Sunline 2000™ packaged air conditioners with gas heating Models D3IG 090, 120 and 150 (Euro 50 Hz)

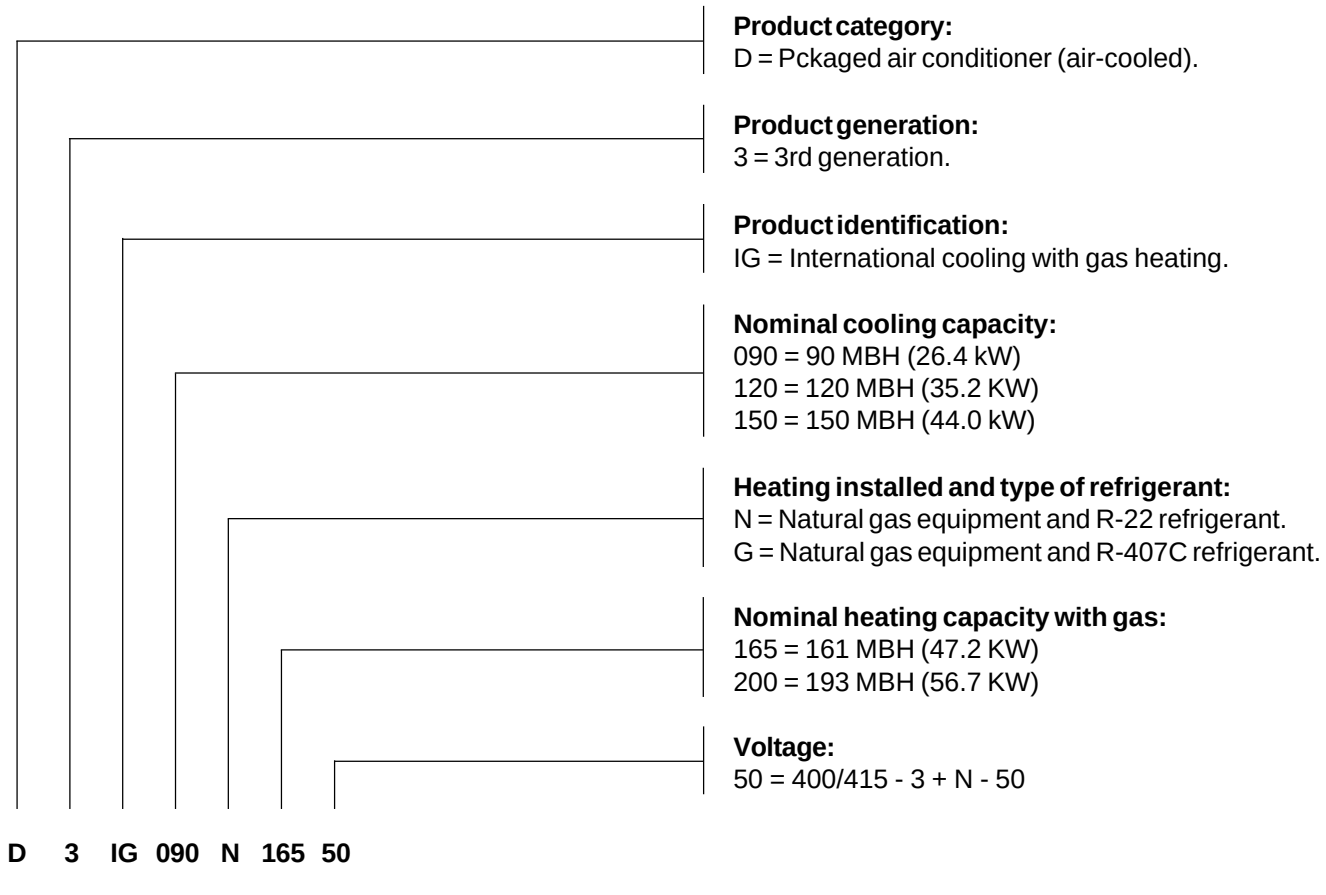
Ref.: Y-R24974 1001M

Operating Instructions

GB Index

General description

Nomenclature



Product category:
D = Pckaged air conditioner (air-cooled).

Product generation:
3 = 3rd generation.

Product identification:
IG = International cooling with gas heating.

Nominal cooling capacity:
090 = 90 MBH (26.4 kW)
120 = 120 MBH (35.2 KW)
150 = 150 MBH (44.0 kW)

Heating installed and type of refrigerant:
N = Natural gas equipment and R-22 refrigerant.
G = Natural gas equipment and R-407C refrigerant.

Nominal heating capacity with gas:
165 = 161 MBH (47.2 KW)
200 = 193 MBH (56.7 KW)

Voltage:
50 = 400/415 - 3 + N - 50

General information

The D*IG models are packaged type air conditioners with gas heating, designed for installation outdoors on a rooftop or bedframe, and comply with the ISO 9002 Quality Standards. These units are supplied completely assembled on rigid beams that are fitted to the base in a permanent manner. All piping, refrigerant loads and electric wiring are factory-assembled and tested. These units require electric power supply, gas connection, duct connections, installation of a hood at the combustion air intake, a hood at the combustion air outlet and a safety/fixed outdoor air intake barometric damper at the installation site. The gas units have aluminium-plated steel tubular heat exchangers with spark ignition.

FOR YOUR OWN SAFETY
Should you smell gas:
1. Do not touch any electric switch.
2. Put out all exposed flames.
3. Call your gas company immediately.

FOR YOUR OWN SAFETY
Do not store or use gasoline or other inflammable products near this or any other equipment.

Environmental protection

Packing

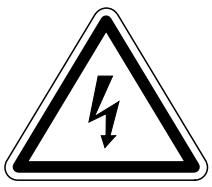
Packing is made of recyclable material. Its eliminate should be carried out in accordance with the existing regulations on selective collection of residual material.

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 or R-407C refrigerant, which should be recuperated and then returned to the gas manufacturer for recycling.
Oil will remain in the sealed 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 its selective recuperation.

Warning signs

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



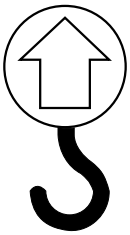
This symbol indicates an electrical danger or risk.

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 in motion.

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

Attention: Fan in operation.

Attention: Do not touch hot surfaces.



Attention: Lifting point.

Inspection

As soon as the unit is received, it should be inspected for damage during transportation. If any damage is observed, it should be noted on the delivery slip. A separate inspection by a transport company agent should be requested in writing. For further details, contact your Distributor.

Standards

These units have been designed and manufactured in compliance with the TÜV, VDE and DVGW requirements:

1. To be used as forced air boilers with cooling equipment.
2. Only for installation outdoors.
3. To be installed on combustible materials without any danger.
4. To be used with natural or propane gas.

These units are not to be used with conventional ventilating systems.

CAUTION
This product should be installed by strictly following the enclosed instructions and all local, state and national regulations including, but not limited to, standards on buildings, electricity and mechanics.

WARNING
Incorrect installation could enable the operation of the unit to cause personal or property damage.

The installer should pay special attention to the words: NOTE, CAUTION and WARNING. The purpose of the Notes is to clarify or facilitate installation. The Cautions attempt to avoid damage to the equipment. The Warnings are to alert the installer that personal damage and/or damage to the equipment could be caused if the assembly operation is not carried out correctly.

Installation

Limits

These units should be installed in compliance with the National or Local Safety Standards in force, for example, HSE, DVGW G613 and G628.
See Table 1 on Unit Application Data, and Table 2 on Gas Heating Application Data.
Should components need be added to the equipment so as to comply with local standards, these should be installed at the expense of the distributor and/or the client.

Table 1 - Unit application data

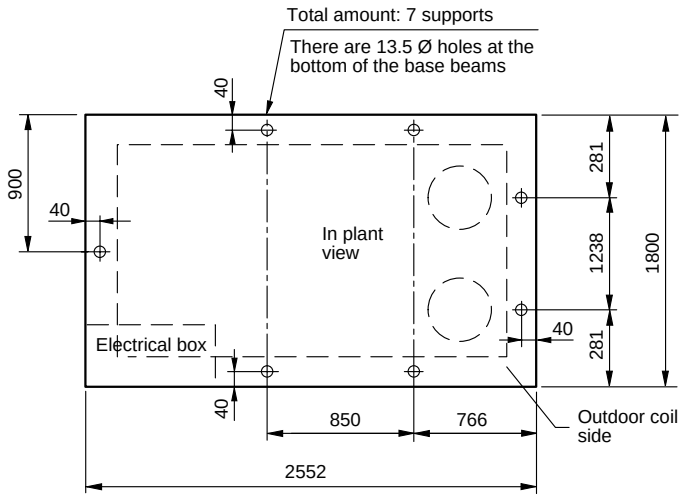
Voltage variation (Min. / Max)	V	360 / 456
WB air temperature in the evaporating coil (Min. / Max.)	°C	14 / 22
	°F	57 / 72
DB air temperature in the condensing coil (Min. / Max.)	°C	7 / 52
	°F	45 / 125

Location

Use the following guidelines to select an adequate location for these units.

1. This equipment is designed for outdoor installation only.
2. The condenser requires an unlimited air supply. Whenever possible, locate the equipment on the north or east side of the building.
3. For ground level installations, use a level concrete slab of at least 100 mm. thick. The length and width should be at least 150 mm. more than the base beams of the units. Do not fasten the bedframe to the foundation of the building.
4. For roof-top assembly, the roof structure should be able to support the weight of the equipment, its options and/or accessories. The equipment should be installed on a mounting base or on an adequate frame of iron angles (an optional "Mounting Base" or Roof-Curb accessory is available).

CAUTION
If this equipment is to be installed on a mounting base or a special angle frame that is not the standard mounting base, gaskets should be placed on all surfaces in contact with the lower part of the unit.
If it is preferable to set the unit on shock-absorbers, this should be done in accordance with the following figure:



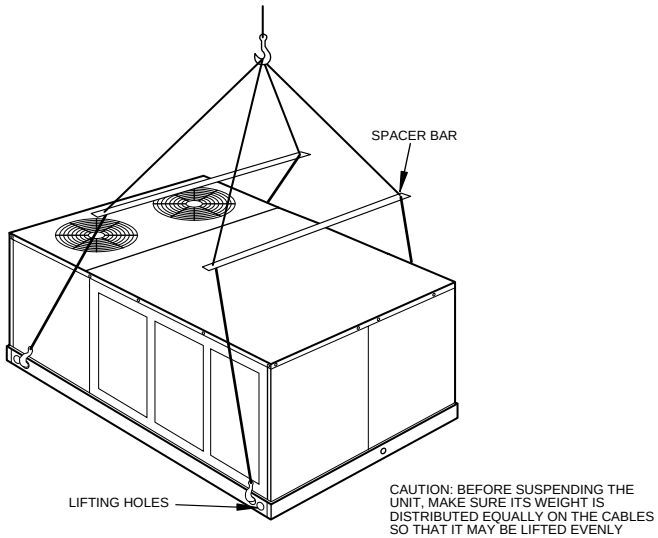
Approx. load at each supporting point (kg)				
D3IG unit size	Basic unit without accesso-ries	Increment per accessory		
		Motor-driven damper or economiser	Electric heater	Extraction fan
090	68	5	2	4
120	77			
150	92			

5. Keep the level tolerance at a maximum of 13 mm. along the entire length or width of the unit.

Installation and use

Be careful when moving the unit. Do not remove any part of the packing until the equipment is near its final location. Suspend the unit using chain or cable slings, inserting them through the lifting holes located on the base beams of the unit. Separators **should** be used all along the top of the unit.

Typical elevation



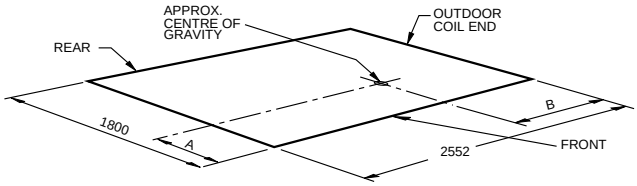
- Fig. 1 -

Remove the four supports that are fitted at the four corners of the top of the unit. All screws withdrawn while removing these supports should be reinserted in the unit.

CAUTION
The opening for combustion air intake has an adhesive label on the outside so as to avoid any humidity within the unit, which would cause damage to the electric components. Leave this seal in place until the combustion air hood is installed (see Fig. 5).

See Table 3 on the weights of the equipment, and Fig. 2 on the approximate centre of gravity.

Centre of gravity



Unit capacity	Dimensions (mm)	
	A	B
090	845	1 207
120	826	1 187
150	826	1 143

- Fig. 2 -

Ducts

A network of closed return ducts should be used. This does not exclude the use of economisers or outdoor air intakes. The impulse and return air connections should be made with flexible gaskets so as to minimise noise levels.
The impulse and return air duct networks should be designed in accordance with the air flow requirements on site. They should **not** be sized to equal the dimensions of the connections of the ducts of the unit.

CAUTION
When fastening the ducts to the side flanges of the equipment, insert the screws only through the duct flanges. **Do not** insert the screws through the casing.
The external ducts should be insulated and waterproofed.

See Fig. 12 for details concerning the side and bottom openings for the impulse and return air ducts.

Safety/fixed outdoor air intake barometric damper assembly (optional accessory)

It acts as a safety barometric damper on units with an economiser, or as a fixed outdoor air intake damper on units without an economiser.

On units with **bottom** return, install the damper assembly over the opening on the side cover of the return air duct (see Fig. 3).

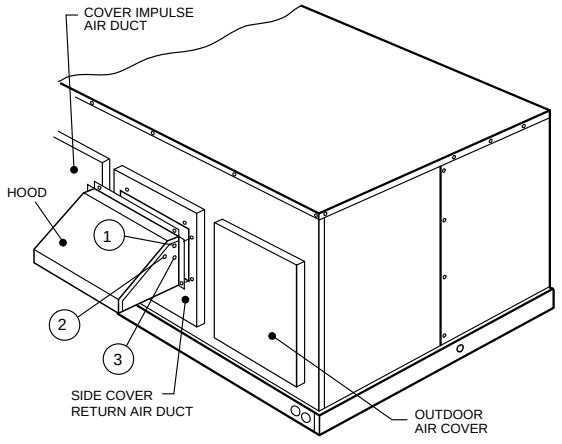
On units with **side** return, install the damper assembly in the return air duct network, as close to the unit as possible. Drill a hole in the duct, 290 mm. high by 445 mm. wide, so as to insert the damper.

Place the damper assembly in position and drill six (6) 3.5 mm. Ø holes, using the holes in the hood flanges as a pattern, and fasten them by means of the six screws supplied.

