

**TECHNICAL GUIDE**  
**Heat Pump Air Conditioner**

**Models RTH 07 to 30B**

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# ROOMTOP

Horizontal Air/Air Heat Pump

R-22



**RTH**



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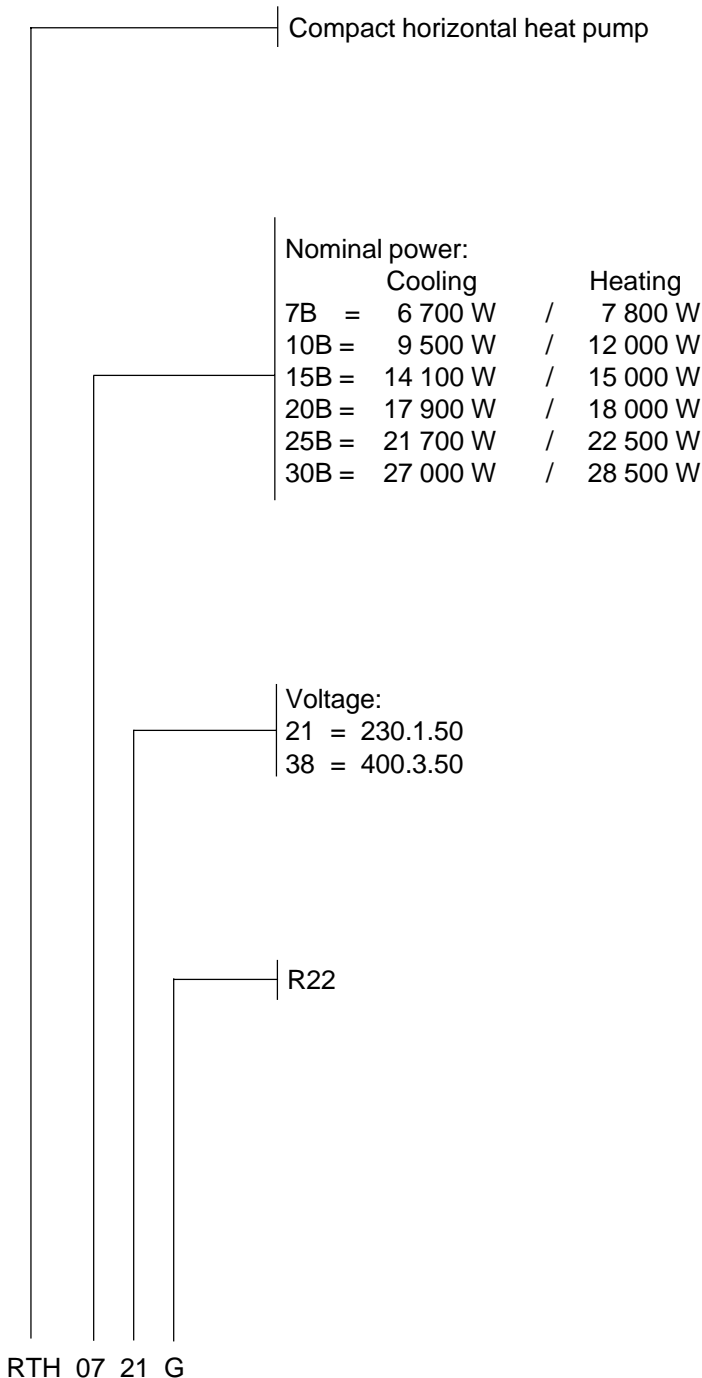
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## General description

The RTH model heat pumps are packaged compact units, condensed by air, that allow air conditioning, both in winter as well as in summer, by inverting their operating cycle. They can be installed either indoors or outdoors, and the fans are of the centrifugal type, and thus allow connection of ductwork.

## Nomenclature



## Control

To achieve maximum savings in energy, correct operation of the equipment, avoid breakdowns and prolong the service life of same, they have the following functions:

### Safety features of the compressor

A temperature sensor protects the compressor against

very high discharge temperatures.

It is also activated in the case of refrigerant leaks, or insufficient air flow through the coil acting as the condensing unit.

Another temperature sensor protects the compressor against very low suction temperatures in the cooling cycle. A set of high and low pressure switch turns the compressor off when the discharge pressure is too high, or suction pressure is too low.

Another optional temperature sensor is also available for mounting on the indoor coil so as to avoid freezing of the evaporating unit during cooling. In the same way, in the heating mode the fan is kept inoperative until the coil temperature is above 35° C.

### Defrost control

The defrost cycle will begin after a period of 30, 60 and 90 minutes, adjustable at will, after start-up or the last defrost cycle, and evaporating temperature is below -3° C.

### Start timer

Eliminates continuous starting and stopping. After a stop, the unit does not start-up again until after 2 or 5 minutes, adjustable at will.

### Thermostat

The unit is controlled by means of a thermostat that allows the following functions:

- 1- Temperature adjustment at will.
- 2- Have cooling or heating automatically, depending upon requirements.
- 3- Adjust continuous or intermittent operation of the indoor fan, in accordance with compressor operation.

### Operating at -20° C

When the outdoor temperature is below -20° C, operation of the compressor is not needed due to the small amount of heat generated by the system.

The electronic module, the unit is equipped with, detects this low temperature and acts automatically. It turns the compressor off and connects the auxiliary heater (if installed).

## Technical specifications

### Compressor

Of the vertical hermetic type, mounted on rubber isolators and with internal motor protection.

### Compressor heater

Keeps the oil in the crankcase warm for easy start-up, and to avoid migration of the oil out of the compressor.

### Suction accumulator

Fitted to the compressor suction tubing, it protects same against liquid return and valveplate damage, avoiding loss of oil in the compressor and mechanical failure of same.

### Coils

With a large surface, made of copper tubing and aluminium fins. Located within the cabinet and completely protected against damage during transportation or installation.

**Indoor and outdoor fans**

Of the centrifugal type with directly fitted motor or belt drive. These fans have sufficient available pressure for the installation of optional ducts and accessories.

**Casing**

Made of galvanized aluminium steel sheeting and finished with oven-polymerized powdered paint, for outdoor

installation.

**Electric heaters (optional)**

Of the exposed wire type to allow fast heat dispersion, avoiding temperature inertia that could affect the components. Equipped with a contactor and a thermal protectors: automatic and manual reset.

**Physical data**

Model		RTH-07B	RTH-10B	RTH-15B	RTH-20B	RTH-25B	RTH-30B	
Compressor	Quantity			1				
	Nominal power	kW	2,7	3,2	4,7	5,2	7,9	9,2
	Power supply	V.ph.Hz.	230.1.50	400.3.50	400.3.50	400.3.50	400.3.50	400.3.50
Coil	Quantity				1			
	Tubing depth x height		5 x 18	5 x 21	5 x 21	5 x 21	5 x 24	5 x 24
	Fins per inch		12	12	12	12	14	14
	Front area	m <sup>2</sup>	0,32	0,41	0,51	0,65	0,71	0,87
	Tubing diameter mm (Inches)				9,52 (3/8")			
Indoor coil	Quantity			1				
	Tubing depth x height		3 x 18	4 x 21	4 x 21	4 x 21	3 x 24	4 x 24
	Fins per inch				12			
	Front area	m <sup>2</sup>	0,22	0,25	0,37	0,47	0,61	0,73
	Tubing diameter mm (Inches)				9,52 (3/8")			
Outdoor fan motor	Quantity			1			(1)	
	Turbine diameter	mm	270	320	320	320	320	320
	Turbine width	mm	270	240	240	320	240	320
	Nominal power	kW	0,58	0,99	0,99	1,1	1,1	1,5
	Motor nominal r.p.m		900	900	900	900	900	1 420
	Power supply	V.ph.Hz.	230.1.50	230.1.50	230.1.50	400.3.50	400.3.50	400.3.50
Indoor fan motor	Quantity			1		(1)	(1)	
	Turbine diameter	mm	240	270	320	320	320	320
	Turbine width	mm	240	200	240	240	240	320
	Nominal power	kW	0,38	0,54	0,95	0,99	1,1	1,1
	Motor nominal r.p.m		900	900	900	900	1 410	1 410
	Power supply	V.ph.Hz.	230.1.50	230.1.50	230.1.50	400.3.50	400.3.50	400.3.50
Approximate nett weight	kg	163	190	224	275	350	412	
Approximate gross weight	kg	174	205	240	295	370	452	
Dimensions with standard packing	cm	114x120x61	119x125x69	135x141x69	167x161x69	176x180x78	181x216x78	

(1) Belt drive

## Nominal capacities

Unit	Summer		Winter	
	Cooling capacity W	Consumption W	Heating capacity W	Consumption W
<b>RTH-07B</b>	6 700	3 600	7 800	2 800
<b>RTH-10B</b>	9 500	4 600	12 000	3 700
<b>RTH-15B</b>	14 100	6 900	15 000	5 000
<b>RTH-20B</b>	17 900	7 600	18 000	6 900
<b>RTH-25B</b>	21 700	10 400	22 500	7 500
<b>RTH-30B</b>	27 000	12 300	28 500	13 500

## Test conditions

Voltage	Summer				Winter			
	Outdoor temp. °C		Indoor temp. °C		Outdoor temp. °C		Indoor temp. °C	
	TS	TH	TS	TH	TS	TH	TS	TH
230 to 400	35	24	27	19	7	6	20	12

## Correction factors

### Correction factors for cooling capacities

Correction factors for cooling capacities in accordance with indoor and outdoor temperatures.

Indoor unit intake air temperature °C WB	Outdoor unit air intake temperature °C DB					
	19	25	30	35	40	46
23	-	1,20	1,15	1,11	1,06	1
19	1,10	1,08	1,04	1	0,96	0,90
14	0,88	0,86	0,84	0,82	0,79	0,74

**Note:** For indoor unit intake temperatures DB between 21 and 32° C. WB - wet bulb. DB - dry bulb.

Cooling capacity correction factors for flows that differ from the nominal flows of the indoor coil.

% Flow	80	90	100	110	120	130
Total capacity	0,960	0,980	1	1,016	1,032	1,046
Sensible Capacity	0,945	0,973	1	1,038	1,075	1,118
Comp. absorbed power	0,980	0,990	1	1,009	1,017	1,025

Correction of the real temperature of air intake of the outdoor coil for flows that differ from the nominal values.

% Flow	70	80	90	100	110	120	130
Correction in °C on real temperature of air intake of outdoor coil	5	3	1,5	0	-1	-2	-2,5

### Correction factors for the heating capacities

Indoor unit intake air temperature, °C DB	Outdoor unit air temperature, °C WB				
	14	10	6	0	-8
23	1,20	1,04	0,96	0,77	0,58
20	1,25	1,10	1,00	0,80	0,69
17	1,30	1,13	1,04	0,83	0,63

Correction of the real temperature of intake air to the outdoor unit coil for flows that differ from the nominal values.

