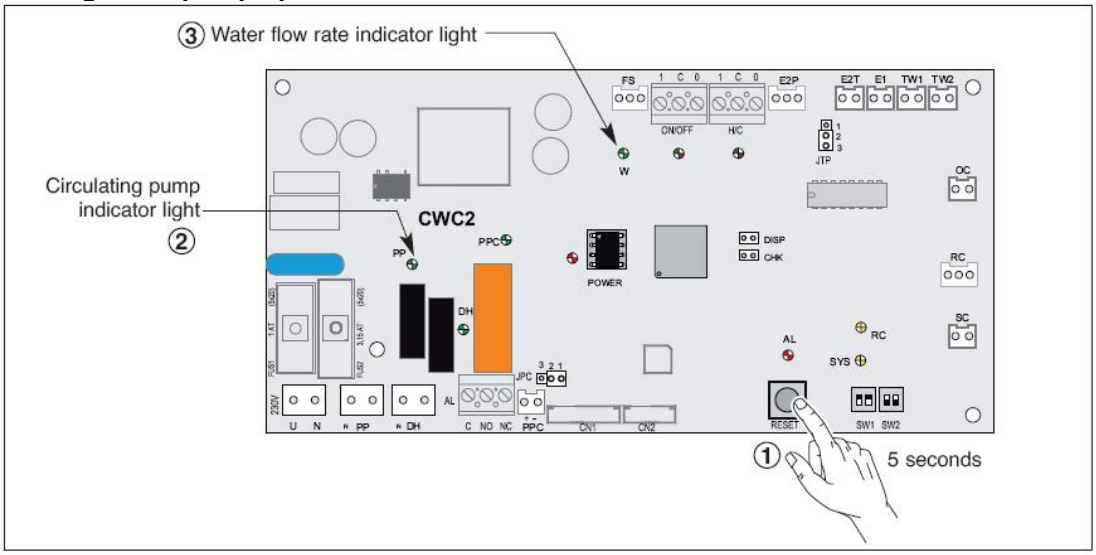
- **JTP jumper**:
E2P input selection.
Must be positioned on "**2-3**" (factory setting).

- **JPC jumper**:
Selection of type of circulating pump speed variation signal.
JPC on "**1-2**" = "**PWM**" (factory setting).
JPC on "**2-3**" = "**0/10V**".

-Other plugs:
CHK: not to be used
DISP: short circuiting this plug allows operation of CWC2 board by a service remote control even if the power board A3 is not connected. In this case, alarm E04 (see part 5), which indicates trouble in the communication between A2 and A3 board, does not occur. This is signaled by power LED flashing.

• Alarms:
- "**AL**" LED:
  - **Flashing** = Automatic reset heat pump alarm.
  - **Stays on** = Manual reset heat pump alarm.
- "**W**" LED:
  - **Off** = No water flow.
  - **Stays on** = Water flow.
  - **Slow flashing** = Water flow rate alarm. (once a second)
  - **Quick flashing** = Water outlet temperature too low alarm. (twice a second)
  - **Flickers** = TW2 water outlet temperature sensor fault.
-**"Power"** LED: illuminates when the power is on. Flashes if there is trouble with the EEPROM of the board (and also if short circuiting "DISP" plug – see before).

Forced circulating water pump operation:



- Make sure that the hydraulic circuit is ready (no leakage, pressure, valves open…)
- Press during 5 seconds the "**RESET**" button of the **CWC2** control board.
  The circulating pump starts (if it was stopped). This action has the priority to any control signal from the system.
  The circulating pump indicator light "**PP**" flashes.
- Check that the "**W**" water flow rate indicator light is on.

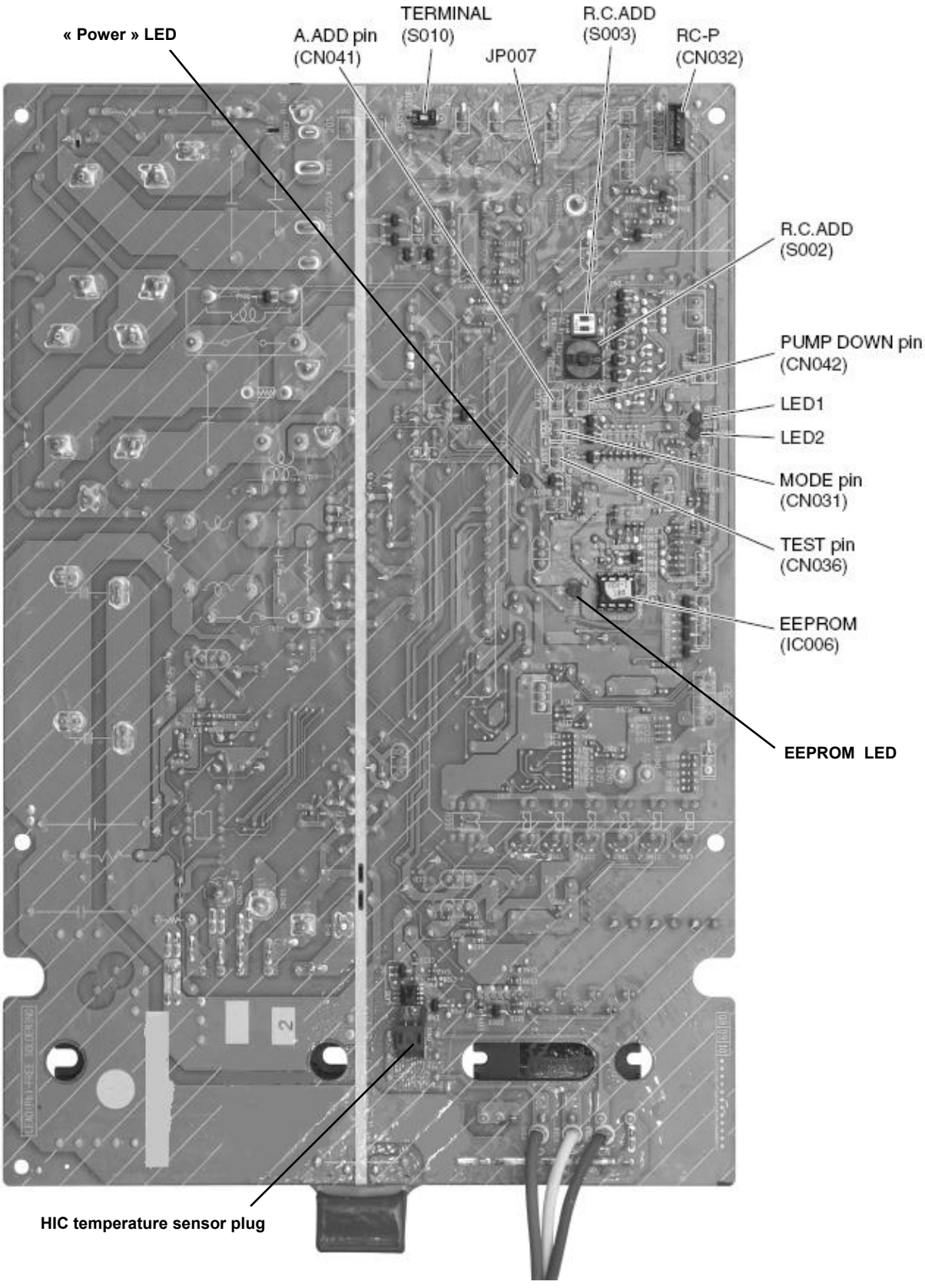
EEPROM:
Non volatile memory. Used to store model information (and other data) – see Part 6 parameters.
When replacing A2 board, remove the EEPROM from the old PCB and install it onto the new PCB. If there is trouble with the EEPROM, replace it with the new one provided with the servicing PCB) and set the necessary parameters with the service remote controller (for setting procedure, refer to the servicing document or see Part 5).

Software versions:

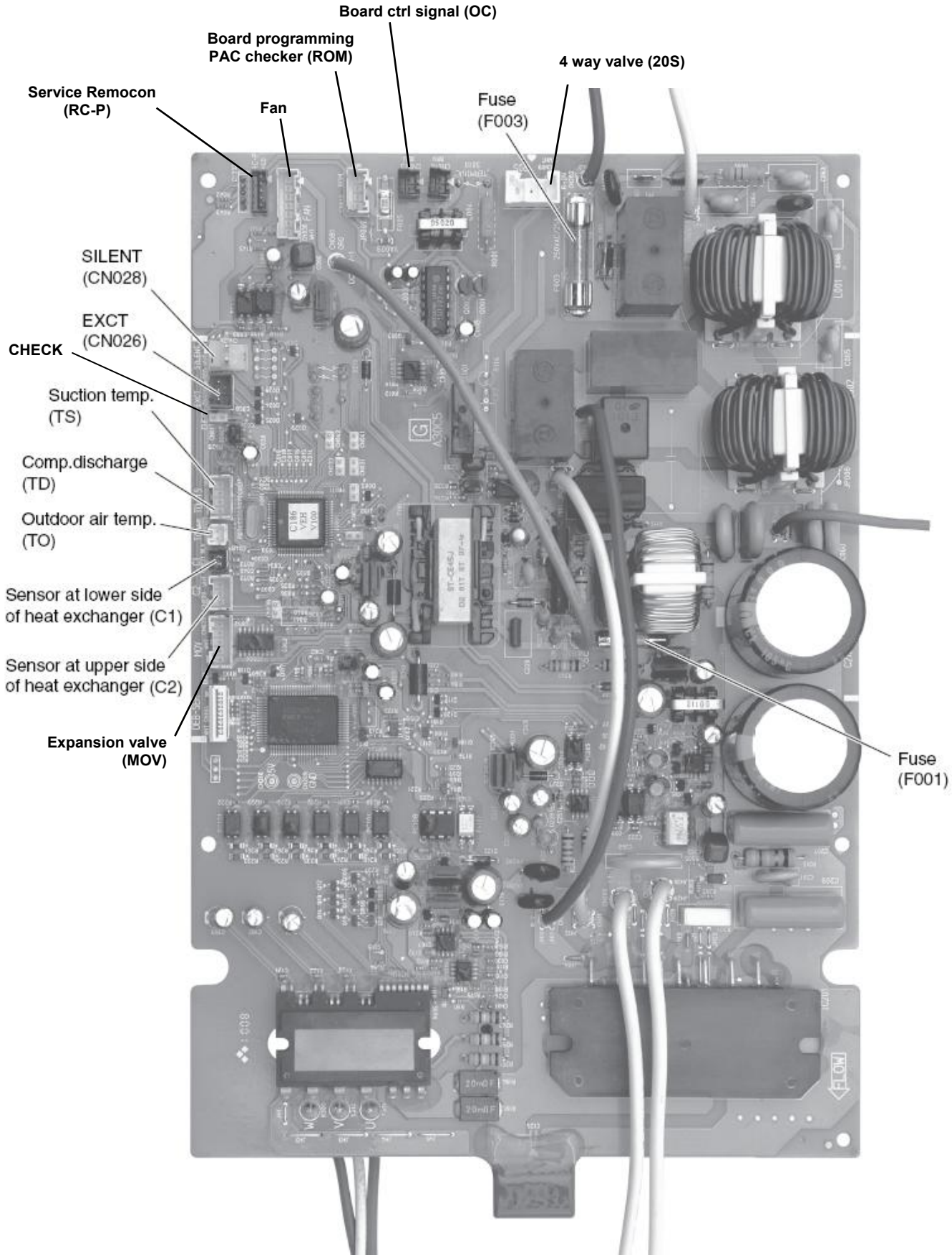
Version	A2 Board code	Date	Modification
V1.00	2220127	Dec. 2010	First issue
V3.01	2220127-01	Jul. 2012	Activation of forcing input in system ctrl (for heat only version - PHIE)
V3.03	2220127-02	Mar. 2013	Safety on outlet temperature TW2 added
V3.04	2220127-02	May 2013	Filter on temperature signal E1 added (used for defrost information with DHW)

3.2.5 REFRIGERANT CIRCUIT POWER BOARD FOR UNITS 095 / 125

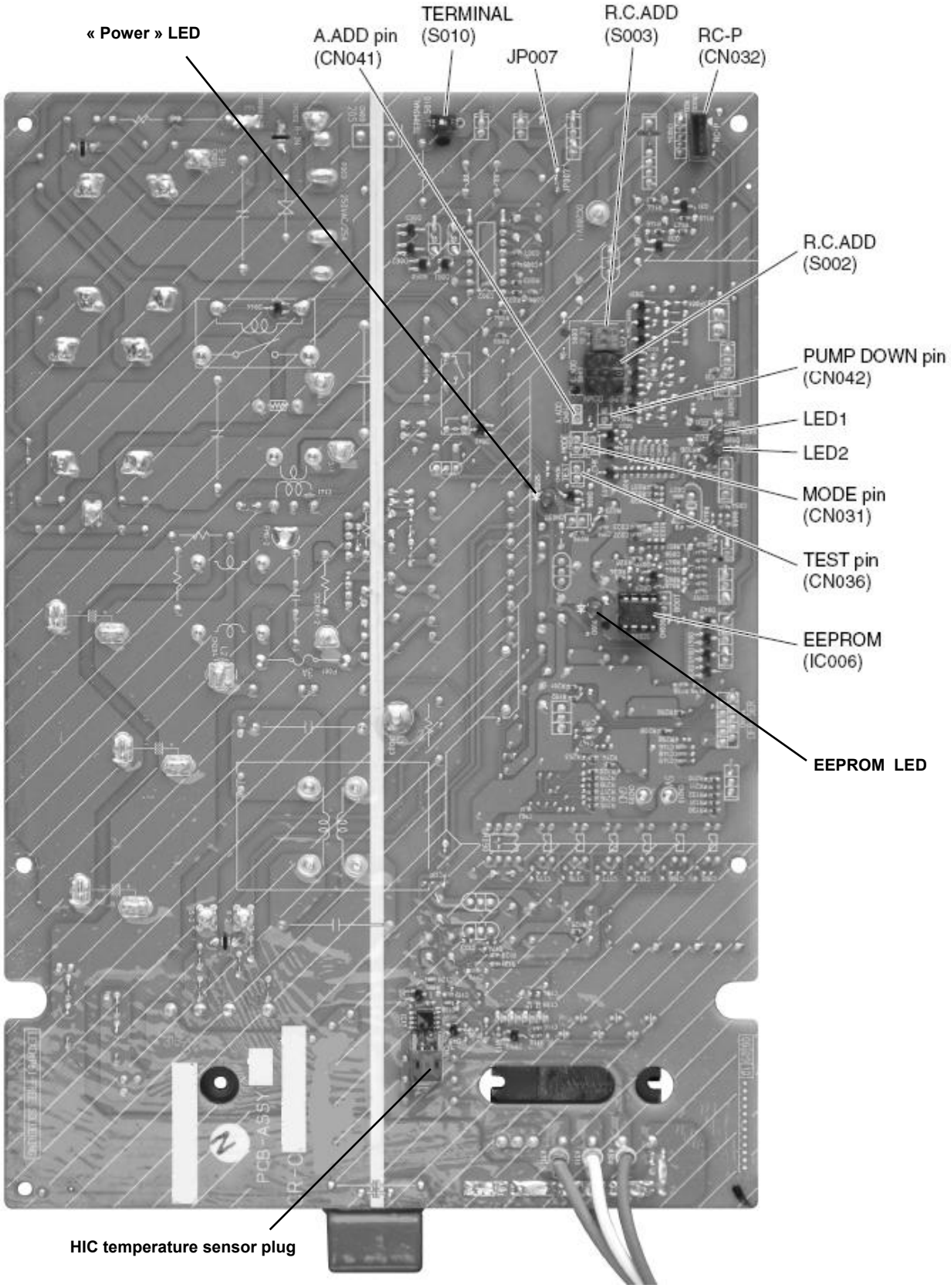
A3 board A056VH (up side) **FOR UNIT 095**



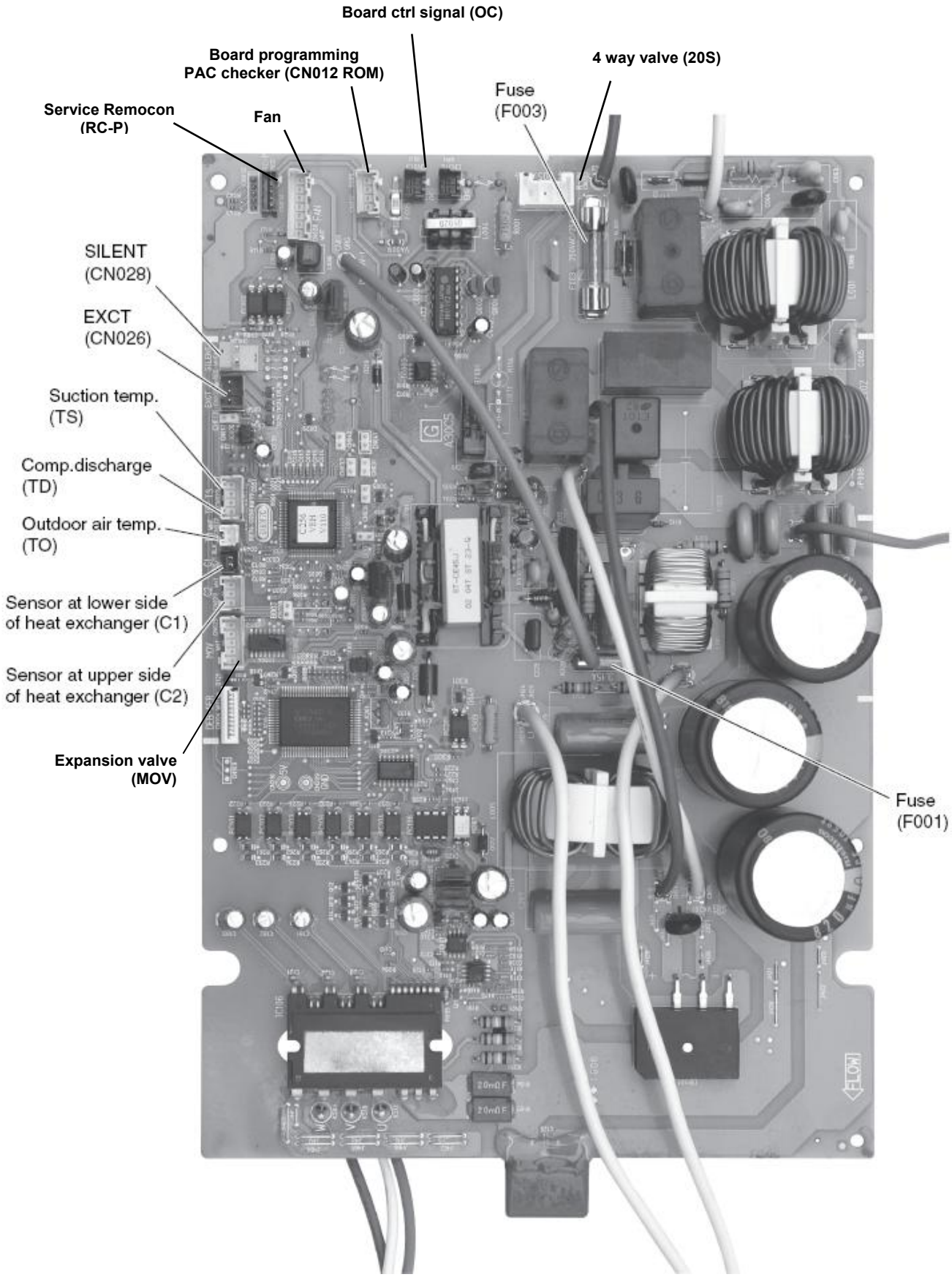
A3 board A056VH (bottom side) **FOR UNIT 095**



A3 board A086VH (up side) **FOR UNIT 125**



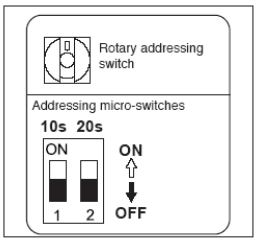
A3 board A086VH (bottom side) **FOR UNIT 125**



UNITS 095 / 125 – COMMENTS

- **S002 rotary switch** (10 positions, black) **/ S003 DIP switches** (2P, blue)**:**

Address for split air to air units – not used for the application.
The factory setting below must not be changed :



- **CN041 Auto address plug** (2P, white)**:**

Normally, the addressing sequence between refrigerant circuit power board A3 and control board A2 takes place when power is initially turned on at the factory.
In case of board replacement or problem of communication on the field, it can be necessary to launch again an addressing sequence. For that, short circuit the pins of the plug.
During automatic address setting, LEDs 1 & 2 are blinking alternatively (open circuit these pins stops automatic address setting).
After the power is turned ON, automatic address setting will not be functioned for over 1 minute and 30 seconds.

- **CN042 Pump down plug** (2P, white)**:**

Used for split air to air units for refrigerant recovery sequence – not used for the application.

- **CN032 RC-P Service remocon connection plug** (5P, red)**:** See PART 6
- **JP007 jumper:** Not used.
- **S010 TERMINAL switch** (black)**:** Not used – Switch position “ON”.
- **CN036 Test plug** (2P)**:** Used for PCB inspection in factory.
- **CN031 MODE plug** (2P)**:** Not used.

- **CN012 ROM plug** (4P, white)**:**

Used for PCB software loading in factory with “PAC checker” interface.

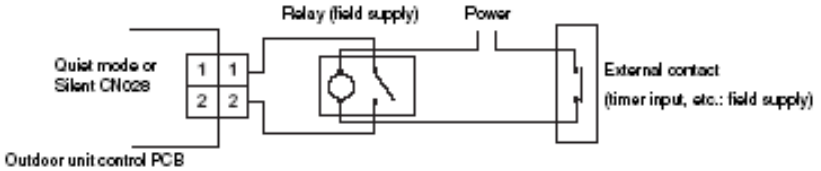
- **CN026 EXCT plug** (3P, red)**:** Designed for capacity control – not used.

- **CN028 SILENT (or QUIET) MODE plug :**

SILENT or QUIET MODE

2P plug (white): Enables operation in quiet mode.

- The outdoor unit fan and compressor frequencies are subject to limits during operation.
- Low-noise operation is enabled when the relay is turned ON. (Non-voltage contact "a")
- Example of wiring



Note 2: The maximum length of the wiring between the outdoor unit PCB and the relay is 2 m.

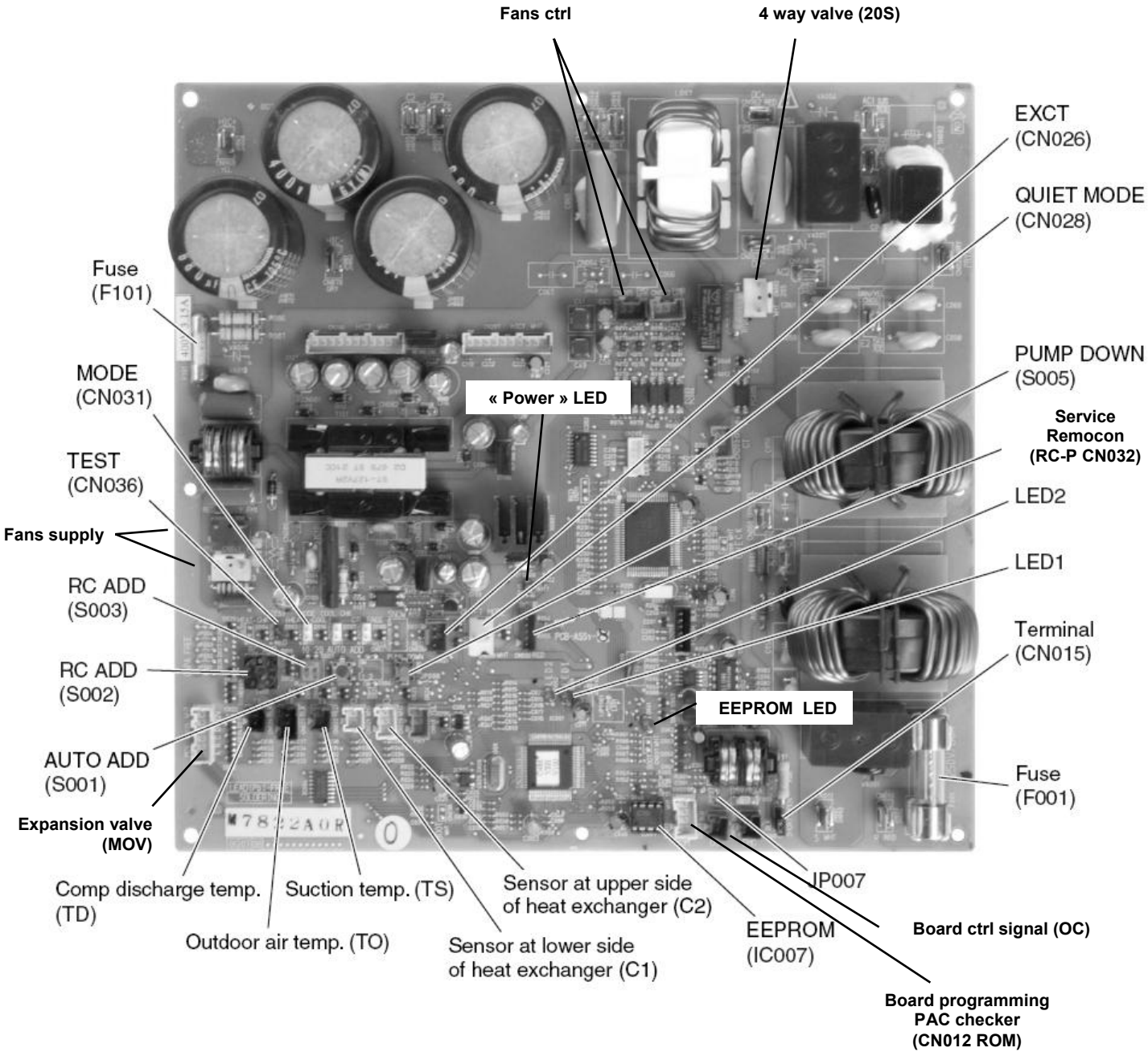
- Lead wire with 2P plug (special-order part: 623-161-2098)
- Relay, (field supply) contact input specifications: DC 5 V, 0.5 mA
  (Recommended relay: Fuji Electric HH62SW, compatible with micro contacts)
- Use a commercially available timer (such as the Omron H5 daily time switch).

Software version:

Unit	Version	Date
095 (2HP)	V110	Dec. 2011
125 (3HP)	V100	Jul. 2011

3.2.6 REFRIGERANT CIRCUIT POWER BOARDS FOR UNITS 155 / 175 / 195

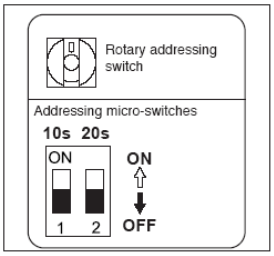
A3 board A116VH for units 155 / 175
A3 board A166VH for unit 195



UNITS 155 / 175 / 195 – COMMENTS

- **S002 rotary switch** (10 positions, black) **/ S003 DIP switches** (2P, blue)**:**

Address for split air to air units – not used for the application.
The factory setting below must not be changed :



- **S001 AUTo ADDress push button switch** (black)**:**

Normally, the addressing sequence between refrigerant circuit power board A3 and control board A2 takes place when power is initially turned on at the factory.
In case of board replacement or problem of communication on the field, it can be necessary to launch again an addressing sequence. For that, press once the switch.
During automatic address setting, LEDs 1 & 2 are blinking alternatively (pressing again this switch stops automatic address setting).

- **S005 Pump down push button switch** (red)**:**

Used for split air to air units for refrigerant recovery sequence – not used for the application.

- **CN032 RC-P Service remocon connection plug** (5P, red)**:** See PART 6

- **JP007 jumper:** Not used.

- **CN036 Test plug** (2P, red)**:** Used for PCB inspection in factory.

- **CN031 MODE plug** (2P, white)**:** Not used.

- **CN012 ROM plug** (4P, white)**:**

Used for PCB software loading in factory with “PAC checker” interface.

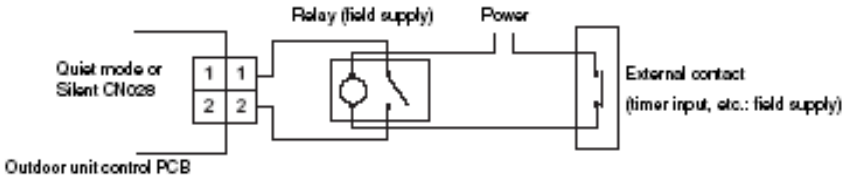
- **CN026 EXCT plug** (3P, red)**:** Designed for capacity control – not used.

- **CN028 SILENT (or QUIET) MODE plug:**

SILENT or QUIET MODE

2P plug (white): Enables operation in quiet mode.