On units without an economiser, adjust the damper in accordance with the desired air flow opening, by moving the damper support (within the hood).

to one of the three positions. Position 1 allows a recycled air flow of approximately 25%; Position 2, approximately 15%; and Position 3, approximately 10%. On either side of the hood there is a screw for fastening this support correctly in place.

Safety/fixed outdoor air intake barometric damper assembly (optional accessory)



REAR VIEW

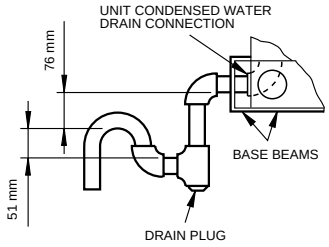
- Fig. 3 -

Condensed water drain

The piping installation should comply with local regulations. Use sealing putty on male threads. Install a condensed water drain pipe from the 3/4" BSP (19 mm.) female connection on the unit, to an open drain.

NOTE:
The condensed water drain pipe must have a siphon so as to facilitate correct drainage. See Fig. 4.

Piping recommended for drain



- Fig. 4 -

Compressors

These units are supplied with the supplied with the antivibratory supports factory adjusted and ready for use. Do **not** loosen the screws of the antivibratory supports.

Filters

All units are supplied with 50 mm. filters. 25 mm. replacement filters may be used without having to modify the holders. The filters should always be mounted before the evaporating coil, and must be kept clean or be replaced by others of the same size and type. Dirty filters limit the capacity of the unit, and can cause freezing of the coils or a security lock-out. Table 3 shows the minimum filter surface and size required.

Table 2 - Application data with gas heating

Absorbed power (Nett) kW (Mbh)	Given powe kW (Mbh)	Model	Gas consumption* m^3/h (cfm)	Temperature increase - Min./Max. at full absorbed power**	
				°C	(°F)
53.5 (183)	47.5 (163)	090	4.3 (151)	17 / 33	(30 / 60)
64.2 (220)	57 (196)	120	5.4 (190)	17 / 33	(30 / 60)
64.2 (220)	57 (196)	150	5.4 (190)	11 / 28	(20 / 50)

NOTE: Gas heaters are supplied for natural gas, but can also be transformed to propane gas (LPG) by means of a conversion kit.

* Based on nett absorbed power, gas type 2nd-H, G20 (9.97 kW/m^3).

** Air flow should be adjusted so as to achieve a temperature increase within the indicated limits.

Combustion discharge

The combustion products are discharged horizontally through an opening (with a hood), protected by a grill and located at the upper access panel of the gas heating.

Gas pipes

The correct sizing of the gas pipes depends upon the flow required, specific gravity of the gas and the length of the pipes. The regulations of the local gas company must be complied with when determining the diameter of the pipes.

The heating value of the gas may vary from city to city. This value should be check with the local gas (supplier) company.

NOTE:
There could be a regulation of the local gas company with regard to the minimum diameter of gas pipes.

Gas connection

The gas supply pipes can be channelled through the hole located at the front of the unit. See Fig. 12 for the location of these access openings. Fig. 6 shows the usual position of the supply pipes.

The fan compartment contains a wall through-ring for all units with gas heating, and should be placed in the access panel when the gas pipes are inserted through the front of the unit.

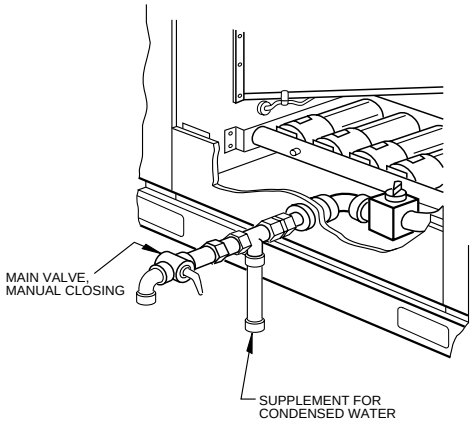
Recommendations on gas pipes:

1. A condensed water supplement and grounding should be installed on the gas pipes.
2. If so specified by local regulations, it may be necessary to install a manual shut-off valve on the outside of the unit.
3. Use wrought iron or steel pipes for all gas lines. The sealing putty should be applied, scarcely, only on the male threads.

WARNING:
Natural gas may contain a small amount of propane. Due to the fact that propane is an excellent solvent, it would quickly dissolve the lead carbon or the majority of normal commercial type components. Therefore, a special sealing putty should be applied when wrought iron or steel pipes are used. Putties that comply with Standard BS6956 Part 5, or equivalent, may be used.

4. All dirt and burrs should be removed from the pipes by lightly tapping the pipe with a hammer and blowing them out. Prior to the initial start up, make sure all air has been drained from all external gas lines of the unit.
5. Gas supply should be carried out by means of a separate line, installed in compliance with all state, local and city safety regulations. Once the gas connections are finished, open the main valve to normal gas pressure. Make sure there are no leaks at joints by means of a soap solution or any other adequate method. **Never use an open flame.**
6. The boiler and its individual manual shut-off valves should be disconnected from the gas supply pipe system during the pressure test of said system with test pressures over 0.5 psi (3.5 kPa).

External supply connection



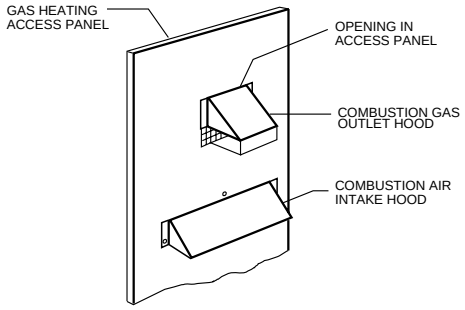
- Fig. 6 -

PIPE CONNECTION	
MODEL	**DIG 090 - 120 - 150**
GAS CONNECTION FEMALE	3/4"

Ventilation and combustion air hoods

The gas outlet and combustion air intake hoods are supplied fastened to the fan casing inside this compartment. These hoods should be installed so as to guarantee correct operation of the unit. Both hoods should be fastened to the outside of the gas heating access panel, by means of the screws supplied in the bag that is also included in the fan casing.

When installing, the upper latch of this hood slips in beneath the top of the access panel opening, and is fastened with the screws supplied. (See Fig. 5).



- Fig. 5 -

GLP/propane gas units, tanks and pipes

All units with gas heating are supplied factory equipped for operation with natural gas only. The unit can be transformed for operation with GLP/propane gas by means of a conversion kit installed on job site.

All units operating with GLP/propane gas must comply with local or city safety regulations.

For satisfactory operation, the pressure of the GLP/propane gas should be (37 mbar) with the unit at full load. Maintaining an adequate gas pressure will depend upon three main factors:

1. The evaporation rate that depends upon: (a) the temperature of the liquid and (b) the magnitude of the "wet surface" of the container o containers.
2. A correct pressure adjustment. (A two-stage adjustment is recommended, both from a cost as well as a performance point of view).
3. The pressure drop in the lines between the regulators and between the second phase regulator and the unit. The diameter of the pipes will depend upon the length of same and the total load of all units.

Complete information on the sizing of evaporating tanks, adjustments recommended for the regulator and pipe sizing can be obtained from the corresponding manufacturers and the GLP/propane gas suppliers.

WARNING:
Natural gas may contain a small amount of propane. Due to the fact that propane is an excellent solvent, it would quickly dissolve the lead carbon or the majority of normal commercial type components. Therefore, a special sealing putty should be applied when wrought iron or steel pipes are used. Putties that comply with Standard BS6956 Part 5, or equivalent, may be used.

After final installation of pipes, check for leaks at the joints with a soap solution. **Never use an open flame.**

Power and control wiring

Site wiring and grounding of the unit should be carried out in compliance with national, local and city regulations. The voltage tolerances to be maintained at the compressor terminals during start up and operation appear on the Identification Plate and in Table 1.

The inner wiring hose supplied with the unit is an integral part of same. No variation should be necessary for compliance with electrical regulations.

An automatic switch and a differential should be installed on site for the unit. This switch should be independent of all other circuits. Should any of the cables supplied with the unit need replacement, the replacement cable should be of the type shown on the wiring diagram. See Table 4 for wiring specifications.

The power supply line should be adequately sized for the load. **Use only copper wires.** Each one of the units should be connected to an independent circuit with an automatic switch and a differential, supplied directly from the main panel.

CAUTION:
When connecting the power supply and control wiring to the unit, waterproof type wires **should be used** so as to avoid water or humidity getting into the unit during normal operation. These waterproof conditions also apply when a switch is installed on site.

See Fig. 8 for typical wiring on site, and Fig. 9 for unit wiring diagram and information on the control circuit and power wiring.

Thermostat

The ambient thermostat should be located on an inner wall, at about 1420 mm. above floor level, where it will not be exposed to air flows, direct sunlight or heat from other electric devices. For general installation, follow the instructions supplied by the manufacturers. To connect the thermostat to the unit, eight colour-coded 1 mm² wires should be used.

Unit control wiring

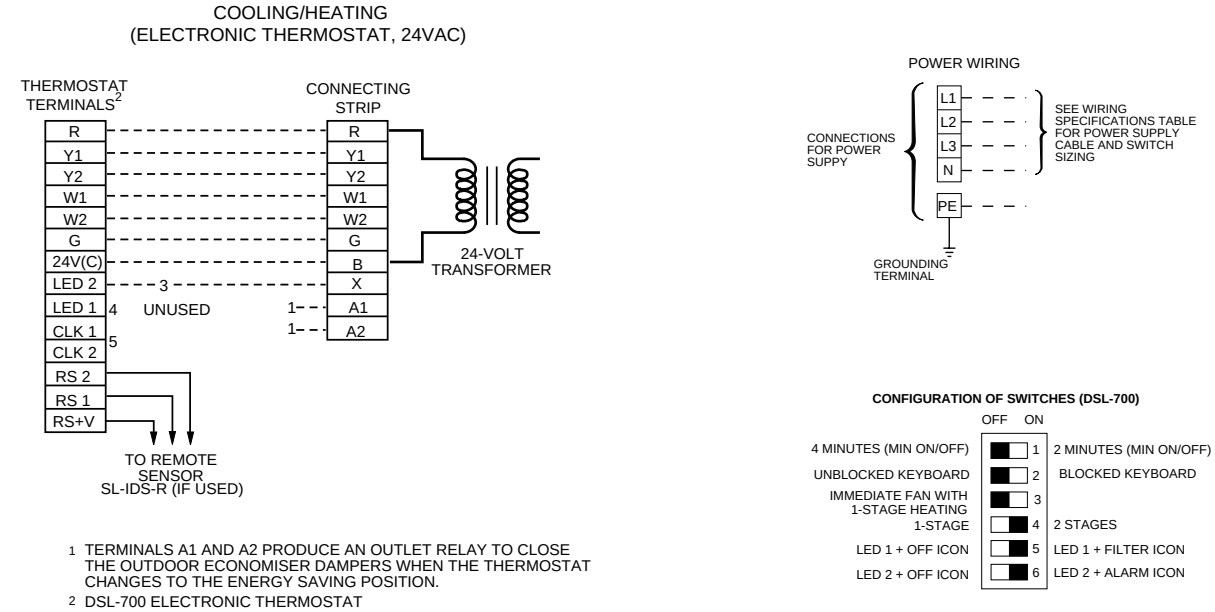
The following **notes and indications** pertain to the unit wiring diagram shown in Fig. 9.

NOTES:

1. All site wiring should be carried out in compliance with all city and local standards and/or regulations in force at the time of installing the unit.
2. Should it be necessary to remove any cables supplied with the unit, these should be replaced by cables of the HO5V-K, HO7V-K or equivalent type, and be numbered clearly for identification purposes.
3. Remove jumper "608" if an occupation switch has been installed.
4. Motors are intrinsically protected, except for the indoor fan motor, that has external protection.
5. This unit is wired for operation with a 415 V power supply.
6. See the Identification Plate for the maximum size of the automatic switch and the minimum power supply cable section.
7. The timer for the "KM 1" and "KM 2" contacts depends on the thermostat (DSL-700).
8. To invert the rotation of the indoor fan, interchange wires 125 and 126 of the "KM 3" connector.

Typical site wiring

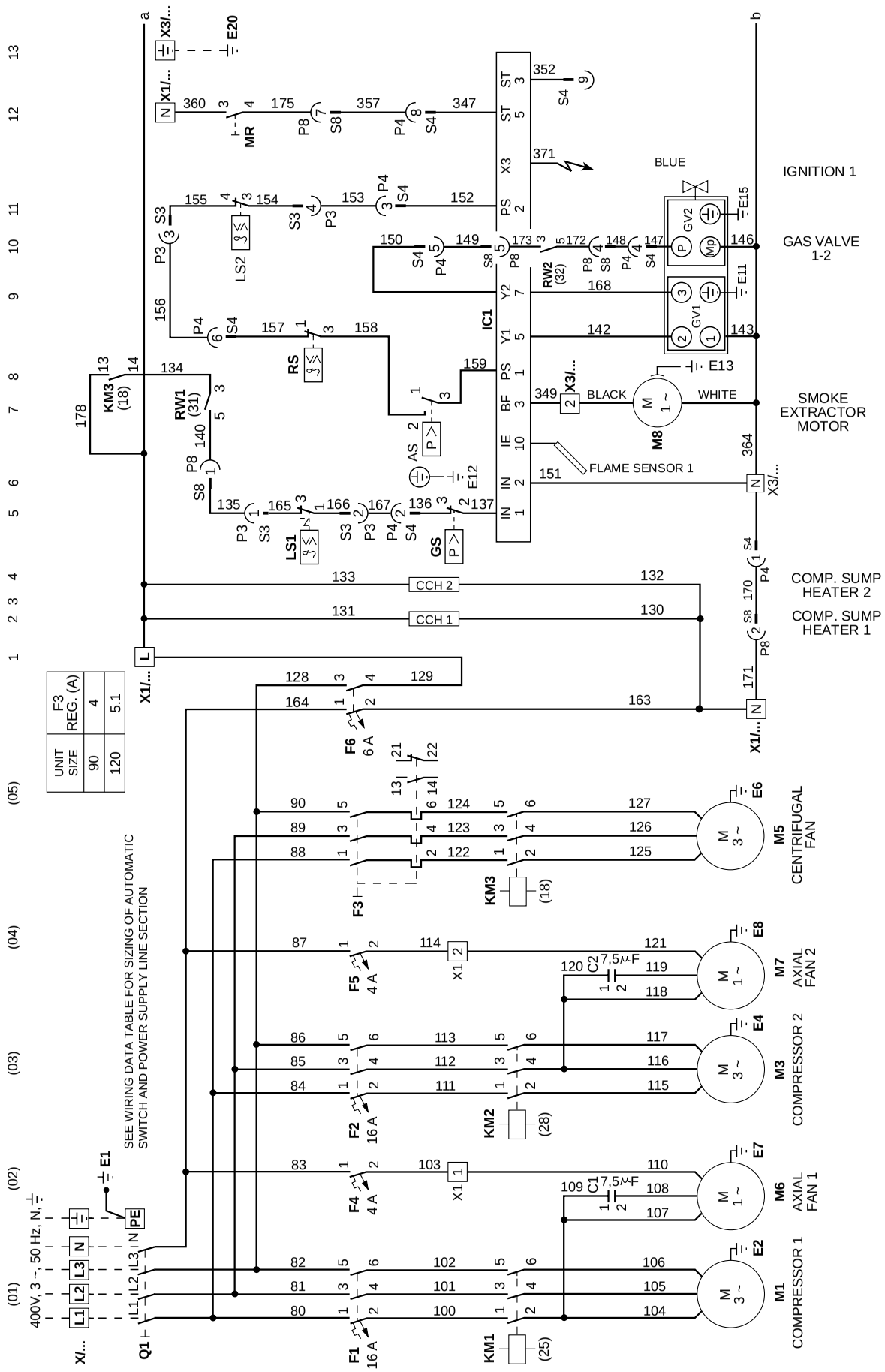
CONTROL WIRING



1 TERMINALS A1 AND A2 PRODUCE AN OUTLET RELAY TO CLOSE THE OUTDOOR ECONOMISER DAMPERS WHEN THE THERMOSTAT CHANGES TO THE ENERGY SAVING POSITION.
2 DSL-700 ELECTRONIC THERMOSTAT
3 PRESSURE SWITCH FAILURE INDICATION (HP, LP)
4 DIRTY FILTER INDICATION (IF DIRTY FILTER PRESSURE SWITCH IS USED)
5 REMOTE CONTACT TO ALTERNATE DAY/NIGHT SET POINT