% Flow	70	80	90	100	110	120	130
Correction in °C on real temperature of air intake of outdoor coil	-2	-1,5	-0,5	0	0,5	1	1,2

## Nominal flows

The cooling and heating capacities that appear in the corresponding tables are valid for the following nominal flows:

Model	Nominal flow indoor fan m <sup>3</sup> /h	Nominal pressure available Pa	Nominal flow outdoor fan m <sup>3</sup> /h	Nominal pressure available Pa
<b>RTH-07B</b>	1970	25	2 380	50
<b>RTH-10B</b>	2 430	37	3 450	50
<b>RTH-15B</b>	4 000	50	4 350	50
<b>RTH-20B</b>	4485	50	5 250	50
<b>RTH-25B</b>	5 000	62	5 250	50
<b>RTH-30B</b>	5 850	62	6 400	50

For other flows, apply the correction factors of the corresponding table.

## Sensible cooling capacities

Model	Temperature of air on to condenser °C(DB)	Temperature of air on to evaporator °C (WB)	Total capacity	Sensible capacity (W)				Compressor absorbed power
				Entering air temperature to coil, °C (DB)				
				22	24	27	29	
			W	W	W	W	W	kW
<b>RTH-07B</b>	25	22	8 040	2 397	3 502	5 158	6 264	2,27
		19	7 236	4 114	5 218	6 875	7 236	2,38
		17	6 700	5 243	6 348	6 700	6 700	2,49
	35	22	7 437	2 199	3 303	4 960	6 064	2,57
		19	6 700	3 916	5 021	6 677	6 700	2,71
		17	6 164	4 531	5 636	6 164	6 164	2,84
	45	22	6 700	1 978	3 082	4 739	5 843	2,98
		19	6 030	3 691	4 795	6 030	6 030	3,11
		17	5 494	4 769	5 494	5 494	5 494	3,25
<b>RTH-10B</b>	25	22	11 400	3 422	4 897	7 110	8 587	2,72
		19	10 260	5 715	7 190	9 403	10 260	2,85
		17	9 500	7 224	8 698	9 500	9 500	2,97
	35	22	10 545	3 138	4 613	6 825	8 300	3,07
		19	9 500	5 433	6 908	9 120	9 500	3,23
		17	8 740	6 489	7 964	8 740	8 740	3,39
	45	22	9 500	2 821	4 296	6 508	7 983	3,56
		19	8 550	5 111	6 586	8 550	8 550	3,72
		17	7 790	6 545	7 790	7 790	7 790	3,88
<b>RTH-15B</b>	25	22	16 920	4 991	7 562	11 417	13 991	3,99
		19	15 228	8 982	11 552	15 228	15 228	4,18
		17	14 100	11 613	14 100	14 100	14 100	4,37
	35	22	15 651	4 581	7 151	11 007	13 577	4,52
		19	14 100	8 573	11 143	14 100	14 100	4,75
		17	12 972	10 446	12 972	12 972	12 972	4,99
	45	22	14 100	4 122	6 692	10 548	13 119	5,23
		19	12 690	8 105	10 676	12 690	12 690	5,47
		17	11 562	10 628	11 562	11 562	11 562	5,70



## Sensible cooling capacities

Model	Temperature of air on to condenser °C(DB)	Temperature of air on to evaporator °C (WB)	Total capacity	Sensible capacity (W)				Compressor absorbed power
				Entering air temperature to coil, °C (DB)				
				22	24	27	29	
			W	W	W	W	W	kW
<b>RTH-20B</b>	25	22	21 480	6 463	9 189	13 279	16 009	4,39
		19	19 332	10 702	13 429	17 519	19 332	4,60
		17	17 900	13 490	16 216	17 900	17 900	4,81
	35	22	19 869	5 925	8 652	12 742	15 468	4,97
		19	17 900	10 169	12 895	16 985	17 900	5,23
		17	16 468	12 115	14 841	16 468	16 468	5,49
	45	22	17 900	5 326	8 053	12 143	14 869	5,75
		19	16 110	9 559	12 286	16 110	16 110	6,02
		17	14 678	12 209	14 678	14 678	14 678	6,28
<b>RTH-25B</b>	25	22	26 040	7986	10 822	15 075	17 915	6,63
		19	23 436	12 398	15 223	19 487	22 327	6,95
		17	21 700	15 291	18 126	21 700	21 700	7,26
	35	22	24 087	7 314	10 149	14 403	17 238	7,50
		19	21 700	11 732	14 568	18 821	21 657	7,90
		17	19 964	13 049	15 884	19 964	19 964	8,29
	45	22	21 700	6 566	9 402	13 655	16 491	8,69
		19	19 530	10 974	13 810	18 064	19 530	9,08
		17	17 794	13 699	16 535	17 794	17 794	9,48
<b>RTH-30B</b>	25	22	32 400	9 907	13 518	18 934	22 550	7,77
		19	29 160	15 524	19 135	24 551	28 169	8,14
		17	27 000	19 209	22 820	27 000	27 700	8,51
	35	22	29 970	9 074	12 685	18 101	21 712	8,79
		19	27 000	14 700	18 311	23 727	27 000	9,25
		17	24 840	17 274	20 884	24 840	24 840	9,72
	45	22	27 000	8 148	11 759	17 176	20 787	10,18
		19	24 300	13 761	17 372	22 788	24 300	10,64
		17	22 140	17 237	20 848	22 140	22 140	11,10

## Indoor fan performance

Model	Available static pressure		Air flow		Absorbed power
	mm WG	Pa	m³/h	m³/s	W
<b>RTH -07B</b>	8	78,4	1 615	0,45	395
	6	58,8	1 760	0,49	403
	4	39,2	1 865	0,52	410
	2	19,6	2 010	0,56	423
	0	0	2 120	0,59	433
	<b>RTH -10B</b>	10	98	2 100	0,58
8		78,4	2 220	0,61	455
6		58,8	2 300	0,64	373
4		39,2	2 410	0,67	480
2		19,6	2 530	0,70	500
0		0	2 645	0,73	518
<b>RTH -15B</b>	12	117,6	3 300	0,92	969
	10	98	3 600	1,00	990
	8	78,4	3 790	1,05	1018
	6	58,8	4 000	1,11	1055
	4	39,2	4 070	1,13	1078
	2	19,6	4 170	1,16	1087
<b>RTH -20B</b>	0	0	4 190	1,15	1 100
	20	196	3 620	1	900
	16	156,8	4 015	1,12	980
	12	117,6	4 305	1,96	1 050
	10	98,0	4 360	1,21	1 080
	8	78,4	4 380	1,22	1 110
	6	58,8	4 455	1,24	1 140
	4	39,2	4 525	1,26	1 170
<b>RTH -25B</b>	2	19,6	4 610	1,28	1 205
	0	0	4 710	1,31	1 240
	16	156,8	3 980	1,10	940
	12	117,6	4 400	1,22	1 050
	10	98	4 520	1,25	1 100
	8	78,4	4 750	1,31	1 160
	6,3	61,7	4 900	1,36	1 220
	4	39,2	5 180	1,43	1 290
<b>RTH -30B</b>	2	19,6	5 420	1,50	1 345
	0	0	5 500	1,52	1 390
	16	156,8	4 700	1,30	1 220
	12	117,6	5 200	1,44	1 365
	10	98	5 350	1,48	1 430
	6,3	61,7	5 800	1,61	1 585
	4	39,2	6 050	1,68	1 680
	2	19,6	6 280	1,74	1 750
0	0	6 400	1,77	1 810	

## Outdoor fan performance

Model	Available static pressure		Air flow		Absorbed power
	mm WG	Pa	m³/h	m³/s	W
<b>RTH -07B</b>	10	98	2 020	0,56	445
	8	78,4	2 190	0,61	460
	6	58,8	2 315	0,64	470
	4	39,2	2 430	0,68	486
	2	19,6	2550	0,71	500
	0	0	2665	0,74	514
<b>RTH -10B</b>	10	98	3 180	0,88	900
	8	78,4	3 310	0,92	930
	6	58,8	3 410	0,95	950
	4	39,2	3 510	0,98	980
	2	19,6	3 625	1,00	1 003
	0	0	3 735	1,04	1 033
<b>RTH -15B</b>	10	98,0	3 970	1,10	1000
	8	78,4	4 170	1,16	1070
	6	58,8	4 320	1,20	1142
	4	39,2	4 425	1,23	1180
	2	19,6	4 520	1,26	1205
	0	0,0	4 635	1,29	1235
<b>RTH -20B</b>	16	156,8	4 410	1,23	990
	10	98,0	4 970	1,38	1 130
	8	78,2	5 100	1,42	1 170
	6	58,7	5 210	1,45	1 205
	4	39,1	5 317	1,48	1 235
	2	19,6	5 428	1,51	1 275
<b>RTH -25B</b>	0	0,0	5 525	1,54	1 305
	14	137,2	4 500	1,25	1 130
	10	98	4 800	1,33	1 200
	8	78,4	4 910	1,36	1 250
	6	58,8	5 050	1,40	1 275
	5,1	50	5 250	1,44	1 295
	4	39,2	5 270	1,45	1 320
	2	19,6	5 350	1,48	1 335
<b>RTH -30B</b>	0	0	5 450	1,51	1 388
	14	137,2	5 490	1,52	1 355
	10	98	5 980	1,66	1 440
	8	78,4	6 200	1,72	1 500
	5,1	50	6 400	1,77	1 555
	4	39,2	6 480	1,8	1 585
	2	19,6	6 600	1,83	1 600
	0	0	6 700	1,86	1 665

# Installation instructions

## General information

The RTH heat pumps are compact units, factory charged and tested. They are designed to be installed on terraces, rooftops, attics or basements with ducts.

## Environmental protection



### Packing

Packing is made of recyclable material. Its elimination should be carried out in accordance with existing local regulations on collection of residual material.

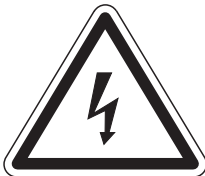
### Elimination of the unit

Upon disassembly after a long service life, the components of the unit should be recuperated ecologically. The cooling circuit contains R-22 refrigerant, which should be recovered and then returned to the gas manufacturer for recycling. Oil will remain in the hermetic compressor and, therefore, must be returned with its circuit sealed. The air conditioning unit will be deposited in an area determined by the local authorities, for recycling.

### Warning signs

The following signs indicate the existence of potentially dangerous conditions for users or servicing personnel. Whenever found on the unit itself, their meaning should be taken into account.

### Transportation



This symbol indicates an electrical danger or risk



Attention: It is obligatory to read the instructions prior to any handling.



Attention: Fan in operation.



Attention: The unit is equipped with remote control and can run automatically. Two minutes prior to having access to the interior, disconnect the power supply so as to avoid any contact with the fan turbine in motion.



Attention: Do not touch hot surfaces.

The units should always be transported in a horizontal position, so as to avoid oil migration from the compressor. If this position has to be changed for any reason, it should be done only for the time strictly necessary.

### Location

Location should be selected foreseeing a permanent access for maintenance servicing, either by means of the side panels or the upper cover. Can be installed outdoors. If installed indoors, in a basement, attic, etc., the outdoor air intake and extract ducts should be connected. When installed indoors, keep in mind that, when operating in the winter cycle, the outdoor coil condenses large amounts of water that must be drained. In occasions, when the operating cycle is inverted in winter so as to eliminate frost on the coil, the air can drag drops of water and, therefore, when selecting location take this possibility into account and avoid an eventual obstruction of the drainage due to foreign matter, dust or dirt.