- The outdoor unit fan and compressor frequencies are subject to limits during operation.
- Low-noise operation is enabled when the relay is turned ON. (Non-voltage contact "a")
- Example of wiring



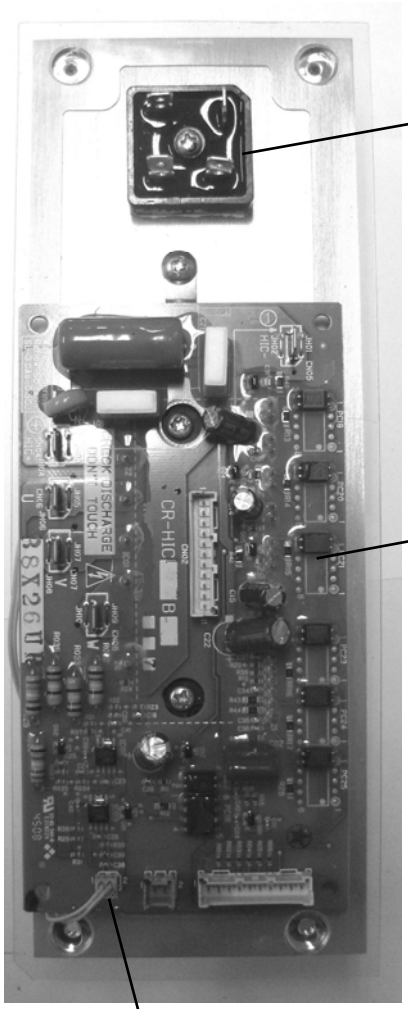
Note 2: The maximum length of the wiring between the outdoor unit PCB and the relay is 2 m.

- Lead wire with 2P plug (special-order part: 623-161-2098)
- Relay, (field supply) contact input specifications: DC 5 V, 0.5 mA
  (Recommended relay: Fuji Electric HH62SW, compatible with micro contacts)
- Use a commercially available timer (such as the Omron H5 daily time switch).

Software version:

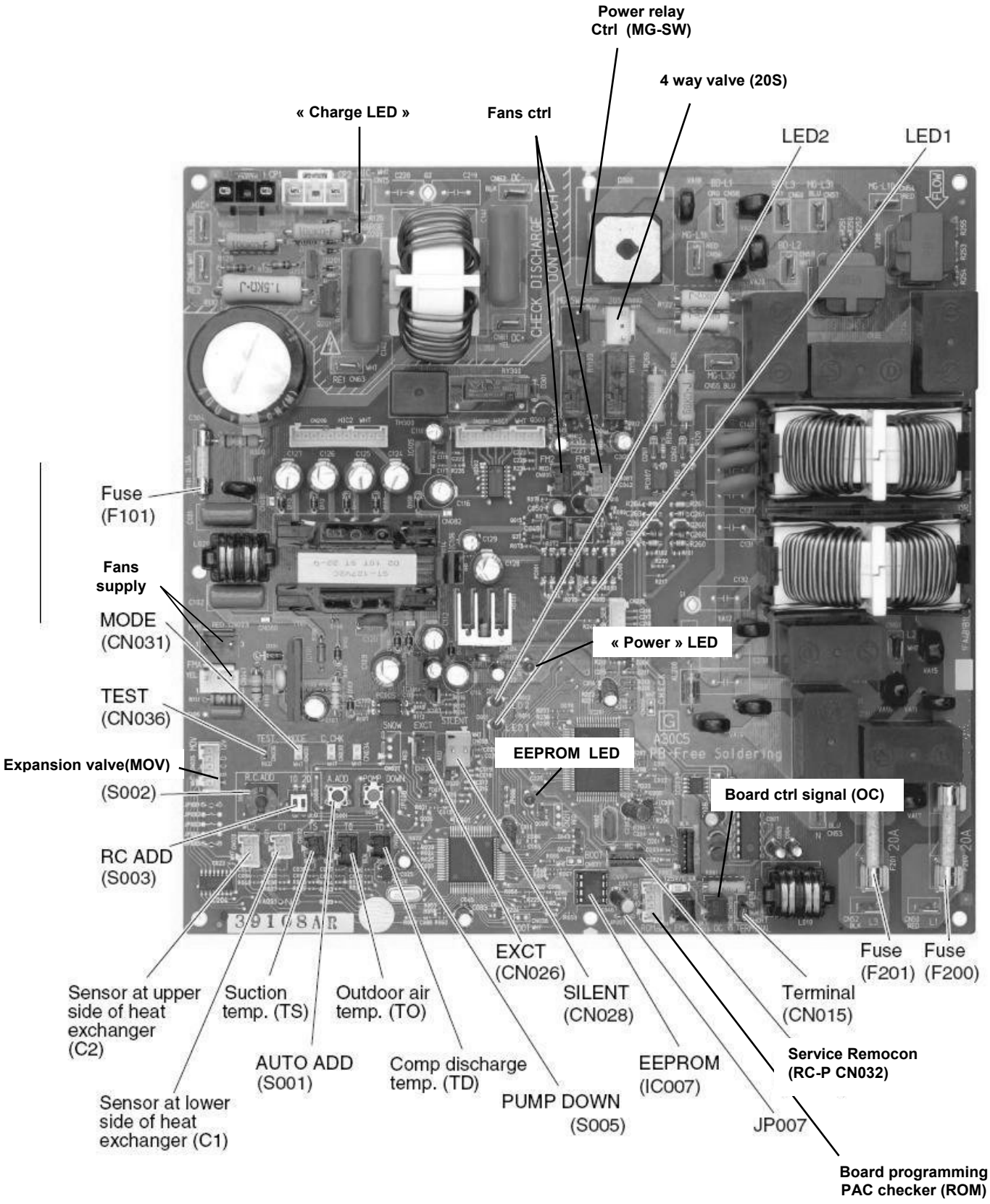
Unit	Version	Date
155 (4HP)	V150	Sep. 2011
175 (5HP)		
195 (6HP)		

HIC board for units 155 / 175 /195
Hybrid Integrated Circuit for inverter compressor



3.2.7 A3 REFRIGERANT CIRCUIT POWER BOARD FOR UNITS 157 / 177 / 197

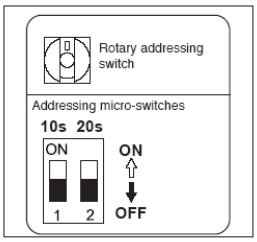
A3 board A166VH8



UNITS 157 / 177 / 197 – COMMENTS

- **S002 rotary switch** (10 positions, black) **/ S003 DIP switches** (2P, blue)**:**

Address for split air to air units – not used for the application.
The factory setting below must not be changed :



- **S001 AUTo ADDress push button switch** (black)**:**

Normally, the addressing sequence between refrigerant circuit power board A3 and control board A2 takes place when power is initially turned on at the factory.
In case of board replacement or problem of communication on the field, it can be necessary to launch again an addressing sequence. For that, press once the switch.
During automatic address setting, LEDs 1 & 2 are blinking alternatively (pressing again this switch stops automatic address setting).

- **S005 Pump down push button switch** (red)**:**

Used for split air to air units for refrigerant recovery sequence – not used for the application.

- **CN032 RC-P Service remocon connection plug** (5P, red)**:** See PART 6

- **JP007 jumper:** Not used.

- **CN036 Test plug** (2P, red)**:** Used for PCB inspection in factory.

- **CN031 MODE plug** (2P, white)**:** Not used.

- **CN012 ROM plug** (4P, white)**:**

Used for PCB software loading in factory with “PAC checker” interface.

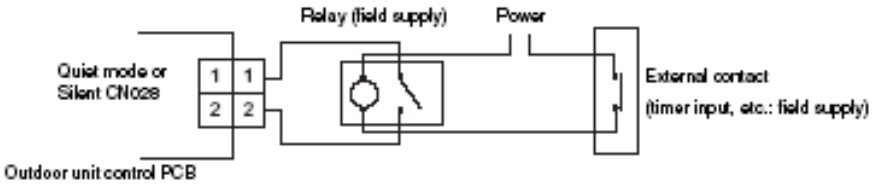
- **CN026 EXCT plug** (3P, red)**:** Designed for capacity control – not used.

- **CN028 SILENT (or QUIET) MODE plug:**

SILENT or QUIET MODE

2P plug (white): Enables operation in quiet mode.

- The outdoor unit fan and compressor frequencies are subject to limits during operation.
- Low-noise operation is enabled when the relay is turned ON. (Non-voltage contact "a")
- Example of wiring



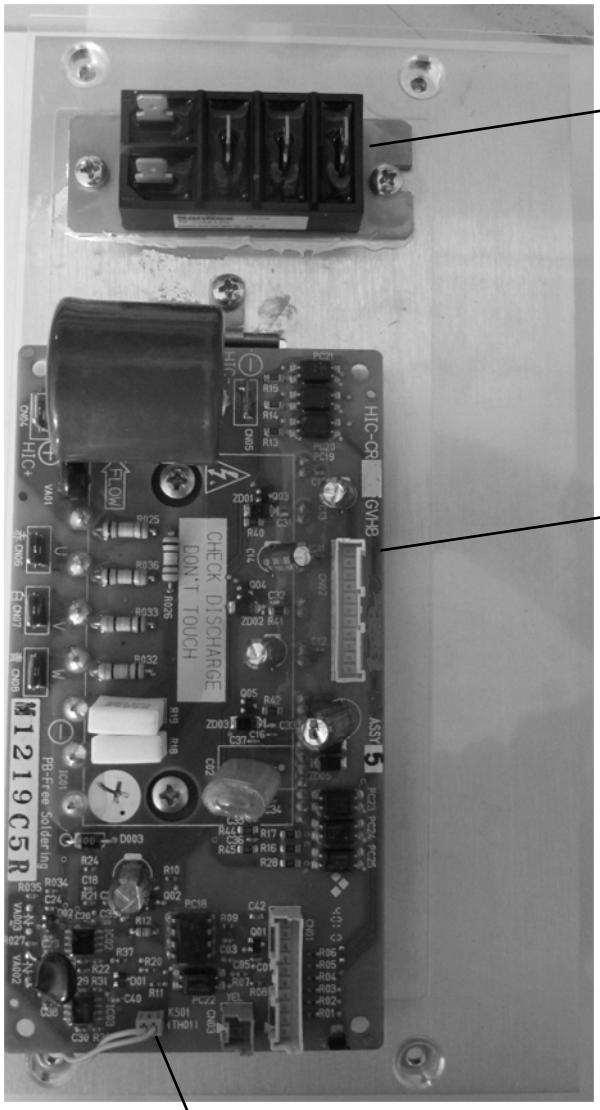
Note 2: The maximum length of the wiring between the outdoor unit PCB and the relay is 2 m.

- Lead wire with 2P plug (special-order part: 623-161-2098)
- Relay, (field supply) contact input specifications: DC 5 V, 0.5 mA
  (Recommended relay: Fuji Electric HH62SW, compatible with micro contacts)
- Use a commercially available timer (such as the Omron H5 daily time switch).

Software version:

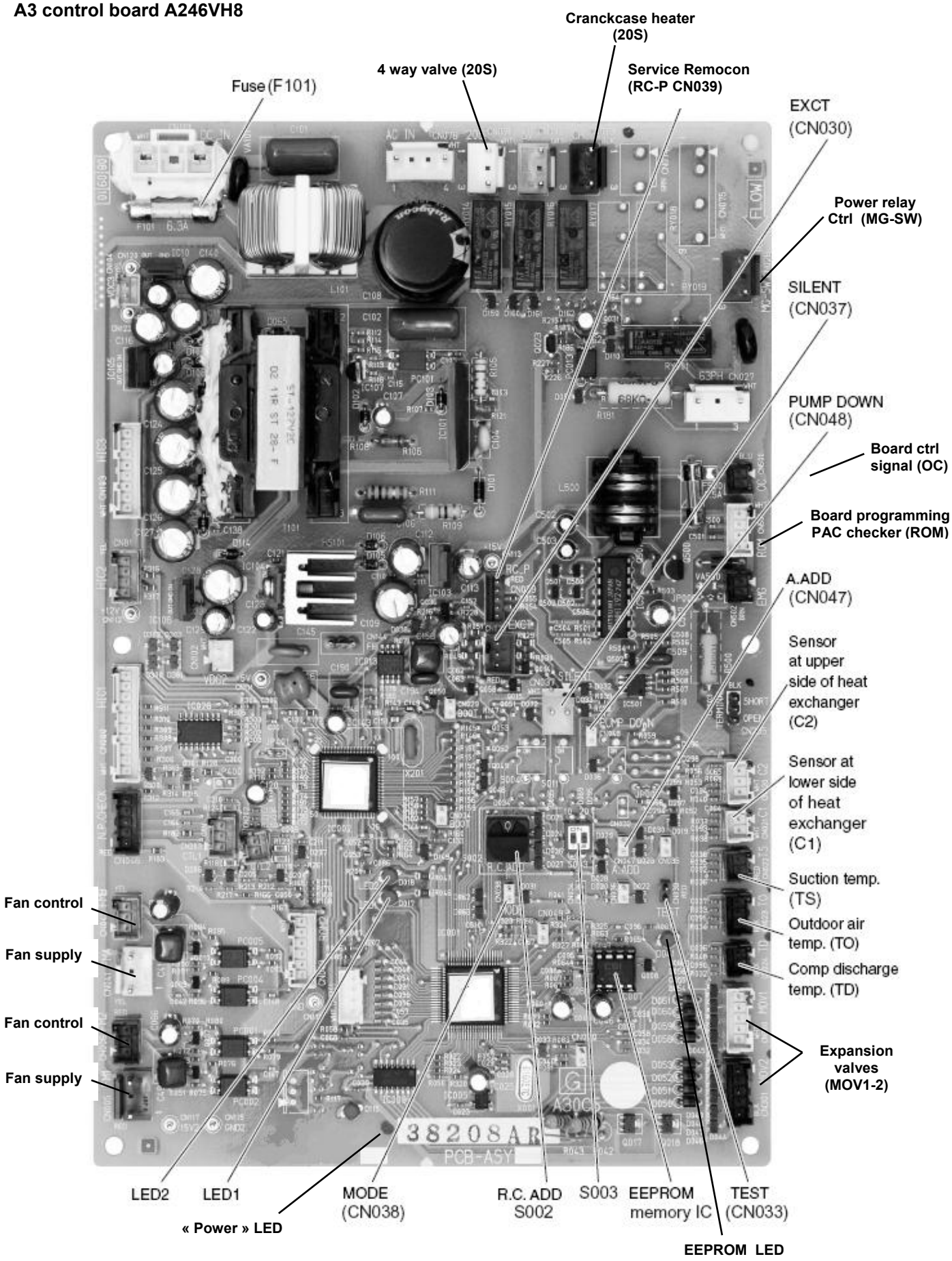
Unit	Version	Date
157 (4HP)	V150	Nov. 2011
177 (5HP)		
197 (6HP)		

HIC board for units 157 / 177 /197
Hybrid Integrated Circuit for inverter compressor



3.2.8 REFRIGERANT CIRCUIT POWER BOARD FOR UNITS 257 / 307

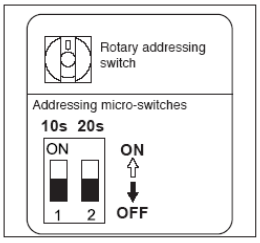
A3 control board A246VH8



UNITS 257 / 307 – COMMENTS

- **S002 rotary switch** (10 positions, black) **/ S003 DIP switches** (2P, blue)**:**

Address for split air to air units – not used for the application.
The factory setting below must not be changed :



- **CN047 Auto address plug** (2P, white)**:**

Normally, the addressing sequence between refrigerant circuit power board A3 and control board A2 takes place when power is initially turned on at the factory.
In case of board replacement or problem of communication on the field, it can be necessary to launch again an addressing sequence. For that, short circuit the pins of the plug.
During automatic address setting, LEDs 1 & 2 are blinking alternatively (open circuit these pins stops automatic address setting).
After the power is turned ON, automatic address setting will not be functioned for over 1 minute and 30 seconds.

- **CN048 Pump down plug** (2P, white)**:**

Used for split air to air units for refrigerant recovery sequence – not used for the application.

- **CN039 RC-P Service remocon connection plug** (5P, red)**:** See PART 6

- **CN033 Test plug** (2P, red)**:** Used for PCB inspection in factory.

- **CN038 MODE plug** (2P, white)**:** Not used.

- **CN501 ROM plug** (4P, white)**:**

Used for PCB software loading in factory with “PAC checker” interface.

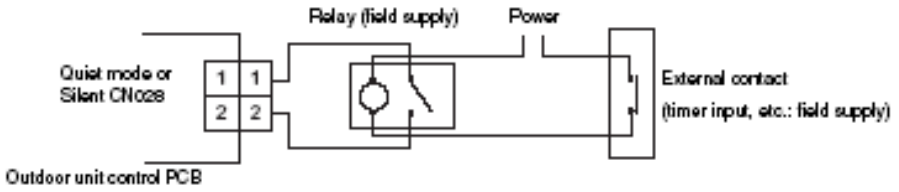
- **CN030 EXCT plug** (3P, red)**:** Designed for capacity control – not used.

- **CN037 SILENT (or QUIET) MODE plug:**

SILENT or QUIET MODE

2P plug (white): Enables operation in quiet mode.

- The outdoor unit fan and compressor frequencies are subject to limits during operation.
- Low-noise operation is enabled when the relay is turned ON. (Non-voltage contact "a")
- Example of wiring



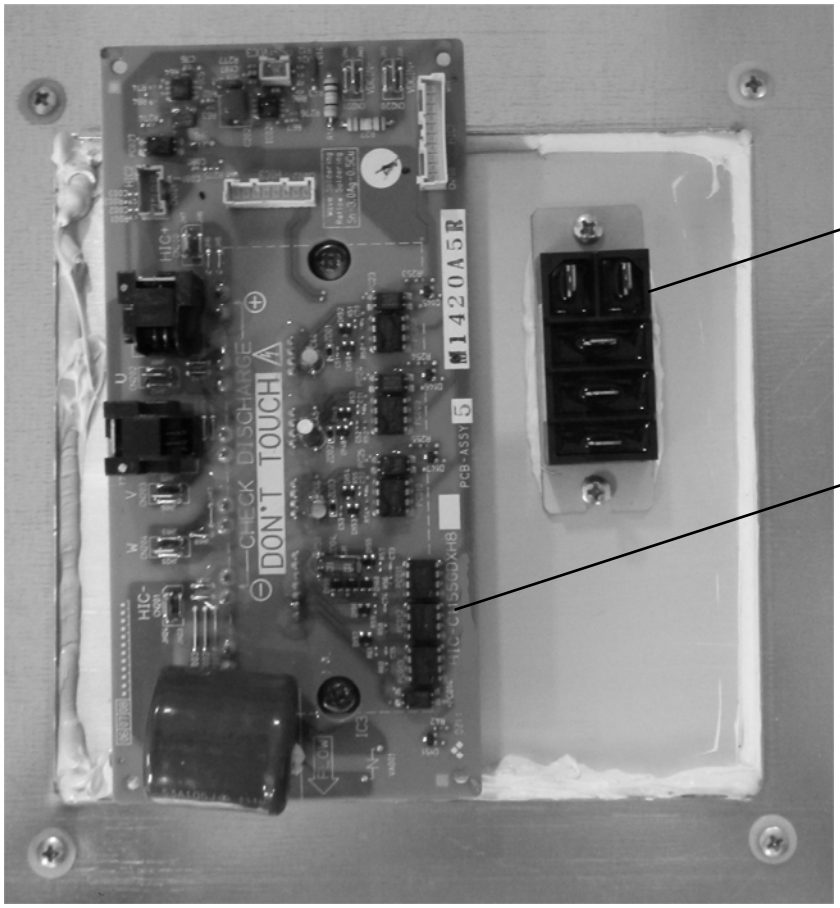
Note 2: The maximum length of the wiring between the outdoor unit PCB and the relay is 2 m.

- Lead wire with 2P plug (special-order part: 623-161-2098)
- Relay, (field supply) contact input specifications: DC 5 V, 0.5 mA
  (Recommended relay: Fuji Electric HH62SW, compatible with micro contacts)
- Use a commercially available timer (such as the Omron H5 daily time switch).

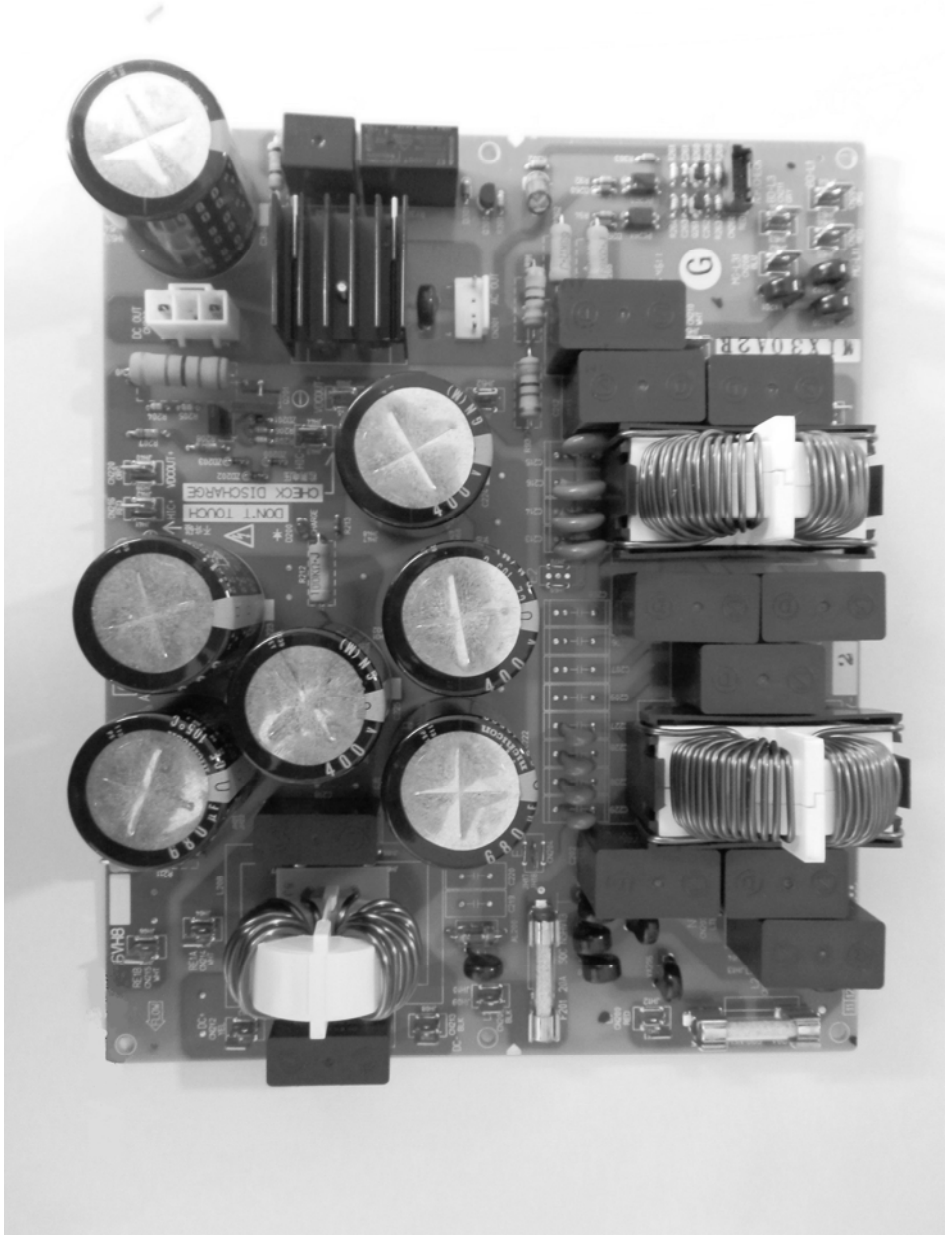
Software version:

Unit	Version	Date
257 (8HP)	V110	Jan. 2012
307 (10HP)		

HIC board for units 257 / 307
Hybrid Integrated Circuit for inverter compressor

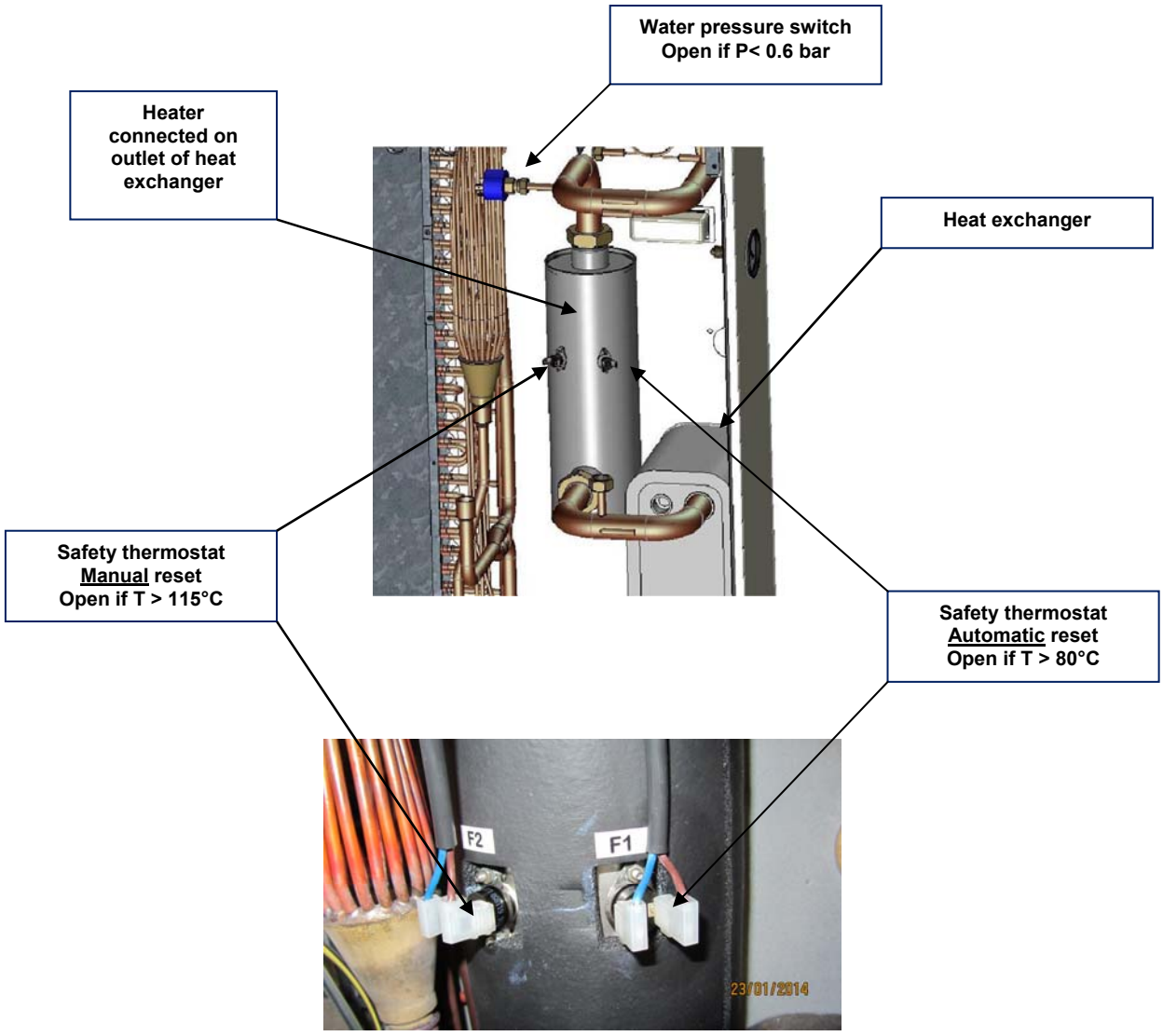


A4 Supply and filter board for units 257 / 307



3.2.9 ELECTRIC SUPPORT HEATER

Content	Unit	095	125	155	157	175	177	195	197	257	307
Number of elements		3 in parallel		3 – star coupling							
Nominal voltage	V	230V - on each heater element									
Capacity	kW	3 x 1.5		3 x 2						3 x 3	
Body material		Stainless steel 304L									
Heating element material		Stainless steel Incoloy 800									



PART 4 – INVERTER CONTROL SPECIFIC FUNCTIONS

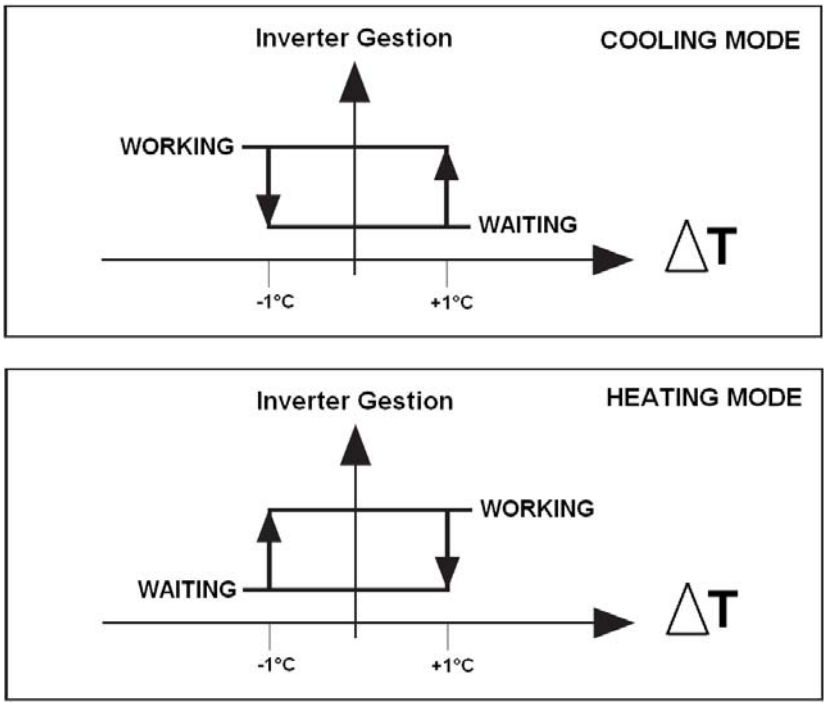
4.1 HEAT PUMP WATER TEMPERATURE CONTROL

Performed by A3 board

- The Inverter gestion is working or waiting in accordance with the **ΔT** shown below.

$$\Delta T = T_A - T_Y$$

T_A : Water temperature from the installation – read by sensor TW1.
T_Y : Resulting water temperature Setpoint Y



Note 1: 10-minute mask time of the Inverter Gestion from WORKING to WAITING to avoid cycling.
Note 2: 3-minute mask time of the Inverter Gestion from WAITING to WORKING to avoid cycling.