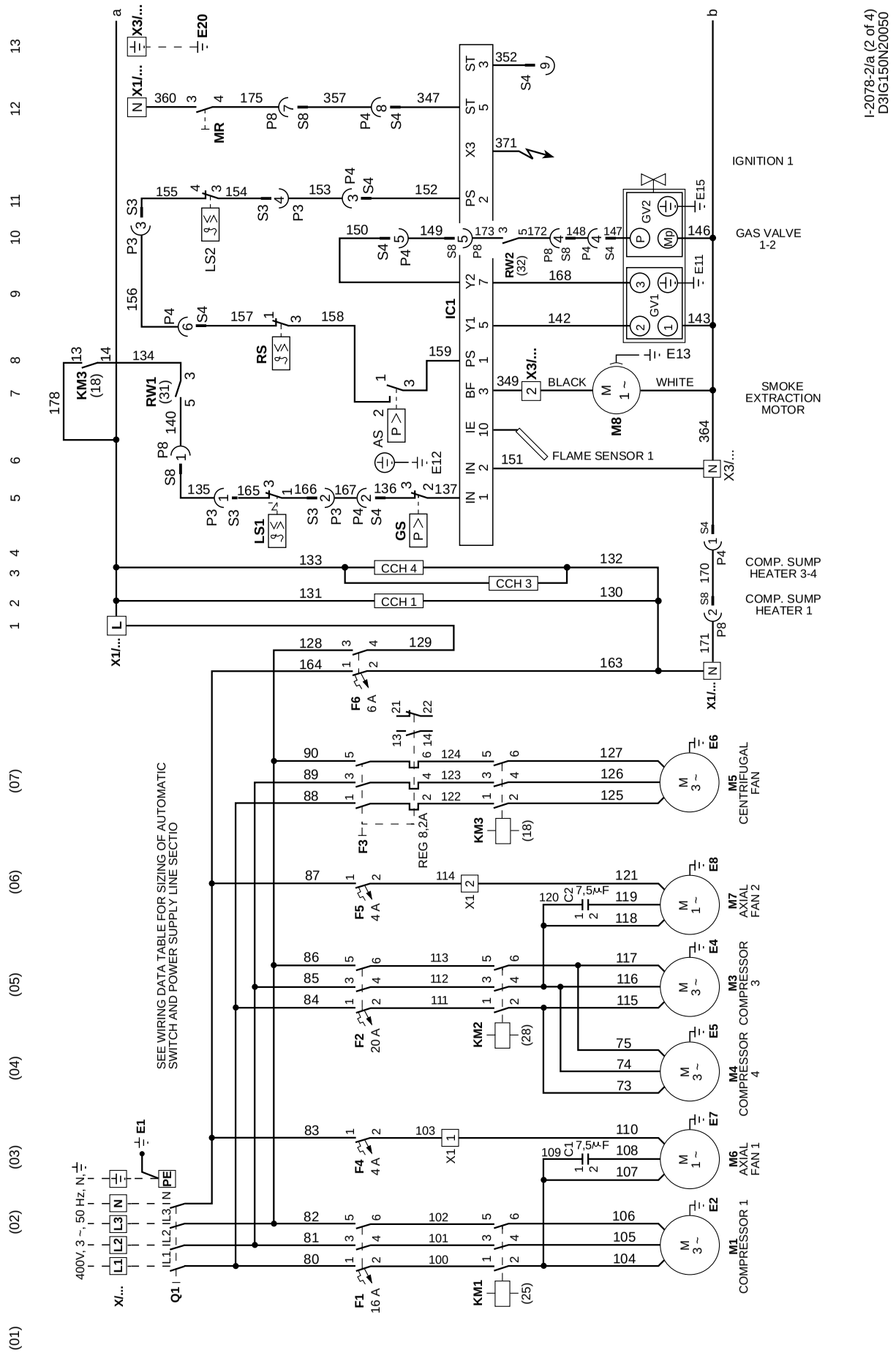
- Fig. 8 -

Unit wiring diagram - 090 and 120



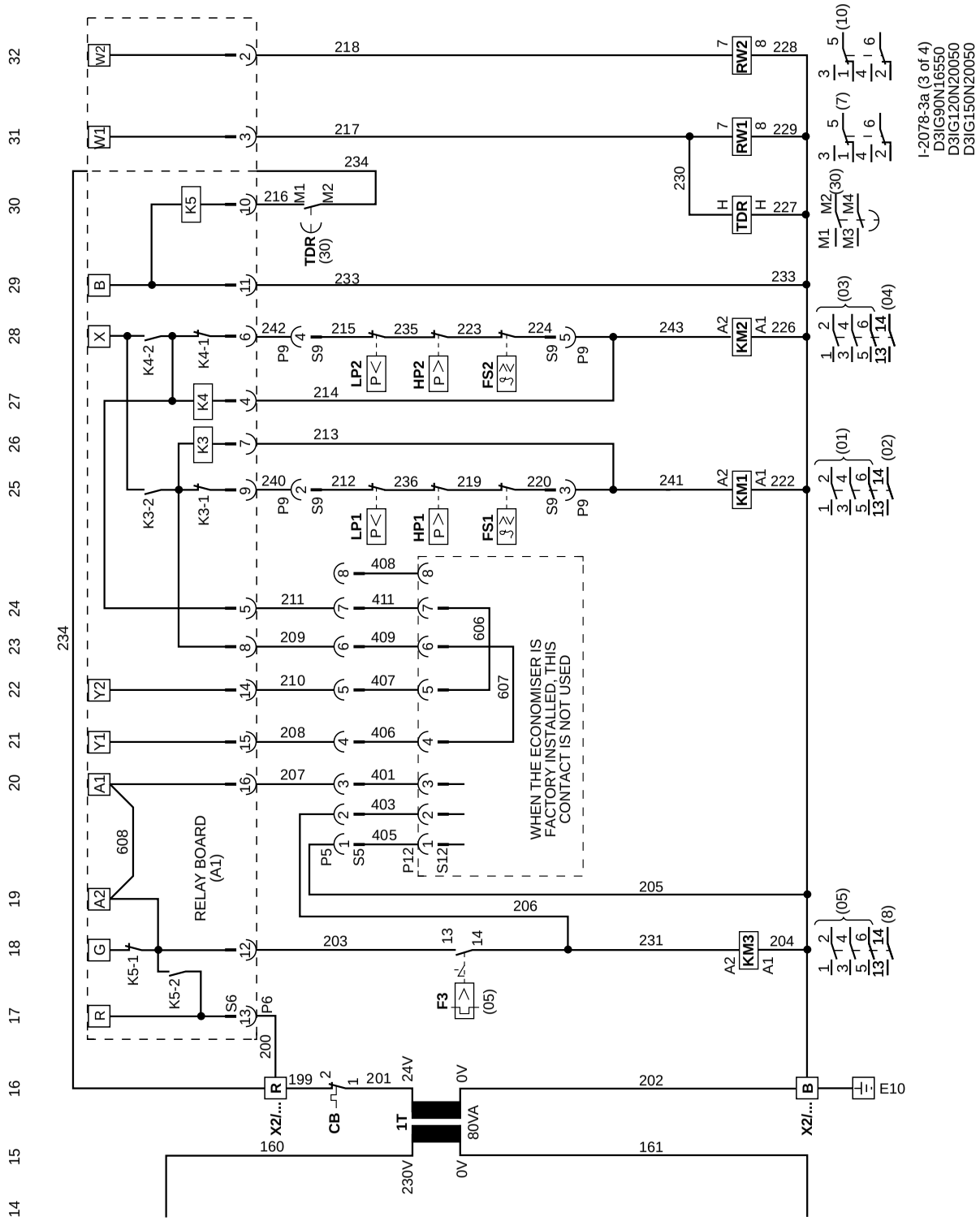
- Fig. 9 -

Unit wiring diagram - 150



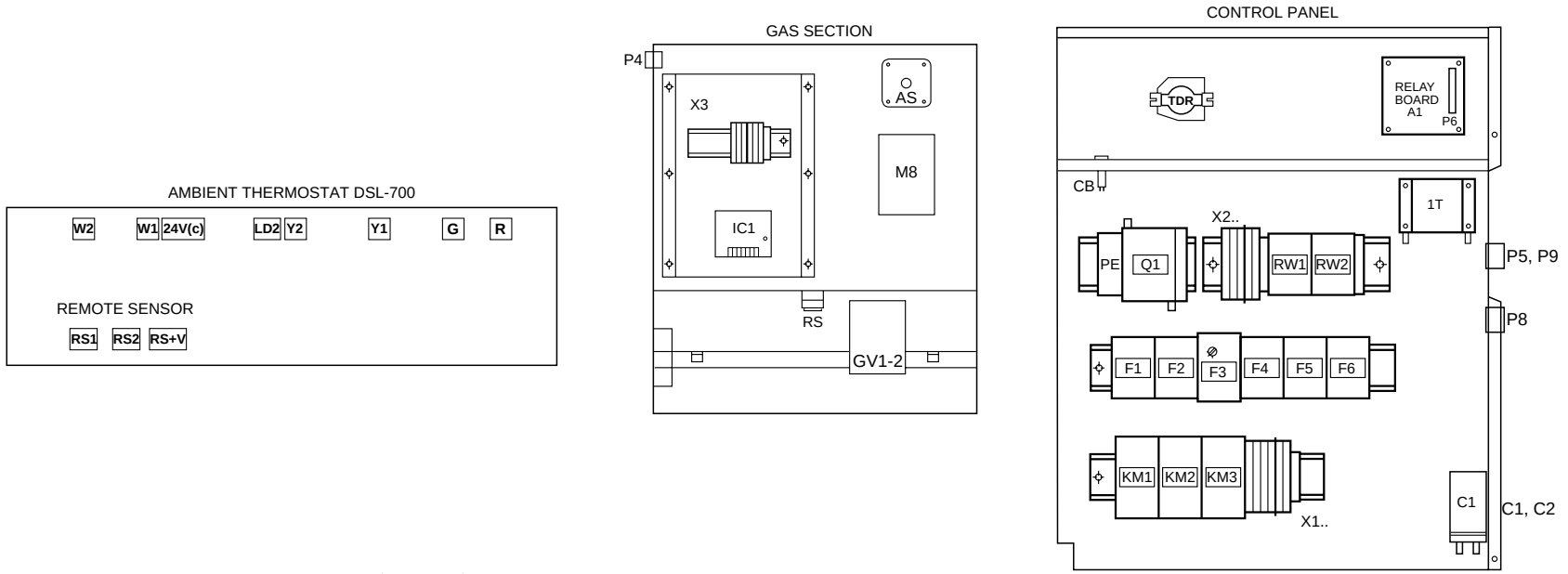
- Fig. 9 -

Unit wiring diagram - 090, 120 and 150



- Fig. 9 -

Unit wiring diagram - 090, 120 and 150



- Fig. 9 -

1T.- 24-VAC TRANSFORMER
A1.- 24-VAC THERMOSTAT RELAY PLATE
AS.- AIR PRESSURES SWITCH
CB.- 24-VAC CIRCUIT BREAKER
CCH1 ÷ 4.- SUMP HEATER
F1 AND F2.- COMPRESSOR AUTOMATIC SWITCH
F3.- AUTOMATIC SWITCH, INDOOR FAN
F4 AND F5.- AUTOMATIC SWITCH, OUTDOOR FANS
F6.- 220-VAC AUTOMATIC SWITCH
FS1 AND FS2.- LOW TEMP. SWITCH, EVAPORATING UNIT
GS.- GAS PRESSURE SWITCH
GV1-2.- GAS VALVES
HP1 AND HP2.- HIGH PRESSURE CONTROL
IC1.- GAS CONTROL
KM1 AND KM2.- COMPRESSOR CONTACTS
KM3.- INDOOR FAN CONTACT
LP1 AND LP2.- LOW PRESSURE CONTROL
LS1.- MANUAL RESET TEMPERATURE LIMIT
LS2.- AUTO RESET TEMPERATURE LIMIT
M8.-SMOKE EXTRACTION MOTOR
OR.- OCCUPIED RELAY

P3/S3, P4/S4, P8/S8.- GAS CONTROL CONNECTOR
P5/S5, P12/S12.- ECONOMISER CONNECTOR
P6/S6.- RELAY BOARD 24-VAC CONNECTOR
P9/S9.- COMPRESSOR SAFETY CONNECTOR
PE.- GROUNDING TERMINAL
Q1.- MAIN SWITCH
RS.- GAS TEMPERATURE THERMOSTAT
RW1 AND RW2.- HEAT RELAY
TDR.- DELAY RELAY
X1.- POWER CONNECTING STRIP
X2.- 24-VAC CONNECTING STRIP
X3.- GAS CONNECTING STRIP

I-2078-4a (4 of 4)
D3IG90N16550
D3IG120N20050
D3IG150N20050

GB

Servicing access

Upon removal of the following panels, the different components subject to revision, repairs or maintenance are accessible:

- Compressor compartment.
- Burner compartment (two panels).
- Fan compartment.
- Main electric panel.
- Filter compartment.