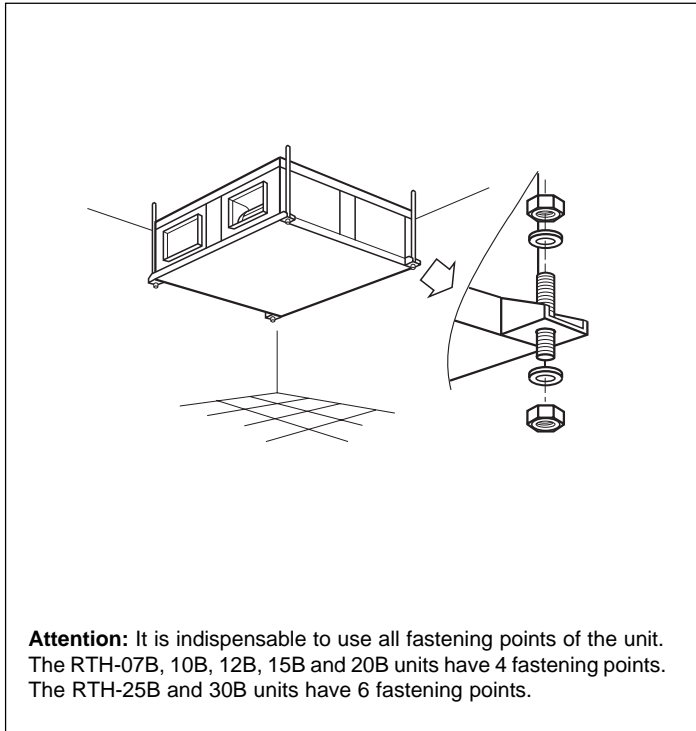
## Securing the unit

### To the ceiling

The unit is secured to the ceiling by means of M-10 bolts, as indicated in the drawing. It is recommendable to install antivibratory supports for this sort of assembly.

Upon securing, make sure the unit is completely horizontal, or very slightly sloped towards the drain, so as to avoid possible drops of condensed water (use a bubble level).

### Floor mounted



CAUTION

It is of great importance to be very careful with the support of the indoor unit from the ceiling. Make sure the ceiling is strong enough to withstand the weight of the unit. Prior to hanging, check each mounting bolt.

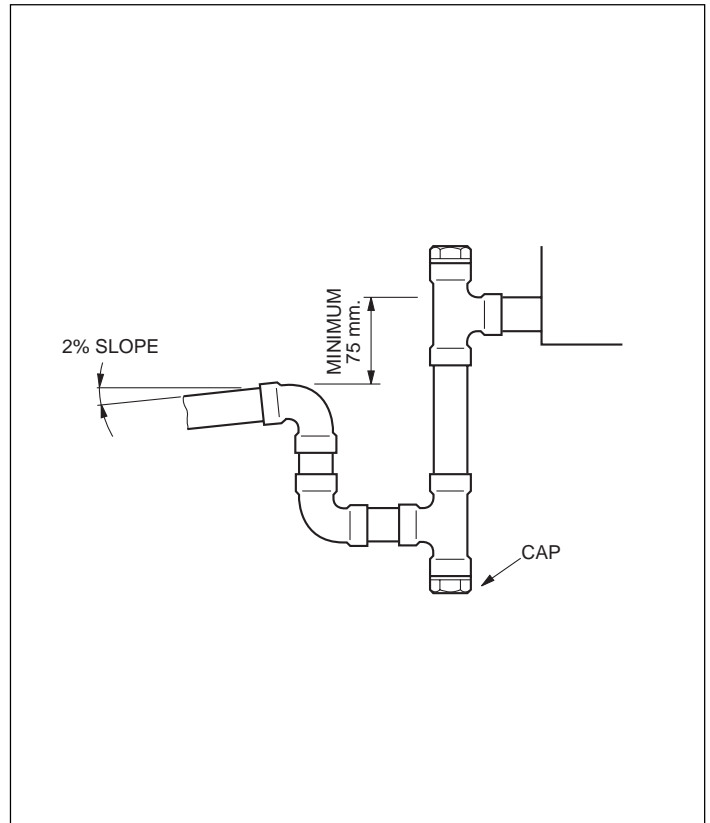
When setting the unit on the floor, if outdoors, it should be placed on supports so as to avoid possible accumulation of snow that would obstruct the air intake.

### Drainage connection ( 2 off required)

Install the drainage tubing for the indoor and outdoor coils through individual traps and leave a minimum level difference of 75 mm. (see drawing) between the height of the unit connection and the tubing line after the traps. This is to avoid that the depression produced by the fans may hinder tray drainage.

The drainage line should be sloped at least 20 mm. for each metre in length.

Unit connections are carried out by means of copper tubing of 22 mm. diameter.



### Attention:

When the heat pump operates at outdoor temperatures below 5° C, the drainage tubing can be blocked by ice. If it is located outdoors, it is convenient to keep this possibility in mind, installing an electrical heater in the tray (optional).

### Clearances

Clearances should be left in the installation of each unit for:

- Air intake and discharge of the condensing unit.
- Connecting the drainage tubing.
- Air ducting.
- Maintenance servicing.
- Power supply control wiring.

For proper operation, the minimum clearances indicated in the general dimension diagrams should always be respected with regard to possible obstruction avoiding free air circulation or servicing.

### Air ducts

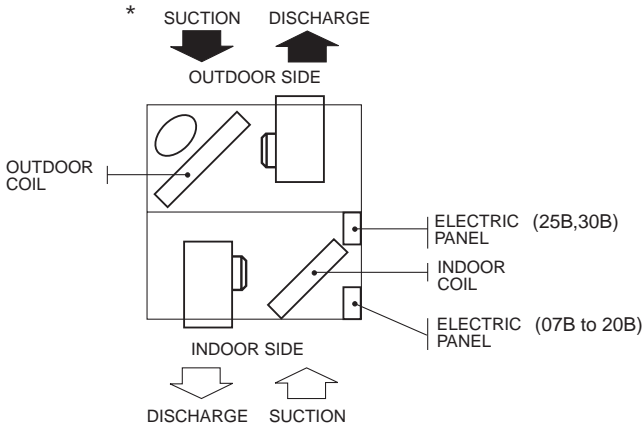
- 1) Connect the ducts, isolating them from the unit by means of a flexible hose (preferably of non-combustible material) so as to avoid the transmission of vibrations of the unit. If the ducts are made of flexible material, they do not transfer vibrations.
- 2) It is advisable to fit a damper at each discharge duct so as to be able to carry out an appropriate balance of the system.
- 3) Make sure to have easy access for cleaning and changing the air filters.
- 4) If the outdoor coil air outlet is ducted, it is convenient that the first 1-metre section be made of galvanized sheeting so as to avoid deterioration due to condensation.

## Orientation of air suction and discharge

Orientation supplied from factory.

### RTH-07B, 10B, 15B, 20B, 25B, 30B

- \*) The direct suction of outdoor air without ducts can be carried out only if it is protected against direct rain.

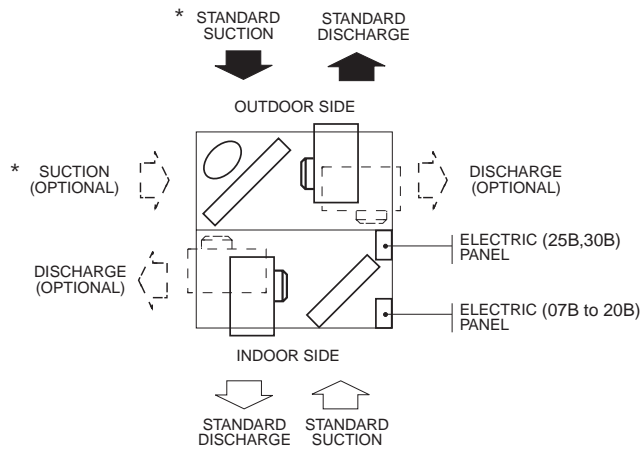


## Variations to be carried out at job site

Based on the standard unit, the orientation of the air suction and discharge of the condensing unit and evaporating unit fans can be varied until any of the desired combinations is achieved.

### RTH-07B, 10B, 15B, 20B, 25B, 30B

- \*) The direct suction of outdoor air without ducts can be carried out only if it is protected against direct rain or fitted with a rain hood.

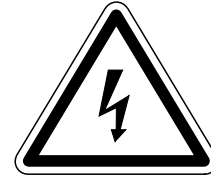


## Wiring

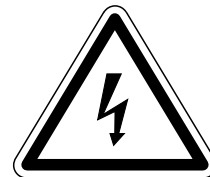
The **established national regulations** should be followed in all cases.

Each heat pump is supplied with a control box, to which the power supply will be connected by means of a fused main switch, or an automatic switch.

The electric heater, if used, should be installed with independent power supply and switches.



Loose cables can produce overheating at the terminals, or incorrect operation of the unit. A fire hazard may also exist. Therefore, make sure all cables are firmly connected.



Do not connect the power supply to the unit, nor start it up until all tubing and wiring connections are completed. Make sure the power supply is connected correctly to the unit, as show in the wiring diagrams.

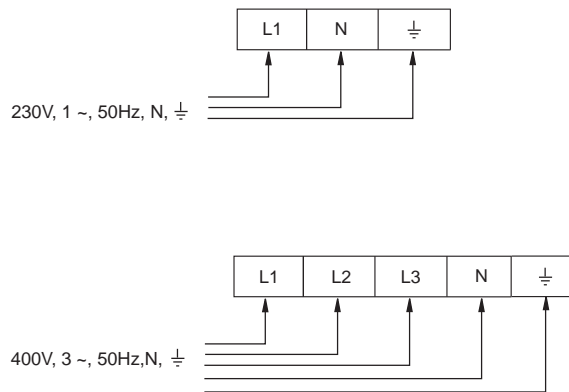
## Electrical characteristics

Model	Power supply V.ph.Hz.		Consumption A			Minimum power supply cable section(2) mm <sup>2</sup>	Automatic switch (Curve K)(1) A		
	Compressor	Fan		Compressor	Outdoor fan			Indoor fan	
		Outdoor	Indoor	Nominal	Run			Run	
<b>RTH -07B</b>	230.1.50				13	2	1,9	4	25
<b>RTH -10B</b>	400.3.50	230.1.50			5,5	4,5	2	2,5	20
<b>RTH -15B</b>	400.3.50				7,5	5,4	5,1	4	25
<b>RTH -20B</b>	400.3.50	400.3.50			9,6	2,8	2,9	4	25
<b>RTH -25B</b>	400.3.50	400.3.50			12,9	2,9	2,8	4	25
<b>RTH -30B</b>	400.3.50	400.3.50			15	4,1	2,6	6	32

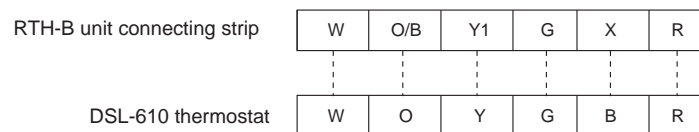
**Important:** Automatic switch dimensioning and power supply and operating line sections are orientative and should be corrected in accordance with conditions at job site, length between units and legislation in force.