- By the control method the frequency of the compressor's inverter is controlled in accordance with the **ΔT** and the return water temperature from the installation.

Inverter frequency is controlled as follows:

When ΔT is high (not yet reached the water temperature setpoint) ⟹ Controlled so that the inverter frequency is increased.

When ΔT is low (approximately +1.0 or less in the cooling mode or approximately -1.0 or more in the heating mode) ⟹ Controlled so that the inverter frequency is decreased or kept.

When the return water temperature is rising in the cooling mode and dropping in the heating mode. ⟹ Controlled so that the inverter frequency is increased.

When the return water temperature is dropping in the cooling mode and rising in the heating mode. ⟹ Controlled so that the inverter frequency is decreased.

Note: The fluctuations of the compressor inverter frequency adjustments are calculated taking into account not only ΔT, but also-fluctuations in T_A.

4.2 COMPRESSOR FREQUENCY CONTROL

Performed by A3 board

The frequency of the compressor's inverter is limited by either of the following controls depending on whether the cooling or heating mode is in operation.

- **Cooling Mode :**
  · Water Inlet temperature control
  · Maximum and minimum frequency control
  · Current release control
  · Cooling high-load prevention control
  · Cooling freeze prevention control
  · Discharge temperature control

- **Heating Mode :**
  · Water Inlet temperature control
  · Maximum and minimum frequency control
  · Current release control
  · Heating high-load prevention control
  · Discharge temperature control

4.3 MIN. & MAX. FREQUENCY CONTROL

Performed by A3 board

The compressor's inverter frequency is controlled in accordance with the model and operation mode.
The maximum and minimum frequencies for each model are shown in the table below.

Note: There are cases in which frequency is limited with other control functions depending on operational conditions, so operations are not always carried out in accordance with the maximum frequencies listed below.

	Cooling Mode		Heating Mode	
	Minimum Hz *	Maximum Hz	Minimum Hz *	Maximum Hz
PHRIE 095	15~24 Hz	87 Hz	15~24 Hz	108 Hz
PHRIE 125	24 Hz	111 Hz	24 Hz	114 Hz
PHRIE 155	15~24 Hz	54 Hz	18~24 Hz	72 Hz
PHRIE 157	15~24 Hz	54 Hz	18~24 Hz	72 Hz
PHRIE 175	15~24 Hz	69.6 Hz	18~24 Hz	85 Hz
PHRIE 177	15~24 Hz	68.4 Hz	18~24 Hz	78 Hz
PHRIE 195	15~24 Hz	75 Hz	18~24 Hz	88 Hz
PHRIE 197	15~24 Hz	80.4 Hz	18~24 Hz	85 Hz
PHRIE 257	25~33 Hz	91.2 Hz	25~33 Hz	96 Hz
PHRIE 307	25~33 Hz	80 Hz	25~33 Hz	85 Hz

*There are cases in which the minimum frequency can vary to protect the compressor in accordance with outdoor air temperature and thermal loads.

4.4 CURRENT RELEASE CONTROL

Performed by A3 board

The inverter frequency is controlled so that the current value for the inverter compressor is less than the value listed in the table below.
This current release control is required in order to prevent abnormal temperature increases in the inverter circuit located within the electrical box and avoid HIC board damages.

The limited values of the primary current are modified in accordance with outdoor air temperature (T_O).

	Is (A)	
	Cooling Mode	Heating Mode
PHRIE 095	10.2 A	12 A
PHRIE 125	16.5 A	18 A
PHRIE 155	20 A	21 A
PHRIE 157	7 A	8 A
PHRIE 175	23 A	23.5 A
PHRIE 177	10 A	11 A
PHRIE 195	27 A	27.5 A
PHRIE 197	13 A	14 A
PHRIE 257	13 A	13 A
PHRIE 307	15 A	15 A

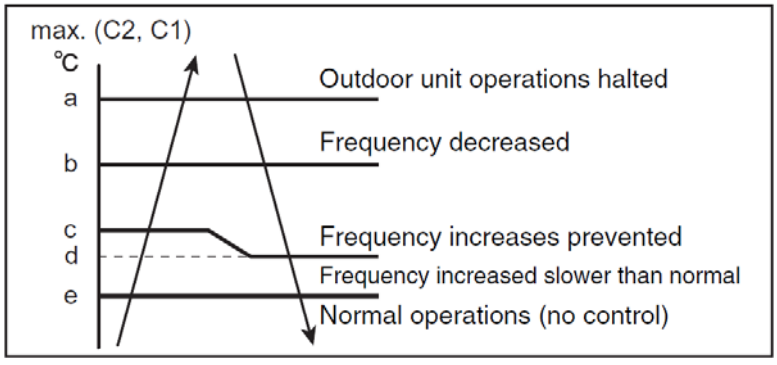
Note: The limited values are lowered when the outdoor air temperature is higher than 40°C in the cooling mode and higher than 14°C in the heating mode.

4.5 COOLING HIGH-LOAD CONTROL

Performed by A3 board

This control is performed to limit the inverter frequency in order to restrict abnormal increases in pressure and high-load operations in the cooling mode.
In accordance with the temperature of the outdoor heat exchanger temperature sensors (C1, C2), such controls are performed as decreasing the inverter frequency and restricting its increase, etc.

If the temperature max (C1, C2) exceeds 64°C, operations are halted and then restarted 3 minutes later. If this start/stop activity is repeated 10 times consecutively, alarm "P20" (cooling high-load error) occurs.



Type	95	125	155	157	175	177	195	197	257	307
a	64	64	61	61	61	61	61	61	64	64
b	61	59	55	57	55	57	55	57	55	53
c	59	57	53	55	53	55	53	55	54	52
d	58	56	51	53	51	53	51	53	52	50
e	53	53	49	51	49	51	49	51	48	47

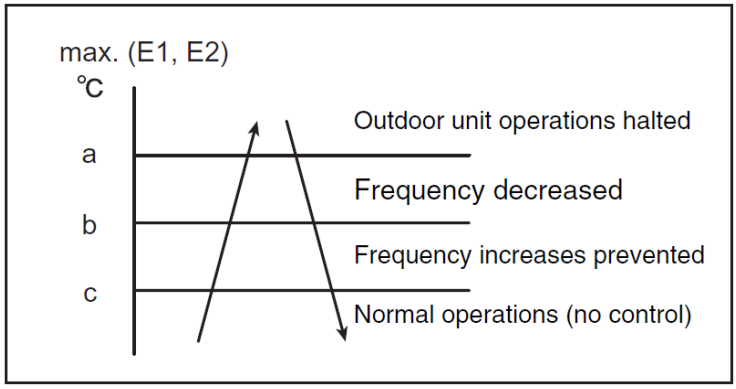
4.6 HEATING HIGH-LOAD CONTROL

Performed by A3 board

This system controls the inverter frequency when the high pressure's abnormal increase and high-load operating prevention occur in the heating mode.

In accordance with the temperature of the water heat exchanger temperatures sensor (E1, E2), such controls are performed as to limiting the increase of inverter frequency, decreasing it or halting operation of the compressor.

When the maximum temperatures (E1, E2) exceeds 64°C, the operation is halted and restarted after 3 minutes.



type	95	125	155	157	175	177	195	197	257	307
a	64	64	63	63	63	63	63	63	63	63
b	58	58	58	58	58	58	58	58	58	58
c	54	54	55	55	55	55	55	55	55	55

4.7 FREEZE PREVENTION CONTROL IN COOLING MODE

Performed by A3 board

The following control is performed during cooling operations, in accordance with the lowest water heat exchanger temperatures (E1 or E2). (See the chart below.)

(1) If the temperature remains in the "J" zone (decreasing operation frequency) for 6 minutes, the operating frequency of the compressor is decreased.
The operation frequency is amended every 30 seconds as long as the temperature is in this zone.

(2) If the temperature is in the "K" zone (operating frequency increase prevention zone), the operating frequency of the compressor is maintained.

(3) If the temperature is in the "H" zone (operating frequency restriction zone) and the outdoor air temperature is less than 32°C, the maximum operating frequency of the compressor is limited.

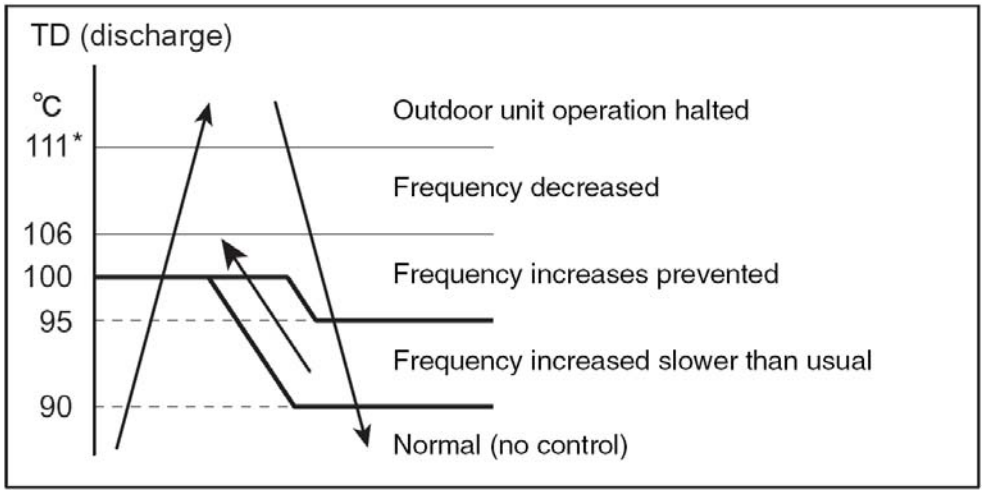
(4) If the temperature is in the "I" zone (normal operation zone), normal operations are performed.

(5) If the temperature is continuously in the "J" zone with the compressor's operating frequency reaches "0", then temperature A, which is temperature for changing from the "J" zone to the "H" zone, is raised from 5°C to 8°C, and operation continues until the temperature enters the "H" zone.

4.8 DISCHARGE TEMPERATURE CONTROL

Performed by A3 board

The following control is performed to prevent the discharge temperature from rising abnormally in order to protect the inverter compressor. In accordance with the temperature of the discharge sensor TD, such controls are performed as to limiting the increase of inverter frequency, decreasing it or halting operation of the compressor.

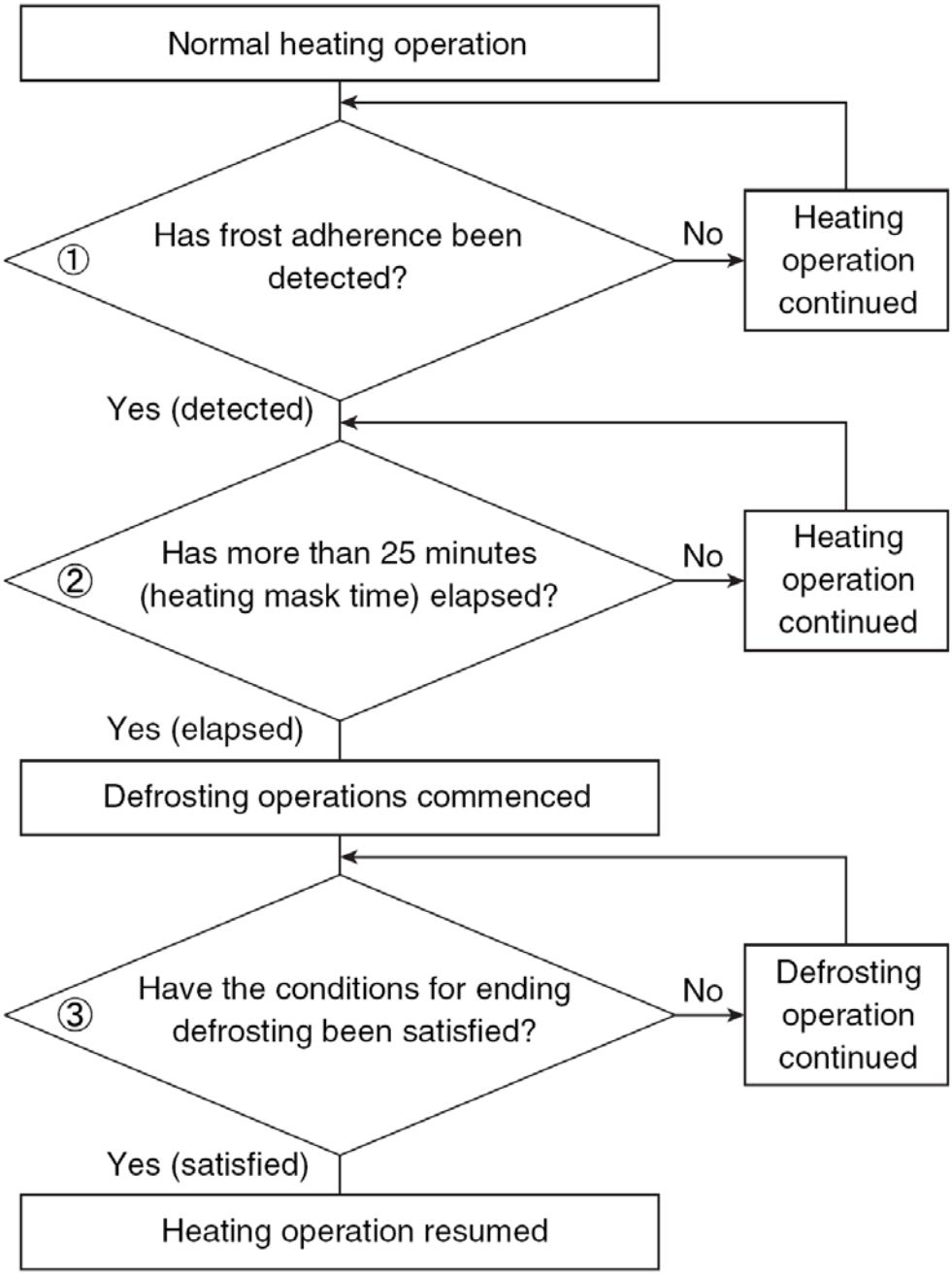


* If the discharge temperature exceeds 111°C (or 115°C for 257 & 307 units), operations of the compressor are halted and then restarted 3 minutes later.
If this start/stop activity is repeated 4 times consecutively, the alarm "P03" (abnormal discharge temperature) occurs.

4.9 AIR HEAT EXCHANGER DEFROST CONTROL

Performed by A3 board

4.9.1 FLOWCHART OF DEFROST CONTROL (1) (2) (3)



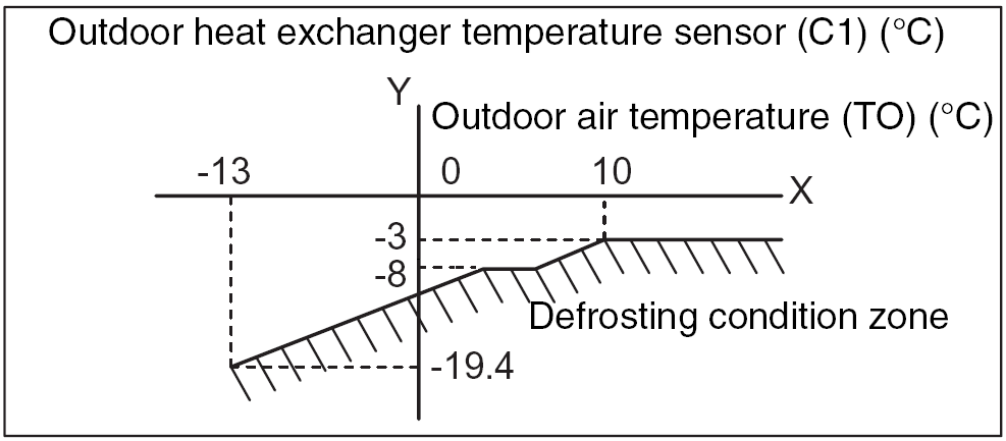
4.9.2 FROST ADHERENCE DETECTION (1)

If the following conditions are satisfied during heating operations, it is regarded as "frost adherence is detected".

• Frost adherence detection is performed in accordance with the outdoor air temperature (TO) and the outdoor heat exchanger temperature sensor (C1).
Note: Frost adherence detection is not performed for the first 15-minute of compressor operations in the normal heating mode.

• Frost adherence detection conditions

(a) With the outdoor air temperature (TO) being -13°C or above, the frost adherence condition shown below are satisfied for whether 3 consecutive minutes or a total of 60 intermittent minutes, or the outdoor heat exchanger temperature sensor (C1) remains -18°C or below for 20 consecutive seconds.



(b) With the outdoor air temperature (TO) being less than -13°C, the outdoor heat exchanger temperature sensor:
(C1) ≤ [(TO) – 5°C] for 20 consecutive seconds → Defrosting condition

(c)With the outdoor heat exchanger temperature sensor (C1) being less than -3°C, a total of 90 minutes has elapsed (defrosting carried out periodically in accordance with the time).

4.9.3 HEATING MASK TIME (2)

This refers to the shortest time that heating operations must be performed without defrosting operations being executed.
The mask time for this model is 25 minutes.

Note: Defrosting operations will not be commenced until the defrosting mask time has elapsed, even if frost adherence has been detected.

4.9.4 DEFROST CYCLE END (3)

Defrosting operations are ended when the following conditions are aligned:

(a) When the temperature of the outdoor heat exchanger temperature sensor (C1) is 12 or higher.

(b) When the temperature of the outdoor heat exchanger temperature sensor (C1) is 7 or higher for 60 consecutive seconds.

(c) When defrosting has been initiated for 10 minutes.

4.10 FAN CONTROL

Performed by A3 board

- **Cooling Mode:**
  The appropriate rotations per minute for the fan are determined in accordance with the outdoor air temperature and the frequency of the compressor inverter.
  The fan step is controlled between a range of W1 (Step 1) and WF (Step 16).

- **Heating Mode:**
  The appropriate rotations per minute for the fan are determined in accordance with the outdoor air temperature and the frequency of the compressor inverter.
  The fan step is controlled between a range of W1 (Step 1) and WF (Step 16).

  Note: However, the fan is halted (Step 0) when defrosting is being carried out.

4.11 ELECTRONIC EXPANSION VALVE CONTROL

Performed by A3 board

The electrical expansion valve controls the amount of refrigerant that is allowed to flow in accordance with the operation status.
The valve is adjusted in accordance with the discharge temperature (TD), the outdoor heat exchanger temperature sensor (C1), the suction temperature sensor (TS), and the heat exchanger temperature sensors (E1 and E2).

- **Cooling Mode:**
  Controlled so that the suction temperature (TS) - water heat exchange temperature minimum (E1 and E2) is between 1°C and 5°C under normal conditions.
  There are cases where the aperture opens wider than usual if the discharge temperature increases.

- **Heating Mode:**
  Controlled so that the Suction Temperature (TS) - Outdoor heat exchange temperature (C1) is between 1°C and 5°C under normal conditions.
  There are

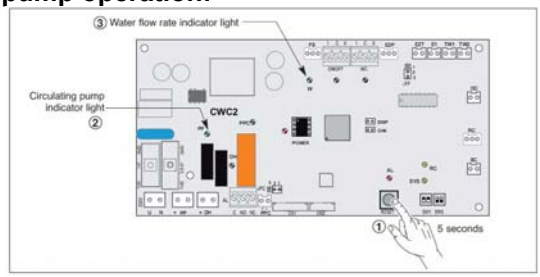
4.12 WATER CIRCULATING PUMP CONTROL

Performed by A2 board - see presentation § 3.2.4

In normal operation, water pump is actuated automatically by system control
(see details in the corresponding technical manual) :
-in heating mode when outdoor temperature is lower than the “non heating threshold”,
-during “Domestic Hot Water” cycle,
-in cooling mode (as soon as it is selected).

Anyway, it is possible to operate the circulating pump in a forced way; then water pump runs permanently. This kind of operation can be needed for commissioning or maintenance (or operation without system control).

Forced circulating water pump operation:



- Make sure that the hydraulic circuit is ready (no leakage, pressure, valves open…).
- Press during 5 seconds the “**RESET**” button of the **CWC2** control board.
The circulating pump starts (if it was stopped). This action has the priority to any control signal from the system.
The circulating pump indicator light “**PP**” flashes.

- Check that the “**W**” water flow rate indicator light is on.

Other functions:

- **Time delay:** Water pump stop is time delayed (3 mn), but immediate in the case forcing is stopped.
- **Anti-sticking**: automatic operation for 5 seconds every 24 hours.
- **Anti-freeze**": function activated by setting micro-switch **sW1-1** to "**on**" (delivery default setting). The pump is started if outside temperature is below 0°C.

4.13 WATER FLOW MONITORING

Performed by A2 board - see presentation § 3.2.4

When the circulating pump is in operation, a lack of water flow longer than 10 seconds will cause the heat pump to stop.
The alarm light "**AL**" flashes.
If the lack of water flow continues for more than one minute (or if it happens more than 3 in the last hour), the water flow fault is stored in A2 memory:

- The alarm light "**AL**" then remains on steady; the "**W**" water flow light flashes (once a second).
- The flow alarm has to be sent to the system, for that, **the micro-switch sW1-2 must be set to "on"**.

⚠ - On A2 boards version 00 the circulating pump stops. On A2 boards versions 01 & 02, the water circulating pump remains operating.

The alarm is reset by pressing the "**reset**" button, or turning the system "**OFF**", or by disconnecting the power.

4.14 HEAT PUMP BASE DE-ICE HEATER CONTROL

Performed by A2 board - see presentation § 3.2.4

The heater is actuated for a period of 30 mn if heat pump is in defrost and outdoor temperature (measured by heat pump sensor “OT”) is lower than 0°C.

4.15 HEAT PUMP OUTGOING WATER TEMPERATURE ALARM

Performed by A2 board - see presentation § 3.2.4

⚠ **Note: this function is available only on A2 board in version 02.**
See installation manual 1011597 concerning additional water outlet temperature sensor kit.

This alarm is detected by the TW2 sensor at the heat pump exchanger water outlet.
It is generated and stops the heat pump if the heat pump exchanger outgoing water temperature goes below a threshold in the following cases:

- In heat mode, during defrost exclusively, if the temperature is below 16°C.
- In cool mode if the temperature is below 4°C.

This alarm is reset automatically (with a re-set differential on the threshold of + 4 K) for the first 3 events occurred the previous hour. The "**W**" light of the CWC2 board flashes according to a specific rate (twice a second) to signal this alarm. The "**AL**" light of the CWC2 board also flashes to signal this heat pump alarm in "**automatic**" phase.
If a 4th event occurs within the hour, the alarm is saved and goes to manual reset. The "**AL**" light of the CWC2 board remains steady to signal this heat pump alarm in "**manual**" phase. The alarm saved is transmitted to the system for "**GR**" display. To help in troubleshooting this alarm, the "**W**" light continues to flash according to the specific rate until the alarm is reset. The alarm report contact of the CWC2 board is activated.
On alarm reset, the "**W**" light resumes the state of the water flow input.

TW2 sensor fault:
This fault is managed like another fault on the heat pump giving rise to a "**GR**" system alarm.
When a sensor fault is detected, the heat pump stops and the "**AL**" light of the CWC2 board flashes during the automatic reset phase. The "**W**" light of the CWC2 board flashes very quickly (flickers) to signal this alarm.
If the sensor fault persists, the alarm is saved after 30 minutes and goes into manual reset. The "**AL**" light of the CWC2 board remains steady to signal this heat pump alarm in "**manual**" phase. The alarm saved is transmitted to the system for "**GR**" display. To help in troubleshooting this alarm, the "**W**" light continues to flicker until the alarm is reset.
On alarm reset, the "**W**" light resumes the state of the water flow input.

4.16 HEAT PUMP STAND ALONE OPERATION

Performed by A2 board - see presentation § 3.2.4

For the maintenance and commissioning operations, the heat pump can be operated in a “stand-alone” configuration, without system control, using the specific maintenance remocon (see PART 6) and/or external voltage free contacts.
The system can be disconnected in two ways:

- Either, with power off, disconnect the system communication line "BUS" from A**2** board (connector “**SC**”).
- Or, by the system control unit, deactivate heat pump control by setting parameter 76 to "**0**" – see System control manual.

To operate the heat pump, force the circulating pump (see § 4.12) before initiate an order via the specific maintenance remote control or the external contacts.

Heat pump control with voltage free external contacts:
Inputs for external contacts are available on **A2** (CWC2) board in order to force heat pump operation (**ON / OFF - Heat / cool**). These inputs have priority to the control signals initiated by means of the possible maintenance remote control.
The state of these inputs is indicated by the lights placed on the board. Set points (heat and cool) must be adjusted by the maintenance remote control but for operation and control by contacts, maintenance remote control is not mandatory.

ON/OFF:
-Closing a contact between “**C**” and “**1**” on the terminals block “**ON/OFF**” makes the unit starts. Corresponding LED is lighted in green.
-Closing a contact between “**C**” and “**0**” on the terminals block “**ON/OFF**” makes the unit stops. Corresponding LED is lighted in red.
In case of closing both contacts at the same time, priority is given to “**OFF**”.

⚠ **Note:** on A2 board in versions 01 & 02, “**OFF”** input is also active with system control connected.

HEAT / COOL:
-Closing a contact between “**C**” and “**1**” on the terminals block “**HEAT/COOL**” selects “**HEAT**” mode. Corresponding LED is lighted in red.
-Closing a contact between “**C**” and “**0**” on the terminals block “**HEAT/COOL**” selects “**COOL**” mode. Corresponding LED is lighted in green.
In case of closing both contacts at the same time, priority is given to “**HEAT**”.

⚠ **Note:** on A2 board in versions 01 & 02, “**HEAT**” input is also active with system control connected.

A voltage free change-over contact (use in 24 V max.) is available on **A2** (CWC2) board for remote heat pump alarm signaling.

4.17 HEAT PUMP ALARM SIGNAL FOR SYSTEM CONTROL

Performed by A2 board - see presentation § 3.2.4

Heat pump faults coming from the frigorific circuit are classified in 2 categories:

- **Manual reset faults**:
Memorized by board A2 as soon as they appear and transmitted to the system control. The A2 board alarm light “AL” comes on steady.

- **automatic reset faults**:
The A2 board alarm light “AL” flashes as soon as a fault appear. If it lasts longer than 30 minutes, fault is memorized in board A2 and transmitted to the system control. The alarm light “AL” then remains steady.
The detailed list of faults is indicated in part 5.
To determine the exact nature of the fault, refer to **LED1 & LED2** on the power board A3 or connect the specific maintenance remocon to the heat pump (see Part 6).

PART 5 – SERVICE PROCEDURES

WARNING:
Before carrying out any work on the machine, make sure that its power supply is switched off and the access to it is prevented. Any work must be carried out by personnel qualified and authorized to work on this type of machine.

5-1 FRIGORIFIC CIRCUIT ALARMS

Managed by A3 board and partially by A2 board.