See Fig. 12 for the location of these access panels.

CAUTION:
To maintain an airtight seal of the panels, be sure to replace all screws with their corresponding O-rings (located between the panel internal supporting surface and the base of the unit).

Optional economiser rain-hood

When an economiser rain-hood is installed, proceed as described below. The outdoor and return air dampers, the damper actuator, the damper drive mechanism, and outdoor and return air dividing deflectors and all control sensors are supplied factory mounted, as a part of the economiser option.
All hood components, including filters, gaskets and mounting accessories are packed and located in the filter section of the unit. (See Fig. 10).

1. Remove and discard the outdoor air opening cover located at the back of the unit.
2. Assemble the rain-hood as follows:
   a) Place gaskets on all hood components, as described below:
      - On the outer surface and on the latch (facing the unit) of each side panel. Extend the gasket approximately 6 mm. further out than the top and bottom of the latch so as to insure an adequate seal.
      - On the edge and latches (with a continuous strip) on both sides of the central filter support.
      - On the top latch of the bottom filter support (on the surface facing the unit).
      - On the hood cover flange (models 120 and 150). (This flange does not require gaskets on model 090).
   b) Fasten two filter guide-angles to the inner surface of each side panel, using 3 screws for each angle. Observe the position of the holes in the angles for appropriate location when proceeding to fasten them to the side panels. Tighten the screws.
   c) Fasten the two side panels to the central filter support, using 4 screws on each side. Do not tighten the screws.
   d) Fasten the bottom filter support between the side panels, using 2 screws on both sides. Do not tighten the screws.
   e) Fasten the hood cover to the side panels, using 3 screws on both sides. Do not tighten the screws.
   f) Place the hood assembly on a flat surface to make sure all components fit properly, and then tighten all screws.
3. Fasten the hood assembly over the outdoor air opening located on the panel of the unit ducts, as follows:
   Model 090. The hood cover latch should slide under the top latch of the unit cover. One screw should be removed from the unit cover latch, and another screw should be loosened (at the right corner of the unit cover latch) to allow the grooved latch of the hood cover to fit into place. Replace both screws and tighten.
   Models 120 and 150. Fasten the hood flange to the duct panel with 3 screws. Use the holes in the hood cover latch as a pattern and drill three 3.5 mm. Ø holes in the duct panel.
   On all units. Fasten the hood side latches to the duct panel, drilling six 3.5 mm. Ø holes in each side, in the small depression (A) located on the duct panel. Fasten the hood in place by using 6 screws and washers on each side.
4. Insert two filters in the centre of the hood, resting on the central filter support located at the back of the hood. Push the filters against the guide-angles located on the side panels, and use 1 screw (B) on each side of the hood to hold them in place.
   Insert two filters in the bottom support, and follow the same procedure as for the central filters.

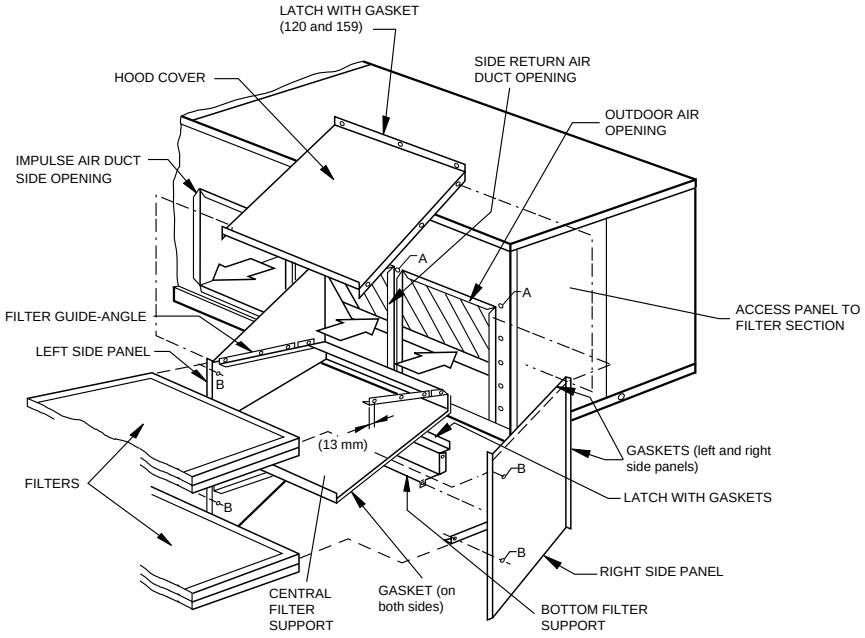
NOTE:
Install the filters so that the "Air Flow" arrows point upwards and towards the unit.

Enthalpy set point adjustment

CAUTION:
Special care should be taken when turning the adjusting screws of both the set point and minimum position, so as to avoid their removal.

5. At this point, the damper enthalpy set point can be adjusted by selecting the desired position, as shown in Fig. 11. Adjust by carefully turning the set point adjustment screw to settings "A", "B", "C" or "D" that correspond to the curve with letters.
6. To make sure that the blades of the damper move smoothly, carefully turn the minimum position adjusting screw completely to the right (clockwise), and then connect and disconnect terminals "R" to "G". With terminals "R" to "G" connected, turn the minimum position adjusting screw counter clockwise until the desired minimum setting is reached.
7. Replace the access panel on the filter section.

Economiser rain-hood assembly (optional)

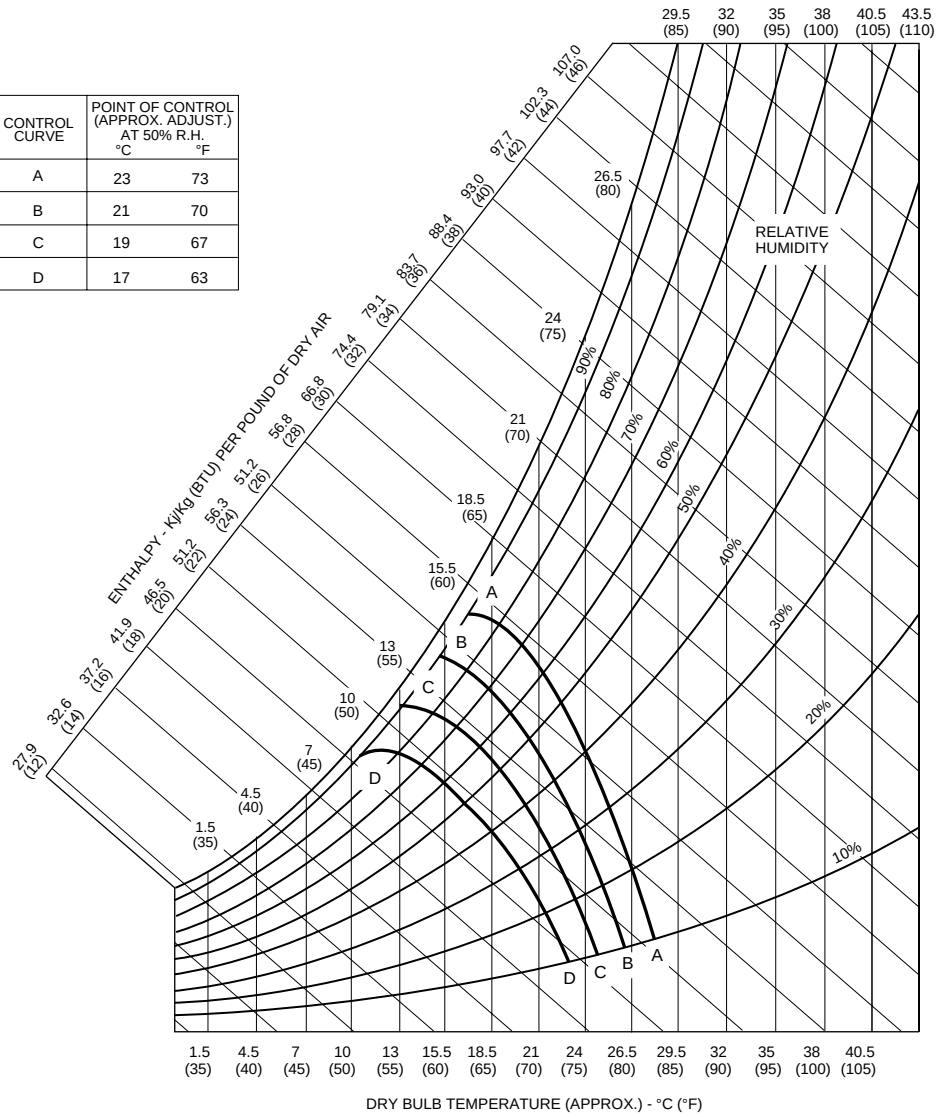


ATTENTION:
Use airtight washers
on all screws

- Fig. 10 -

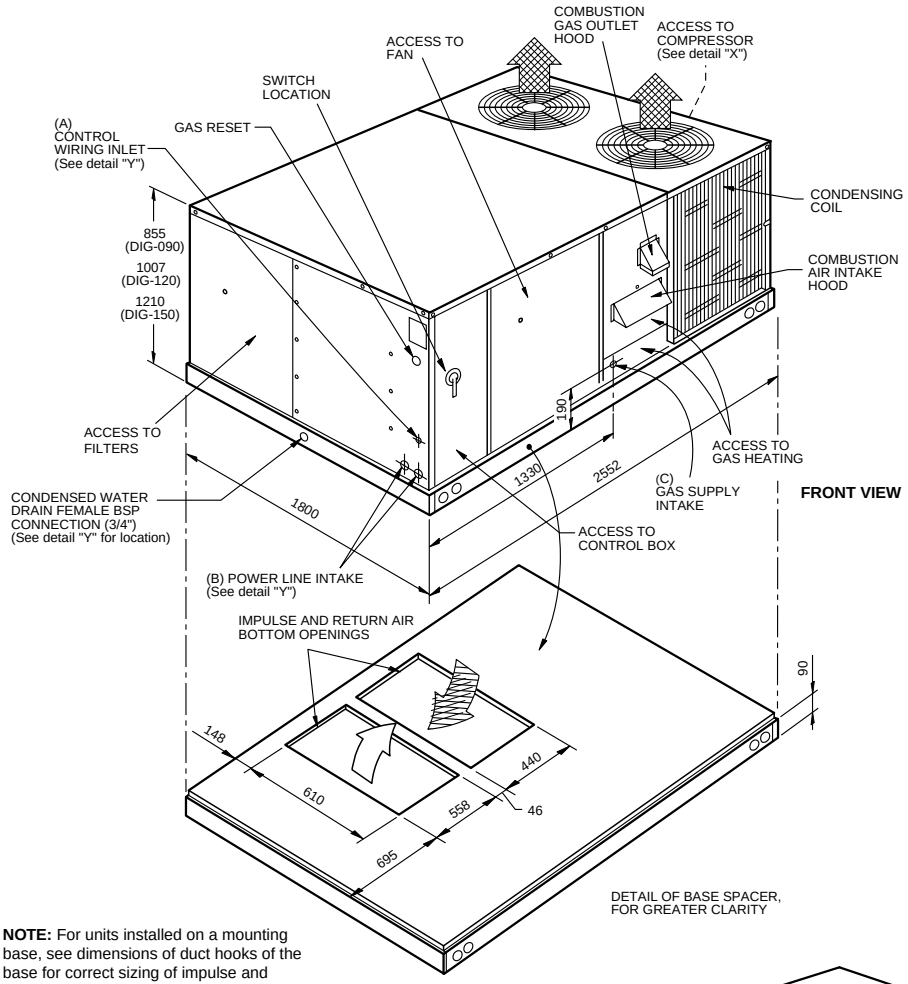
Adjustment of enthalpy set point

CONTROL CURVE	POINT OF CONTROL (APPROX. ADJUST.) AT 50% R.H. °C	°F
A	23	73
B	21	70
C	19	67
D	17	63



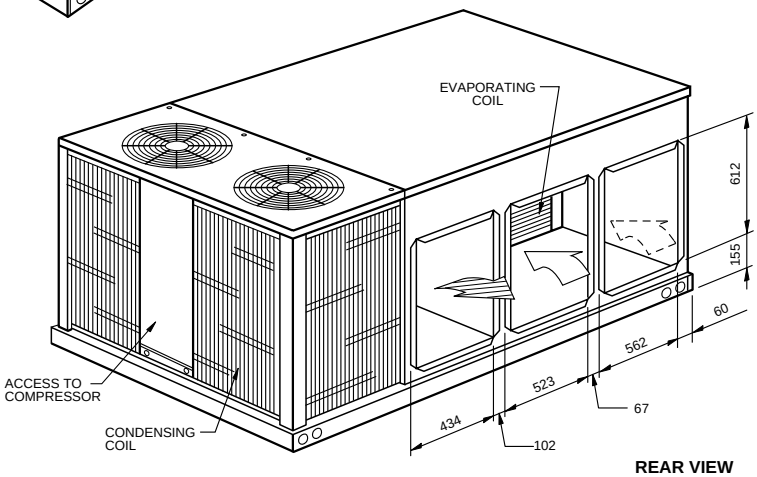
- Fig. 11 -

Dimensions and clearances - D*IG090, 120 and 150

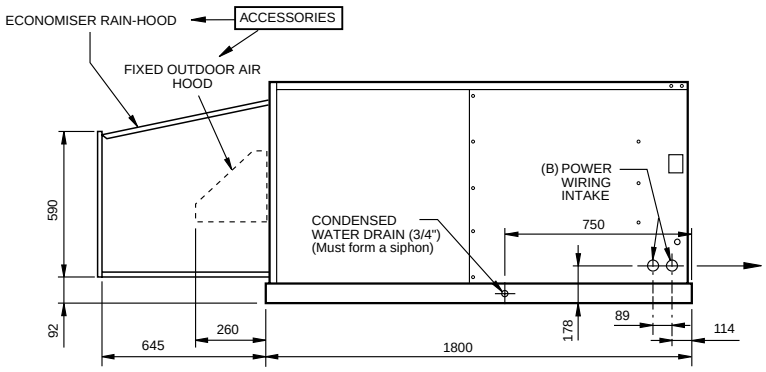


NOTE: For units installed on a mounting base, see dimensions of duct hooks of the base for correct sizing of impulse and return air duct connection.