**Notes:** 1.- K curve (DIN, VDE 0660-104). 2.- Based on copper conduction.

## Power supply connection diagram



## Thermostat connection diagram

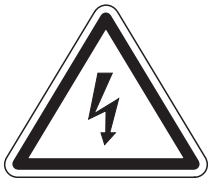


# Limits of Use

Voltage limits				DB air intake temperature to outdoor coil °C				Air intake temperature to indoor coil			
Nominal 230 V		Nominal 400 V		Operating cycle				Operating cycle			
				Minimum °C		Maximum °C		Minimum °C		Maximum °C	
Minimum	Maximum	Minimum	Maximum	Cool	Heat	Cool	Heat	Cool WB	Heat DB	Cool WB	Heat DB
198	254	342	436	19	-20 <sup>(1)</sup>	46	24	15	10 <sup>(2)</sup>	23	32

**Notes:** WB = Wet bulb. DB = Dry bulb. (1) At below -20° C, only the emergency electric heater (optional) remains operative. (2) This equipment can operate for a short period of time at a temperature below 10° C so as to increase the air temperature within the space conditioned.

## Prior to final approval of the installation



**Verify that:**

- The voltage is always between 198-254 V, or 342-436 V.
- The power supply cable section is, at least, that recommended in the corresponding wiring diagrams.



- Information has been given on the need to clean the air filter regularly.



- Condensed water drainage is carried out correctly, and there are no leaks in the water circuit.



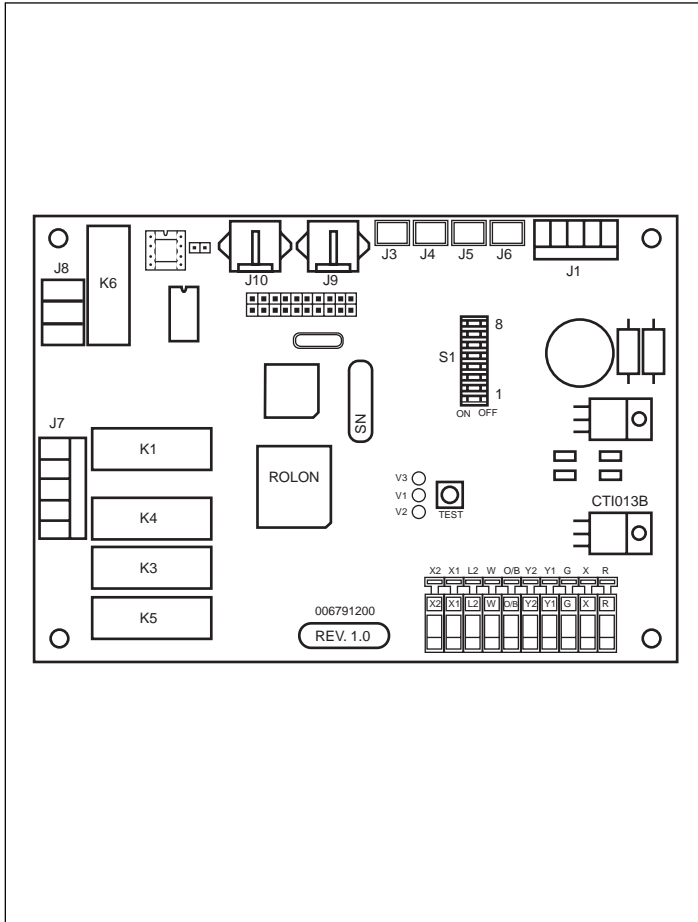
- The guarantee card has been filled out.
- Maintenance instructions have been given, or a contract has been made for periodical servicing.



- Operating instructions have been given to the user.

## Operation

Heat pump control is carried out by means of a resident software in the control board. The system operates in accordance with the position of the microswitches in the main board. There are also variations in the control algorithm, depending upon the accessories the board detects installed in the equipment.



## Indoor fan

Operation can be continuous or automatic. For continuous operation, select said operation on the thermostat.

If the internal coil probe (optional accessory) is installed, and the operating mode is in heat, the fan will not start until the indoor coil is at a temperature of 35° C, and it will stop if the coil temperature drops to below 30° C. Whenever the electric heater is on, the indoor fan will also be on.

## Outdoor fan

The outdoor fan starts 5 seconds before the compressor. And stops after the compressor stops.

## 4-way valve

When SW6 of the control board is set to ON, the 4-way valve is activated when the thermostat demands heat. When a defrost cycle is carried out, the valve operates inversely; that is to say, in cooling mode.

## Compressor

When signal Y1 is present, the outdoor fan starts, and then the compressor. The compressor, along with the outdoor fan, does not start until after a minimum off time, so as to avoid consecutive start-up. This period of time can be set by means of microswitches SW4; ON = 2' and OFF = 5'.

## Defrost

Defrost is carried out only in heat pump operation.

## Defrost Initiation

The following conditions should apply:

- 1) The compressor is operative.
- 2) The liquid probe temperature is below -3° C for 3'.
- 3) If the outdoor temperature is below 0° C, once the compressor has started up it will be timed 10' prior to beginning a defrost cycle.

## Operation

Once the defrost cycle begins, the following operations are to be carried out:

- 1) Set the 4-way valve to cooling mode.
- 2) Turn outdoor fan off.
- 3) Activate the next heat stage if the thermostat demands heat.
- 4) Turn indoor fan off if there is no following heat stage.
- 5) Do not turn off the compressor while carrying out the defrost cycle, even if indicated by the thermostat.

## Defrost Termination

Defrost will continue until one of the following conditions is present:

- a) Liquid temperature over 13° C for 2".
- b) Liquid temperature over 5° C for 30".
- c) Over 10' after beginning the defrost cycle.
- d) A failure signal from the high pressure switch.

## Operation

Once the defrost cycle is over:

- 1) Set the 4-way valve to heating mode.
- 2) Turn outdoor fan on.
- 3) Turn indoor fan on if there is no following heat stage.
- 4) Turn off heating started by the defrost cycle.

## Test and LED button

Pressing Test shortens certain timings, resets any failure detected and also acts as a LonWorks service pin.

There are three signalling LED diodes:

- a) The green LED indicates correct operation of the equipment. If the equipment is operating correctly, this LED flashes at a frequency of 1.6 Hz.
- b) The red LED indicates failures. If no failure is present, this LED remains off.
- c) The yellow LED is the LonWorks service LED, and also indicates, by flashing, that the operating compressor is timed.

## Configuration

Whenever the electronic board is powered, system configuration will be checked, with the exception of the accessories. Below we can see how the different options are configured.

## Microswitches

They can be read after power supply connection, and the board will act in accordance with their position. Switches SW1 and SW2 set to OFF indicates that the configuration is carried out by remote control, and the parameters stored in the EPROM memory are used.



## Configuration of switches

The microswitches establish the following configurations:

Number	State	Meaning
1 / 2	OFF/OFF	Ignore SW, programmed via communications
	ON/OFF	Defrost period 30'
	OFF/ON	Defrost period 60'
	ON/ON	Defrost period 90'
3	ON	Discharge temperature >115°C
	OFF	Discharge temperature >130°C
4	ON	Compressor delay 2'
	OFF	Compressor delay 5'
5	ON	Cool mode
	OFF	Heat pump mode
6	ON	4-way valve active in heat
	OFF	4-way valve active in cool
7	ON	Receives signal B from thermostat (active in heat)
	OFF	Receives signal O from thermostat (active in cool)
8	ON	NA
	OFF	NA

## Accessories

To carry out an accessory search and configuration, the test button should be pressed for over two seconds, until the red LED goes on. Once the search and configuration process begins, the red LED on the board goes on, and stays on until the operation is concluded. Once off, the board uses the accessories found.

This search will also determine which optional probes are connected to the board. A failure will be given if one of the optional probes, established as existing in the configuration process, does not give valid values.

The following table shows the probe configuration.

Probe	RTH-B Heat pump	
	Standard	Optional
Discharge	X	
Liquid	X	
Outdoor	X	
Suction	X	
Indoor coil		X

## Accessories

The accessories are used to support extended functions of the unit.

These accessories can be either factory mounted or installed by the client. Power supply to the unit should always be disconnected. The accessory, along with the necessary elements, will then be assembled, and the power supply connected once again.

Once the search and configuration sequence is carried out, the new elements will be recognised and they will begin to operate.

The function of the different accessories is defined below.

### Tray electric heater

Used to feed a cable resistance heater located between the bottom of outdoor coil and the tray, where defrost water is collected. This heater avoids freezing of the water collected in the tray and ice forming in the bottom of the coil.

This heater should be activated in the winter cycle, with the compressor in operation, and when liquid temperature is below -2°C; and is to be turned off when the temperature is above 2°C.

### Electric heating

In the case of the heaters, the relay is used to switch the power contactor on and off, as well as the thermal switch with automatic reset.

In the RTH-G, the response to a demand for first stage from the thermostat starts the compressor stage; and the second stage starts the electric heating stage.

In the case of a failure in the compressor stage, the electric heating would come on as the first stage.

Whenever the electric heating is on, the indoor fan will also be operative.

### Indoor coil probe

Located in the indoor coil and, depending upon the temperature, carries out the following operations:

- 1) If in heat mode and the electric heater is not on, the fan will not be operative until the indoor coil is at a temperature of 35°C. If the electric heater is not on, the indoor fan will stop if the temperature is below 30°C.  
If after having the compressor in operation in heat for 2' the indoor temperature does not rise above 35°C, a failure of heat temperature is indicated.
- 2) If in cool mode and the probe temperature is below -25°C, or the compressor is operative for over 5' and the temperature is below -4°C, both the compressor and the outdoor fan turn off. Once the timing period is over, the compressor starts up again. Should this condition be repeated 3 times in 35 minutes, a failure of repeated start-up in cool is indicated, and the compressor cannot restart again.

## Malfunctions

There are two different types of malfunctions: incidents that do not turn the unit off, and failures or lockouts, that shutdown the unit.

### High and low pressure switches

Their activation turns the compressor and outdoor fan off. A failure of the high or low pressure switch is indicated.

## Electric heating thermal switch (accessory)

Activation turns the electric heating off and indicates an incident. If this error occurs more than 3 times in an hour, an electric heater thermal switch incident is indicated, and the electric heater is turned off.

## Thermostat errors

If signal Y is given without signal G, it acts as if signal G were active. An incident of signal Y1 without signal G is indicated.

If signal W is given without signal G, it acts as if signal G were active. An incident of signal W without signal G is given.

If signal W is given without signal B/O, it acts as if signal B/O were indicating heat mode. An incident of signal W without signal B/O is given.

## Protection for defrost cycles

If 3 consecutive defrost cycles are carried out and ended in compliance with the 10' timer, an incident of repeated defrosts is indicated. This incident is deleted when a defrost cycle is ended in compliance with another condition that is not the maximum timer period.

## Protection for temperature

- If the outdoor temperature is below  $-20^{\circ}\text{C}$ , the compressor turns off. An incident of 'too low' outdoor temperature (only in heat mode) is indicated.
- If the discharge temperature is above SW3; ON =  $115^{\circ}\text{C}$ , OFF =  $130^{\circ}\text{C}$ , the compressor and outdoor fan turn off. An excessive discharge temperature failure is indicated.
- If while the compressor is on for 5', the discharge temperature does not rise above  $50^{\circ}\text{C}$ , in cool mode, or  $35^{\circ}\text{C}$  in heat mode, a low discharge temperature incident is indicated.
- If the suction temperature is very low, the compressor and outdoor fan turn off. If this is repeated 3 times in 35 minutes, a failure is indicated.
- If, in heat mode, the liquid temperature is below  $-25^{\circ}\text{C}$ , the compressor and outdoor fan turn off, and a failure is indicated.