5.1.1 LIST OF ALARMS

(*) see § 5.1.3

Type		Designation	Code	Action	Reset (*)
Serial communication errors & Mis-setting	Maintenance remocon detects error signal from A2 board	-Poor reception of the signal on the maintenance remocon -Auto address not completed	E01	stop	Automatic (then manual)
		-Poor transmission of the signal on the maintenance remocon	E02	stop	Automatic (then manual)
	A2 board detects error signal from remocon	-Poor reception of the signal on A2 board from the maintenance remocon	E03	stop	Automatic (then manual)
	A2 board detects error from A3 board	-Poor reception of the signal on A2 board from the A3 board	E04	stop	Automatic (then manual)
		-Poor transmission of the signal from A2 board to the A3 board	E05	stop	Automatic (then manual)
	A3 board detects error from A2 board	-Poor reception of the signal on A3 board from the A2 board	E06	stop	Automatic (then manual)
		-Poor transmission of the signal from A3 board to A2 board	E07	stop	Automatic (then manual)
	Automatic address setting failed	-Incorrect capacity set in A2 board detected. Too low.	E15	stop	manual
		-Incorrect capacity set in A2 board detected. Too high.	E16	stop	manual
		-A2 board not detected during automatic address sequence	E20	stop	manual
	Mis-wiring	-Mis-wiring between boards -Missing phase on power supply	E22	stop	manual
	Communication trouble	-Communication abnormal (A3 board).	E31	stop	Automatic (then manual)
Sensor failure	Sensor circuit open or short circuit / Sensor failure	-Abnormal sensor for the inlet temp. on the H/E – "liquid line" in cooling - (E1/S7)	F01	stop	Automatic (then manual)
		-Abnormal pressure sensor (E2P/B1) on the H/E -Loss of refrigerant charge	F02	stop	Automatic (then manual)
		-Abnormal sensor for the compressor discharge temperature (TD/S5)	F04	stop	Automatic (then manual)
		-Abnormal sensor for the air heat exchanger temp. (C1/S2)	F06	stop	Automatic (then manual)
		-Abnormal sensor for the air heat exchanger temp. (C2/S1)	F07	stop	Automatic (then manual)
		-Abnormal sensor for outdoor temp. (TO/S4)	F08	stop	Automatic (then manual)
		-Abnormal sensor for water inlet temp. (TW1/S8)	F10	stop	Automatic (then manual)
		-Abnormal sensor for compressor suction temp. (TS/S3)	F12	stop	Automatic (then manual)
Component failure	EEPROM	-Abnormal non-volatile memory (EEPROM) on A2 board.	F29	stop	manual
		-Abnormal non-volatile memory (EEPROM) on A3 board	F31	stop	manual
Mis-setting	Setting error	-Unit type mismatch between A3 and A2 (parameter)	L02	stop	manual
		-No address setting on A2 board	L08	stop	manual
		-No unit capacity setting on A2 board	L09	stop	manual
		-Incorrect capacity setting on A3 board	L10	stop	manual
		-incorrect unit type setting on A2 board	L13	stop	manual
Activation of protective device	A3 board	-High discharge temperature of compressor	P03	stop	manual
		-High refrigerant pressure switch activated (for 257 & 307 units only)	P04	stop	manual
		-Low current on power supply (missing phase or incorrect phases order)	P05	stop	manual
		-No refrigerant	P15	stop	manual
		-Four way valve locked	P19	stop	manual
		-High refrigerant pressure	P20	stop	manual
		-Fan(s) trouble	P22	stop	manual
		-Incorrect current value for compressor (over current on HIC PCB)	P26	stop	manual
		-Incorrect current value for compressor (trouble on motor detection circuit - MDC)	P29	stop	manual
		-Incorrect current value for compressor (overload)	H01	stop	manual

5.1.2 ALARM MESSAGES DISPLAY

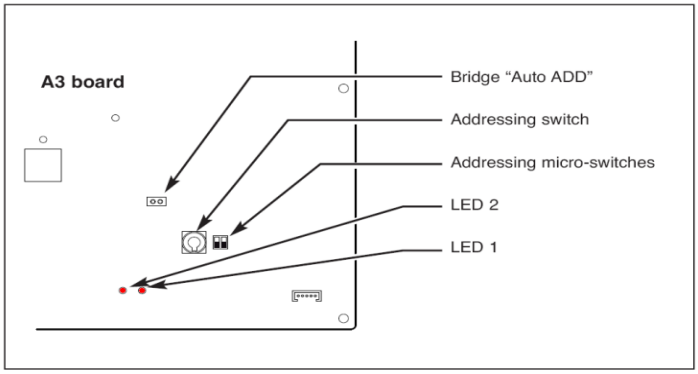
2 ways for reading alarm messages:

-with maintenance remocon connected to A2 board (connector RC). Alarm code is directly displayed. See details PART 6.

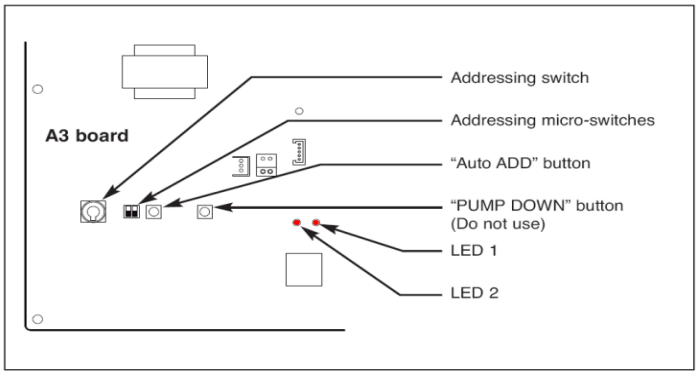
-with LED 1 & LED 2 on A3 board.

LED 1 & LED 2 display:

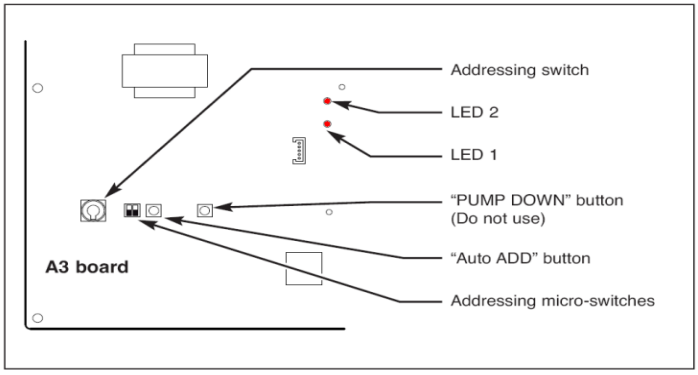
- **PHRIE 095 / PHIE 095 / PHRIE 125 / PHIE 125**



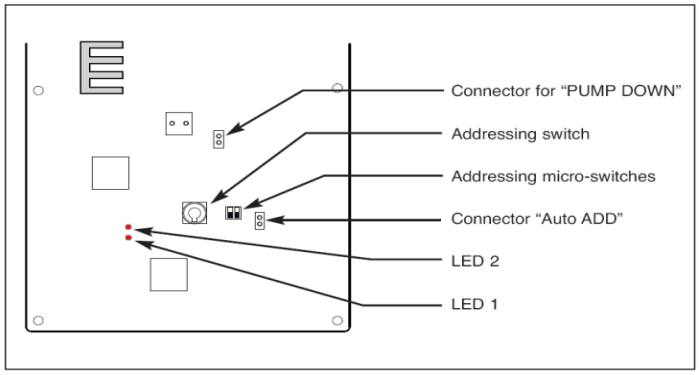
- **PHRIE 155 / PHIE 155 / PHRIE 175 / PHRIE 195**



- **PHRIE 157 / PHIE 157 / PHRIE 177 / PHRIE 197**



- **PHRIE 257 / PHRIE 307**



Alarm Code is composed of two parts. First part is a letter, second part is a number:

The blinking of LED 1 indicates the code letter

LED 1	
Number of Blinks	**Alarm Code Letter**
0	No alarm
2	P
3	H
4	E
5	F
6	L

The blinking of LED 2 indicates the number

LED 2	
Number of Blinks	**Alarm Code Number**
0	No alarm
1	1
2	2
….	….
16	16
17	17

Examples: (other than E15, E16 and E20)

Alarm code	**LED 1** alternately	**LED 2**
P04	Blinks twice = P	Blinks four times = 04
-		
H01	Blinks three times = H	Blinks once = 01
-		
E03	Blinks four times = E	Blinks three times = 03
-		
F07	Blinks five times = F	Blinks seven times = 07
-		
L09	Blinks six times = L	Blinks nine times = 09
-		

LED 1 & 2 – Other indications:

	LED 1	**LED 2**	**Remarks**
Power ON sequence			
Step 1 : no communication A3 / A2	**On**	**On**	
Step 2 : communication received from A2	Off	**On**	
Step 3 : normal communication	Off	Off	
In normal operation			
A3 EEPROM error (F31)	**On**	Blinks (0.5/0.5)	During auto address & initial communication ; then F31 displayed.
Pre trip (insufficient gas)	Blinks (0.25/0.75)	Off	**P03**
Pre-trip (P20 - HP)	Blinks (0.75/0.25)	Off	
Pre-trip (other)	Blinks (0.5/0.5)	Off	
Alarms	Blinks	Blinks	**See details in table before**
Insufficient refrigerant indicator	Blinks (0.5/0.5)	Off	
Refrigerant recovery mode	Blinks (0.5/0.5)	**On**	Not used – only for split heat pumps
Automatic address setting (A3 – A2)			
Automatic address setting in progress	Blinks (0.5/0.5)	Blinks (0.5/0.5)	Blinking alternately
Automatic address setting alarm (E15)	Blinks (0.25/0.75)	Blinks (0.25/0.75)	Blinking simultaneously
Automatic address setting alarm (E20)	Blinks (0.75/0.25)	Blinks (0.75/0.25)	Blinking simultaneously
Automatic address setting (other than E15/E20)	Blinks (0.5/0.5)	Blinks (0.5/0.5)	Blinking simultaneously

Note: blinking (0.25/0.75) means that LED illuminates for 0.25 seconds and then is Off for 0.75 seconds.

5.1.3 ALARMS RESET

Performed by A2 board

Heat pump faults coming from the frigorific circuit are classified in 2 categories:

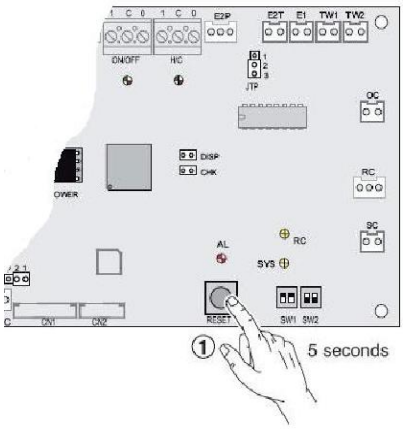
- "**Manual" reset faults**:
Memorized by board A2 as soon as they appear and transmitted to the system control.
The A2 board alarm light "AL" comes on steady.
Heat pump is stopped until alarm is reset.

- "**Automatic" reset faults**:
The A2 board alarm light "AL" flashes as soon as a fault appear. Heat pump is stopped.
If the default lasts less than 30 minutes, alarm is automatically cleared and heat pump starts again.
If it lasts longer than 30 minutes, default is memorized by board A2 and transmitted to the system control.
The alarm light "AL" then comes on steady.
Heat pump is stopped until alarm is reset.

How to reset the alarm:

Note : problem must be solved before final reset action.

Alarm reset by pressing push button « RESET » on A2 board for 5 seconds



Alarm reset by setting the system control in OFF position
See detail in corresponding technical manual

Alarm reset by switching off power supply

This action is recommended in case of problem of setting error (E15, E16, E20, L02, L08, L09, L10, L13) and memory (F29, F31).

5.1.4 SYMPTOMS & PARTS TO INSPECT

Serial communication errors & mis-setting				
Maintenance remocon alarm display	**Alarm contents**	**Judgement conditions**	**clearing condition**	**Judgement and correction**
E01	Maintenance Remocon detected error signal from A2 board	Serial signal receiving failure	Automatic recovery	1. Check remocon connection 2. Check address on A2 board 3. Check A2 board
E02		Serial signal sending failure		
E03	A2 board detected error signal from remocon	Serial signal failure	Automatic recovery	1. Check remocon connection 2. Check remocon configuration (see part 6) 3. Check address on A2 board 4. Check A2 board
E04	A2 board detected error signal from A3 board	Serial signal receiving failure	Automatic recovery	1.Check connection between boards (OC connector) 2. Check addresses – if necessary, launch auto address sequence 3. Check boards
E05		Serial signal sending failure		
E06	A3 board detected error signal from A2 board	Serial signal receiving failure	Automatic recovery Automatic recovery	1. Check connection between boards (OC connector) 2. Check A2 and A3 boards.
E07		Serial signal sending failure		
E15	Automatic address setting failure.	A2 capacity/number parameters (too low)	Power supply reset recovery	1. Check A2 parameters (see Part 6) - if necessary, launch auto address sequence 2. Check connection between boards (OC connector) 3. Check A2 board 4. Check A3 board
E16		A2 capacity/number parameters (too low)		
E20		A3 board cannot receive any serial signals from A2 board.		
E22	Mis-wiring error	Mis-wiring between boards or Missing phase on power supply	Power supply reset recovery	1. Check wiring. 2. Check power supply connections
E31 (*)	Communications trouble within boards	No communication possible with MDC for 3 minutes or longer	Automatic recovery	Check A3 board Refer to diagnosis method (section 5.1.5)

(*) see detail § 5.1.5

Sensors failure

Maintenance remocon alarm display	Alarm contents	Judgement conditions	clearing condition	Judgement and correction
F01	Disconnection, open circuit or short circuit in H/E temp. sensor "liquid line" E1/S7	Open circuit or short circuit	Automatic recovery	1. Check "liquid line" temp. sensor E1/S7 2. Check connection 3. Check A2 board
F02	Abnormal pressure detected in the plate exchanger with E2P/B1 pressure sensor	Value delivered by pressure sensor is out off range	Automatic recovery	1. Check pressure in the frigorific circuit 2. Check connection between E2P and A2 board 3. Check JTP bridge on A2 board, (set between pins 2 & 3" = factory setting) 3. Check U voltage on E2P connector on A2 board, pins 1/3 (24V DC): 20V < U < 26V Right voltage: E2P sensor damaged Wrong voltage: A2 board damaged
F04 (*)	Disconnection, open circuit or short circuit in discharge temperature sensor TD/S5	Sensor detection error (90°C or more after 60 minutes has elapsed since the compressor was halted - open circuit)	Automatic recovery	1. Check discharge temp. sensor TD/S5 2. Check (A3) board Refer to diagnosis method (section 5.1.5)
F06 (*)	Disconnection, open circuit or short circuit in sensor C1/S2	Open circuit or short circuit	Automatic recovery	1. Check Air heat exchanger temperature sensor C1/S2 2. Check A3 board Refer to diagnosis method (section 5.1.5)
F07 (*)	Disconnection, open circuit or short circuit in outdoor unit heat exchanger temp. sensor C2/S1	Open circuit or short circuit	Automatic recovery	1. Check Air heat exchanger temperature sensor C2/S1 2. Check A3 board Refer to diagnosis method (section 5.1.5)
F08 (*)	Disconnection, open circuit or short circuit in sensor TO/S4	Open circuit or short circuit	Automatic recovery	1. Check outdoor air temp. sensor TO/S4 2. Check (A3) board Refer to diagnosis method (section 5.1.5)
F10	Disconnection, open circuit or short circuit in water inlet temp. sensor TW1/S8	Open circuit or short circuit	Automatic recovery	1. Check water inlet temp. sensor TW1/S8 2. Check (A2/CWC2) board
F12 (*)	Disconnection, open circuit or short circuit in suction temp. sensor TS/S3	Open circuit or short circuit	Automatic recovery	1. Check suction temp. sensor TS/S3 2. Check A3 board Refer to diagnosis method (section 5.1.5)
F29	EEPROM trouble on A2 board	Reading/writing failure	Power supply reset recovery	1. Check EEPROM of A2 board 2. Check A2 board
F31	EEPROM trouble on A3 board	Reading/writing failure	Power supply reset recovery	1. Check EEPROM of A3 board 2. Check A3 board

(*) see detail § 5.1.5

Mis-setting

Maintenance remocon alarm display	Alarm contents	Judgement conditions	clearing condition	Judgement and correction
L02	A2 and A3 boards settings are incompatible	A2 board judged incompatible with A3 board (wrong spare part or wrong parameters setting)	Power reset recovery	1. Check setting parameters in the EEPROM of A2 2. Check A2 board 3. Check setting parameters in the EEPROM of A3
L08	Settings failure	Incorrect address in EEPROM of A2 board.	Power reset recovery	Check address setting in the EEPROM of A2 board
L09	Settings failure	Incorrect capacity in EEPROM of A2 board.	Power reset recovery	Check capacity setting in the EEPROM of A2 board
L10	Settings failure	Capacity not set in EEPROM of A3 board	Power reset recovery	Check capacity setting in the EEPROM of A3 board
L13	Settings failure	A3 and A2 board types of unit judged incompatible (wrong spare part or wrong parameters setting)	Automatic recovery	1. Check setting parameters in the EEPROM of A2 2. Check A2 board 3. Check setting parameters in the EEPROM of A3 4. Check A3 board

Activation of protective device				
Maintenance remocon alarm display	**Alarm contents**	**Judgement conditions**	**clearing condition**	**Judgement and correction**
P03	Abnormal discharge temperature: Discharge temp. detected at or above specified value	• Discharge temp. TD exceeds X°C X = 111°C : For models 095/125/127/155/157/175/177/195/197 X = 115°C: for models 257/307 • Alarm after 4 consecutive pre-trips	Recovery at restart	1. Check refrigerant circuit (leakage) 2. Check electronic expansion valve 3. Check discharge temperature sensor TD/S5
P04	High refrigerant pressure (switch) *Only for units 257/307*	High refrigerant pressure switch activated Threshold = 41.5 bars	Recovery at restart	Check A3 control board
P05	• Missing phase or incorrect phases order (for three-phase models) or AC power supply error • Current Transformer disconnected	•Current value transmitted to A3 board is low or the phases are not in correct order (for three-phase models) When no AC power input for more than 3 minutes: alarm after 5 consecutive pre-trips	Recovery at restart	1.Check power supply and phases order 2.Check current transformer connection 3.Check HIC 4.Check A3 board
P15	Insufficient refrigerant detected.	• Discharge temperature TD is 95°C or higher (100°C for models 257/307) • Electronic expansion valve is at Step 480 (Step 960 for models 257/307). • The current value from the MDC module is 2.0A or less (6A or less for models 257/307). When the above conditions has continued for 1 minute	Recovery at restart	1.Check refrigerant circuit (leakage) 2.Check electronic expansion valve
P19	4-way valve trouble: Judged after 5 minutes had elapsed since the compressor was switched on	•Water heat exchanger temperature drops even though compressor is switched on during the heating mode. [min(E1,E2P)] is 10°C or lower. •Water heat exchanger temperature rises even though compressor is switched on during cooling mode. E2P is 50°C or higher. •Alarm after 2 consecutive pre-trips	Recovery at restart	1. Check 4-way valve 2. Check 4-way valve wiring 3. Check position of sensors E1 & C1 4. Check A3 board
P20	High-pressure protection error caused by cooling high-load max (C1/S2, C2/S1) temperature	• Air H/E temperature exceeds X°C X = 64°C: for 095/125/257/307 X = 61°C: for 155/157/175/177/195/197 • Alarm after 10 consecutive pre-trips: for 095/125/155/157/175/177/195/197 • Alarm after 4 consecutive pre-trips: For 257/307	Recovery at restart	1. Check cleanliness of air H/E 2. Check refrigerant amount 3. Check sensors C1/S2 and C2/S1
P22 (*)	Fan motor trouble: fan inverter protection circuit was activated, or lock was detected on fan motor	Inverter stops after fault is detected Alarm after 4 consecutive pre-trips	Recovery at restart	Fan motor over current protection circuit is activated: • Check A3 board • Check fan Refer to diagnosis method (section 5.1.5)
P26 (*)	Comp. inverter protection circuit was activated. Short-circuit on HIC board (Short time: 0.8 seconds or less) HIC temperature protection	Inverter stops after fault is detected Alarm after 4 consecutive pre-trips	Recovery at restart Temp. dropped	1. Check HIC board • Wiring trouble • HIC failure • Contact trouble – heat sink 2. Check compressor Refer to diagnosis method (section 5.1.5)
P29 (*)	Error in current detection circuit: • AC current value is high, even while compressor is halted.	Inverter halted after fault detected Alarm after 4 consecutive pre-trips	Recovery at restart	1. Check HIC board (& diode bridge) 2. Check compressor Refer to diagnosis method (section 5.1.5)

(*) see detail § 5.1.5

Activation of protective device

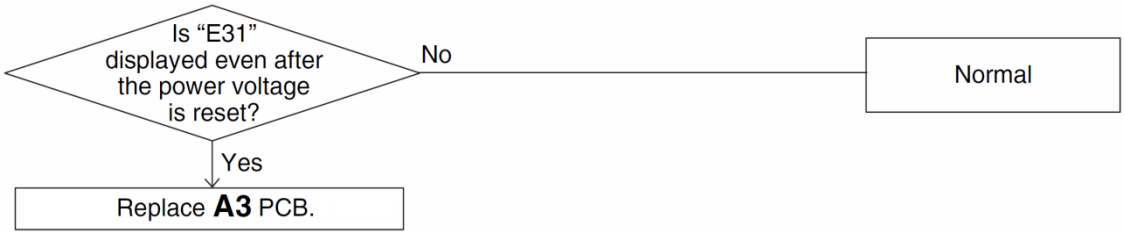
Maintenance remocon alarm display	Alarm contents	Judgement conditions	clearing condition	Judgement and correction
H01	Over-current error	Inverter stops after fault is detected.	Recovery at restart	1.Refrigerant cycle abnormal overload operations 2.Screws connecting the HIC circuit between the heat sink (HIC radiator) are loose 3.Faulty cooling of heat sink (HIC) 4.Check A3 PCB wiring

A3 board power supply

Maintenance remocon alarm display	Alarm contents	Judgement conditions	clearing condition	Judgement and correction
No display!	**"Power" LED off** Problem of power supply on A3 board	Unit does not operate No alarm displayed	Recovery at restart	1.Check power supply on board 2.Check board wiring 3.Check fan(s) 4.Check expansion & 4 ways valves 5.Check A3 board

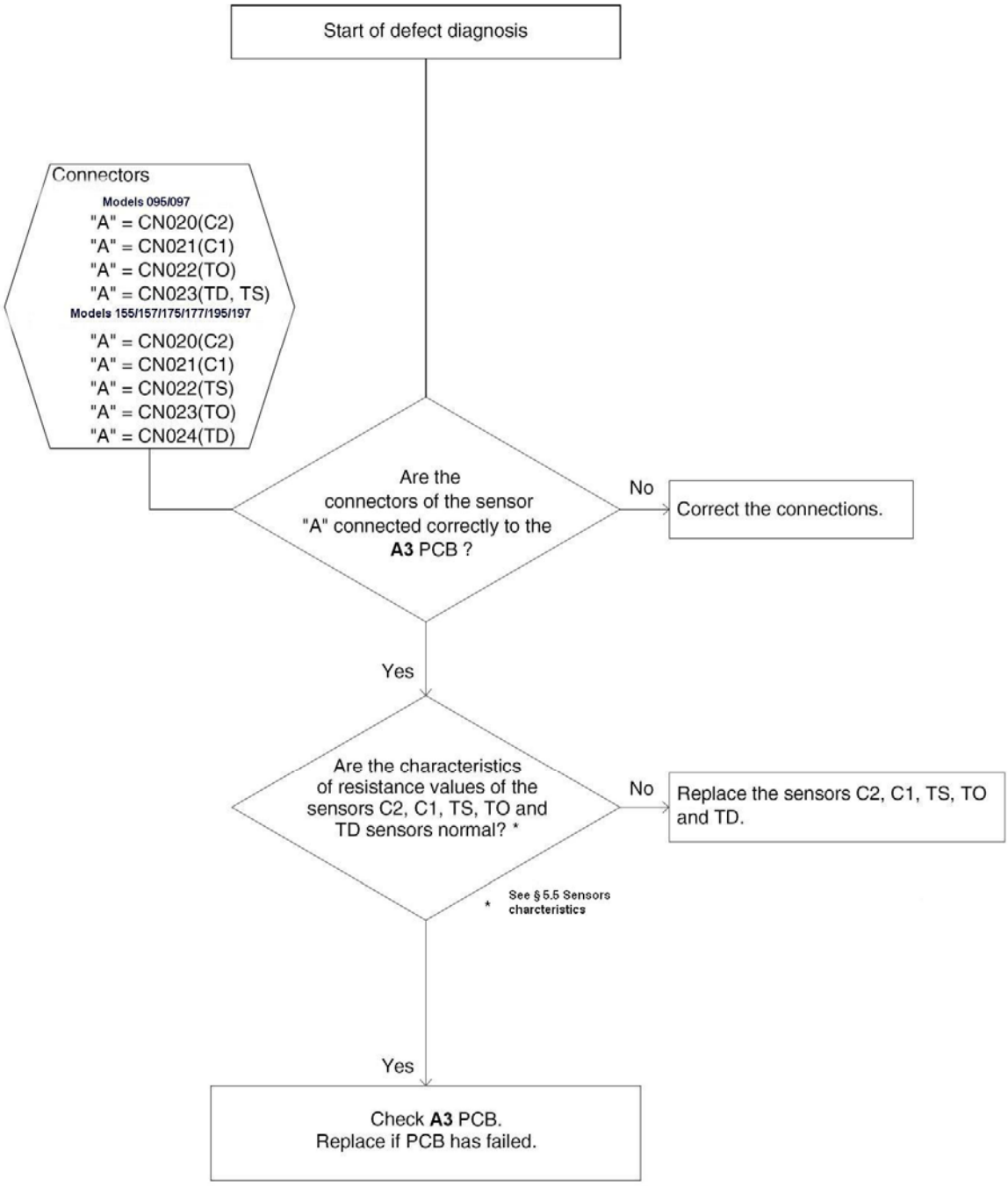
5.1.5 ALARM DIAGNOSIS: “E31”-“F04”-“F06”-“F07”-“F08”-“F12”-“P22”-“P26”-“P29”

[Alarm “E31”]
(communications trouble)



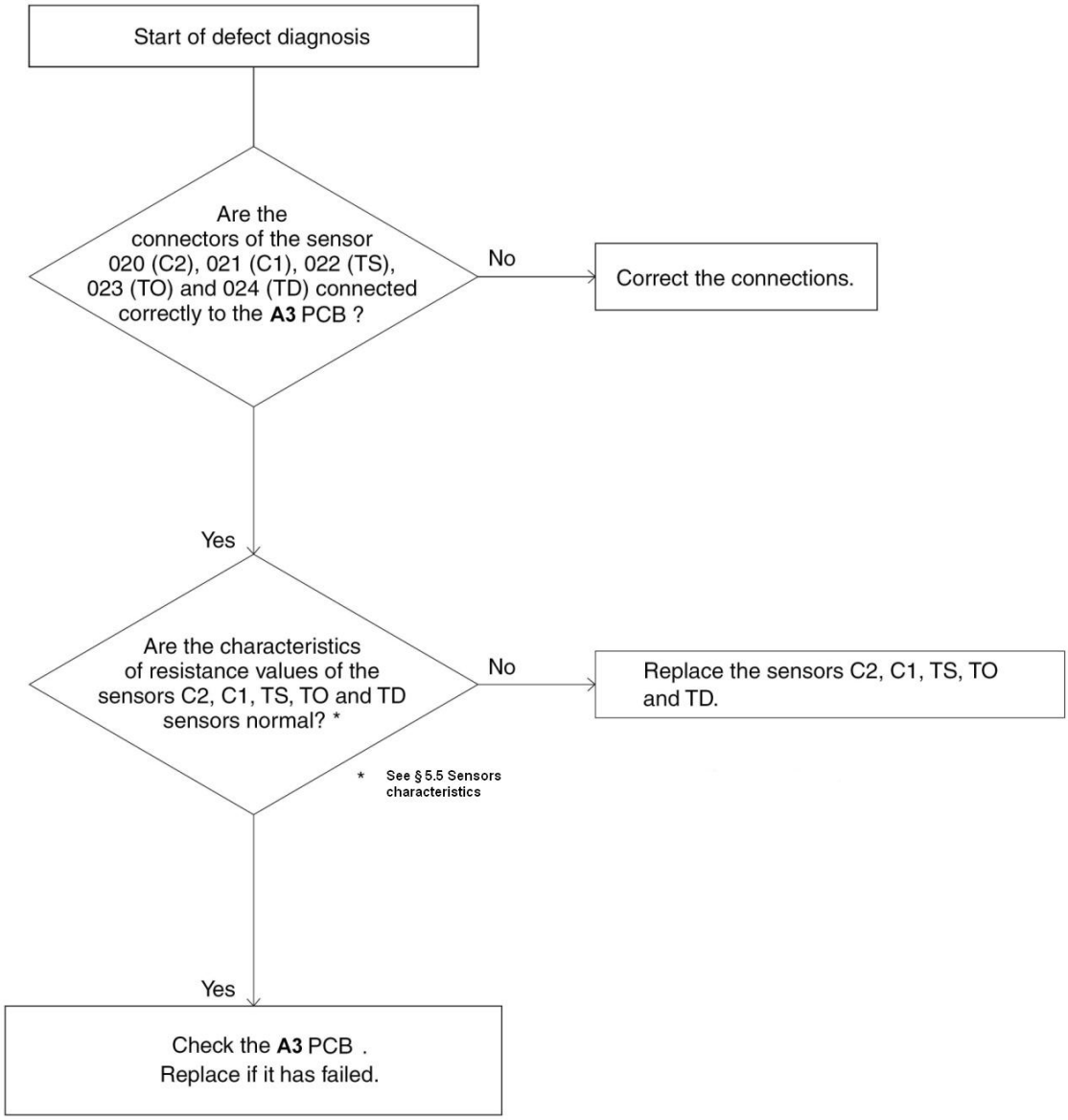
For models 095/125/155/157/175/177/195/197:

[Alarms “F04,” “F06,” “F07,” “F08,” “F12,”]———Sensor trouble



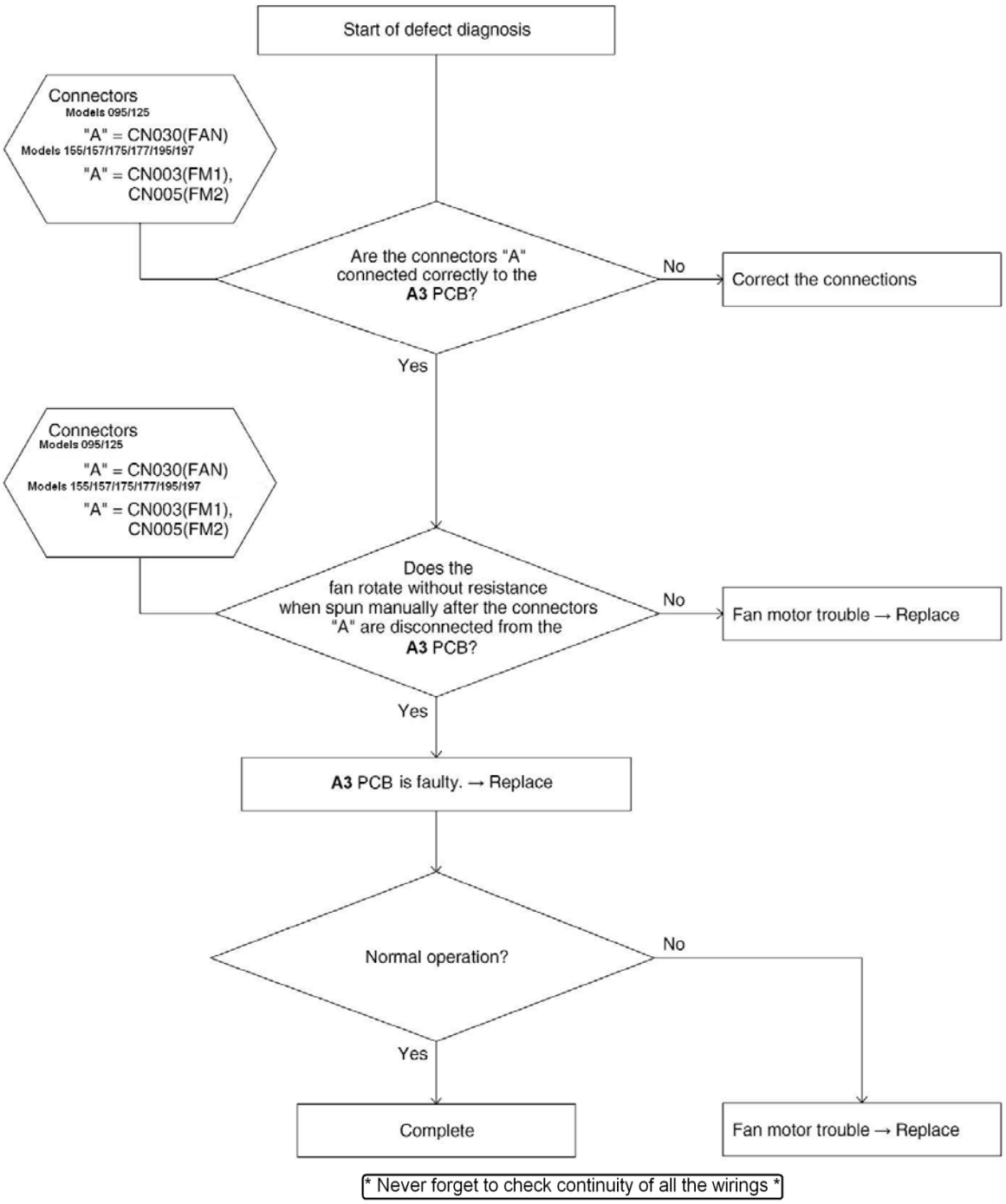
For models 257/307

[Alarms "F04," "F06," "F07," "F08," "F12"] ——— Sensor trouble



For models 095/125/155/157/175/177/195/197:

[Alarm "P22"] ——— Outdoor unit fan motor drive circuit trouble



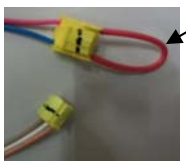
Note about built-in fan motor power supply circuit checking:

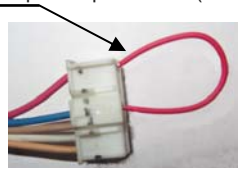
Must be done with unit power suplly switched off.