See page 18 for the diameter of service connection intakes, clearances and low to remove the duct cover.

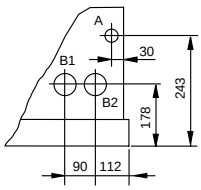


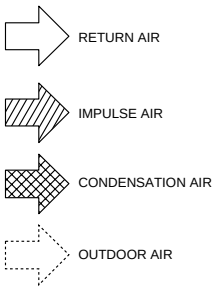
REAR VIEW



DETAIL "Y" (with accessory rain-hoods)

Impulse and return air side openings **DETAIL "X"**





- Fig. 12 -

Clearances, supply entry diameters and duct cover extraction (ref. Fig. 12)

All units require certain clearances for optimum operation and performance. The installer must foresee adequate combustion and ventilation air in compliance with local regulations regarding buildings. See the following dimensions with regard to the clearances required for the fuel, construction, servicing and correct operation of the unit.

Clearances - mm

Front[1]	610
Behind[2]	300 (Without economiser) 915 (With economiser)
Left side (access to filter)	610 (Without economiser) 1 370 (With economiser)
Right side (cond. coil)	610
Beneath unit[2 3]	0
Over unit[4]	1 830

[1] Combustion products should not be accumulated in closed areas, nor recycled through the combustion air intake. Locate the unit in such a way that the hood of the ventilation air outlet is at least:
   a. 915 mm. above any forced air intake located horizontally at a distance of 3050 mm. (excluding those that form an integral part of the unit).
   b. 1220 mm. below or horizontally, or 305 mm. above any door, window or normal air intake of the building.
   c. 1220 mm. from electric metres, gas metres, regulators and safety devices.

[2] A clearance of 25 mm. should be left between any combustible material and the network of impulse air ducts at a distance of 915 mm. from the unit.

[3] The unit can be installed on combustible materials capable of withstanding temperatures of up to 92°C (197°F), with an intermittent exposure to temperatures of up to 124°C (255°F).

[4] This unit is designed to be installed outdoors only. When installed on ground level, the building eaves should not be at less than 1830 mm. perpendicularly from the top of the unit, and should not overextend more than 915 mm. horizontally over the top of the unit. If the eaves are at more than 3050 mm. above the top of the unit, there are no restrictions on the horizontal dimensions.

Supply entry data

Hole	Opening diameter (mm)	Used for	
A	23	Control wiring	Side
B1 B2	38 29	Power wiring	
C	38	Gas pipes (front)	

DUCT COVERS - The units are supplied with all air duct openings covered.
In applications with **side** ducts:
1. Remove and discard the impulse and return air duct covers.
2. Connect the duct network to the duct flanges.

In applications with **bottom** ducts:
1. Remove the side covers of the impulse and return air ducts so as to have access to the bottom impulse and return air covers .
2. Remove and discard the bottom duct covers.
3. Replace the side duct covers.

Table 3 - Physical data

Description of components			Size of the unit D3IG-090, 120 and 150		
			090	120	150
Evaporating unit fan	Centrifugal fan	Dia. x Width (mm)	305 x 305	381 x 305	381 x 305
	Fan motor	kW	1.5	2.2	4
Evaporating coil	Tubing		3	3	3
	Fins per inch		13	13	13
	Front surface	m^2	0.73	1.02	1.25
Condensing unit fan (two per unit)	Dia. propeller	mm (per unit)	610	610	610
	Condensing unit motor	kW (per unit)	0.4	0.4	0.4
	Nominal air flow	CFM (per unit)	2 900	3 600	4 400
		m^3/s (per unit)	1.37	1.70	2.08
Condensing unit	Tubing		2	2	2
	Fins per inch		13	13	16
	Front surface	m^2	1.55	2.23	2.73
Air filters (see note)	Quantity per unit	294 x 594 (mm)	2	-	-
	Quantity per unit	390 x 594 (mm)	2	2	3
	Quantity per unit	442 x 594 (mm)	-	2	2
	Total front surface	m^2	0.87	1.05	1.30
Load	Refrigerant 22 or 407C	Sys. Nº1 kg	3.13	4.20	5
		Sys. Nº2 kg	3.13	4.28	4.75
Weight kg			472	537	642
Weight accessories (kg)					
Motor-driven damper					34
economiser					35
Mounting base (fixed/adjustable)					70/130
Barometric damper/fixed outdoor air intake					4.5
Extraction fan					30

NOTE: The filter-holders are prepared for 25 mm. or 50 mm. filters.

Table 4 - Wiring specifications

Model	Power supply	Compressor (Nos. 1 & 2)		Outdoor fan motor x 2		Impulse air fan motor		Total unit consumption (A)	Max. auto. switch (Curve K)[1]	Min. section cables[2] (mm^2)
		Operating intensity of each one, A	Start intensity of each one, A	kW	Intensity of each one, A	kW	Intensity (A)			
090	400/3/50	6.1	62	0.4	2.1	1.5	3.5	19.9	32	4
120	400/3/50	7.5	66	0.4	2.1	2.2	5.1	24.3	32	6
150	400/3/50	9.2/12.4	79/128	0.4	2.1	4	8.9	34.8	40	10

NOTES: 1. Curve K (DIN, VDE 0660 - 104).- 2. The section of the site wiring is based on copper wires, 105°C insulation, 3-phase, sleeved.

Table 5 - Impulse air fan performances (Mod. D*GI090)

Application of side ducts (m^3/s)

Fan speed RPM	Flow														
	1.06 m^3/s			1.24 m^3/s			1.42 m^3/s			1.59 m^3/s			1.77 m^3/s		
	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)
950	191	0.8	1.0	138	0.9	1.1	78	1.1	1.2	-	-	-	-	-	-
1 005	228	0.9	1.1	176	1.0	1.2	116	1.1	1.3	43	1.3	1.5	-	-	-
1 060	271	1.0	1.1	218	1.1	1.3	159	1.2	1.4	86	1.4	1.6	-	-	-
1 120	322	1.0	1.2	270	1.2	1.4	210	1.3	1.6	138	1.5	1.8	60	1.7	2.0
1 175	375	1.1	1.4	323	1.3	1.5	263	1.4	1.7	190	1.6	1.9	-	-	-
1 230	432	1.2	1.5	380	1.4	1.7	320	1.6	1.9	-	-	-	-	-	-

Application of ducts with downward discharge (m^3/s)

Fan speed RPM	Flow														
	1.06 m^3/s			1.24 m^3/s			1.42 m^3/s			1.59 m^3/s			1.77 m^3/s		
	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)
950	173	0.8	1.0	116	0.9	1.1	46	1.1	1.2	-	-	-	-	-	-
1 005	211	0.9	1.1	154	1.0	1.2	84	1.1	1.3	-	-	-	-	-	-
1 060	253	1.0	1.1	196	1.1	1.3	126	1.2	1.4	43	1.4	1.6	-	-	-
1 120	305	1.0	1.2	248	1.2	1.4	178	1.3	1.6	95	1.5	1.8	-	-	-
1 175	357	1.1	1.4	300	1.3	1.5	230	1.4	1.7	148	1.6	1.9	-	-	-
1 230	415	1.2	1.5	358	1.4	1.7	288	1.6	1.9	-	-	-	-	-	-

Application of side ducts (CFM)

Fan speed RPM	Flow														
	2 250 CFM			2 625 CFM			3 000 CFM			3 375 CFM			3 750 CFM		
	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)
950	0.8	1.1	1.0	0.6	1.3	1.1	0.3	1.4	1.2	-	-	-	-	-	-
1 005	0.9	1.2	1.1	0.7	1.3	1.2	0.5	1.5	1.3	0.2	1.7	1.5	-	-	-
1 060	1.1	1.3	1.1	0.9	1.5	1.3	0.6	1.6	1.4	0.3	1.8	1.6	-	-	-
1 120	1.3	1.4	1.2	1.1	1.6	1.4	0.8	1.8	1.6	0.6	2.0	1.8	0.2	2.3	2.0
1 175	1.5	1.5	1.4	1.3	1.7	1.5	1.1	1.9	1.7	0.8	2.2	1.9	-	-	-
1 230	1.7	1.7	1.5	1.5	1.9	1.7	1.3	2.1	1.9	-	-	-	-	-	-

Application of ducts with downward discharge (CFM)

Fan speed RPM	Flow														
	2 250 CFM			2 625 CFM			3 000 CFM			3 375 CFM			3 750 CFM		
	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)
950	0.7	1.1	1.0	0.5	1.3	1.1	0.2	1.4	1.2	-	-	-	-	-	-
1 005	0.8	1.2	1.1	0.6	1.3	1.2	0.3	1.5	1.3	-	-	-	-	-	-
1 060	1.0	1.3	1.1	0.8	1.5	1.3	0.5	1.6	1.4	0.2	1.8	1.6	-	-	-
1 120	1.2	1.4	1.2	1.0	1.6	1.4	0.7	1.8	1.6	0.4	2.0	1.8	-	-	-
1 175	1.4	1.5	1.4	1.2	1.7	1.5	0.9	1.9	1.7	0.6	2.2	1.9	-	-	-
1 230	1.7	1.7	1.5	1.4	1.9	1.7	1.2	2.1	1.9	-	-	-	-	-	-

NOTES: 1. The fan performances comprise a wet evaporating coil, standard filters and heat exchangers.
2. See Table 8 for the resistance of unit accessories.
E.S.P. = External Static Pressure available for the impulse and return air duct system. All interior resistances of the unit have been subtracted from the total static pressure of the fan.

Table 6 - Impulse air fan performances (Mod. D*IG120)

Application of side ducts (m³/s)

Fan speed RPM	Flow														
	1.42 m³/s			1.65 m³/s			1.89 m³/s			2.12 m³/s			2.36 m³/s		
	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)
880	283	1.1	1.3	231	1.2	1.5	176	1.4	1.7	102	1.6	2.0	20	1.8	2.2
930	332	1.2	1.5	282	1.4	1.7	228	1.5	1.9	156	1.7	2.1	76	1.9	2.4
975	377	1.3	1.6	329	1.5	1.8	276	1.7	2.1	206	1.9	2.3	127	2.1	2.6
1 025	429	1.4	1.8	381	1.6	2.0	330	1.8	2.2	261	2.0	2.5	184	2.3	2.8
1 070	475	1.5	1.9	429	1.7	2.1	380	2.0	2.4	312	2.2	2.7	236	2.4	3.0
1 120	528	1.7	2.0	484	1.9	2.3	436	2.1	2.6	370	2.4	2.9	-	-	-

Application of ducts with downward discharge (m³/s)

Fan speed RPM	Flow														
	1.42 m³/s			1.65 m³/s			1.89 m³/s			2.12 m³/s			2.36 m³/s		
	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)
880	250	1.1	1.3	186	1.2	1.5	118	1.4	1.7	27	1.6	2.0	-	-	-
930	300	1.2	1.5	237	1.4	1.7	171	1.5	1.9	82	1.7	2.1	-	-	-
975	345	1.3	1.6	284	1.5	1.8	219	1.7	2.1	131	1.9	2.3	37	2.1	2.6
1 025	396	1.4	1.8	336	1.6	2.0	273	1.8	2.2	187	2.0	2.5	94	2.3	2.8
1 070	443	1.5	1.9	385	1.7	2.1	323	2.0	2.4	238	2.2	2.7	147	2.4	3.0
1 120	496	1.7	2.0	439	1.9	2.3	379	2.1	2.6	295	2.4	2.9	-	-	-

Application of side ducts (CFM)

Fan speed RPM	Flow														
	3 000 CFM			3 500 CFM			4 000 CFM			4 500 CFM			5 000 CFM		
	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)
880	1.1	1.5	1.3	0.9	1.7	1.5	0.7	1.9	1.7	0.4	2.1	2.0	0.1	2.4	2.2
930	1.3	1.6	1.5	1.1	1.8	1.7	0.9	2.1	1.9	0.6	2.3	2.1	0.3	2.6	2.4
975	1.5	1.7	1.6	1.3	2.0	1.8	1.1	2.2	2.1	0.8	2.5	2.3	0.5	2.8	2.6
1 025	1.7	1.9	1.8	1.5	2.2	2.0	1.3	2.4	2.2	1.0	2.7	2.5	0.7	3.1	2.8
1 070	1.9	2.1	1.9	1.7	2.3	2.1	1.5	2.6	2.4	1.3	2.9	2.7	0.9	3.3	3.0
1 120	2.1	2.2	2.0	1.9	2.5	2.3	1.7	2.8	2.6	1.5	3.2	2,9	-	-	-

Application of ducts with downward discharge (CFM)

Fan speed RPM	Flow														
	3 000 CFM			3 500 CFM			4 000 CFM			4 500 CFM			5 000 CFM		
	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)
880	1.0	1.5	1.3	0.7	1.7	1.5	0.5	1.9	1.7	0.1	2.1	2.0	-	-	-
930	1.2	1.6	1.5	1.0	1.8	1.7	0.7	2.1	1.9	0.3	2.3	2.1	-	-	-
975	1.4	1.7	1.6	1.1	2.0	1.8	0.9	2.2	2.1	0.5	2.5	2.3	0.1	2.8	2.6
1 025	1.6	1.9	1.8	1.4	2.2	2.0	1.1	2.4	2.2	0.7	2.7	2.5	0.4	3.1	2.8
1 070	1.8	2.1	1.9	1.5	2.3	2.1	1.3	2.6	2.4	1.0	2.9	2.7	0.6	3.3	3.0
1 120	2.0	2.2	2.0	1.8	2.5	2.3	1.5	2.8	2.6	1.2	3.2	2.9	-	-	-

NOTES: 1. The fan performances comprise a wet evaporating coil, standard filters and heat exchangers.
2. See Table 8 for the resistance of unit accessories.
E.S.P. = External Static Pressure available for the impulse and return air duct system. All interior resistances of the unit have been subtracted from the total static pressure of the fan.