## Open or short circuit of the outdoor or indoor liquid probe

An incident of the corresponding probe is indicated if the value read is below  $-40^{\circ}\text{C}$ , or above  $100^{\circ}\text{C}$ . If this incident takes place in heat mode in the liquid probe, repeated defrost cycles are carried out with a maximum duration of 1'.

## Open or Short circuit of the discharge probe

An incident of the discharge probe is indicated if its value is below  $-20^{\circ}\text{C}$ , or above  $150^{\circ}\text{C}$ . If the probe is short circuited, a failure is indicated.

## Signalling

Failure signalling is carried out at two levels. One for incidents and another for failures.

## Incidents

Incidents do not turn the unit off, and are indicated by the

green LED on the electronic board. If there is no failure present, this LED flashes at a frequency of 1 Hz. When an incident occurs, the LED flashes in three sequences. The first indicates the compressor involved: one flash for stage 1, followed by a short pause. Then the type of incident is indicated. Another short pause, and then the detected incident is indicated, followed by a long pause and the sequence is repeated again as long as the incident lasts.

The incidents reset when the cause disappears.

In the case of more than once incident at the same time, only the first one detected and not reset is indicated. As they reset, the other existing incidents will be indicated.

The following table shows the possible errors:

Type	Flashes	Incident
Probes	1	1 Discharge probe open or $>150^{\circ}\text{C}$
	1	2 Liquid probe open or short circuited
	1	3 Outdoor probe open or short circuited
	1	4 Indoor probe open or short circuited
	1	5 Outdoor temperature too low
Thermostat	2	1 Signal Y1 or Y2 without signal G
	2	2 Signal W without signal B
	2	3 Signal W without signal G
	2	4 Signal Y2 without signal Y1
Electric heater	3	1 Electric heater thermal switch AUX1
	3	2 Electric heater thermal switch AUX2
	3	3 Electric heater thermal switch EM1
	3	4 Electric heater thermal switch EM2
Temperature	4	1 Repeated defrost cycles
	4	2 Discharge temperature low
	4	4 Temperature in heat does not recover
Others	5	1 ID of transceiver unknown
	5	2 Accessory removed

## Failures (lockouts)

Failures or lockouts turn the unit off.

They are indicated by the red LED on the board, and by means of the thermostat (depending upon the model). Relay K6 of the board is also activated. If no failure is present, this LED remains off. When a failure takes place, this LED flashes in two sequences. The first indicates the compressor involved: one flash for stage 1, followed by a short pause. Then the detected failure is indicated, followed by a long pause and the sequence is repeated.

Should more than one alarm take place, only the first one detected and not reset is indicated.

The following table shows the possible errors:

Flashes	Meaning
1	Discharge temperature excessive or probe short circuited
2	High pressure switch
3	Low pressure switch
4	Indoor or outdoor fan overload/Klixon
5	Repeated start-ups in cooling
6	Low liquid temperature

## Reset

The incidents, with a few exceptions, do not need to be reset. They reset automatically once the cause has disappeared.

The following incidents require resetting, and are reset in the same way as the alarms:

- Accessory removed.
- Repeated defrost cycles (also reset if a defrost cycle ends normally).
- Electric heating klixon tripped.

The alarms can be reset as follows:

- Setting the thermostat to OFF, if communication with the thermostat has been implemented.
- Pressing the test button on the electronic board.
- Disconnecting and reconnecting power supply to the electronic board.
- By means of the communications bus.

It is worth pointing out that with a reset by means of setting the thermostat to OFF, the board cannot be reset more than 3 times a day.

## Operating Instructions

### General information

Automatic temperature start-up and regulation is carried out by means of an ambient thermostat.

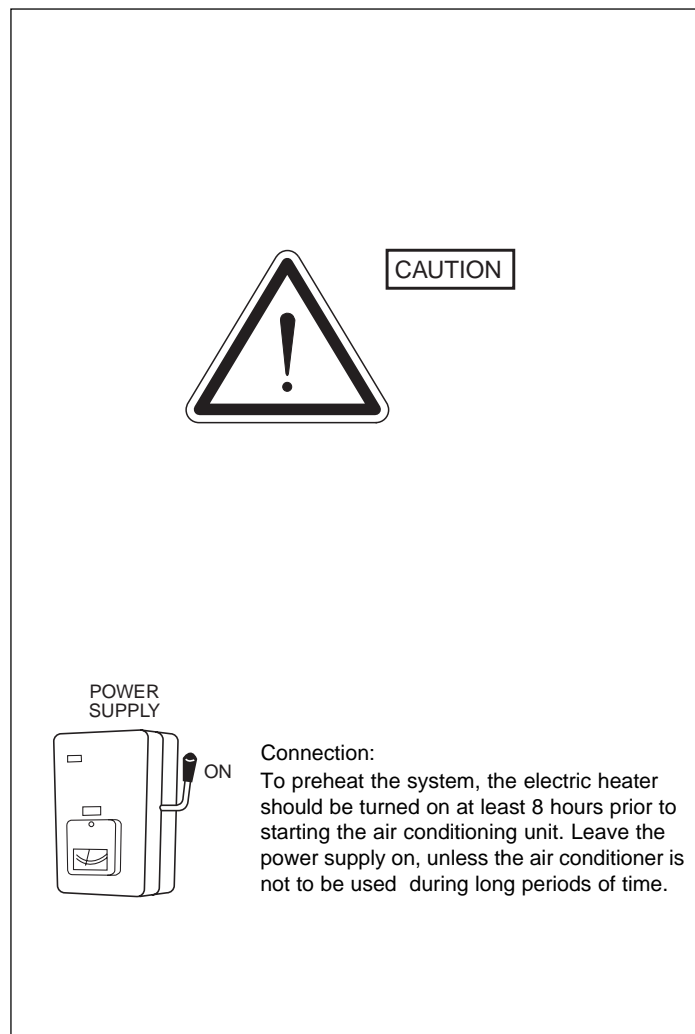
Locate the thermostat at approximately 1.5 m. above floor level, where no obstacle can avoid measuring the real temperature of the room.

### Important warning

The thermostat should be placed on a wall not exposed to direct sunlight; otherwise, temperatures would not be accurate and operation would be poor. Before starting up, turn the general switch on so as to supply power to the electrical heater of the compressor crankcase.

**The compressor should not be started until at least eight hours later.**

This is done to evaporate any refrigerant in liquid form that may be been mixed with the oil in the compressor.



## Recommendations for best operation

- Turn the air conditioning on before the room gets warm. Any heat accumulated on furniture, walls, etc., makes the unit take longer to reach the desired temperature.
- It is advisable to inspect and service your equipment whenever necessary; this avoids damage and ensures long service life of your air conditioning unit.

## Ambient thermostat-DSL 610

This thermostat is designed to give precise ambient temperature control and graphic information with regard to heat pump operation.

This control has a Proportional-Differential-Integral response and, depending upon the difference between the programmed temperature and the ambient temperature, it reacts varying the on-off cycles between 3 and 7.5 cycles per hour.

The liquid crystal (LCD) screen normally indicates the ambient temperature, operating mode and whether the cooling or heating system is operative.

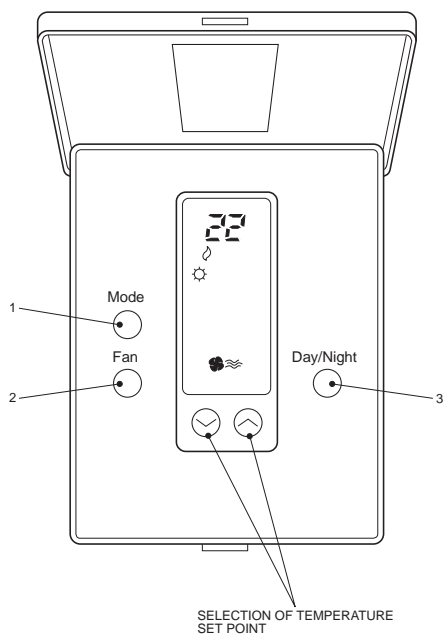
It allows selection of different temperature settings for cooling and heating, as well as their indication in °C or °F.

The fan may operate in a continuous or automatic mode, starting and operating jointly with the compressor.

The controls are located beneath a cover that avoids handling by unauthorised personnel.

### Controls and indicators

- 1.- Selection of operating mode.
- 2.- Selection of fan speed.
- 3.- Day/night selection.



### Cleaning the filters

Keep the coil filters in good condition, checking them at least every month. If filters are dirty, they limit air flow and equipment performance.

### Cleaning the outdoor unit

Dirt should not be allowed to accumulate in the outdoor coil. It should be cleaned as frequently as needed, with a brush, vacuum cleaner or detergent.

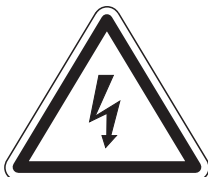


CAUTION

For safety reasons, make sure to turn the air conditioner off, and unplug the power supply, before cleaning.

### Maintenance

Clean the casing with a vacuum cleaner or a rag moistened in a mild liquid detergent.



Do not spill water on the unit for cleaning purposes. Water could damage internal components and cause electric discharges.



CAUTION

Check the outdoor unit periodically to see if the air inlet or outlet are clogged by dirt or leaves, etc. The internal coil, and other components of the outdoor unit, should also be cleaned regularly. Contact your dealer or maintenance service.

### Discharge of indoor units with ducts

The discharge of the indoor units equipped for ducts is supplied without a protecting grill. When carrying out maintenance servicing, keep this in mind.



CAUTION

In the case of installing an indoor unit with free discharge and equipped for ducts, the outlet opening should be protected with a grill. The lack of this protection could provoke damage caused by the fan turbine.

### Filling the drain trap

So as to avoid having problems with the condensed water, we recommend that, at start-up and before the beginning of each season, the drainage trap be filled with water so as to avoid air being sucked in through it's tubing.