Normally fan rotates without resistance.

After having unplugged fan connector(s) from A3 board, connect a jumper on power line (blue and red wires) as shown below.

Models 155/157/175/177/195/197



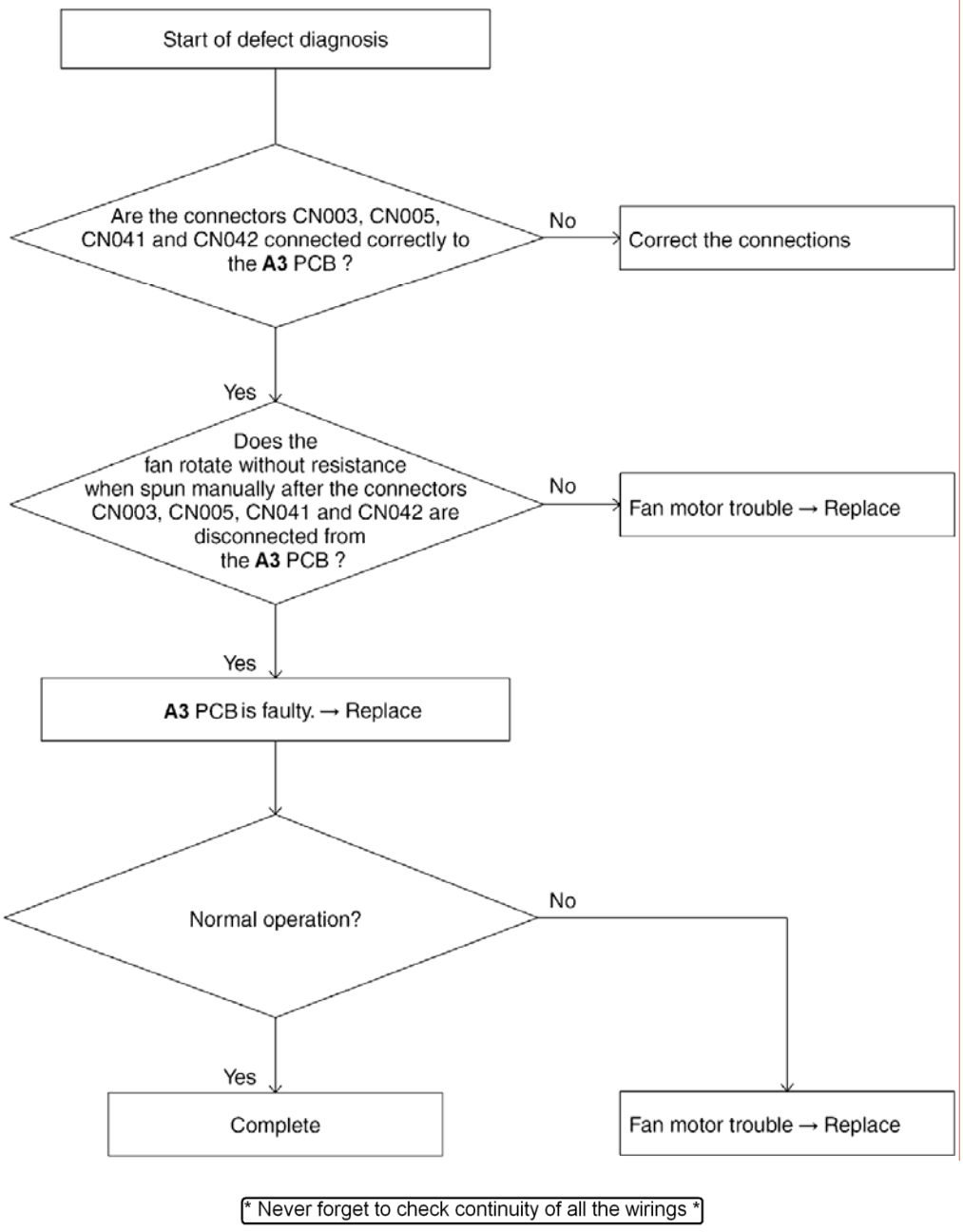


Models 095 / 125

Then rotate manually the fan; if fan motor built-in power circuit is OK, a light resistance must be felt. This resistance disappears when jumper is taken out.

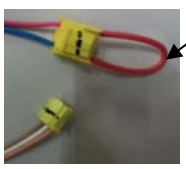
For models 257/307

[Alarm "P22"] ——— Outdoor unit fan motor drive circuit trouble



* Never forget to check continuity of all the wirings *

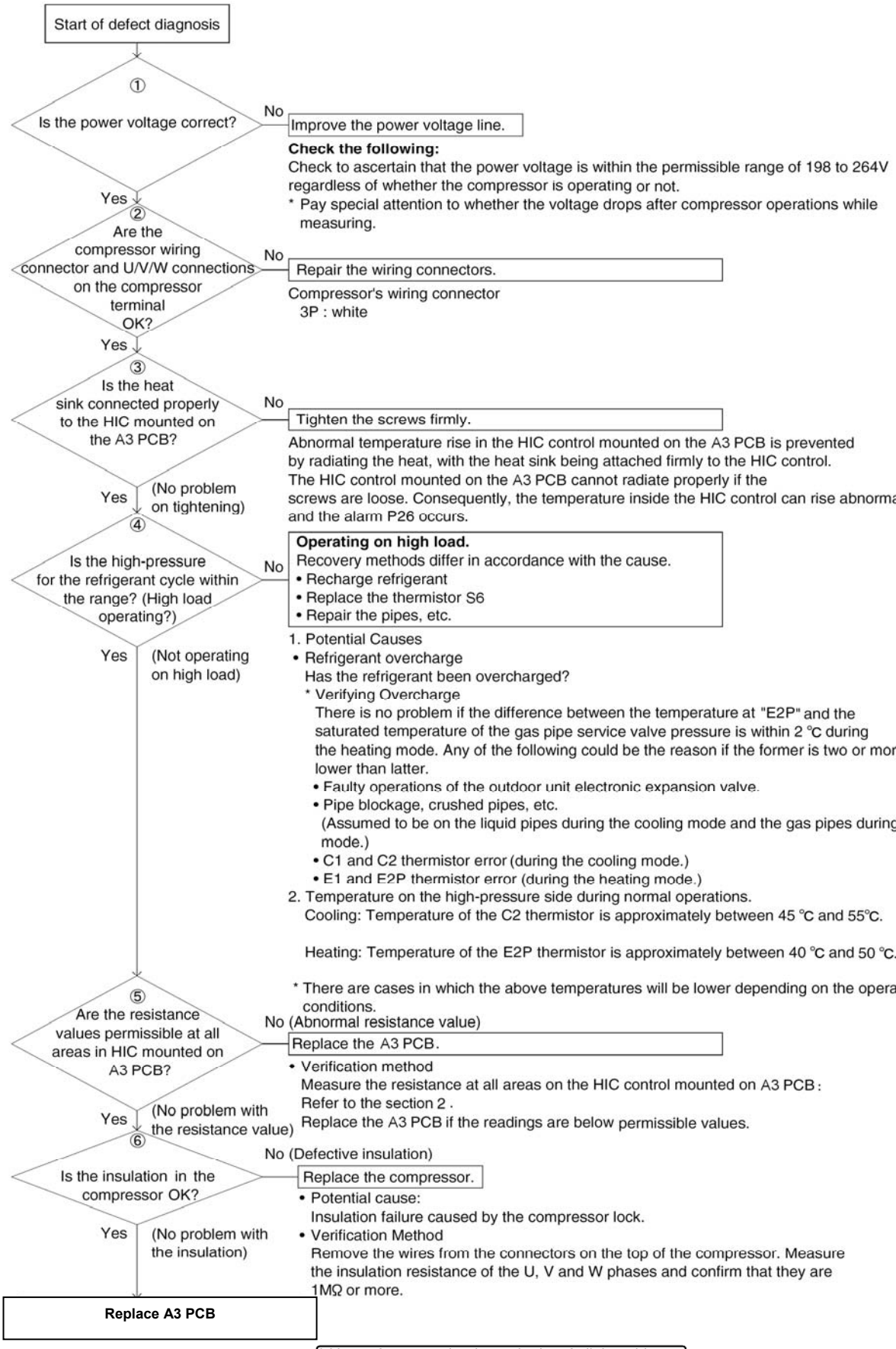
Note about built-in fan motor power supply circuit checking:
Must be done with unit power suplly switched off.
Normally fan rotates without resistance.
After having unplugged fan connectors from A3 board, connect a jumper on power line (blue and red wires) as shown below.



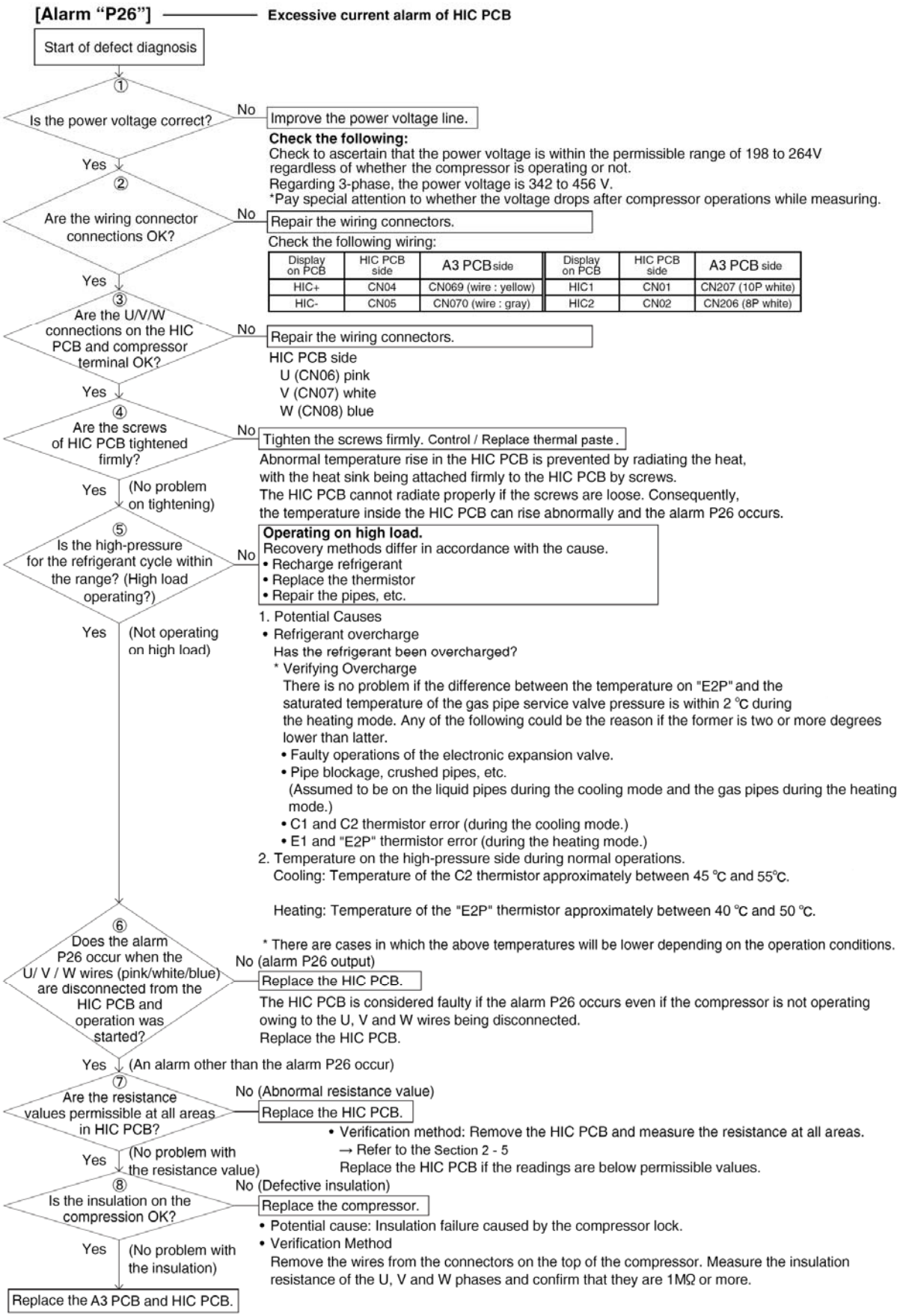
Then rotate manually the fan; if fan motor built-in power circuit is OK, a light resistance must be felt. This resistance disappears when jumper is taken out.

For models 095/125

[Alarm "P26"] Excessive current alarm of HIC Control Mounted on A3 PCB



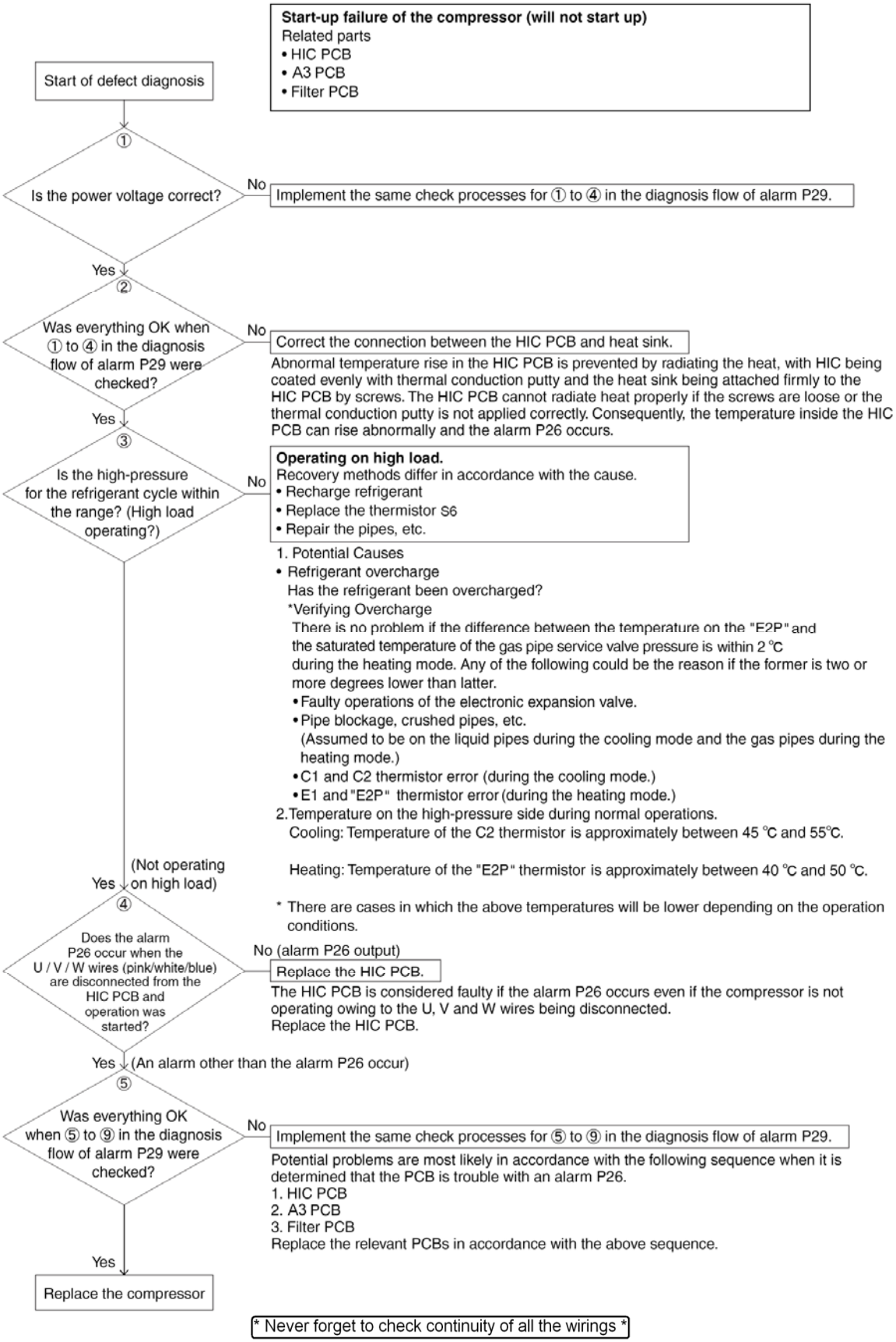
For models 155/157/175/177/195/197



* Never forget to check continuity of all the wirings *

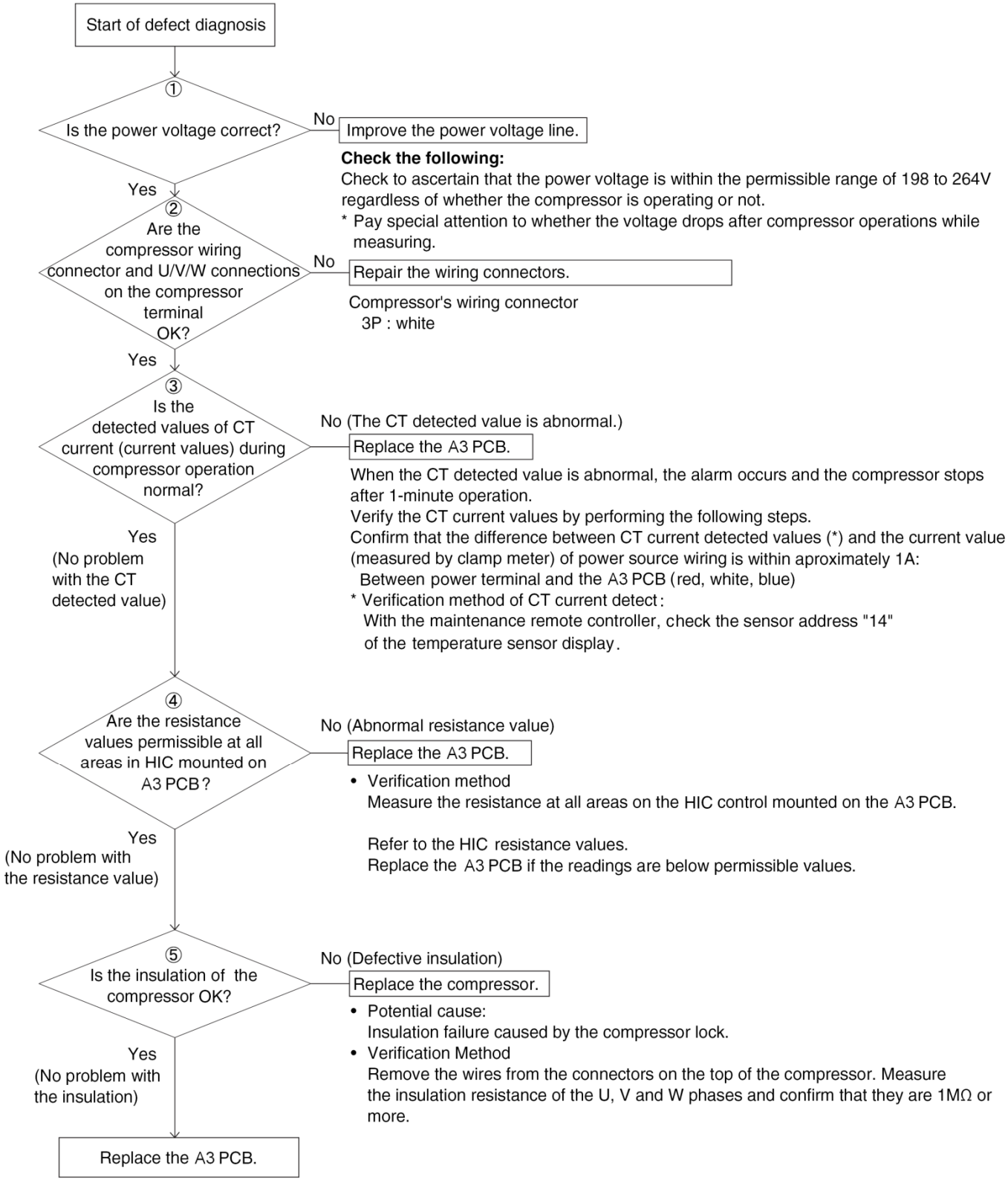
For models 257/307

[Alarm "P26"]

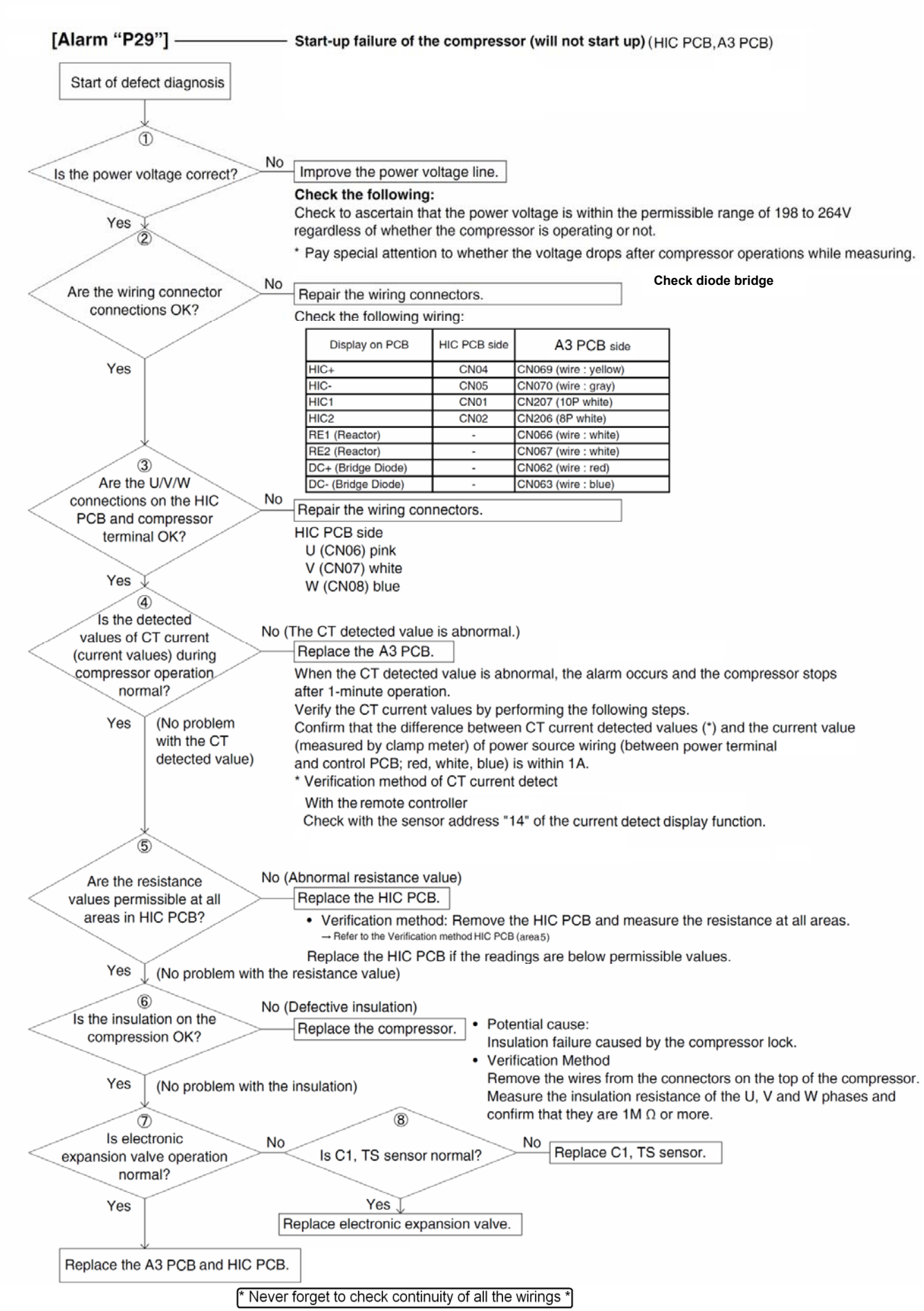


For models 095/125

[Alarm "P29"] ——————— Start-up failure of the compressor (will not start up)