Table 7 - Impulse air fan performances (Mod. D*IG150)

Application of side ducts (m³/s)

Fan speed RPM	Flow														
	1.80 m³/s			2.10 m³/s			2.40 m³/s			2.70 m³/s			3.00 m³/s		
	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)
960	270	1.5	1.8	179	1.7	2.1	91	2.1	2.5	22	2.6	3.1	-	-	-
1 000	321	1.6	2.0	229	1.9	2.3	140	2.3	2.7	70	2.8	3.3	-	-	-
1 040	372	1.8	2.2	280	2.1	2.5	190	2.5	3.0	119	3.0	3.6	44	3.7	4.4
1 080	424	2.0	2.4	331	2.3	2.8	240	2.7	3.3	169	3.3	3.9	93	3.9	4.7
1 120	476	2.3	2.7	382	2.5	3.0	291	3.0	3.6	219	3.5	4.2	142	4.2	5.0
1 160	529	2.5	3.0	434	2.8	3.3	342	3.2	3.9	269	3.8	4.5	-	-	-

Application of ducts with downward discharge (m³/s)

Fan speed RPM	Flow														
	1.80 m³/s			2.10 m³/s			2.40 m³/s			2.70 m³/s			3.00 m³/s		
	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)	E.S.P. (Pa)	Power supply (kW)	Absorbed power (kW)
960	213	1.5	1.8	104	1.7	2.1	-	-	-	-	-	-	-	-	-
1 000	264	1.6	2.0	154	1.9	2.3	51	2.3	2.7	-	-	-	-	-	-
1 040	315	1.8	2.2	205	2.1	2.5	100	2.5	3.0	30	3.0	3.6	-	-	-
1 080	367	2.0	2.4	256	2.3	2.8	151	2.7	3.3	79	3.3	3.9	-	-	-
1 120	419	2.3	2.7	307	2.5	3.0	201	3.0	3.6	129	3.5	4.2	42	4.2	5.0
1 160	472	2.5	3.0	360	2.8	3.3	253	3.2	3.9	179	3.8	4.5	-	-	-

Application of side ducts (CFM)

Fan speed RPM	Flow														
	3 810 CFM			4 450 CFM			5 090 CFM			5 725 CFM			6 360 CFM		
	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)
960	1.1	2.0	1.8	0.7	2.3	2.1	0.4	2.8	2.5	0.1	3.5	3.1	-	-	-
1 000	1.3	2.2	2.0	0.9	2.5	2.3	0.6	3.1	2.7	0.3	3.7	3.3	-	-	-
1 040	1.5	2.4	2.2	1.1	2.8	2.5	0.8	3.3	3.0	0.5	4.0	3.6	0.2	4.9	4.4
1 080	1.7	2.7	2.4	1.3	3.1	2.8	1.0	3.7	3.3	0.7	4.4	3.9	0.4	5.2	4.7
1 120	1.9	3.0	2.7	1.5	3.4	3.0	1.2	4.0	3.6	0.9	4.7	4.2	0.6	5.6	5.0
1 160	2.1	3.3	3.0	1.7	3.7	3.3	1.4	4.3	3.9	1.1	5.1	4.5	-	-	-

Application of ducts with downward discharge (CFM)

Fan speed RPM	Flow														
	3 810 CFM			4 450 CFM			5 090 CFM			5 725 CFM			6 360 CFM		
	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)	E.S.P. (iwg)	Power supply (HP)	Absorbed power (kW)
960	0.9	2.0	1.8	0.4	2.3	2.1	-	-	-	-	-	-	-	-	-
1 000	1.1	2.2	2.0	0.6	2.5	2.3	0.2	3.1	2.7	-	-	-	-	-	-
1 040	1.3	2.4	2.2	0.8	2.8	2.5	0.4	3.3	3.0	0.1	4.0	3.6	-	-	-
1 080	1.5	2.7	2.4	1.0	3.1	2.8	0.6	3.7	3.3	0.3	4.4	3.9	-	-	-
1 120	1.7	3.0	2.7	1.2	3.4	3.0	0.8	4.0	3.6	0.5	4.7	4.2	0.2	5.6	5.0
1 160	1.9	3.3	3.0	1.4	3.7	3.3	1.0	4.3	3.9	0.7	5.1	4.5	-	-	-

NOTES: 1. The fan performances comprise a wet evaporating coil, standard filters and heat exchangers.
2. See Table 8 for the resistance of unit accessories.
E.S.P. = External Static Pressure available for the impulse and return air duct system. All interior resistances of the unit have been subtracted from the total static pressure of the fan.

Table 8 - Economiser* static resistance

Description	External static pressure drop - Resistance, Pa/inch each				
	m^3/s (CFM)				
	0.94 (2 000)	1.41 (3 000)	1.89 (4 000)	2.36 (5 000)	2.83 (6 000)
Economiser	5.0 / 0.02	5.0 / 0.02	7.5 / 0.03	12.5 / 0.05	17.4 / 0.07

* Subtract these resistance values from the external static pressure available indicated shown in the Fan Performance Table.

Table 9 - Fan motor and drive specifications

Model	Fan range (RPM)	Motor[1]	Adjustable motor pulley		Fixed fan pulley		Belt		
		kW	Ø Prim. (mm)	Ø shaft (mm)	Ø Prim. (mm)	Ø shaft (mm)	Prim. lenght	Denomination	Quantity
090	950-1 230	1.5	86-112	24	132	25	1 240	B47	1
120	880-1 120	2.2	86-112	24	132	25	1 360	BX52	1
150	960-1 160	4	125-150	28	188	25	1 540	BX59	1

[1] All motors are of the totally enclosed type, fan-cooled at 1450 rpm, with a solid base and a service factor of 1.15.
[2] Do **not** close this pulley below the minimum number of turns. See Table 11 for limitations.

Operation

Cooling system

The cooling system is a complete factory-mounted assembly that uses an air-cooled condenser. The system is delivered loaded with refrigerant. The compressors are sealed airtight and have internal shock absorbency.
The compressors also have intrinsic (internal) protection. Should there be an unusual temperature increase in the compressor, the safety device will turn the compressor off.

Preliminary cooling operation

Once installation is finished, connect the sump heaters during at least four hours prior to starting the unit up. After this initial operation, the compressors should undergo three false connections (sufficient for a few rotations), with a 5-7-minute delay between starts, prior to full operation.

NOTE:
Before each cooling season, the sump heaters should be connected at least 10 hours prior to starting the system.

Thermostat operation

FAN SWITCH AUTO MODE: If the fan switch is set to "FAN", the indoor fan is in continuous operation. If the fan switch is set to "AUTO", the fan is activated by means of the thermostat only while in cool or heat operation.
AUTO MODE: If the thermostat is set to "AUTO", the unit operates both in the cooling as well as heating modes, as required by the thermostat. There is a differential of 1°C between the cool and heat set points (this value can be increased with the DSL-700 thermostat).
COOL/HEAT: If the thermostat is set to "COOL", the unit operates in the cooling mode when the thermostat requires cool, but does not operate in the heating mode. If set to "HEAT", the unit operates in the heating mode when required, but not in the cooling mode.

Cooling operation sequence

Without economiser: If the unit is not equipped with an Economiser, the P5 plug of the economiser wiring hose will be bridged in such a way that terminals P5-4 and P5-6, and P5-5 and P5-7 will be connected. In this way, upon the request for cooling, Signal Y1 goes to terminal P6-8 of the Relay Board, and Signal Y2 to terminal P6-5, also of the Relay Board.
REQUEST FOR COOLING, Y1: Signal Y1 of the thermostat activates contactor KM1 of the compressor, which in turn activates Compressor No. 1 and the Outdoor Fan.
REQUEST FOR COOLING, Y2: If the thermostat is not satisfied by signal Y1 and the temperature continues to rise, Signal Y2 from the thermostat activates contactor KM2 of the compressor, which in turn activates Compressor No. 2 and the Outdoor Fan.
With economiser: If the unit is equipped with an Economiser, the request for Cooling will depend upon whether the enthalpy of the outdoor air (a combination of temperature and humidity) is below the Logic Module set point of the Economiser (model with single enthalpy), or the enthalpy of the return air (model with dual enthalpy). If the enthalpy of the outdoor air is above (for example, hotter and/or more humid) the set point enthalpy (or return air), operation is as described above.
REQUEST FOR COOLING, Y1: If the outdoor air enthalpy is below (for example, cooler and/or drier) the set point enthalpy (or return air), Signal Y1 from the thermostat will go through contact K1-2 of the relay to activate the Economiser Damper Motor assembly. Contact K1-1 of the relay remains open, avoiding compressor operation. The Damper Motor modulates through the Discharge Air Sensor (DAS), mixing the cold outdoor air the warm return air so as to reach the selected temperature of the impulse air.
REQUEST FOR COOLING, Y2: If the thermostat is not satisfied by the operation of the economiser from Signal Y1 and the temperature continues to rise, Signal Y2 from the thermostat goes through contact K2-2 of the relay to terminal P6-8 of the Relay Board, activating the circuit of Compressor No. 1, as described above.
Occupation relay, OR: If the Occupied Switch is installed in

the thermostat, and is set to Occupied, mechanical cooling will be produced (compressor), as described above, depending upon the operating mode of the thermostat and the economiser. If the Occupied Switch is set to Unoccupied, the economiser can operate as described above, but mechanical cooling cannot be produced. This device allows free cooling by the economiser of the unoccupied and air conditioned space, but avoids the expense of the mechanical cooling of that unoccupied space.

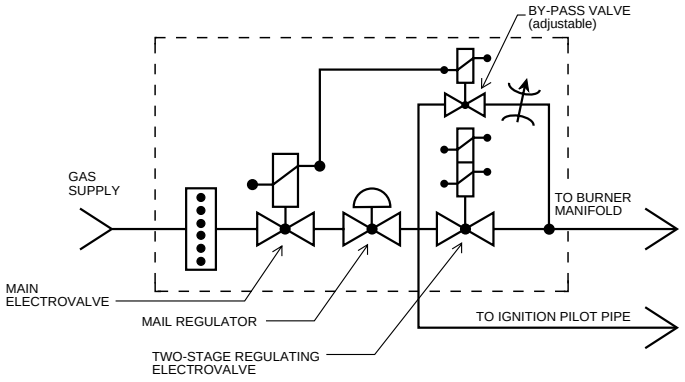
Heating operation sequence

REQUEST FOR HEATING, W1: Signal W1 from the thermostat activates

Heat Relay RW1 and Timer Relay TDR. The Heat Relay RW1 contact closes, activating the system of Ignition Control circuits. After about 15 seconds, the Timer Relay TDR contacts close, activating the Fan Lock-out Relay K5 (on the relay board). Contact K5-2 of relay K-5 closes, activating contact KM3 of the Indoor Fan, which in turn starts the indoor fan. Contact K5-1 opens, isolating contact KM3 of the Indoor Fan from the G signal of the thermostat.

If the gas supply pressure is above the set point of the Gas Pressure Switch (GS), the Ignition Control (IC1) is activated and the ignition sequence begins. See Fig. 13 for typical gas valve pipes.

Gas valve pipes



- Fig. 13 -

IGNITION SEQUENCE: Once contacts RW1 and GS have closed, the Ignition Control makes sure the Air Pressure Switch (AS) contact is open. In this case, the burner fan motor is activated through terminal BF-3 of the IC1, and a 30-second prepurge sequence is begun.

If the AS contact has closed and the prepurge is finished, terminal X3 of the IC1 activates the Ignition Transformer, which gives a high frequency arc at the ignition electrode (located in the burner on the left). The main gas valve is activated at a low flow rate through terminal Y1-5 of the IC1. The burner on the left ignites and assures that all burners ignite correctly. If the flame detector (of the ionisation electrode type, located within the burner on the right) does not supply an adequate current to terminal IE-10 of the IC1 within a 5-second interval, the Ignition Control is locked out.

If ignition sequence is correct but the flame goes out afterwards, the Ignition Control tries to start again. If no flame presence is detected at the end of the cycle, the IC1 control is locked out. Should the flame go out, the Ignition Control is locked out. Likewise, if heat switches LS1 or LS2 open due to excessive temperature, or if the heat switch of the Burner Assembly (RS) opens due to high temperature in the gas control compartment, or if the Air Pressure Switch (AS) opens due to a lack of combustion air (for example, lock-out or failure of the fan), the unit is locked out.

Request for heat, W2: If the thermostat is not satisfied by signal W1 and the temperature continues to drop, contact RW2 of the Heat Relay closes, activating the first/second flame actuator of the gas valve, which increases the pressure of the burner manifold to its maximum value, thus making the boiler operate at maximum power.

Safety features and controls

Cooling lock-out: If the High Pressure Control (HP1), the Low Pressure Control (LP1) or the Low Temperature Control of the Evaporating Unit (FS1) open while the compressor is in operation, Lock-out Relay K3 of Compressor No. 1 is activated. Contact K3-1 opens and keeps K3 active after contacts HP1, LP1 or FS1 have closed again. At the same time, contact K3-2 closes, activating terminal X of the Relay Board so as to create an external lock-out signal. Despite the fact that contact KM1 is connected in series to relay K3, the great pressure drop in high impedance relay K3 avoids the activation of KM1. The lock-out is deleted from the thermostat, eliminating and re-establishing Signal Y1; that is to say, setting the thermostat to OFF and then to ON again.

The circuit system of Lock-out Relay K4 of cooling circuit No. 2 operates as per the description given for the previously mentioned circuit No. 1.

Heating lock-out: Should the Ignition Control (IC1) be locked

Table 10 - Gas valve/heat switch adjustment

Boiler model	Capacity kW (Mbh)			Type of gas	Gas valve adjustments mbar (inch each)			Heat switch limits °C (°F)	
	Absorbed (Gross)*	Absorbed (Nett)*	Given		Main regulator	Second flame	First flame	Automatic reset	Manual reset
No. 165	59.3 (202)	53.5 (183)	47.5 (163)	2ND-H (G20) 2ND-L (G25)	10.5 (4.2) 15.2 (6.1)	9.9 (4.0) 14.6 (5.9)	4.9 (2.0) 7.3 (2.9)	82 (180) 82 (180)	93 (200) 93 (200)
No. 200	71.2 (242)	64.2 (220)	57 (196)	2ND-H (G20) 2ND-L (G25)	10.5 (4.2) 15.2 (6.1)	9.9 (4.0) 14.6 (5.9)	4.9 (2.0) 7.3 (2.9)	82 (180) 82 (180)	93 (200) 93 (200)

* Heating value.

out due to the activation of any of the LS2 (Automatic Reset Heat Switch), RS (Burner Heat Switch) or AS (Air Pressure Switch) features, the control does not unlock until the feature activated is re-established. In the case of a lock-out due to a lack of flame detection, the IC1 control generates an alarm signal to terminals ST-3 and ST-4 (a tension of 230 VAC appears). To unlock IC1, press the MR manual reset button located on the outside of the unit. The IC1 will not reset in the case of a power shortage or restriction, and it cannot be reset from the ambient thermostat. Should the Manual Reset Heat Switch (LS1) open (LS2 has a lower set point and, normally, should open first), the Ignition Control will not operate until LS1 is reset manually. LS1 can be accessed through the impulse air access panel (for installations of the downward flow type), or through the cover located on the dividing wall of the condenser compartment (for installations with side ducts).