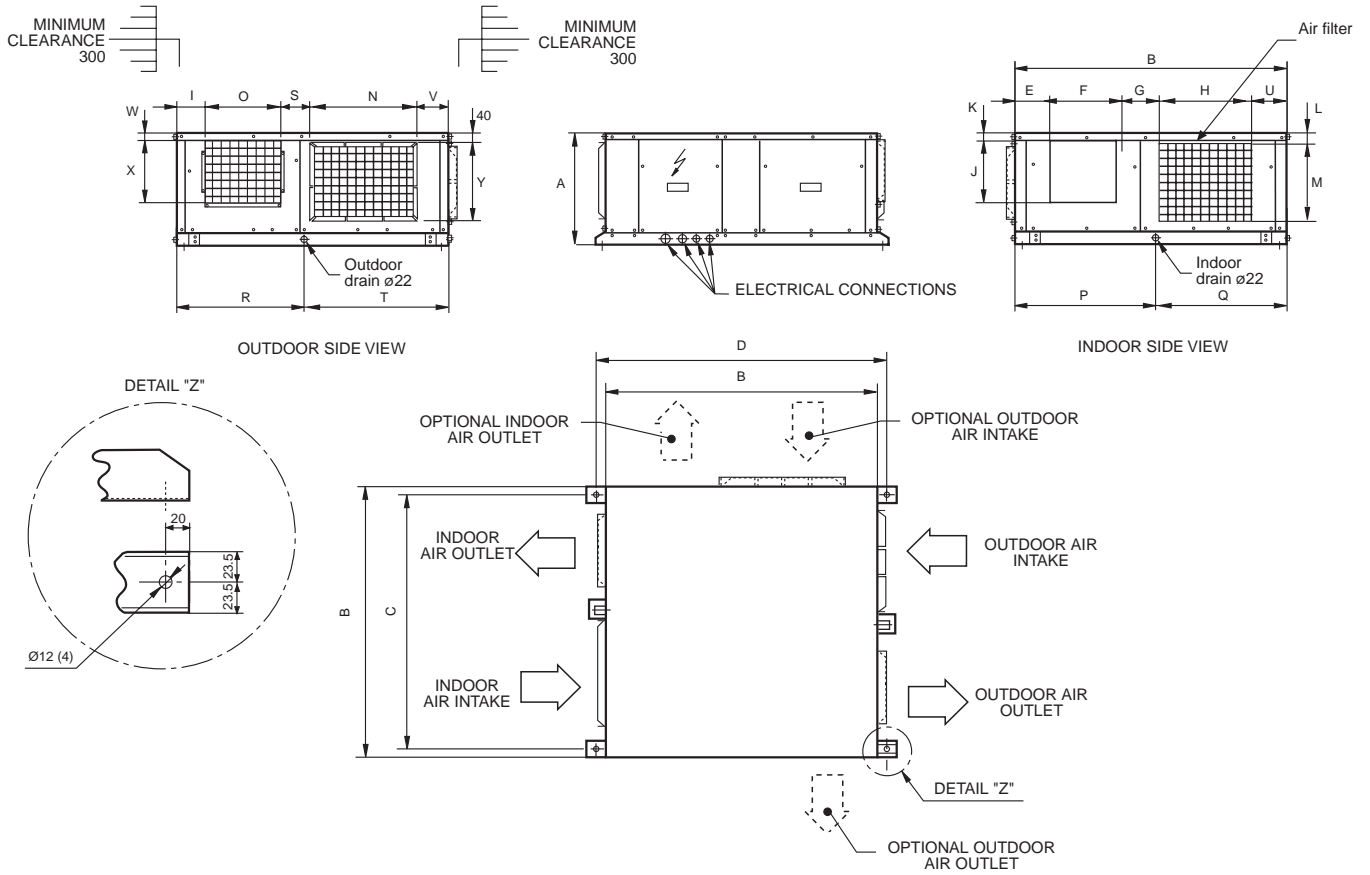
### Access to units for maintenance servicing



Attention: The unit is equipped with remote control and can run automatically. Two minutes prior to having access to the interior, disconnect the power supply so as to avoid any contact with the fan turbine in motion.

# General dimensions mm

## RTH-07B, 10B, 15B & 20B



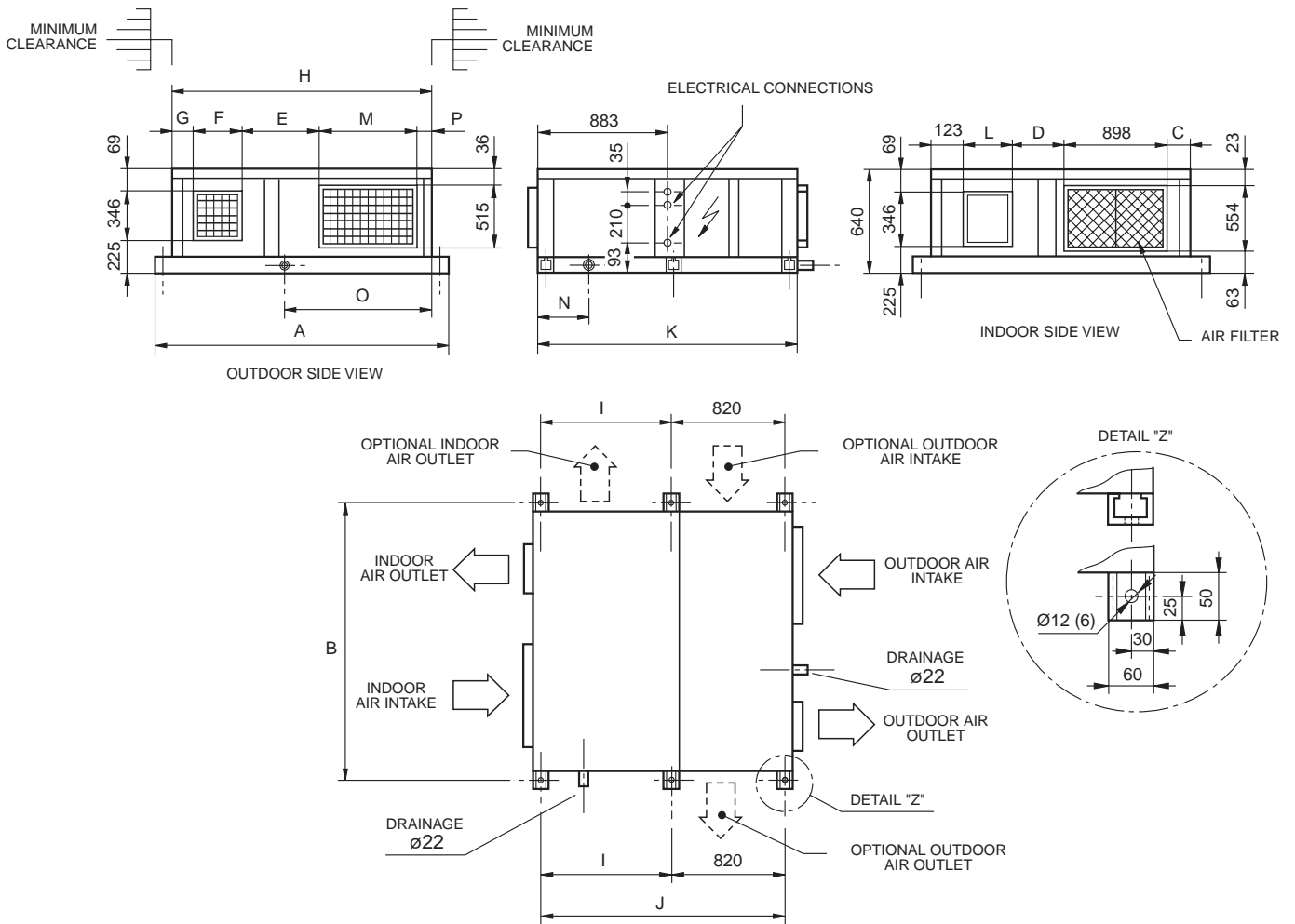
**Note:**

1- The solid arrows indicate the standard air intakes and outlets. The dotted arrows are the intakes and outlets that can be obtained at job site.

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
<b>RTH-07B</b>	478	1100	1055	1150	117	302	136	425	82	262	72,5	60	300	425	347	600	500	602	165	500	120	82	18	305	342
<b>RTH-10B</b>	555	1150	1105	1200	130	270	210	375	82	294	101	50	420	404	323	600	550	615	220	537	165	117	20	353	430
<b>RTH-15B</b>	555	1310	1265	1360	140	316	154	600	87	346	24	45	425	554	323	600	710	590	225	720	100	121	20	353	430
<b>RTH-20B</b>	555	1570	1525	1620	140	316	210	750	85	346	24	50	420	770	407	622	950	697	206	875	154	102	20	353	430

# General dimensions mm

## RTH-25B & 30B



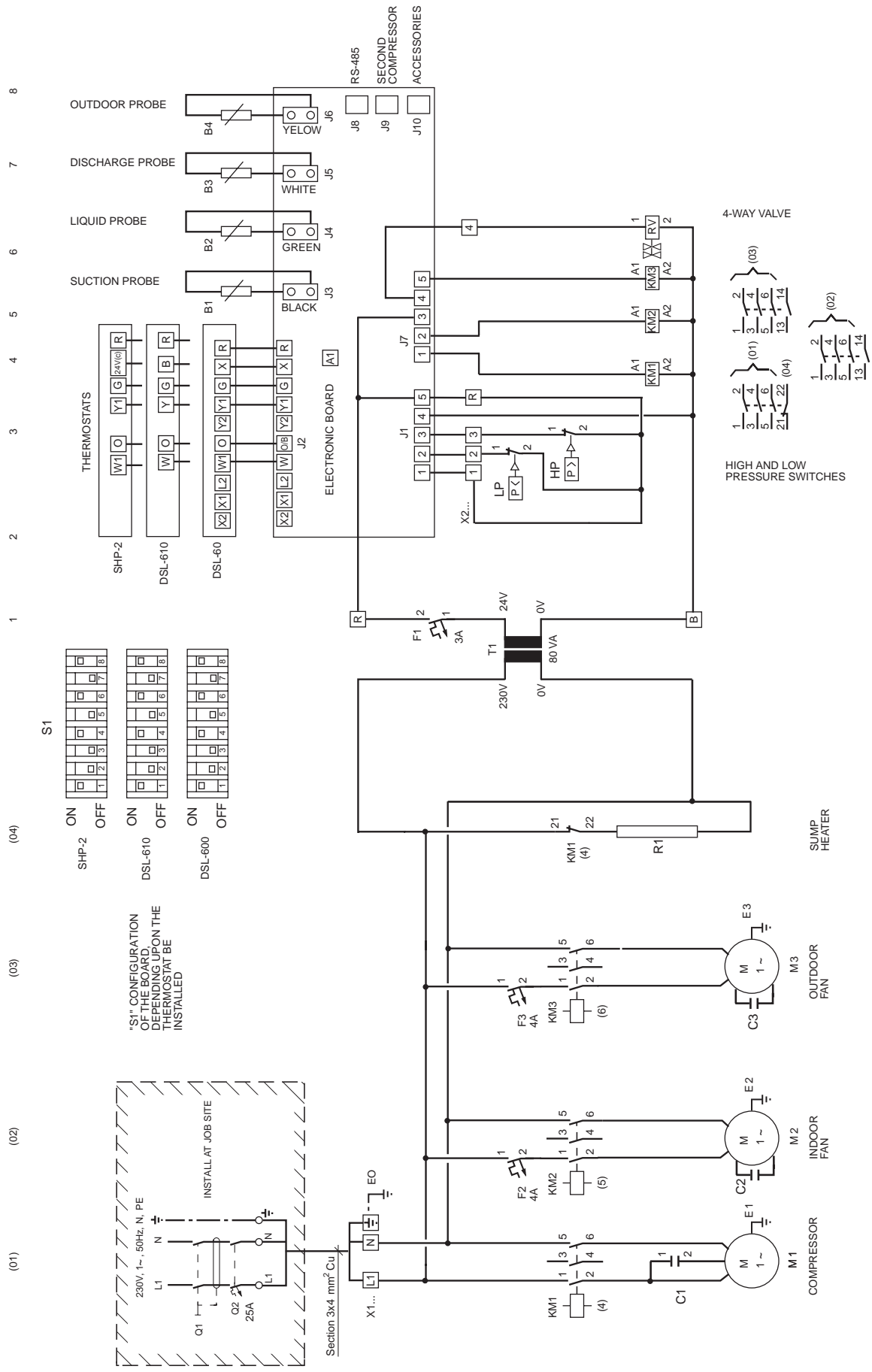
**Note:**

- 1- Always use the fixing points to install to unit.
- 2- The solid line arrows indicate the standard air inlets and outlets. The dotted line arrows show inlet and outlet arrangements that can be performed on the jobsite.