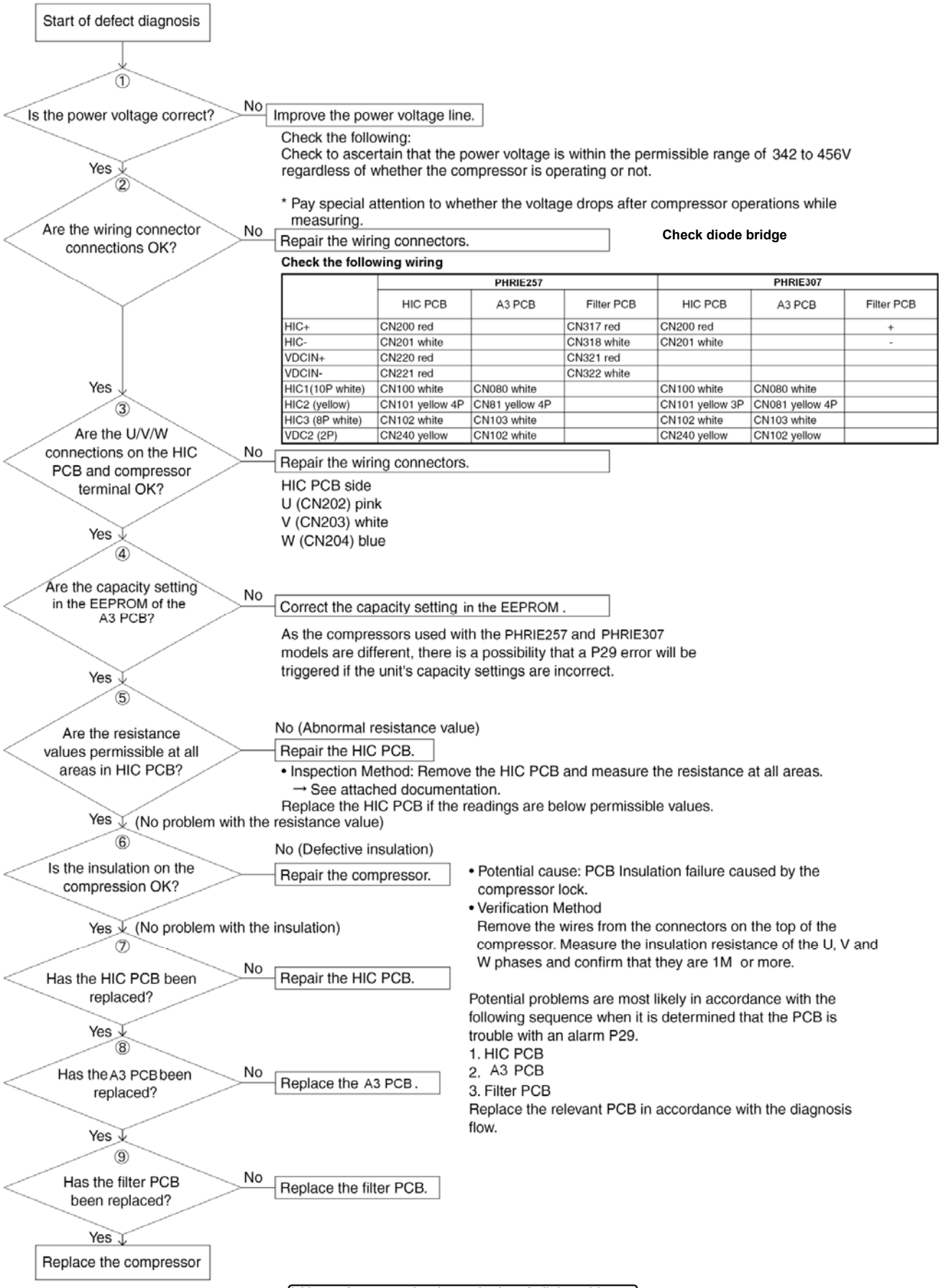
For models 155/157/175/177/195/197



Display on PCB	HIC PCB side	A3 PCB side
HIC+	CN04	CN069 (wire : yellow)
HIC-	CN05	CN070 (wire : gray)
HIC1	CN01	CN207 (10P white)
HIC2	CN02	CN206 (8P white)
RE1 (Reactor)	-	CN066 (wire : white)
RE2 (Reactor)	-	CN067 (wire : white)
DC+ (Bridge Diode)	-	CN062 (wire : red)
DC- (Bridge Diode)	-	CN063 (wire : blue)

For models 257/307

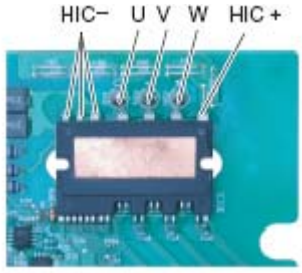
[Alarm "P29"] ———— Start-up failure of the compressor (will not start up)



	PHRIE257			PHRIE307		
	HIC PCB	A3 PCB	Filter PCB	HIC PCB	A3 PCB	Filter PCB
HIC+	CN200 red		CN317 red	CN200 red		+
HIC-	CN201 white		CN318 white	CN201 white		-
VDCIN+	CN220 red		CN321 red			
VDCIN-	CN221 red		CN322 white			
HIC1(10P white)	CN100 white	CN080 white		CN100 white	CN080 white	
HIC2 (yellow)	CN101 yellow 4P	CN81 yellow 4P		CN101 yellow 3P	CN081 yellow 4P	
HIC3 (8P white)	CN102 white	CN103 white		CN102 white	CN103 white	
VDC2 (2P)	CN240 yellow	CN102 white		CN240 yellow	CN102 yellow	

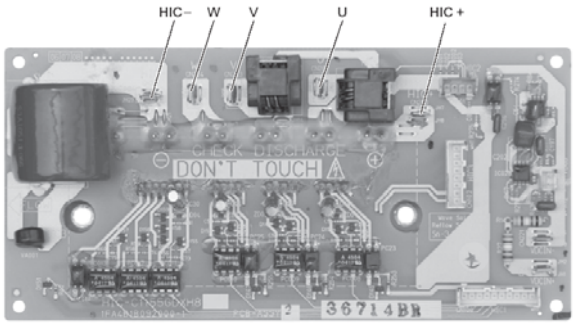
5.1.6 HIC (Hybrid Integrated Circuit) BOARD CHECKING

Models 095/125:
HIC is included on A3 PCB



Models 157/177/197:

Models 257/307:



Resistance Common use

Between terminals		Resistance	Between terminals		Resistance
Tester terminal (+)	Tester terminal (-)		Tester terminal (+)	Tester terminal (-)	
HIC +	HIC –	5 kΩ ~ 10 kΩ	HIC –	HIC +	100 kΩ ~ ∞ Ω
HIC +	U	1 kΩ ~ 5 kΩ	HIC –	U	100 kΩ ~ ∞ Ω
HIC +	V	1 kΩ ~ 5 kΩ	HIC –	V	100 kΩ ~ ∞ Ω
HIC +	W	1 kΩ ~ 5 kΩ	HIC –	W	100 kΩ ~ ∞ Ω

Resistance Common use in reversed tester measuring terminal

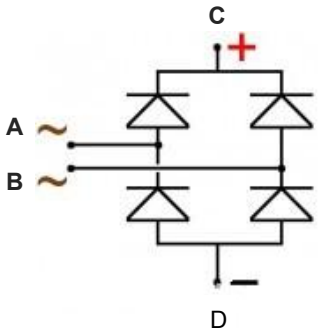
Between terminals		Resistance	Between terminals		Resistance
Tester terminal (-)	Tester terminal (+)		Tester terminal (-)	Tester terminal (+)	
HIC +	HIC –	100 kΩ ~ ∞ Ω	HIC –	HIC +	100 kΩ ~ ∞ Ω
HIC +	U	100 kΩ ~ ∞ Ω	HIC –	U	1 kΩ ~ 5 kΩ
HIC +	V	100 kΩ ~ ∞ Ω	HIC –	V	1 kΩ ~ 5 kΩ
HIC +	W	100 kΩ ~ ∞ Ω	HIC –	W	1 kΩ ~ 5 kΩ

* Be sure to measure by an analog tester.
* The table shows the value measured in kΩ.

5.1.7 DIODE BRIDGE CHECKING

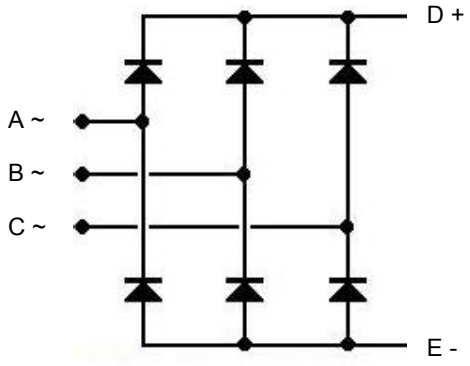
Use multimeter in position “diode test”

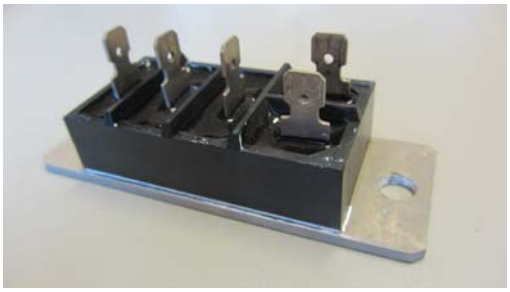
- **Single phase**



Between terminals		Junction forward voltage drop
Tester terminal +	Tester terminal -	
A ~	C+	0.5 to 0.7
A ~	D-	OL
B~	C+	0.5 to 0.7
B~	D-	OL
C+	A ~	OL
C+	B~	OL
D-	A ~	0.5 to 0.7
D-	B~	0.5 to 0.7

- **Three phases**





Between terminals		Junction forward voltage drop
Tester terminal +	Tester terminal -	
A ~	D+	0.5 to 0.7
A ~	E-	OL
B~	D+	0.5 to 0.7
B~	E-	OL
C~	D+	0.5 to 0.7
C~	E-	OL
D+	A ~	OL
D+	B~	OL
D+	C~	OL
D-	A ~	0.5 to 0.7
D-	B~	0.5 to 0.7
D-	C~	0.5 to 0.7

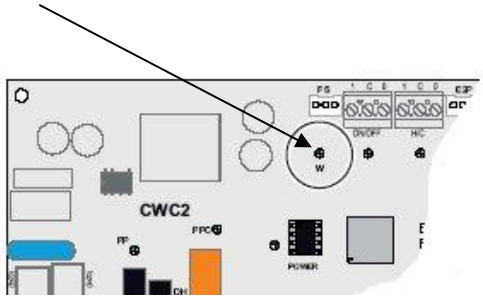
5-2 HYDRAULIC CIRCUIT ALARMS

Managed by A2 board.
Note: This kind of alarm can not be displayed by the maintenance remote control.

5.2.1 LIST OF ALARMS

Type		Designation	LED	Action	Reset(**)
Activation of protective device	**A2 board**	-No water flow	**W Slow flashes (once a second)**	Stop	Automatic then Manual
		-Low water temperature on H/E outlet detected by TW2 (S9)	**W Quick flashes (twice a second)**	Stop	Automatic then Manual
Sensor failure	**Sensor circuit open or short circuit / Sensor failure**	-Abnormal sensor for water outlet temp. (TW2 / S9)	**W flickering**	Stop	Automatic then Manual

The alarms are signalled by means of LED “W” on A2 board.



5.2.2 ALARMS RESET

Water flow default:
When the circulating pump is in operation, a lack of water flow longer than 10 seconds will cause the heat pump to stop. The alarm light "**AL**" flashes.
If the lack of water flow continues for more than one minute (or if it happens more than 3 in the last hour), the water flow fault is stored in A2 memory:
- The alarm light "**AL**" then remains on steady; the "**W**" water flow light flashes (once a second).
- The flow alarm has to be sent to the system, for that, **the micro-switch sW1-2 must be set to "on"**.

⚠ - On A2 boards version 00 the circulating pump stops. On A2 boards versions 01 & 02, the water circulating pump remains operating.

The alarm is reset by pressing the "**reset**" button, or turning the system "**OFF**", or by disconnecting the power

Low water temperature on H/E outlet:

⚠ **Note: this function is available only on A2 board in version 02.**

This alarm is detected by the TW2 sensor at the heat pump exchanger water outlet.
It is generated and stops the heat pump if the heat pump exchanger outgoing water temperature goes below a threshold in the following cases:
- In heat mode, during defrost exclusively, if the temperature is below 16°C.
- In cool mode if the temperature is below 4°C.

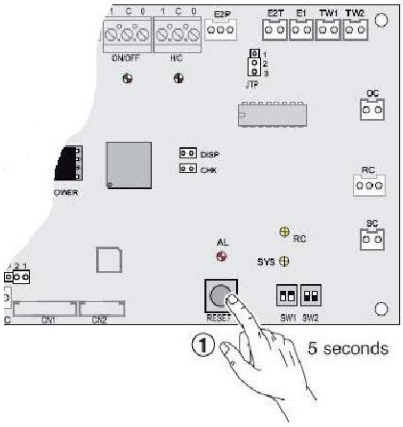
This alarm is reset automatically (with a re-set differential on the threshold of + 4 K) for the first 3 events occurred the previous hour. The "**W**" light of the CWC2 board flashes according to a specific rate (twice a second) to signal this alarm. The "**AL**" light of the CWC2 board also flashes to signal this heat pump alarm in "**automatic**" phase.
If a 4th event occurs within the hour, the alarm is saved and goes to manual reset. The "**AL**" light of the CWC2 board remains steady to signal this heat pump alarm in "**manual**" phase. The alarm saved is transmitted to the system. To help in troubleshooting of this alarm, the "**W**" light continues to flash according to the specific rate until the alarm is reset.
On alarm reset, the "**W**" light resumes the state of the water flow input.

TW2 sensor fault:
When a sensor fault is detected, the heat pump stops and the "**AL**" light of the CWC2 board flashes during the automatic reset phase. The "**W**" light of the CWC2 board flashes very quickly (flickers) to signal this alarm.
If the sensor fault persists, the alarm is saved after 30 minutes and goes into manual reset. The "**AL**" light of the CWC2 board remains steady to signal this heat pump alarm in "**manual**" phase. The alarm saved is transmitted to the system. To help in troubleshooting of this alarm, the "**W**" light continues to flicker until the alarm is reset.
On alarm reset, the "**W**" light resumes the state of the water flow input.

How to reset the alarm:

Note : problem must be solved before final reset action.

Alarm reset by pressing push button « RESET » on A2 board for 5 seconds



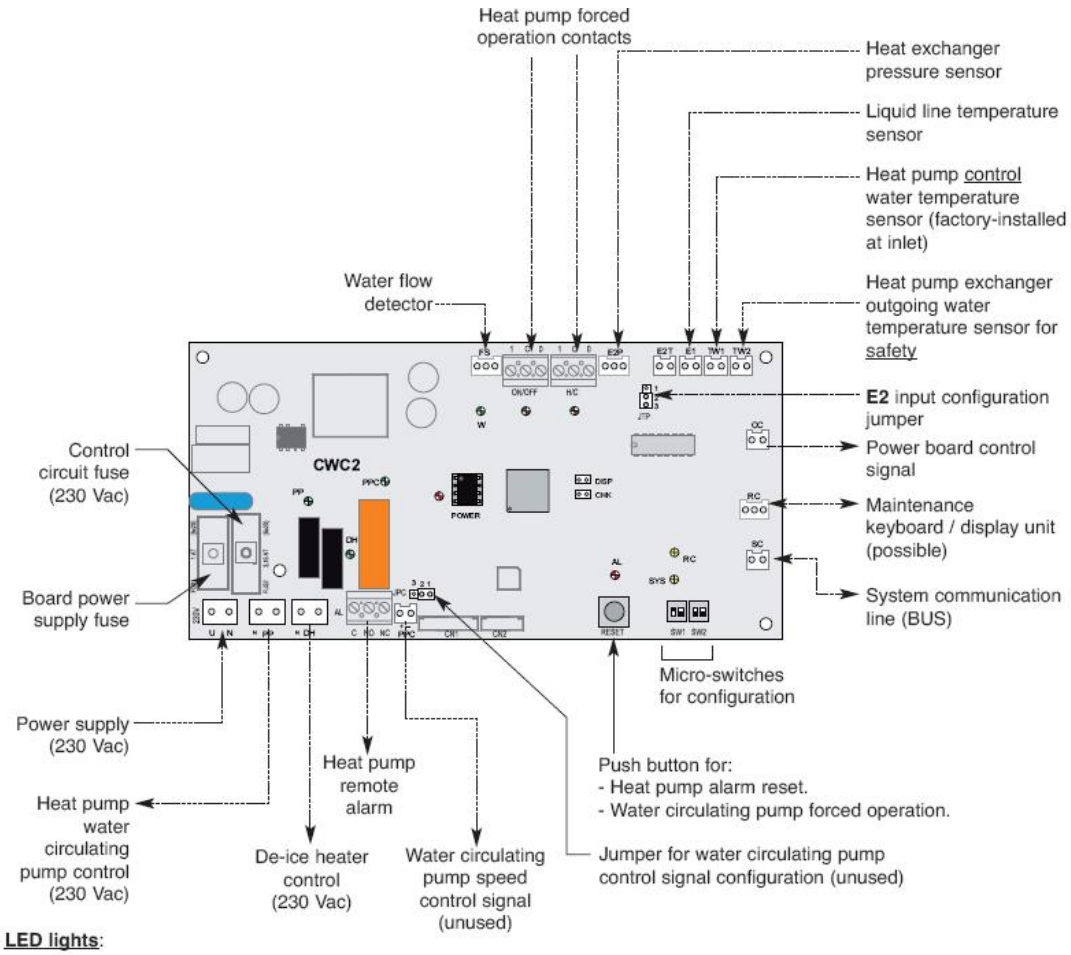
Alarm reset by setting the system control in OFF position
See detail in corresponding technical manual

Alarm reset by switching off power supply

5.2.3 SYMPTOMS & PARTS TO INSPECT

Hydraulic circuit defaults				
alarm display LED W on A2	**Alarm contents**	**Judgement conditions**	**clearing condition**	**Judgement and correction**
Slow flashes (1/sec)	Water flow default in heat pump	No water flow detected by flow switch Manual reset if default lasts more than 1 mn or happens more than 3 times in a hour	Recovery at restart	1.Check water circulating pump operation 2. Check that circuit valves are open 3. Check water circuit filter 4. Check water circuit pressure 5. Check flow switch (see §2.3.2)
Quick flashes (2/sec)	Low water temperature on Heat Exchanger outlet	In defrost, temperature detected by TW2 sensor is below 16°C In cooling mode, temperature detected by TW2 sensor is below 4°C Manual reset if default happens more than 3 times in a hour	Recovery at restart	1.Check water volume of the circuit (could be too low) 2.Check water flow in heat pump: • Water flow adjustment on circulating pump (see § 2.3.1) • Position of valves on circuit • Water circuit filter cleanliness
Flickering	Disconnection, open circuit or short circuit in water temperature sensor TW2/S9	Open circuit or short circuit Manual reset if default lasts more than 30 mn	Recovery at restart	1. Check temperature sensor TW2 2. Check A2 board Refer to diagnosis method (section 5.4)

5.2.4 A2 BOARD CHECKING



LED lights:

Power	: Supply.
PPC	: Water circulating pump speed control signal.
PP	: Water circulating pump control.
DH	: De-ice heater control.
W	: Water flow.
ON/OFF	: Forced operation status.
H/C	: Forced operation status.
AL	: Heat pump alarm.
SYS	: System communication line (BUS).
RC	: Maintenance keyboard / display.

Power supply :

-main power supply 230Vac on terminals “U/N”
-red LED “Power” lighted
-fuses

A2 board generates 3 control power supplies:

- Supply 24Vdc :
  Can be checked on connector “E2P” (with no connection) – terminals 1/3: 20 <U< 26Vdc
- Supply 12Vdc :
  Can be checked on terminals block “ON/OFF” (not wired) – terminals “C/0”: 10 <U< 16Vdc
- Supply 5Vdc regulated:
  on connector “TW2” (not wired): 4.5 <U< 5.5Vdc

Communication lines:

-connector “SC” (system communication line) : 10 <U< 15Vdc
yellow LED lighted (glittering when communication)
-connector “RC” (Maintenance display) : terminals 1/3: 16 <U< 24Vdc
yellow LED lighted
-connector “OC” (frigorific circuit power board control) : not connected U = 0.5Vdc

Sensors:

-temperature values displayed on maintenance remote control
-resistance value of temperature sensors – see tables § 5.5

Note: for input “E2P”, measured value is a pressure signal (coming from pressure sensor 0-50b 4/20mA) which is converted by A2 board in an equivalent temperature (displayed on maintenance remote control)
Pressure sensor power supply 24Vdc nominal:
on connector “E2P” (with no connection) – terminals 1/3: 20 <U< 26Vdc

Input:

-flow switch “FS”: status according green LED “W”
-with flow switch disconnected: terminals 1/3: 10 <U< 16Vdc

Outputs:

-forcing water pump operation: green LED PP lighted (blinking)
+ 230Vac on connector “PP” (pump ctrl output)

Configuration:

-A2 board code (indicated on identification label): code 2220127 + board revision
-software version: see parameter P85 with system remote control box
-position of jumpers & switches

5-3 SYSTEM CONTROL ALARMS

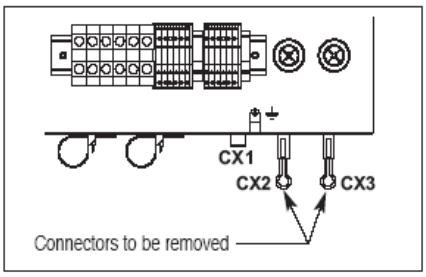
⚠ **For details, please refer to the specific System Service Manual 1012212**

Note: This kind of alarm can not be displayed by the maintenance remote control.

For applications with electric support heater, system control part is managed by A1 board in the heat pump.

For Boiler Back-up application, system control part is managed by the board installed in the cabinet of the specific control kit. So, system control board A1 mounted in the heat pump must be deactivated:

(1) The system control electronic board and the electric support heater built into the heat pump must be deactivated. To do this, with the device switched off, remove the connectors **CX2** and **CX3** at the bottom of the plate.



(2) The water temperature of the system is controlled with respect to the outgoing water of the heat pump.
The heat pump control water temperature sensor is connected to the "**TW1**" output of the **CWC2** control board (item **A2**) of the heat pump.
This sensor should be placed at the heat pump water outlet.

5.3.1 LIST OF ALARMS

Specific system alarms messages are displayed by the remote system control box:

See complete list in System Service Manual 1012212.

Here below the system control alarms list concerning the heat pump itself

Sensors failure				
System ctrl box alarm display	**Alarm contents**	**Judgement conditions**	**clearing condition**	**Judgement and correction**
SEin	Disconnection, open circuit or short circuit in system water inlet temperature S11	Open circuit or short circuit	Automatic recovery	1. Check water inlet temperature sensor S11 2. Check connection 3. Check A1 board
SEOu	Disconnection, open circuit or short circuit in system water outlet temperature S12	Open circuit or short circuit	Automatic recovery	1. Check water outlet temperature sensor S12 2. Check connection 3. Check A1 board
SAE	Disconnection, open circuit or short circuit in system outdoor temperature S13	Open circuit or short circuit	Automatic recovery	1. Check outdoor temperature sensor S13 2. Check connection 3. Check A1 board

Heat pump defaults				
System ctrl box alarm display	**Alarm contents**	**Judgement conditions**	**clearing condition on system**	**Judgement and correction**
Gr	Synthetic heat pump alarm transmitted to system control	See § 5.1 & 5.2	Manual reset	See § 5.1 & 5.2
HE	Electric support heater default	• Water pressure in heat pump circuit too low • Safety thermostats on heater activated (80°C for auto reset 115°C for manual reset)	Automatic recovery	1. Check water pressure in heat pump circuit 2. Check water flow in heat pump circuit 3. Check thermostats and their connection **! Important !: in case of manual reset thermostat action, check carefully if any components (insulation, heater,...) have been damaged.** **Replace parts if necessary.** **Check also the operation of the automatic reset thermostat.**
FL	Water flow default in heat pump	See § 5.2	Manual reset	See § 5.2
Cn	System communication failure	Communication line between A1 & A2 board defective	Automatic recovery	1. Check wiring and connections” 2. Check line supply (LED “SC” on A2 /LED” C” on A1lighted glittering) 3. Check system configuration (parameters) 4. Check board A2 5. Check board A1

5.3.2 ALARMS RESET

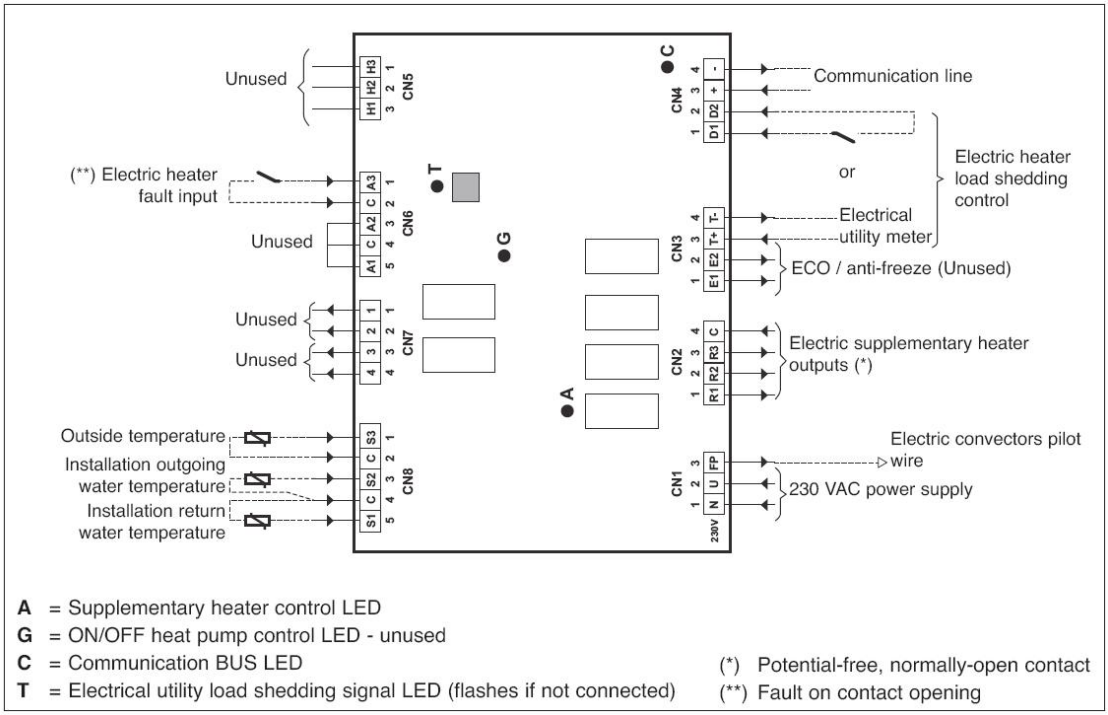
Note: problem must be solved before final reset action.

System alarm reset by setting the system control in OFF position
See detail in corresponding technical manual

Alarm reset by switching off power supply

This action is recommended in case of problem of communication Cn

5.3.3 A1 BOARD CHECKING



Power supply:

-main power supply 230Vac on terminals “N/U” (block CN1)
-red LED “T” lighted

A1 board generates 2 control power supplies:

- one regulated 5Vdc (+/- 0.5V)
- one non regulated 10 / 16 Vdc – can be checked on terminals “H1/H3” (block CN5)

Communication line:

-terminals +/- (block CN4) : 10Vdc <U< 16Vdc
-green LED “C” lighted (glittering when communication)

Sensors:

-sensor inputs voltage with sensors disconnected (block CN8): 4.5<U<5.5Vdc
-temperature values displayed on system remote ctrl box
-resistance value of sensors: NTC 10kΩ at 25°C – see table § 5.5

Inputs:

-electric heater default (terminals “A3/C” of block CN6):
If disconnect = alarm “HE” displayed on system remote ctrl box and voltage on terminals = 10 / 16 Vdc
-load shedding contact (terminals “D1/D2” on block CN4):
if contact open or not connected, voltage on terminals = 5Vdc
-load shedding signal (terminals “T+ / T-“ on CN3):
Not connected: red LED “T” flashing
Connected in normal condition: red LED “T” lighted permanently

Outputs:

-forcing outputs (electric heater outputs by means of special parameter (P40) on system remote control box
-when electric heater activated, green LED “A” is lighted

Configuration:

-A1 board code (indicated on identification label):
for heat pumps in version “A” = code 2220126 + board revision
for heat pumps in version “B” = code 2220171 + board revision
-Software version: see parameters P81with system remote control box; check also version of the other boards (P80 / P85) and especially System remte control box (P80).
Refer to the specific System Service Manual 1012212.

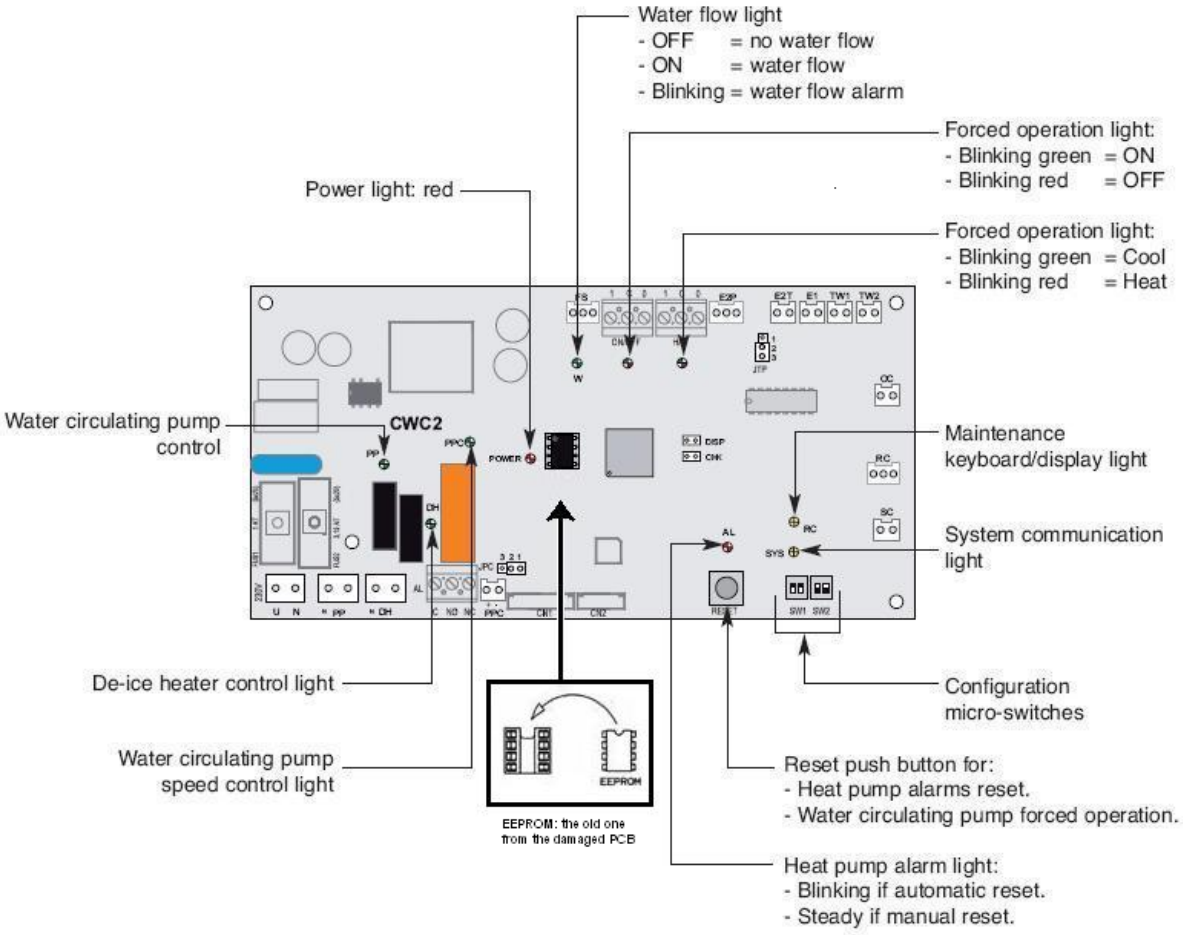
5-4 BOARDS REPLACEMENT

WARNING:

Before carrying out any work on the machine, make sure that its power supply is switched off and the access to it is prevented.
Any work must be carried out by personnel qualified and authorized to work on this type of machine.