Low pressure of gas: If the gas supply pressure drops below the set point of the gas pressure switch (GS), the electric power supply to the Ignition Control is interrupted, and this unit becomes inoperative. The boiler will reset automatically once the gas supply pressure surpasses the pressure switch set point, and the ignition sequence will begin once again. See Table 10 for gas valve and heat switch adjustments.

Motor overload protection: All motors of the sealed compressors, fan motors and burner fan motors are protected against overloads by means of an internal heat cut-off switch. This protection will reset automatically once the motor has cooled down sufficiently. Externally, they are protected against short circuits and overloads by means of automatic switches (F1, F2, F4 and F5), curve K (DIN, VDE 0660-104).

The indoor fan motor is protected by a motor-guard, adjusted to the maximum amperage of the fan motor. In the case of an excessive power consumption in the three phases, motor-guard F3 opens, interrupting the electric power supply to Indoor Fan Contact KM3.

Check list prior to start up

Check the following before starting the unit.

1. Check the type of gas to be used. Make sure it is of the same type shown on the Identification Plate of the unit.
2. Make sure the gas and combustion air outlet hoods are installed correctly.

Start up

Operating instructions

CAUTION:
This boiler is equipped with an automatic ignition system. **Do not** attempt to ignite it manually.

To ignite the main burners:

1. Disconnect the power supply to the unit.
2. Set the ambient thermostat to its lowest setting.
3. Connect the power supply to the unit.
4. Set the ambient thermostat to the desired temperature. (If the temperature "set" on the thermostat is higher than the ambient temperature, the burner will ignite).

To turn them off:

1. Disconnect the power supply to the unit.

Check list after start up (gas)

After having activated the entire control circuit and the heating section is in operation, check the following:

1. Make sure there are no gas leaks at the unit or supply pipes.
2. Make sure that the gas pressures in the manifold are correct. See "Checking Gas Intake".
3. Check the gas supply pressure. It should be within the limits that appear on the Identification Plate. The supply pressure should be checked with all gas equipment in the building operating at full power. In no case should the pressure of the auxiliary gas line surpass 25 mbar (10" each), nor should the operating pressure drop below 12.5 mbar (5" each) on natural gas equipment. If the gas pressure is not within these limits, contact the local gas company so that the corresponding corrective measures may be taken.

Gas pressure adjustment in the manifold

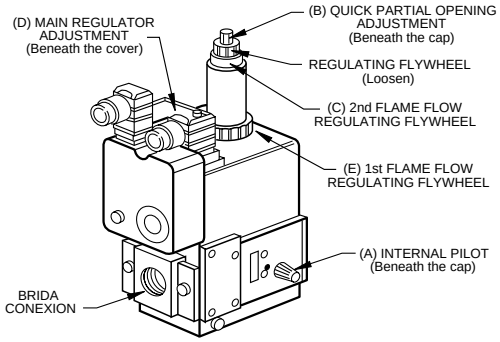
This equipment is dispatched from the factory prepared for natural gas of the 2ND-H family (G-20).

When adjustment is needed, depending upon the type of gas used, this can be done by means of the adjusting screws of the gas valve (Fig. 14), in accordance with the following sequence. Set to the values given in Table 10.

Note
For equipment converted to propane gas (LPG), the gas valve should be adjusted in accordance with the technical information included in the conversion kit.

1. Set the interior pilot (A) to maximum value (+).
2. Turn the Quick Partial Opening Regulation flywheel (B) one complete turn backwards.
3. With the second phase in operation, loosen the Flow Regulating Flywheel of the second flame (C) slightly, and set said flywheel to its maximum opening. Adjust the main regulator (D) in accordance with the tabulated value. Reduce the Flow Regulation of the second flame (C) until that specific pressure is reached.
4. With only the second phase in operation, set the Flow Regulating flywheel of the first flame (E) at the specific pressure. Tighten the Regulating Flywheel to fix the settings permanently. Close the little cover located on the main regulator.
5. Using an extraction gas analyser, check the content of CO1, CO2 and Nox, if possible, in the combustion gasses at the outlet of the smoke duct. The carbon monoxide (CO) content should be less than 0.1% (1000 ppm). Make sure the CO/CO2 ratio is less than 0.02.

Typical gas valve



- Fig. 14 -

Burner instructions

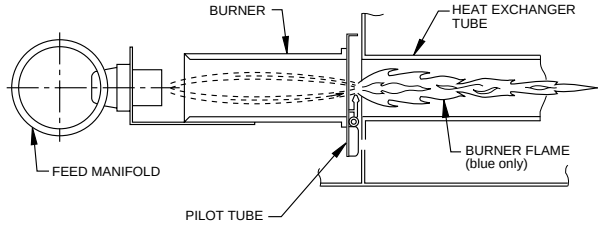
To check the burners, pilots or jets, **close the main manual valve and shut off all power supply to the unit.**

1. Remove the screws that hold the burner to its supports on both sides.
2. Disconnect the gas supply line by loosening the connecting flange at the gas valve intake.
3. Disconnect the gas valve and ignition electrode cables. Remove the manifold-gas valve from the burner by pulling up and towards the rear.

The burners can now be accessed. See Fig. 15 for a view of a typical burner and flame.

To reassemble this assembly, invert the previous procedure. Make sure the burners are level and rest on the guides at the bottom of the heat exchanger.

View of typical flame



- Fig. 15 -

Checking air flow

The RPM of the impulse air fan depend upon the air flow required, the accessories of the unit and the static resistances of the impulse and return air systems. With this information, the RPM of the impulse air fan can be determined by means of the performance data of the fan shown in Tables 5, 6 and 7. With the value of the RPM required, the adjustment (turns open) of the impulse air motor pulley can be determined by means of Table 11.

Table 11 - Impulse air fan motor pulley adjustment

Fan operating range (RPM)				
Turns open*	090 unit	Turns open*	120 unit	150 unit
5	950	6	880	960
4	1 005	5	930	1 000
3	1 060	4	975	1 040
2	1 120	3	1 025	1 080
1	1 175	2	1 070	1 120
0	1 230	1	1 120	1 160

* The pulleys can be adjusted in increments of half a turn.

Turn the impulse air fan on. Adjust resistances both in the impulse as well as return air systems so as to balance distribution throughout the air conditioned space. Due to the specifications of the job site, it may be necessary to have this balancing carried out by someone other than the unit installer.

To check the impulse air flow after initial balancing:

1. There are two 9.5 mm. ports for reading pressure before and after the evaporating coil.
   They are located in the filter side and fan side access panels, and are fitted with caps, Fig. 16.
   Remove both caps.
2. Insert at least 200 mm. of piping (with a diameter of about 6 mm.) through each one of the ports in such a way that there is sufficient penetration in the air flow on both sides of the indoor coil.

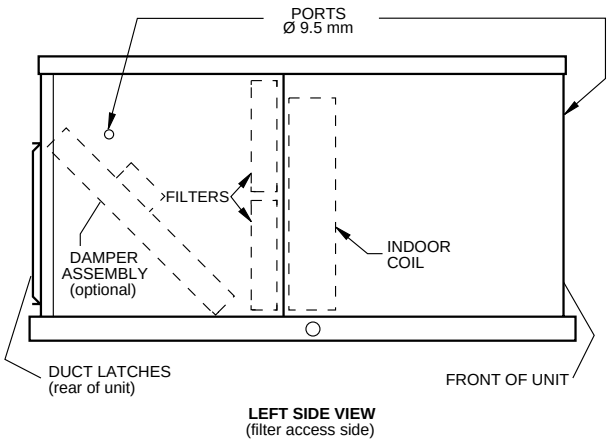
NOTE:
The pipes should be inserted and kept in perpendicular to the air flow in such a way that the speed pressure does not affect the static pressure reading.

3. Using an inclined pressure gauge, determine the pressure drop in a dry indoor coil. Since humidity can vary considerably in an indoor coil, to measure a pressure drop in a wet coil under job site conditions would not be precise.
   To make sure the coil is dry, the compressors should be disconnected during this test.
4. Having the value of the pressure drop in a dry coil, the real air flow through the unit can be determined by means of the curve appearing in Fig. 17.

WARNING
Not being able to adjust the total amount of air in the system could cause serious damage to the fan.

Once these readings are made, remove the pipes and replace the caps on both ports.

Location of ports (pressure drop reading)



- Fig. 16 -

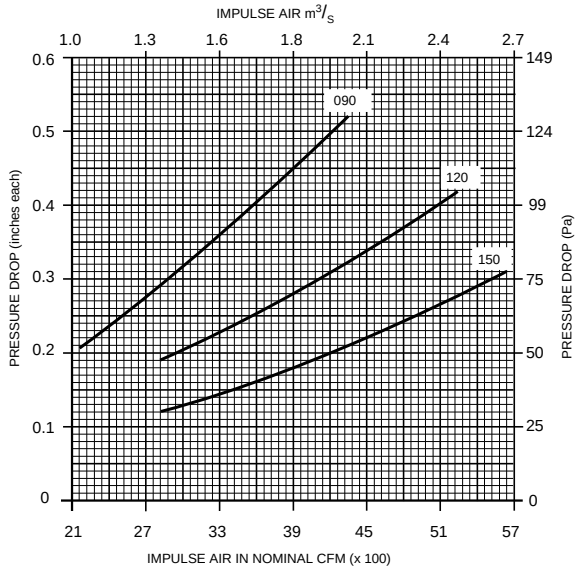
NOTE:
Disconnect the compressors before testing so as to make sure the indoor coil is dry.

Temperature increase adjustment

Temperature increase (or temperature difference between the return air and the hot air from the boiler) should be within the limits shown in Table 2.
Once the temperature increase is determined, the flow can be calculated as follows:

$$m^3/s = \frac{0{,}8 \times kW\ Gas\ intake^*}{1{,}2072 \times °C\ Temp.\ increase} \quad or\ CFM = \frac{0{,}8 \times Btu\ Gas\ intake^*}{1{,}08 \times °F\ Temp.\ increase}$$

Pressure drop in dry indoor coil vs. impulse air flow



- Fig. 17 -

* Based on an 80% nominal performance and the gross heating value, or over, of the fuel. Alternatively, use gas intake 0.9 x based on 90% nominal performance and the nett heating value, or over, of the fuel.

After about 20 minutes of operation, determine the temperature increase in the boiler. Take a reading of both the return and hot air in the ducts (at about 1.8 m. from the boiler), where this reading is not affected by radiant heat. **Increase** the fan air flow so as to **decrease** the temperature; **decrease** the fan air flow so as to **increase** the temperature. See Table 9 for fan motor and data on operation of same.

Belt-driven fan

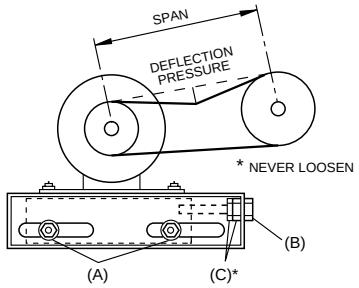
All units are equipped with single speed motors and belt drive for fans. The variable fan motor pulley can be adjusted so as to obtain the desired impulse air flow. Tensing belts should be carried out as shown in Fig. 18.

Tensing belts

CAUTION
Procedure for tensing belts:

1. Loosen the four nuts (upper and lower) (A).
2. Turn to adjust (B).
3. Never loosen nuts (C).
4. With a belt tensing tester, apply perpendicular pressure on the intermediate point of the belt, as shown below. This deflecting pressure should be applied until a correct 4 mm. deflection distance is achieved.

To determine the deflection distance from normal position, use a straight edge, from pulley to pulley, as a line of reference. The recommended deflection pressure is as shown below:



Tense all new belts to the maximum deflection recommended. Check belt tension at least twice during the first 24 hours of operation. Whenever the belts are retensed, the deflection pressure values should be within maximum and minimum.

5. After this tensing operation, retighten nuts (A).

- Fig. 18 -

Insure owner approval: Once the system is operating correctly, insure the approval of the owner. Show him the location of all switches and the thermostat. Show him how to start and stop the unit, as well as how to adjust the temperature within the limits of the system.

Maintenance

Normal maintenance

CAUTION:
Before carrying out any of the following operations, disconnect all electric power supply to the unit so as to avoid personal damage.

Normally, periodical maintenance comprises changing or cleaning filters and (in certain cases) cleaning the main burners.
FILTERS: Check them once a month. Replace the non-reusable or clean the permanent filters, as required. DO NOT replace the permanent type with non-reusable types. The dimensions of the replaced filter should be the same as the original.
MOTORS: The indoor and outdoor fan motors have permanent lubrication and do not require maintenance.
OUTDOOR COIL: Dirt should not accumulate on the surface of the outdoor coil, or on other parts of the air circuit. It should be cleaned as frequently as required to keep the coil clean. Use a brush, vacuum cleaner or any other appropriate means. If water is used to clean the coil, make sure the power supply is disconnected before cleaning.

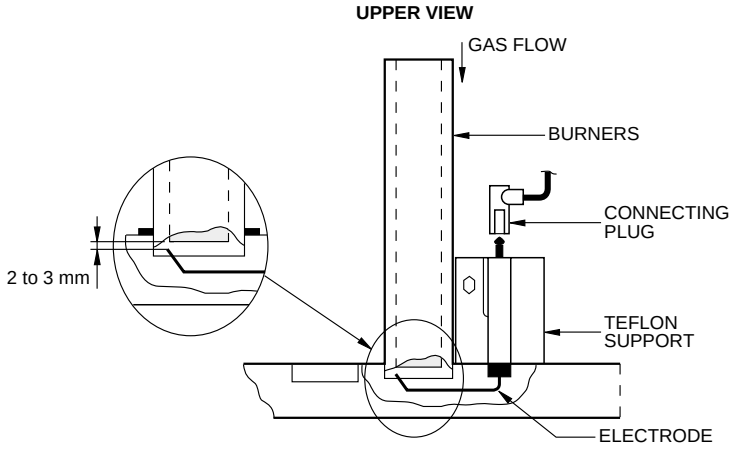
NOTE:
When cleaning the coil, be sure not to damage the fins of same. Do not allow any structure or overhanging element to obstruct outdoor air discharge.

BURNER: Regularly (at least once a year, at the beginning of each heating season), visually check the flame of the main burner. If necessary, adjust the main burner until a yellow flame is no longer seen. If the adequate flame cannot be achieved, the burners may require cleaning.
TO CLEAN THE BURNERS: Remove them from the boiler as described in "Burner Instructions". Clean the burners with hot water along the top of same. When reassembling a burner, make sure the electrode is at 2 or 3 mm. See Fig. 19.
COMBUSTION AIR DISCHARGE: Regularly, visually check the discharge outlet to make sure there is no accumulation of soot and dirt. If necessary, clean to keep the combustion air discharge in adequate condition.