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
<b>RTH-25B</b>	1 750	1 700	81	233	442	315	133	1 650	870	1 690	1 750	315	667	348	1 145	93
<b>RTH-30B</b>	2 150	2 100	130	499	648	400	138	2 050	890	1 710	1 770	400	732	368	1 495	132

# Wiring diagram

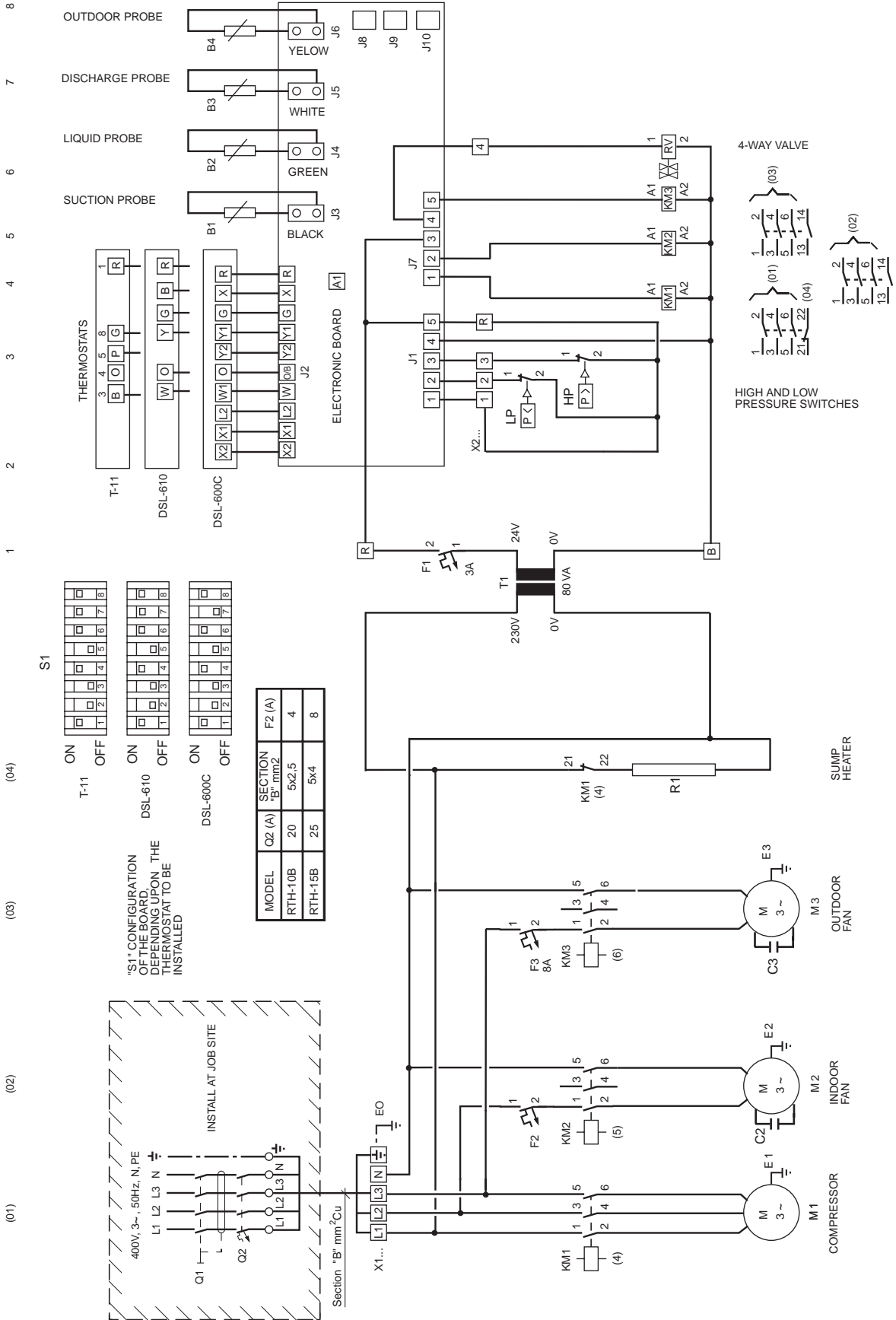
RTH-07B, 230.1.50



I-1971a  
RTH-07B  
230.1.50

# Wiring diagram

## RTH-10B-15B, 415.3.50

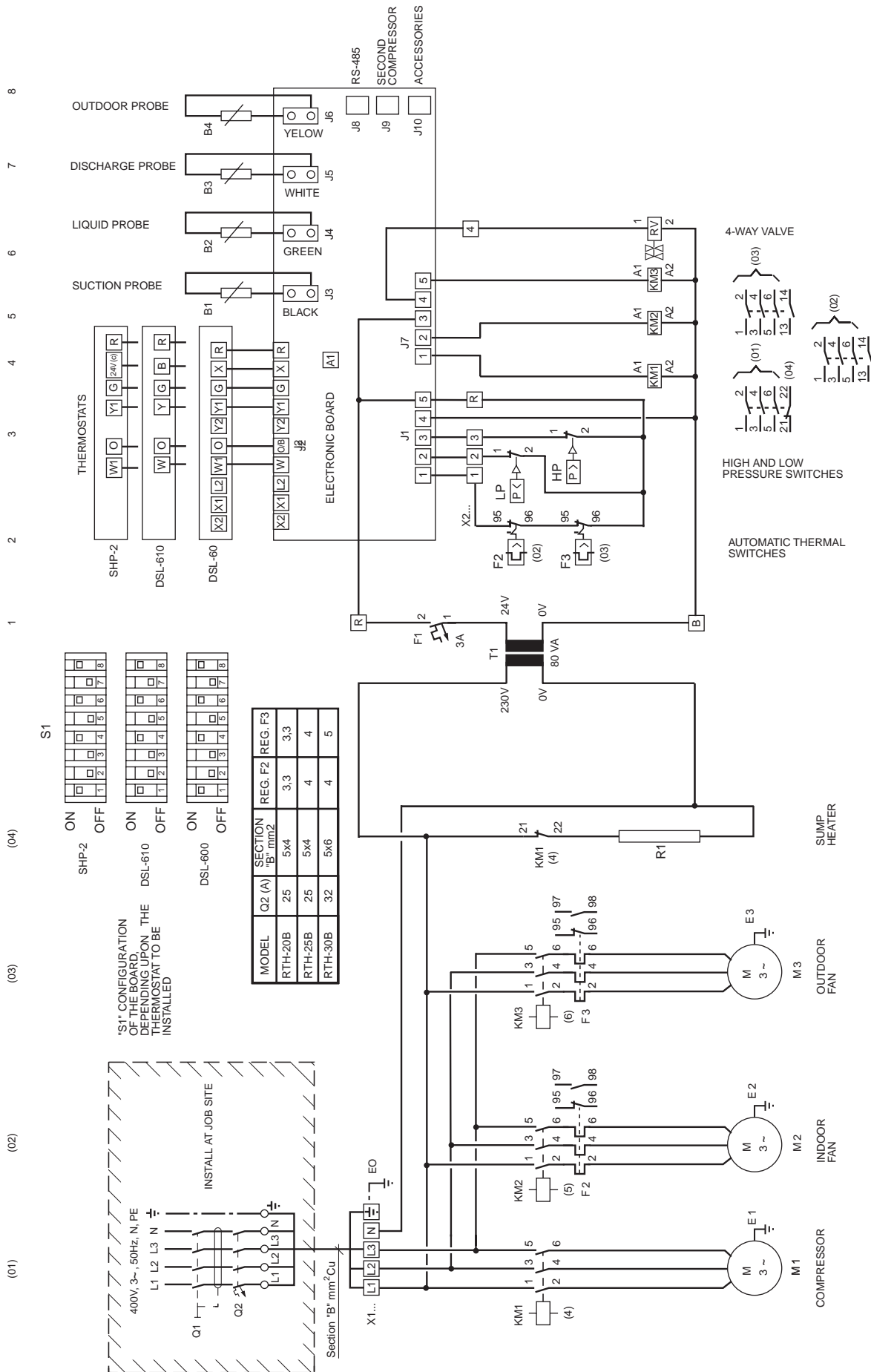


I-1972a  
RTH-10B-15B  
400.3.50



# Wiring diagram

## RTH-20B-25B-30B, 415.3.50



I-1953a  
RTH-20B-25B-30B  
400.3.50

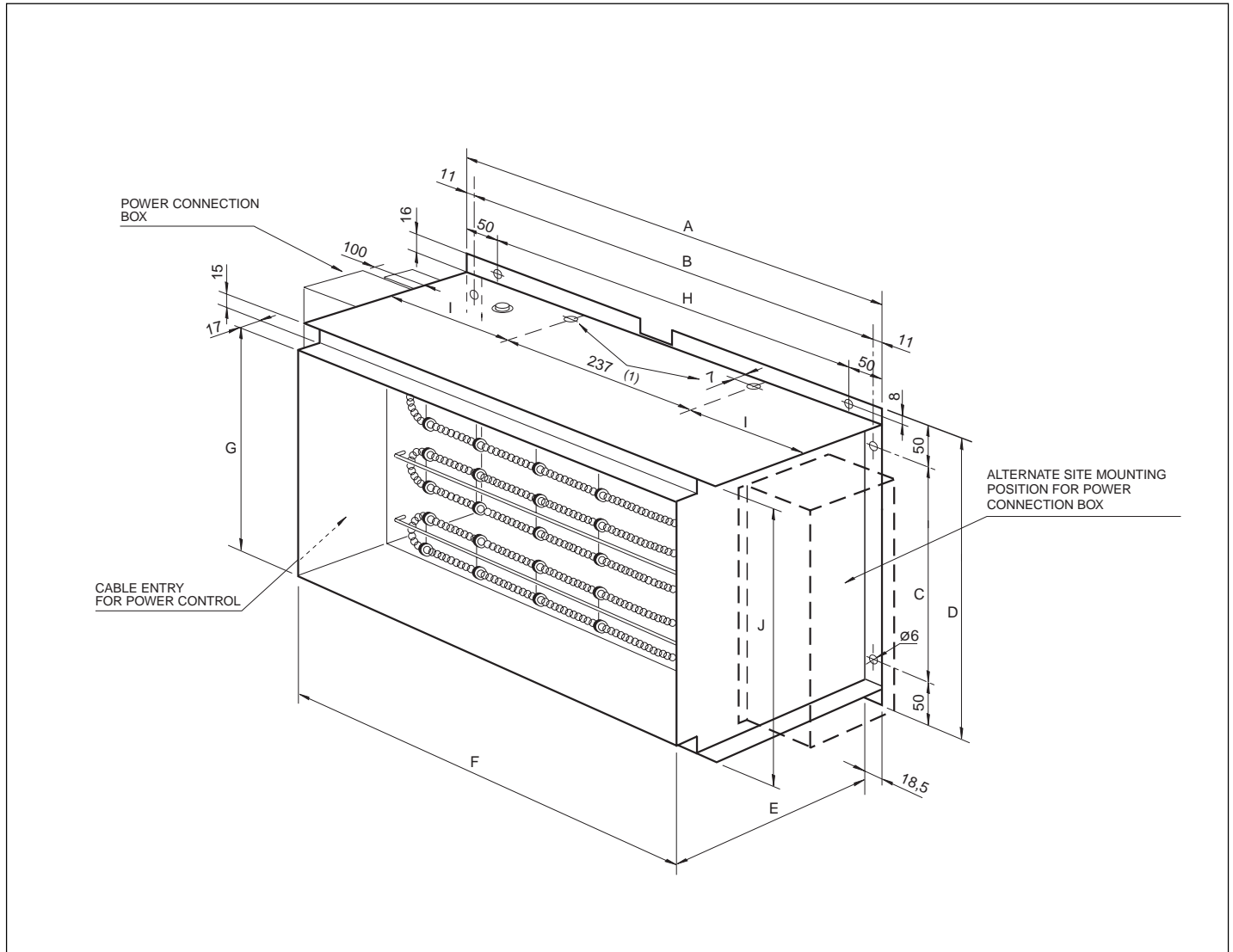
## Duct electric heaters

For installation in the indoor fan outlet (supply air).