5.4.1 A2 BOARD REPLACEMENT

IMPORTANT: Some setting data (parameters) specific to each type of heat pump are stored in the EEPROM on the (A2/CWC2) control board.
When replacing a PCB, it is necessary to remove the EEPROM from the malfunctioning board and re-install it on the new board.



Procedure:

1) **B**efore replacing the board (A2), make sure that the unit is switched off ("Power" LED - red - is Off).
2) Disconnect completely all wires and connectors from the board.
3) Remove the board by pulling it off from the spacers (4).
4) Take out from the old board the EEPROM and possible wire jumper.
5) Plug the EEPROM (and possible jumper) on the specific socket of the new board. Respect position of the EEPROM on its socket (see picture above). Be careful when handling the EEPROM, as its pins can be easily bent.
6) Make sure that micro switches SW1 / SW2 and jumpers JTP / JPC are in the right selection – refer to § 3.2.4 and picture above.
7) Install the new board on the spacers and connect it while respecting wiring diagram.
8) Switch on again the unit. LED "Power" must be lighted on (If this LED is blinking or is off, check that EEPROM is installed correctly).
9) Start the unit and check its correct operation.

Caution: If the EEPROM is not functioning correctly, alarm F29 appears. In that case, EEPROM must be changed also (use the one delivered with the new board). Then, parameters specific to the unit must set in the EEPROM, by means of service remote control, before starting again the unit. For that refer to part 6.

5.4.2 A3 CONTROL & POWER BOARD REPLACEMENT

WARNING: Certain boards are fit with power capacitors which can keep electrical and can be dangerous even after switch off.

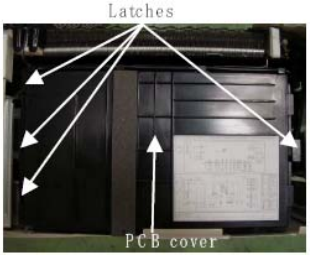
IMPORTANT: Some setting data (parameters) specific to each type of heat pump are stored in the EEPROM on the A3 board.

When replacing a PCB, it is necessary to remove the EEPROM from the malfunctioning board and re-install it on the new board.

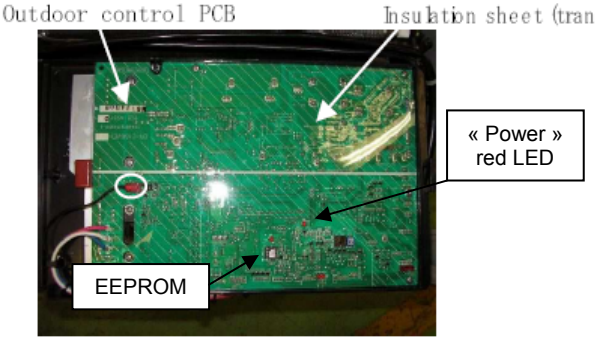
FOR UNITS 095 & 125:

Procedure:

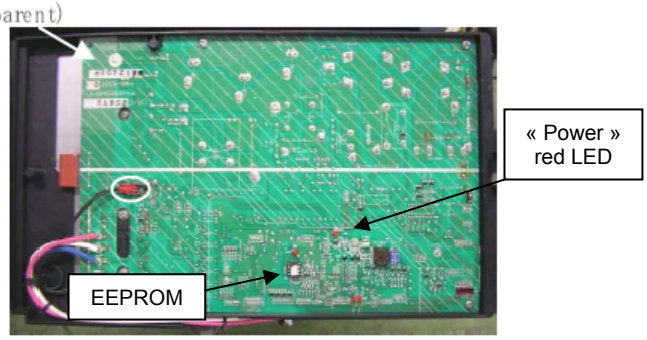
1) Before replacing the board (A3), make sure that the unit is switched off.
2) Remove top and front panel of the unit.
3) A3 board is installed in a plastic cabinet. Remove the four latches to take out the plastic cover.



4) Disconnect the red plug and remove the insulation sheet.

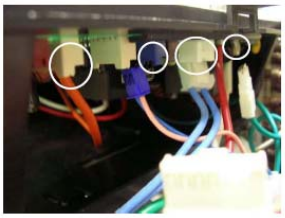


Unit 095

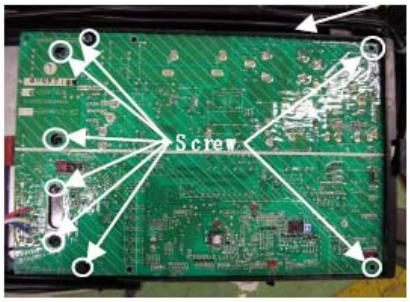


Unit 125

5) Disconnect completely all wires and connectors from the board.



6) Unscrew fixing screws of the PCB in the cabinet



Unit 095

Unit 125

7) Remove the PCB.

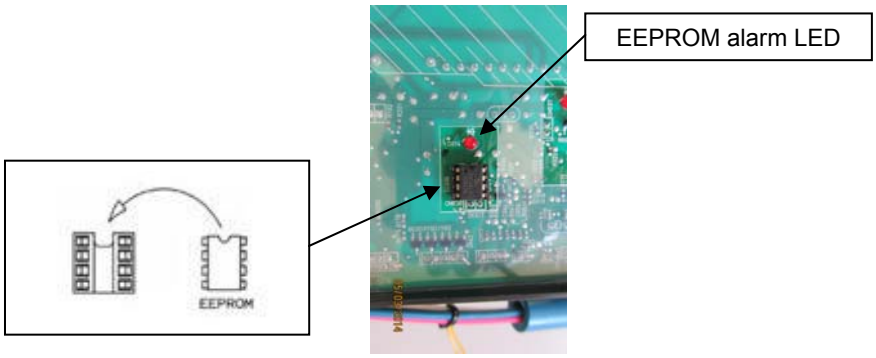
8) Take care of power components covered with thermal paste

Unit 095

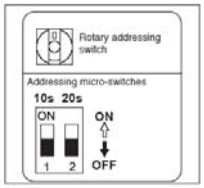
Unit 125

9) Take out from the old board the EEPROM and possible wire jumpers.

10) Plug the EEPROM (and possible jumpers) on the specific socket of the new board. Respect position of the EEPROM on its socket (see picture below). Be careful when handling the EEPROM, as its pins can be easily bent.



11) Make sure that micro switches and jumpers are in the right selection – refer to § 3.2.5.



12) Install the new board in the cabinet and connect it while respecting wiring diagram. Pay attention to apply some thermal paste on power components.

13) Switch on again the unit. EEPROM alarm LED must off (If this LED is blinking, check that EEPROM is installed correctly).

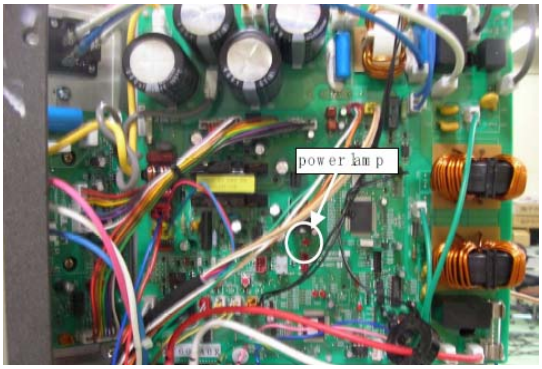
14) Start the unit and check its correct operation.

⚠ **Caution:** If the EEPROM is not functioning correctly, alarm F31 appears. In that case, EEPROM must be changed also (use the one delivered with the new board). Then, parameters specific to the unit must set in the EEPROM, by means of service remote control, before starting again the unit. For that refer to part 6.

FOR UNITS 155, 175 & 195:

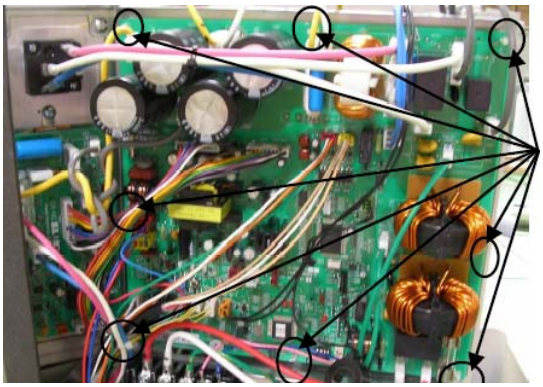
Procedure:

1) Before replacing the board (A3), make sure that the unit is switched off ("Power" LED - red - is Off).

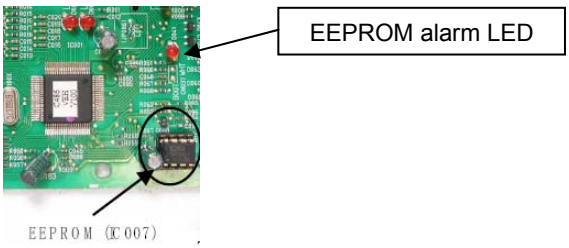


2) Disconnect completely all wires and connectors from the board.

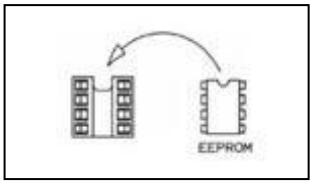
3) Remove the PCB from the spacers



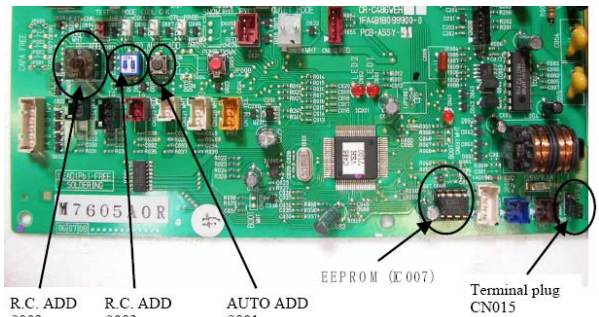
4) Take out from the old board the EEPROM and possible wire jumpers.



5) Plug the EEPROM (and possible jumpers) on the specific socket of the new board. Respect position of the EEPROM on its socket. Be careful when handling the EEPROM, as its pins can be easily bent.



6) Make sure that micro switches and jumpers are in the right selection and position – refer to § 3.2.6.



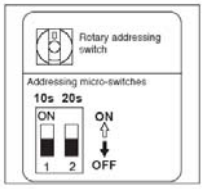
R.C. ADD S002 Rotary SW

R.C. ADD S003 2P DIP (Blue)

AUTO ADD S001 Button SW

Terminal plug CN015 (Black)

CN 015 in « short » position



7) Install the new board on the electrical plate and connect it while respecting wiring diagram.

8) Switch on again the unit. EEPROM alarm LED must off (If this LED is blinking, check that EEPROM is installed correctly).

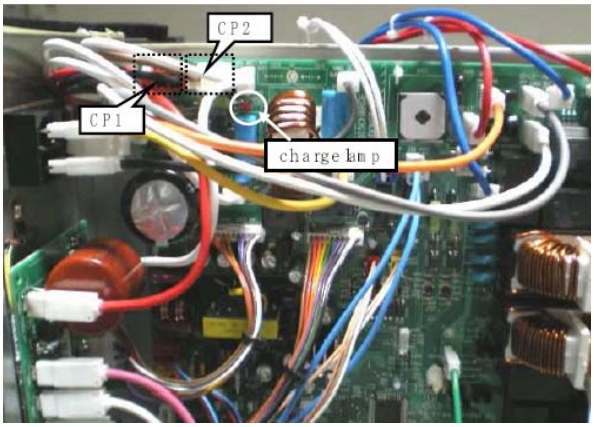
9) Start the unit and check its correct operation.

⚠ **Caution:** If the EEPROM is not functioning correctly, alarm F31 appears. In that case, EEPROM must be changed also (use the one delivered with the new board). Then, parameters specific to the unit must set in the EEPROM, by means of service remote control, before starting again the unit. For that refer to part 6.

FOR UNITS 157, 177 & 197:

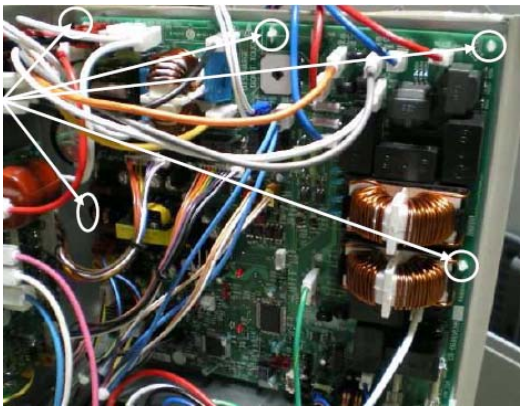
Procedure:

1) Before replacing the board (A3), make sure that the unit is switched off.
Check also that “Charge” LED ⊕ - red - is Off.

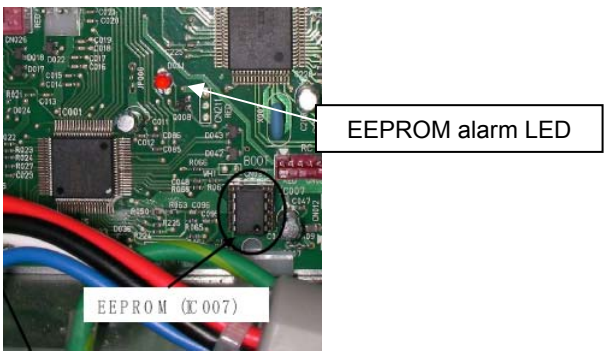


2) Disconnect completely all wires and connectors from the board.

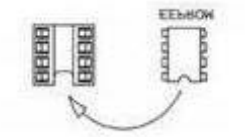
3) Remove the PCB from the spacers



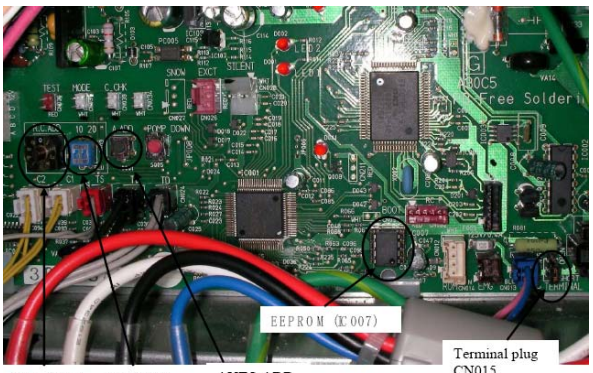
4) Take out from the old board the EEPROM and possible wire jumpers.



5) Plug the EEPROM (and possible jumpers) on the specific socket of the new board. Respect position of the EEPROM on its socket. Be careful when handling the EEPROM, as its pins can be easily bent.



6) Make sure that micro switches and jumpers are in the right selection and position – refer to § 3.2.7.



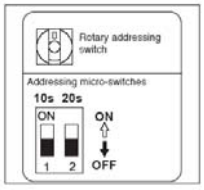
R.C. ADD S002 Rotary SW

R.C. ADD S003 2P DIP (Blue)

AUTO ADD S001 Button SW

Terminal plug CN015 (Black)

CN 015 in « short » position



7) Install the new board on the electrical plate and connect it while respecting wiring diagram. Insert connectors CP1 and CP2 until it clicks (see phase 1).

8) Switch on again the unit. EEPROM alarm LED must off (If this LED is blinking, check that EEPROM is installed correctly).

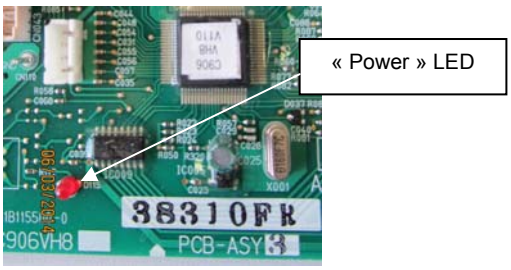
9) Start the unit and check its correct operation.

⚠ **Caution:** If the EEPROM is not functioning correctly, alarm F31 appears. In that case, EEPROM must be changed also (use the one delivered with the new board). Then, parameters specific to the unit must set in the EEPROM, by means of service remote control, before starting again the unit. For that refer to part 6.

FOR UNITS 257 & 307:

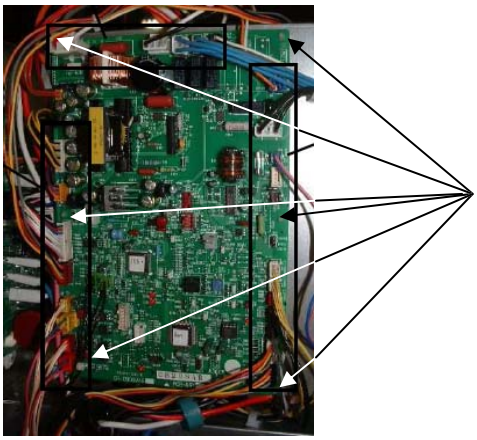
Procedure:

1) Before replacing the board (A3), make sure that the unit is switched off.
Check also that “Power” LED - red - is Off.

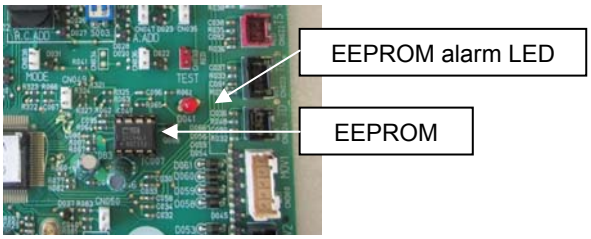


2) Disconnect completely all wires and connectors from the board.

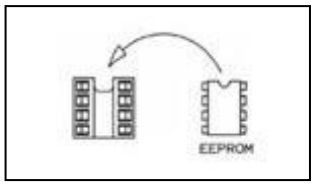
3) Remove the PCB from the spacers



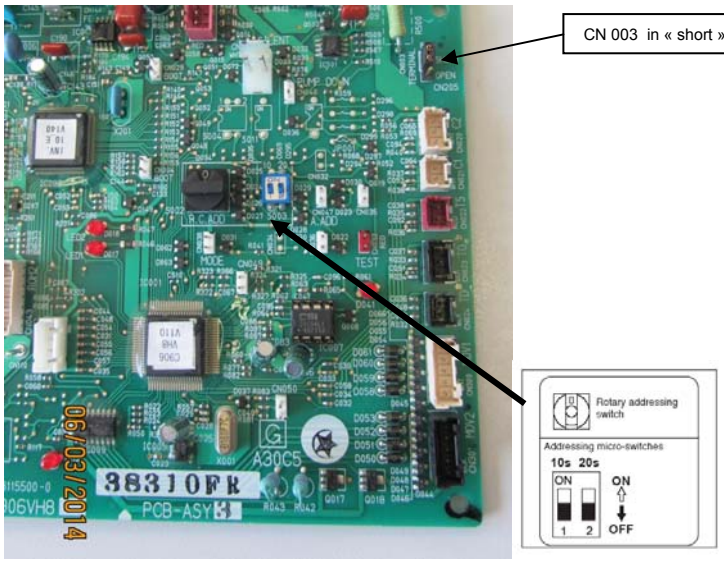
4) Take out from the old board the EEPROM and possible wire jumpers.



5) Plug the EEPROM (and possible jumpers) on the specific socket of the new board. Respect position of the EEPROM on its socket. Be careful when handling the EEPROM, as its pins can be easily bent.



6) Make sure that micro switches and jumpers are in the right selection and position – refer to § 3.2.8.



7) Install the new board on the electrical plate and connect it while respecting wiring diagram.

8) Switch on again the unit. EEPROM alarm LED must off (If this LED is blinking, check that EEPROM is installed correctly).

9) Start the unit and check its correct operation.

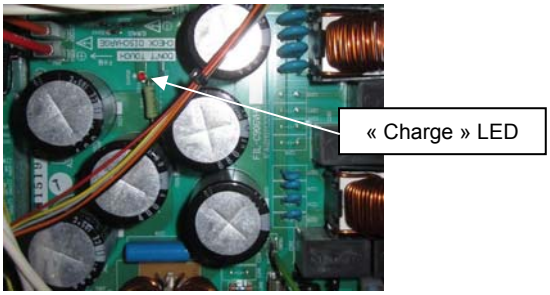
⚠ **Caution:** If the EEPROM is not functioning correctly, alarm F31 appears. In that case, EEPROM must be changed also (use the one delivered with the new board). Then, parameters specific to the unit must set in the EEPROM, by means of service remote control, before starting again the unit. For that refer to part 6.

5.4.3 A4 POWER FILTER BOARD REPLACEMENT – For units 257 & 307

⚠ **WARNING: This kind of board is fit with power capacitors which can keep electrical and can be dangerous even after switch off.**

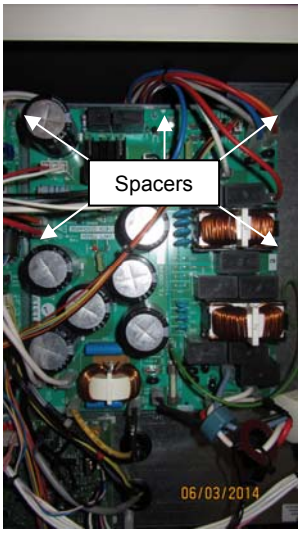
Procedure:

1) Before replacing the board A4, make sure that the unit is switched off.
Check also on A4 board that “Charge” LED - red - is Off.



2) Disconnect completely all wires and connectors from the board.

3) Remove the PCB from the spacers



4) Install the new board on the electrical plate and connect it while respecting wiring diagram.

5) Start the unit and check its correct operation.

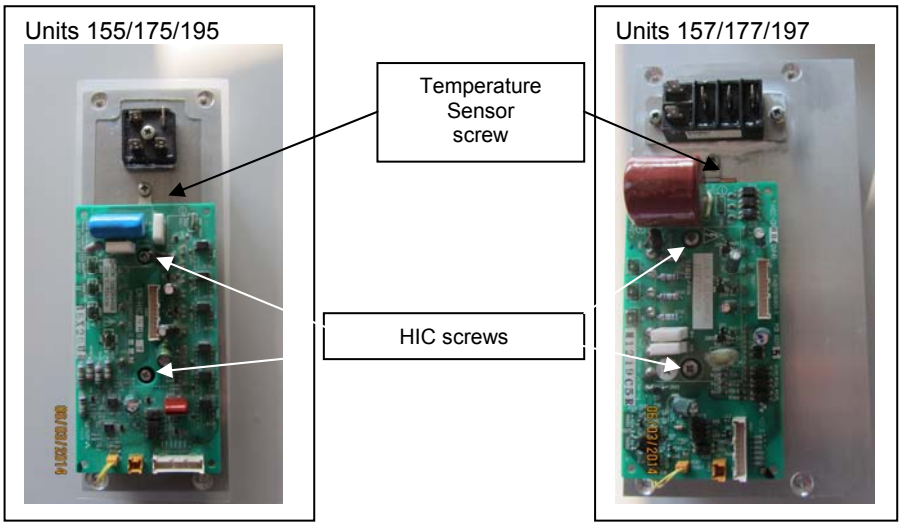
5.4.4 HIC BOARD REPLACEMENT

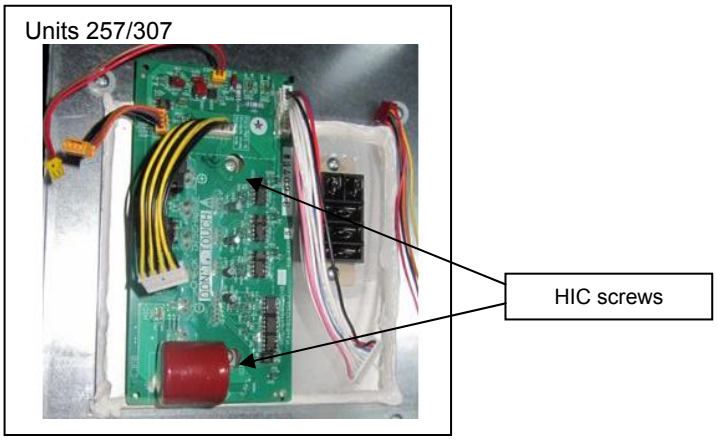
Procedure:

1) Before replacing HIC board A4, make sure that the unit is switched off.
Check also on A3 / A4 boards that “Power” and/or “Charge” LED - red - are Off.

2) Disconnect completely all wires and connectors from the HIC board.

3) Unscrew the 2 fixing screws of HIC on its heat sink.





4) For units 155/157/175/177/195/197, unscrew the fixing screw of temperature senor.

5) Remove HIC.

6) Apply thinly and all over thermal paste on the socket of the new HIC.
Note: Diode bridge needs also thermal paste on its socket.

7) Install temperature sensor and §HIC on the heat sink with screws.

8) Connect the wiring.

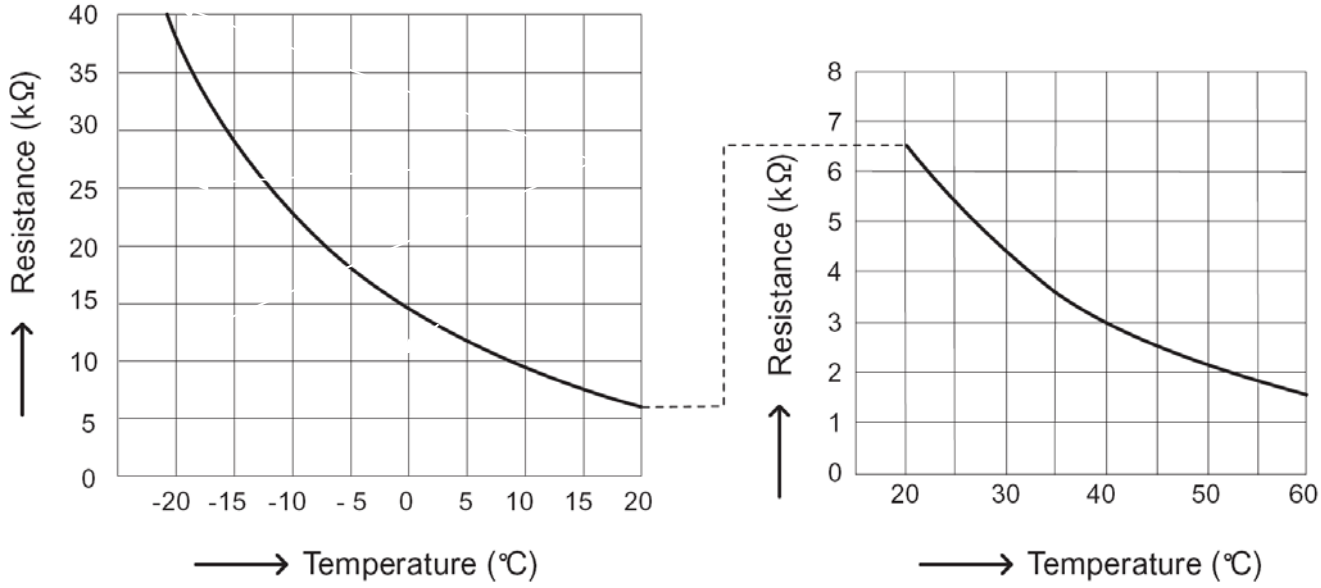
9) Start the unit and check its correct operation.

5-5 SENSORS CHARACTERISTICS

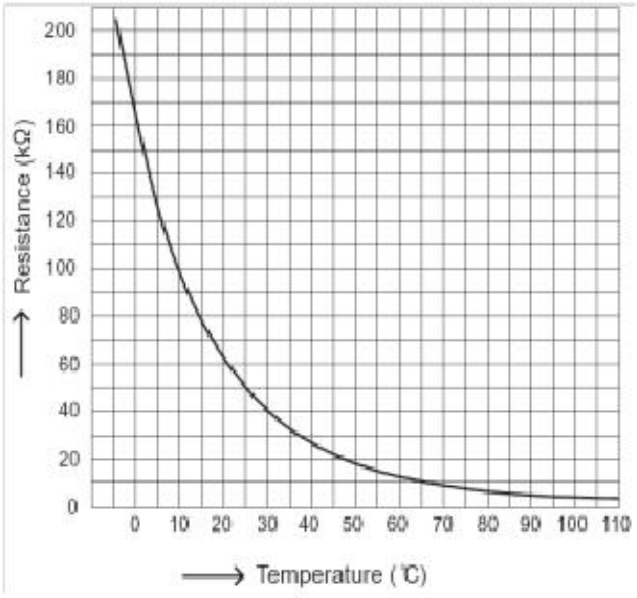
In case of sensor replacement, take care to mount it correctly on its support. Use thermal paste if necessary. Incorrect mounting could induce problems for the unit operation.