Cleaning of smoke stacks and heating elements

With adequate combustion adjustment, the heating element of a boiler hardly ever needs cleaning. If the element has deposits of soot on it, it can be cleaned as follows:

1. Remove the burner assembly as described in "Burner Instructions".
2. Remove the cover over the gas heating section.
3. At the top front of the heating section, remove the screws that fasten the top to the smoke stack. Remove this upper part without tearing the insulation next to it.
4. Inside the smoke stack, remove the deflector inside the tubes.
5. With a metal brush on a flexible rod, sweep the inside of the heat exchangers from the entrance of the burner, and the ends of the smoke discharges.
6. Sweep the inside of the smoke stacks and the smoke deflectors.
7. Pass the metal brush through the ventilation pipe downwards, from the end of the smoke stack.
8. If the accumulation of soot is considerable, remove the fan motor and clean the turbine and casing. Pass the metal brush along the prolonged smoke ducts downwards, at the ventilation outlet.
9. Once brushing is concluded, clean out with air or nitrogen. If necessary, use a vacuum cleaner.
10. Reassemble all parts in the same order as disassembly, following steps 1 to 4.
11. When replacing the top of the smoke stack, be sure not to tear the insulation next to it.
12. Make sure all gaskets on the ventilation side of the combustion system are airtight. Apply high-temperature sealing putty (+500°F/260°C) wherever necessary.



- Fig. 19 -

Trouble shooting

General information

Before trouble shooting in depth, first make sure the thermostat is calling for Cool or Heat, and that the power supply to the unit has not been interrupted by any automatic switch, normal switch, etc. Make sure both the thermostat as well as the job site wiring operate correctly.
Normally, a lack of impulse air supply causes other failures. In cooling, a loss of impulse air will lock out the compressor due to low temperature at the evaporating unit. In heating, a lack of impulse air supply will activate the heat switch. Check and correct this lack of impulse air before trouble shooting.

CAUTION:
For Trouble Shooting, it is normally necessary to have the power supply system in operation while components and operation are being evaluated. Avoid live wires. Check voltage by means of a voltmeter with insulated testers that are adequate for the voltage being tested. Never take for granted that the circuits are inoperative!

Probable causes and suggested corrective measures:

If the unit is operative but does not satisfy the thermostat, go directly to SEC. 7.
See Fig. 20 for the **Trouble shooting diagram.**

SEC. 1: No cooling; presence of impulse air; contacts KM1/KM2 closed.

A. Compressor motor protection open. Wait for protection to reset. Automatic switch F1/F2 open. Reset.
B. One or more phases open. Check power supply.
C. Contacts of Contact KM1/KM2 damaged. Check voltage on the charge side and replace the contact(s), if necessary.
D. Loose or damaged wiring on the line or charge side of the contacts. Check cables.
E. Compressor motor failure.
F. Pressure drop.

SEC. 2: No cooling; presence of impulse air; contacts KM1/KM2 open.

A. Lock out due to high or low discharge pressure, or low suction temperature. The external lock-out alarm, if installed, is activated. Reset thermostat lock-out and check consequences. If the unit locks out again, call a technician.

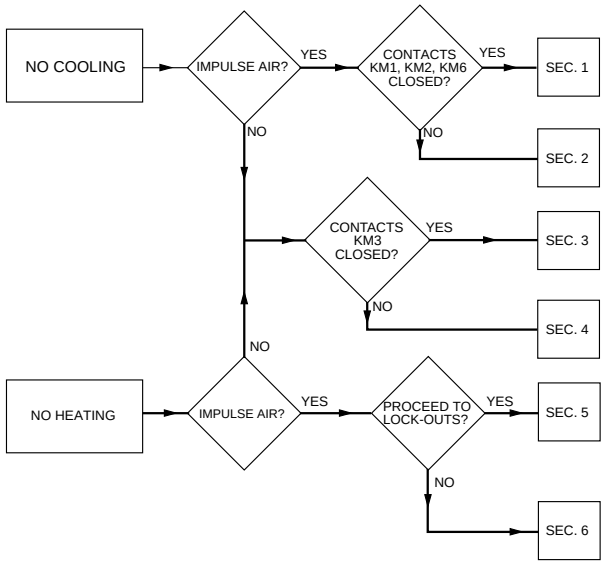
CAUTION:
From a lock-out position, do no reset repeatedly since this could damage the unit.

B. Inadequate connection at Contact KM1/KM2 coil, or failure of this coil. Repair or replace.
C. Contacts K3-1 or K4-1 of the relay board are open when the relay is inoperative. Replace relay board.
D. No signal at relay board:
   i. Without economiser: Defective economiser jumper or wiring.
   ii. With economiser:
      a. Economiser logic module or wiring defective.
      b. Thermostat set to unoccupied mode.
      c. Defective occupied relay coil or contacts.

SEC. 3: No cooling/heating; no presence of impulse air; contacts KM3 closed.

A. One or more phases open. Check the automatic switch and power supply.
B. Failure of contacts 3M. Check voltage at charge side and replace contact, if necessary.
C. Loose or damaged wiring on line or charge side of contacts. Check wiring.
D. Impulse air motor failure.
E. Broken drive belt or loose drive pulley. Check the drive and fan assemblies.

Trouble shooting diagram



- Fig. 20 -

SEC. 4: No cooling/heating; no presence of impulse air; contacts KM3 open.

A. One or more phases open. Check the automatic switch and power supply.
B. No 24 VAC control power. Reset the 24 VAC automatic switch CB, if it has gone off. Check control transformer 1T.
C. No 220-240 V power supply reaching transformer 1T because fuse F6 is open.
D. Overload relay is open due to excessive intensity.
E. Overload relay is open and cannot be reset. Replace relay.
F. Defective connection at KM3 contact coil, or failure of this coil. Repair or replace.

G. COOLING MODE: Contacts K5-1 of relay board are open. Replace the relay board.
H. HEATING MODE: Timed relay contacts (TDR) open. Check wiring. If voltage is present at the TDR coil, but the contacts do not close after the delay time, replace TDR.
I. HEATING MODE: Timed relay contacts (TDR) closed, relay K5 activated, but contacts K5-2 of relay board are open. Replace the relay board.

SEC. 5: No heating, presence of impulse air; ignition control locked out.

Make sure there is 230 VAC tension between terminals ST-3 and ST-4, so as to determine lock-out curve IC1.

A. No flame detected. Check the ignition electrode, the ignition transformer and the flame detector. Check grounding of unit, ignition control and ignition transformer. Make sure the fuel is being liberated by the gas valve.
B. This can also mean that the ignition and the flame were correct, but then failed, perhaps due to a change in the shape or characteristics of the flame after the valve went into the second stage (max. open), causing a failure in flame detection by the ignition control. Check for problems in the gas supply.
   The ignition control should be reset manually by pressing the manual reset button MR.

SEC. 6: No heating; presence of impulse air, ignition control not locked out.

A. Does not start because there is no tension at terminal IN-1. Make sure the indoor fan has started and contacts of KM3 and RW1 are closed. Also make sure contacts LS1 and GS are closed.
B. Contacts RW1 of heating relay are open. Check wiring and the coil. Replace if necessary. Failure of the RW2 heating relay contacts will allow the boiler to operate, but only in first phase (low power). Check RW2 and operation of the second phase of the gas valve, should the boiler not operate at full force.
C. The Gas Pressure Switch (GS) contacts are open. Check wiring and operation of the switch. Make sure GS is adjusted correctly in accordance with the type of gas being supplied to the unit. If the gas line supply pressure is below the GS set point, contact the gas company so adequate corrective measures may be taken.
D. The burner fan is off or permanently on.
   Make sure the Air Pressure Switch (AS), the terminal (LS2) switch or the heat switch (RS) contacts of the burner assembly close after the purge starts. Make sure the contacts of LS2 and RS have continuity.
   Check adequate operation of the burner fan motor and check actuation of AS. Inspect the AS pipe and the smoke discharge, in case they are obstructed. Make sure the pressure generated by the combustion air fan is greater than the pressure at the AS.
E. Heat switch LS1 is open. LS1 should be reset manually so as to resume operation.

CAUTION:
Disconnect all electric power supply to the unit.

Installations with downward discharge: Remove the impulse air access panel. The heat switch assembly is mounted on the dividing wall of the condenser, over the outer most heat exchanger pipe. Reset LS1 manually by pressing the reset button at the top of the switch.
Installations with side discharge: Remove the screws from the rear condenser fan grill, and place the fan assembly aside very carefully. Remove the four screws from the condenser dividing wall cover and, very carefully, withdraw the heat switch assembly, resetting the switch as previously described. Be sure not to damage or loosen cables. Reassemble the heat switch assembly and the condenser fan motor.

SEC. 7: Low performance; the unit cools or heats, but does not maintain the set point.

A. Dirty air filters. Replace filters at least every 3 months, or more regularly if conditions so require.
B. The drive belt slips. Tense the belt or replace same if it is cracked, glossy, etc.
C. Second stage Cooling/Heating inoperative. See "Trouble Shooting" for general causes for failure to produce cooling or heating.
D. COOL ONLY: Low refrigerant load.
E. COOL ONLY: Dirty indoor coil surfaces due to dirty or non-existing filters. Outdoor coil dirty due to dust, leaves, etc.
F. COOL ONLY: A motor/compressor of one of the compressors in tandem (only in units with a certain capacity) may be failing, and thus operates at low power. Check resistance of the windings and power consumption of each motor separately.
G. Defective economiser assembly:
   i. Damper assembly and/or activating mechanism loose or stuck, avoiding complete movement.
   ii. Damper motor inoperative. To check motor operation, remove the screw, withdraw the logic module of the damper motor and carry out the following steps:
      a. Make sure the interior spring takes the motor to a completely closed position (that is to say, the outdoor air dampers should be completely closed, and the return air dampers open).
      b. Apply 24 VAC to terminals TR and TR1. Connect terminals T and T1 by means of a jumper. The damper motor should advance to the totally open position. Remove the jumper between terminals T and T1. The damper motor should advance to the totally closed position. Now place a jumper between terminals P and P1. The damper motor should advance to the totally open position. Replace the damper motor if it does not surpass any of these tests.
   iii. Defective logic module. To check it, remove power supply and jumpers, and reinstall the logic module in the damper motor.
      Models with Single Enthalpy: Disconnect the enthalpy sensor cables from terminals So and +o, and install a 1.2 K ohms resistance (1 watt, ±5%) between the terminals. Terminals SR and +R will be equipped with a 620 ohms resistance (1 watt, ±5%).
      Models with Dual Enthalpy: Disconnect the enthalpy sensor cables from terminals SR and +R, and install a 620 ohms resistance (1 watt, ±5%).
      Disconnect the discharge air sensor and install a jumper between terminals T and T1. Install a jumper between

terminals TR and 1.
Reapply a 24 VAC current between terminals TR (and terminal 1) and TR1 (this can be achieved by setting the fan thermostat switch to "ON") and carry out the following steps:

a. Set the potentiometer of the enthalpy set point to position "A". The LED should go on, indicating low enthalpy, and the damper motor should advance to its open position.
b. Set the potentiometer of the enthalpy set point to position "D". The LED should go off, indicating high enthalpy, and the damper motor should advance to its closed position.
c. If the logic module does not surpass test a. or b., replace it. If not, make sure the signals from the specified thermostat cause the appropriate action. Contacts KM1 and KM2 operate only after a short pause. See notes on UNIT CONTROL WIRING on page 8 for required times. The occupation switch of the thermostat should be set to "Occupied". If a positive response is not achieved, replace the logic module.

Set point	Enthalpy	Signal	Action
"A"	Low	Y1	The dampers modulate
"A"	Low	Y2	Contact KM1 is operative
"D"	High	Y1	Contact KM1 is operative
"D"	High	Y2	Contact KM2 is operative

d. Apply 24 VAC between terminals TR and TR1, and between terminals N and TR1. Remove cables from terminals T and T1. Set the enthalpy set point to "A". The damper motor should advance to its minimum position. Slightly readjust the minimum position of the potentiometer and make sure the dampers move correctly. Then connect terminals T and T1 by means of a jumper. The damper motor should advance to its maximum position. If the damper motor does not respond as described above, replace the logic module.
iv. Defective Enthalpy Sensor(s): To evaluate either one of the two sensors, install a DC ammeter between terminal So (or SR) of the logic module and terminal S of the enthalpy sensor, with the positive cable of the ammeter at the sensor terminal. The output reading should be between 3 and 25 milliamps, depending upon the ambient temperature and humidity.
For reference values of the output reading with respect to ambient conditions, see curves "A" to "D" in Fig. 11. If the output current value is out of limits, replace the sensor(s).

Point on the curve	Sensor output (mA, ±2mA)
"A"	12
"B"	14
"C"	16
"D"	18

v. If the damper motor, logic module and enthalpy sensor operate correctly, but the economiser assembly does not modulate the dampers sufficiently to generate an impulse air within the range of 50 and 56°F (10 to 13°C), check the discharge air sensor resistance.

Sensor temp. °C / °F	Min./Max. ohms
0 / 32	9.300 / 10.300
25 / 77	2.860 / 3.140
100 / 212	188 / 219

After a 15-minute pause at the specified temperatures, this resistance should be within the range shown in the following figure. Should this not be the case, replace the discharge air sensor.
vi. After evaluating the components, replace those that are defective and change the cables removed from the terminals during the tests. Remove all test jumpers and resistances used during the tests. Restore minimum position and set the enthalpy set point potentiometers to their original settings.

DECLARATION OF COMPLIANCE ON MACHINERY

MANUFACTURER: **CLIMA ROCA YORK, S.L.**

ADDRESSE: Paseo Espronceda, 278, 08.204 SABADELL

This machine complies with the basic demands of the EC Standards on machinery (Standard "EC" 89/392/CEE), including any modification of same.

APPLICATION OF THE MACHINE: AIR CONDITIONER/COOLING

TYPE: **D3IG 090, 120 & 150**

EC STANDARDS APPLIED: 89/392/EEC,89/336/EEC

MATCHING STANDARDS APPLIED: EN60204-1, EN292-1, EN292-2, EN563, EN294, EN953, EN55014, EN60555-2, EN50082-1

INTERNATIONAL STANDARDS AND TECHNICAL SPECIFICATIONS APPLIED : EN ISO 9001, (Pr EN378)

PLACE: Sabadell, (España)

SIGNATURES:

ROMÁN LARRODA

QUALITY CONTROL MANAGER