### Attention:

A flow rate control should be installed together with every electric heater, to prevent the heater from operating if the fan has not been switched on.

## General dimensions mm



Modelo	A	B	C	D	E	F	G	H	I	J
<b>RTH-07-10B</b>	400	378	285	385	275	362	320	300	-	353
<b>RTH-15-30B</b>	527	505	325	425	350	490	360	427	145	393

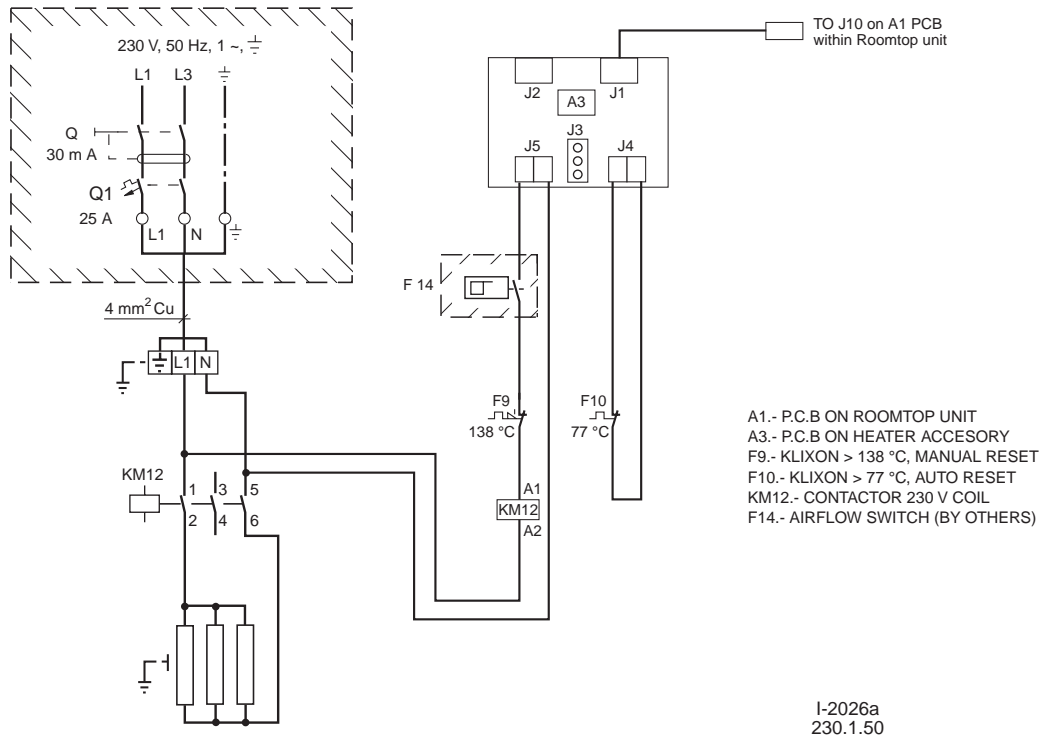
## General characteristics

Model electric heater	Voltage V.ph.Hz	Power kW	Consumption A	Stages	MCB Q1 A	Min power supply C.S.A mm <sup>2</sup>	Frontal area m <sup>2</sup>	Pressure drop Pa
<b>RTH-07B</b>	230.1.50	5	22	1	25	4	0,12	6
<b>RTH-07B-10B</b>	400.3.50	5	8	1	10	1,5	0,12	6
<b>RTH-07-10B</b>	400.3.50	10	15	1	20	2,5	0,12	6
<b>RTH-15-20-25-30B</b>	400.3.50	10	15	1	20	2,5	0,17	15
<b>RTH-15-20-25-30B</b>	400.3.50	15	22	1	25	4	0,17	15

**Notes:** 1.- K curve (DIN, VDE 0660-104).

## Wiring diagram

### Duct electric heater, 230.1.50 RTH-07B



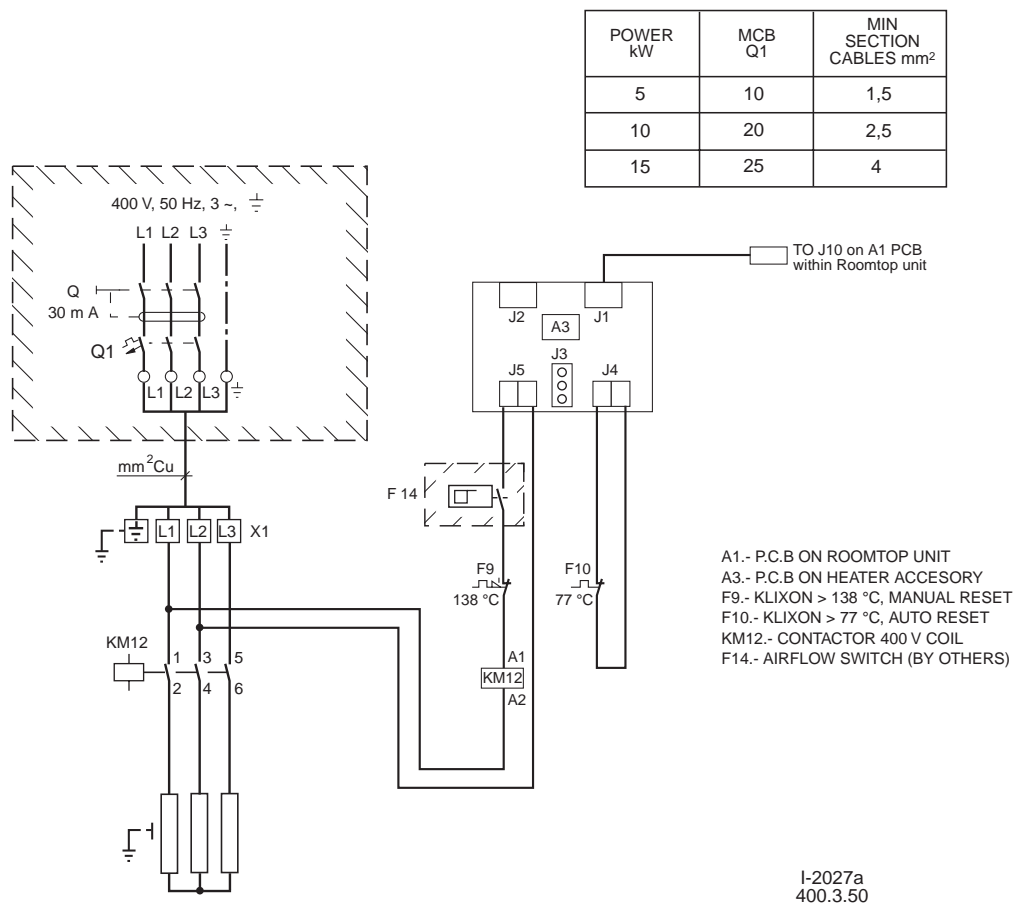
IMPORTANT: Q1 MCB AND POWER CABLE SECTION SHOULD BE SIZED TO SUIT THE HEATER POWER COMSUMPTION AND THE SITE CONFIGURATION

#### Installation of Accessory ARDH electric heater

- Isolate power to unit, connect the 5 mt cable supplied with telephone style plugs from socket J1 on A1PCB at electric heater to socket J10 an A3PCB in roomtop unit.
- Switch on the unit.
- To configure the accessory, press the "Test" button on A1PCB for > 2 seconds until the red LED is lit.
- Once the red LED goes out, the A1PCB has configured the ARDH electric heater.
- Check operation of the electric heater using the thermostat in Emergency heat function.

# Wiring diagram

## Duct electric heater, 400.3.50 RTH-07B/30B



IMPORTANT: Q1 MCB AND POWER CABLE SECTION SHOULD BE SIZED TO SUIT THE HEATER POWER COMSUMPTION AND THE SITE CONFIGURATION

### Installation of Accesory ARDH electric heater

- Isolate power to unit, connect the 5 mt cable supplied with telephone style plugs from socket J1 on A1PCB at electric heater to socket J10 an A3PCB in roomtop unit.
- Switch on the unit.
- To configure the accessory, press the "Test" button on A1PCB for > 2 seconds until the red LED is lit.
- Once the red LED goes out, the A1PCB has configured the ARDH electric heater.
- Check operation of the electric heater using the thermostat in Emergency heat function.

All data subject to change without notice.



## DEFINITIVE SHUTDOWN, DISASSEMBLY & DESTRUCTION

This product includes a refrigerant gas under pressure, moving parts and electric components which may be dangerous and cause injury ! All servicing must be done by qualified personnel, wearing protective clothing, in compliance with applicable safety rules .



Read the Manual



Risk of electrocution



Remote-controlled unit  
May start up unexpectedly



1. Cut off all electric power-supplies from the unit, as well as from the power supply of the control systems running it. Make sure that all electric cut-off devices are blocked in open position and the town-gas supply valves are in closed position. The power-supply wires and gas pipes may then be disassembled and removed. Consult the technical documentation in order to ascertain the unit's connection points.
2. Transfer all refrigerant from each system component to an appropriate recipient, or use a specially-designed recovery unit. The refrigerant can then be re-used or returned to the manufacturer for destruction/recycling, depending on the case. **It is strictly forbidden to discharge the refrigerant into the atmosphere.** Depending on the case, drain the refrigerant oil from each system into an appropriate recipient and eliminate it in accordance with local applicable regulations relative to hydrocarbon waste products.
3. As a general rule, the solid-block units are to be disassembled and removed in a single piece. Remove all fastening bolts and then raise the items with handling equipment with appropriate lifting capacity. It is absolutely essential to consult the information in the technical documentation as regards the weight and recommended handling procedures. The residual refrigerant oil and spills are to be sponged up and eliminated according to instructions given above.
4. After disassembly, the system components are to be destroyed/drained/put in a recycling dump in accordance with local applicable regulations .

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Manufacturer reserves the right to change specifications without prior notice.