5.5.1 HEAT PUMP SENSORS

Outdoor air temp. (TO/S4) sensor,
Suction (compressor) temp. (TS/S3) sensor,
Air heat exchanger temp. (C1/S2) sensor,
Air heat exchanger temp. (C2/S1) sensor,
Liquid line temp. (E1/S7) sensor,
Water inlet temperature temp. (TW1/TA/S8) sensor,
Water outlet temperature temp. (TW2/S9) sensor,
HIC board heat sink temp. (TH6/S6) sensor:

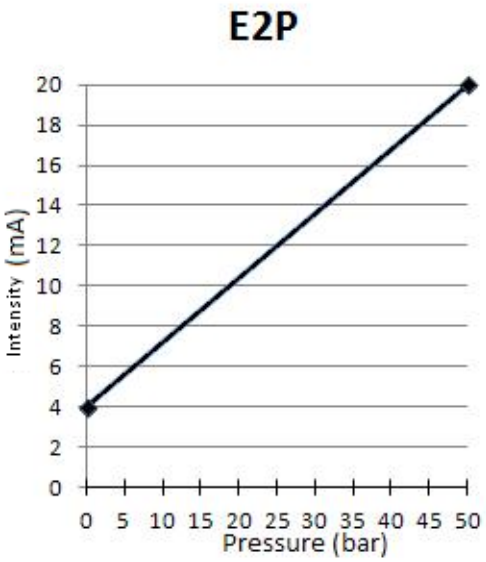


Discharge (compressor) temp. (TD/S5) sensor:



Water heat exchanger pressure Sensor (E2P/B1):
Note: pressure is converted by A2 board in equivalent temperature

Pessure sensor E2P		
Pressure (bar)	0	50
Intensity (mA)	4	20



5.5.2 SYSTEM CONTROL SENSORS

Installation water inlet temp. (S11) sensor,
Installation water outlet temp. (S12) sensor,
Outdoor air temp. (S13) sensor:

Type NTC 10 kΩ at 25 °C

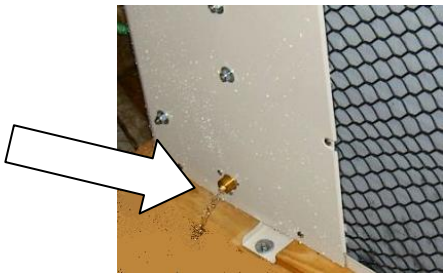
Temperature (°C)	Ohmic value (Ohm)
-20	97,120
-15	72,980
-10	55,340
-5	42,340
0	32,660
5	25,400
10	19,900
15	15,710
20	12,490
25	**10,000**
30	8,058
35	6,532
40	5,326
45	4,368
50	3,502
55	2,936
60	2,488
65	2,082
70	1,751

5-6 ELECTRIC HEATER REPLACEMENT FOR UNITS 095 & 125

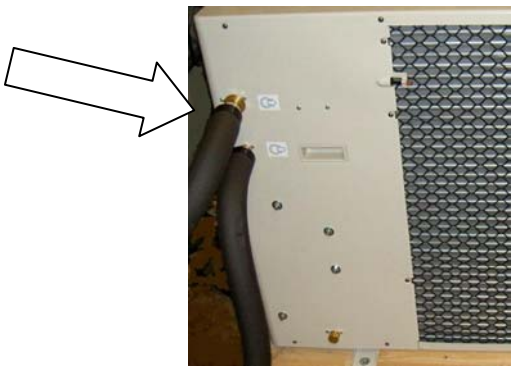
WARNING:

Before carrying out any work on the machine, make sure that its power supply is switched off and the access to it is prevented. Any work must be carried out by personnel qualified and authorized to work on this type of machine.

1- Close installation valves and drain the unit

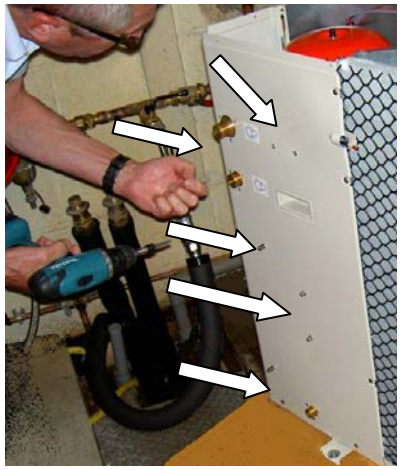


2- Disconnect water pipes



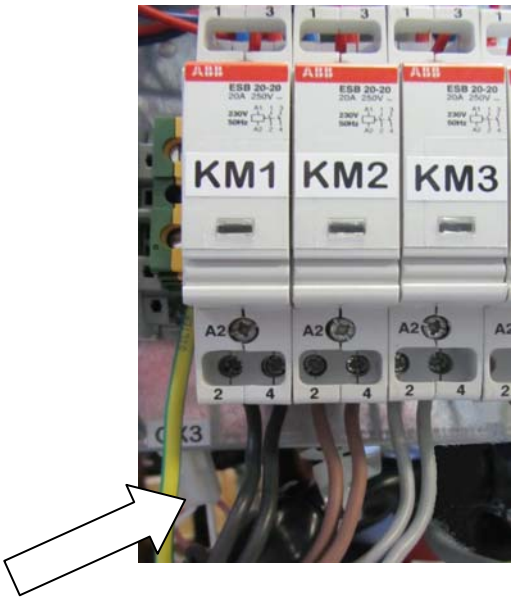
3- Remove front and top panels

4- Unscrew the fixing screws on the rear panel (hydraulic connectors, heat exchanger, expansion vessel, electric heater, panel...)

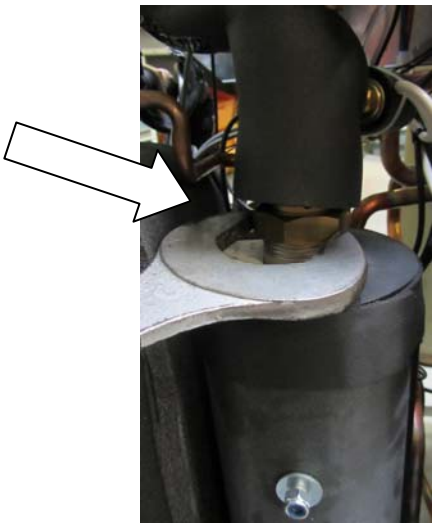


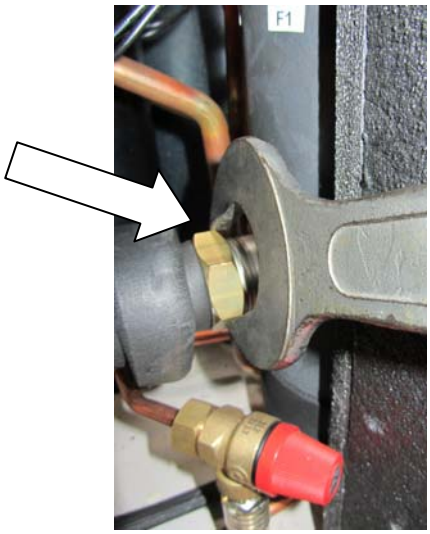
5- Remove the rear panel

6- Disconnect power supply wiring of the electrical heater from contactors KM1/2/3



7- Unscrew the hydraulic connectors (upper & lower) of the electrical heater





8- Remove carefully the electrical heater

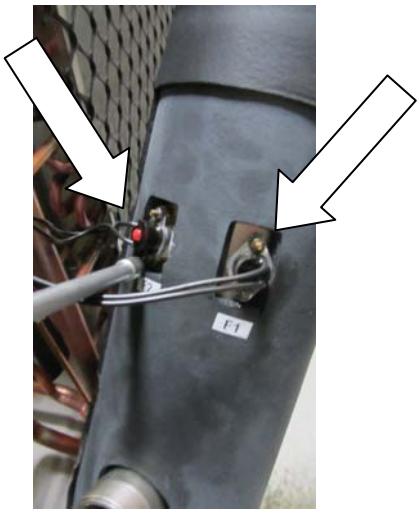
Pay attention to the safety thermostats and their wiring

9- Remove carefully the safety thermostats

CAUTION

These thermostats are very important for **safety**.

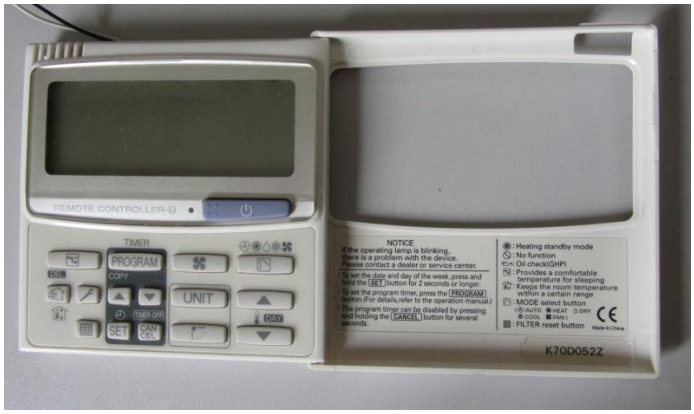
Pay attention that they must be mounted on the new heater carefully respecting position & the factory assy type.
Check that contact between thermostats caps and heater body is correct; use thermal paste.



PART 6 – MAINTENANCE CONTROLLER & PARAMETERS

⚠ **WARNING: Before carrying out any work on the machine, make sure that its power supply is switched off and the access to it is prevented. Any work must be carried out by personnel qualified and authorized to work on this type of machine.**

6-1 PRESENTATION

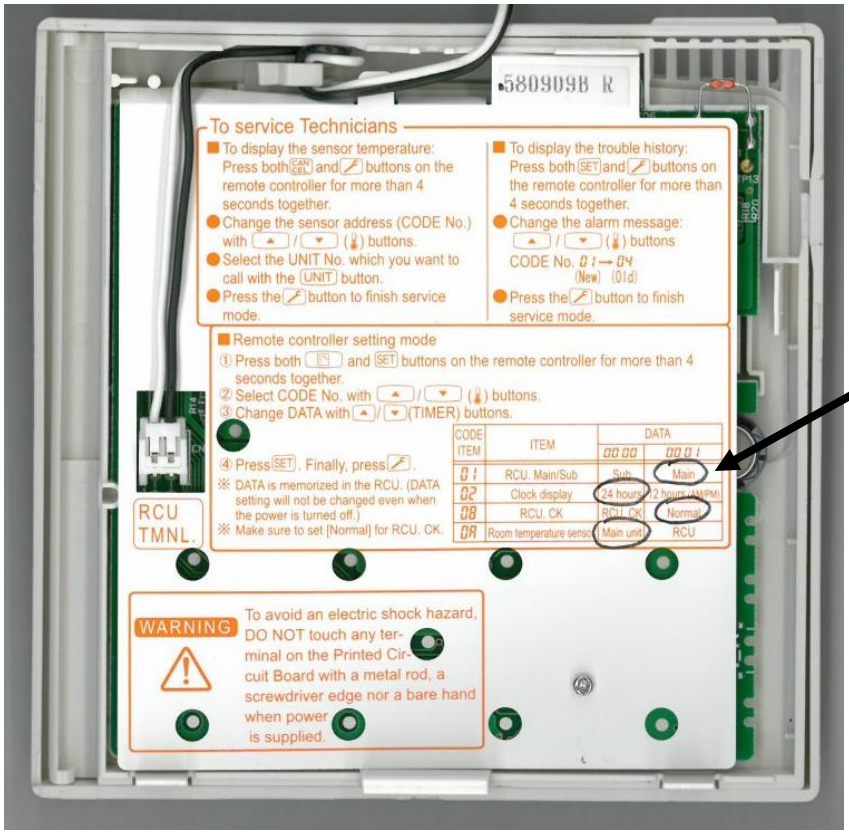


The remote controller can be used for:

- ✓ display of the current heat pump status (Set point, heating/cooling mode, On/off),
- ✓ display of possible frigorific circuit alarm,
- ✓ display of alarms history,
- ✓ display of frigorific circuit sensors values and current information about compressor speed, compressor current & valve position,
- ✓ display and modification of parameters,
- ✓ heat pump control in stand alone configuration (without system control).

Reference of the remote controller: **RCS-TM 80BG (K70D052Z)**

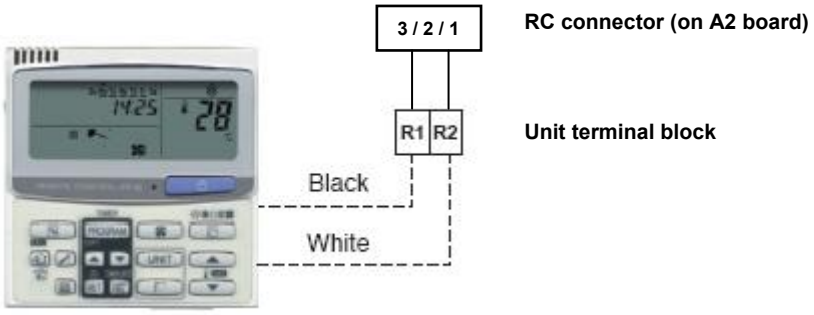
Configuration:
View from backside



6.2 STANDARD DISPLAY & SETTINGS – CONNECTION TO A2 BOARD

6.2.1 REMOTE CONTROL CONNECTION

Maintenance remote control has to be connected to specific terminals “R1” & “R2” of the unit terminal block.
These terminals are connected to the (blue) connector “RC” of A2 board.



6.2.2 CURRENT DISPLAY

Heat pump Off

Heat pump operating in heating mode – time delay on compressor

Heat pump operating in heating mode

Heat pump operating in cooling mode

Alarm on frigorific circuit *- example (see details in §5.1)*

Alarm message « E04 » - blinking

6.2.3 ALARM HISTORY DISPLAY

Possibility to display the 4 last events concerning frigorific circuit managed by A3 board.

Press and hold buttons [🔧] and [SET] simultaneously for 4 seconds or longer to display alarm history mode.

Use temperature setting buttons [▲] and [▼] to display the alarm item code. “01” indicates the most recent alarm; “04” indicates the oldest one.

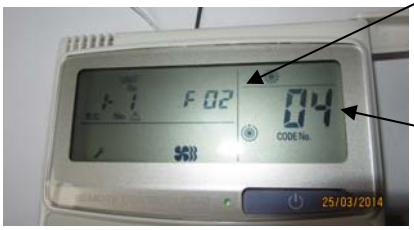
To clear the alarm history, press the [CANCEL] button.

To return to normal display, press button [🔧] .

See § 5.1 for alarms list

Alarm history *- example*

Alarm message « F02 » - blinking



Alarm item code (01 to 04) – blinking

6.2.4 VALUES DISPLAY FOR MONITORING

Press and hold buttons [🔧] and [CANCEL] simultaneously for 4 seconds or longer to display values.

Use temperature setting buttons [▲] and [▼] to display the value item code (see table below).

To return to normal display, press button [🔧] .

Values display *- example*

Measured value : 114 Hz

Value item code
“19” corresponds to compressor frequency

For units 095/125/155/157/175/177/195/197:

Item code	Sensor type	Remark
	From A2 control board	
00	Water temperature for control	Like code 02
01	Remote control ambient temperature	Not used for heat pump control
02	Water temperature for control (TW)	Like code 00
03	Liquid line (in cooling) temperature (E1)	
04	Heat exchanger temperature (E2)	Temp. calculated from pressure
05	Heat exchanger temperature (E3)	Not used
06	Discharge air temperature	Not used
07		Not used
08		Not used
09		Not used
	From A3 control board	
0A	Compressor discharge temperature (TD)	
0B		Not used
0C		Not used
0D	Compressor suction temperature (TS)	
0E	Air heat exchanger temperature (C1)	
0F	Air heat exchanger temperature (C2)	
10		Not used
11	Outdoor temperature (TO)	
12		Not used
13		Not used
14	Compressor current - A	
15	Valve position - step	
16		Not used
17		Not used
18		Not used
19	Compressor operating frequency - Hz	
> = 1A		Not used

For units 257/307:

Item code	Sensor type	Remark
	From A2 control board	
00	Water temperature for control	Like code 02
01	Remote control ambient temperature	Not used for heat pump control
02	Water temperature for control (TW)	Like code 00
03	Liquid line (in cooling) temperature (E1)	
04	Heat exchanger temperature (E2)	Temp. calculated from pressure
05	Heat exchanger temperature (E3)	Not used
06	Discharge air temperature	Not used
07		Not used
08		Not used
09		Not used
	From A3 control board	
0A	Compressor discharge temperature (TD)	
0B		Not used
0C	Air heat exchanger temperature (C2)	
0D	Compressor suction temperature (TS)	
0E	Air heat exchanger temperature (C1)	
0F		Not used
10		Not used
11	Outdoor temperature (TO)	
12		Not used
13		Not used
14	Compressor current - A	
15	Valve 1 position - step	
16	Valve 2 position - step	
17		Not used
18		Not used
19	Compressor operating frequency - Hz	
> = 1A		Not used

6.2.5 PARAMETERS

1-Press and hold buttons , SET and CANCEL simultaneously for 4 seconds or longer.

2-"SETTING", "unit N° 1-1", set data (parameter value) "00 XX" and item code 10 are displayed blinking.

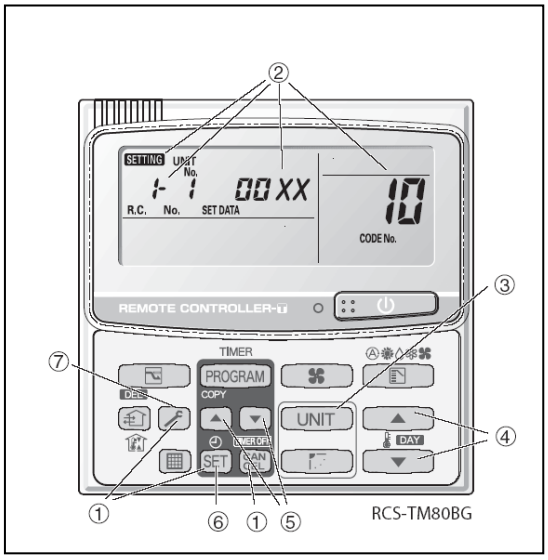
3-Check that unit N° is 1.

4-Use temperature setting buttons ▲ and ▼ to select the item code of the chosen parameter.

5-Use timer time buttons ▲/▼ to select value for parameter.
Refer to the following table for parameters values.

6-Press SET button value validation; display stops blinking and remains lit. Setting is completed.

7-To return to normal display, press button .



Item code	Parameter	Remark	Setting
10	Type of unit		**30** = Air to Water unit
11	Capacity of unit		**9** = 095 (2HP)
			12 = 125 (3HP)
			15 = 155 or 157 (4HP)
			17 = 175 or 177 (5HP)
			18 = 195 or 167 (6HP)
			21 = 257 (8HP)
			23 = 307 (10HP)
12	System adress	Not used	**0001**
13	Board address		**0001**
14	Group address		**0000** = individual
Others	Others		Not to be changed !
1F	Remote ctrl temperature set range Upper limit in cooling		**0018** = 18°C
20	Remote ctrl temperature set range Lower limit in cooling		**0010** = 10°C
21	Remote ctrl temperature set range Upper limit in heating		**0055** = 55°C
22	Remote ctrl temperature set range Lower limit in heating		**0016** = 16°C
Others	Others		Not to be changed !
28	Automatic restart		**01** = YES
Others	Others		Not to be changed !
2C	Additional expansion valve		**02** = NO
2D	Modes selection on remote ctrl		**10** = Heating + Cooling
Others	Others		Not to be changed !

⚠ **Note:** These parameters have to be checked in case of board or EEPROM replacement.

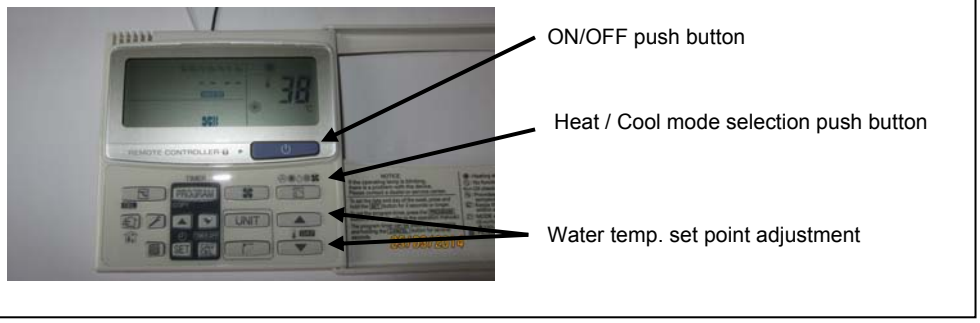
These following parameters can also be checked in case of problem:

15	Type of unit control		**0022** = "PAC-i" type
19			**0000**

6.2.6 HEAT PUMP CONTROL – STAND ALONE

The maintenance remote controller can be used for heat pump control in case of **stand alone operation** (without system control).
Report to § 4.16.
To operate the heat pump, **force the circulating pump** (see § 4.12) before initiate an order via the specific maintenance remote control (or the external contacts).

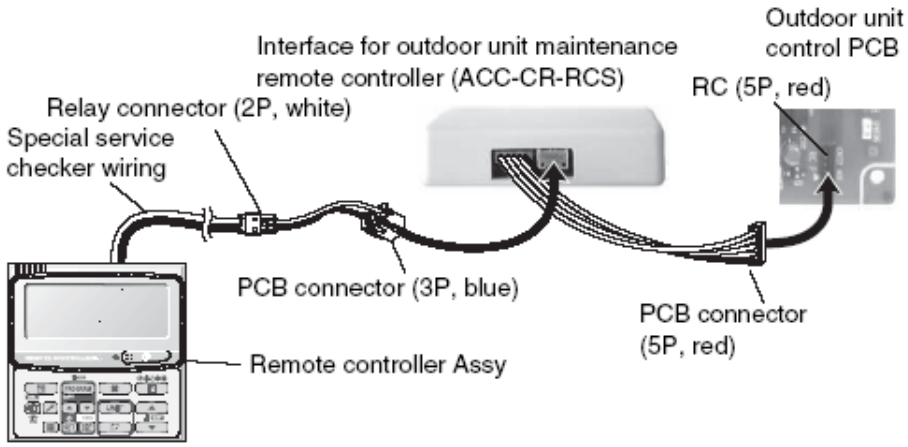
Note 1: If it remains connected, system control has always priority on the remote control.
Note 2: In stand alone configuration, actions by forcing inputs on A2 boards have priority on the maintenance remote controller.



6.3 ADVANCED DISPLAY & SETTINGS – CONNECTION TO A3 BOARD

6.3.1 REMOTE CONTROL CONNECTION

Maintenance remote control must be connected to A3 control board by means of an interface ACC-CR-RCS. Connection on A3 board is made on specific connector RC-P (5 poles, colour red).

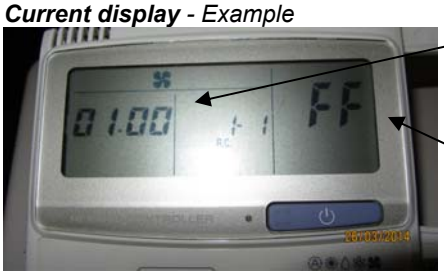


6.3.2 CURRENT DISPLAY

Display when remote control is connected

Note:
It is possible to display current information by means of temperature setting buttons  and  to select the item code.

Current display *- Example*

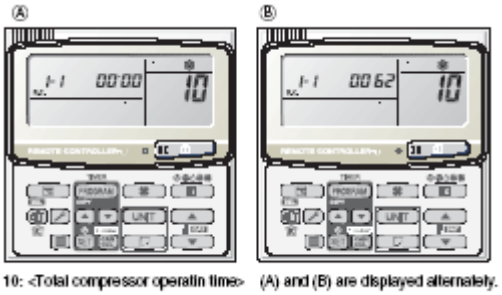


Item code	Parameter	Remark
10	Total compressor operating time	See detail after
16	Total power ON time of the unit	
17	Compressor starts counter	
FE	A3 board firmware version	
FF	A3 board software version	

Compressor operating time :

Displayed (in « 1 hour » unit) using 8 digits.

-When the first 4 digits are displayed, top point of these digits is lit.
-When the last 4 digits are displayed, top point is not lit.
-The display of the first 4 and the last 4 digits changes automatically every 10 seconds.
It can also be changed by pressing the button.



10: <Total compressor operatin time> (A) and (B) are displayed alternately.

6.3.3 ALARM HISTORY DISPLAY

Possibility to display the **8** last events concerning the frigorific circuit managed by A3 board.

Press and hold buttons and SET simultaneously for 4 seconds or longer to display alarm history mode.

Use temperature setting buttons and to display the alarm item code. “01” indicates the most recent alarm; “08” indicates the oldest one.

To clear the alarm history, press the CAN CEL button.

To return to normal display, press button .

See § 5.1 for alarms list

Alarm history - *example*

Alarm message « F04 »

Alarm item code (01 to 08)

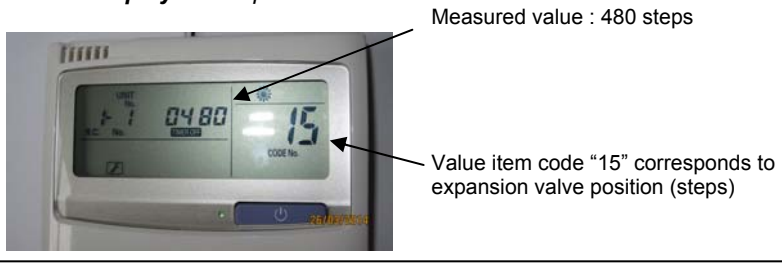
6.3.4 VALUES DISPLAY FOR MONITORING

Press and hold buttons  and  simultaneously for 4 seconds or longer to display values.

Use temperature setting buttons  and  to display the alarm item code (see table below).

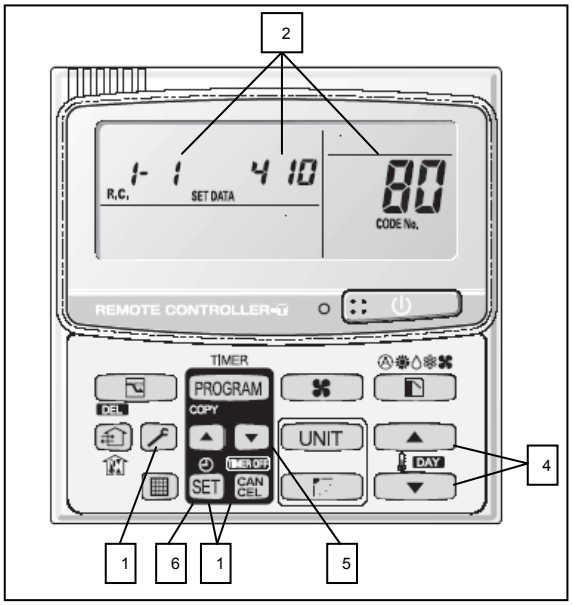
To return to normal display, press button  .

Values display - *example*



Item code	Sensor type	Remark
	From A2 control board	
00	Water temperature for control	Not used
01	Remote control temperature	Not used for heat pump control
02	Water temperature control (TW)	
03	Liquid line (in cooling) temperature (E1)	
04	Heat exchanger temperature (E2)	Temp. calculated from pressure
05	Heat exchanger temperature (E3)	Not used
06	Discharge air temperature	Not used
07		Not used
08		Not used
09		Not used
	From A3 control board	
0A	Compressor discharge temperature (TD)	
0B		Not used
0C		Not used
0D	Compressor suction temperature (TS)	
0E	Air heat exchanger temperature (C1)	
0F	Air heat exchanger temperature (C2)	
10		Not used
11	Outdoor temperature (TO)	
12		Not used
13		Not used
14	Compressor current - A	
15	Valve position - step	
16		Not used
17		Not used
18		Not used
19	Compressor operating frequency - Hz	
> = 1A		Not used

6.3.5 PARAMETERS



1-Press and hold buttons , SET and CAN CEL simultaneously for 4 seconds or longer.

2- Unit N° "1-1", set data (parameter value) 4 10 and item code 80 are displayed after few seconds.
"SETTING" and set data 4 10 are blinking.

3-Check that unit N° is 1.

4-Use temperature setting buttons and to select the item code of the chosen parameter.

5-Use timer time buttons / to select value for parameter.
Refer to the following table for parameters values.

6-Press SET button value validation; "SETTING" stops blinking and remains lit.
Setting is completed.

7-To return to normal display, press button .

Item code	Parameter	Remark	Setting
	Others		Not to be changed !
0E	Operating mode (Heat pump or cool only)		**0** = Heat Pump
	Others		Not to be changed !
64	Type of unit		**3** = Air to Water unit
80	Type of refrigerant		**410** = R410A
81	Capacity of unit		**56** = 095 (2HP)
			80 = 125 (3HP)
			112 = 155 or 157 (4HP)
			140 = 175 or 177 (5HP)
			160 = 195 or 167 (6HP)
			224 = 257 (8HP)
			280 = 307 (10HP)
	Others		Not to be changed !
84	Power supply – single or three phases		**1** = single phase
			0 = three phases
	Others		Not to be changed !

Note: These parameters have to be checked in case of board or EEPROM replacement.