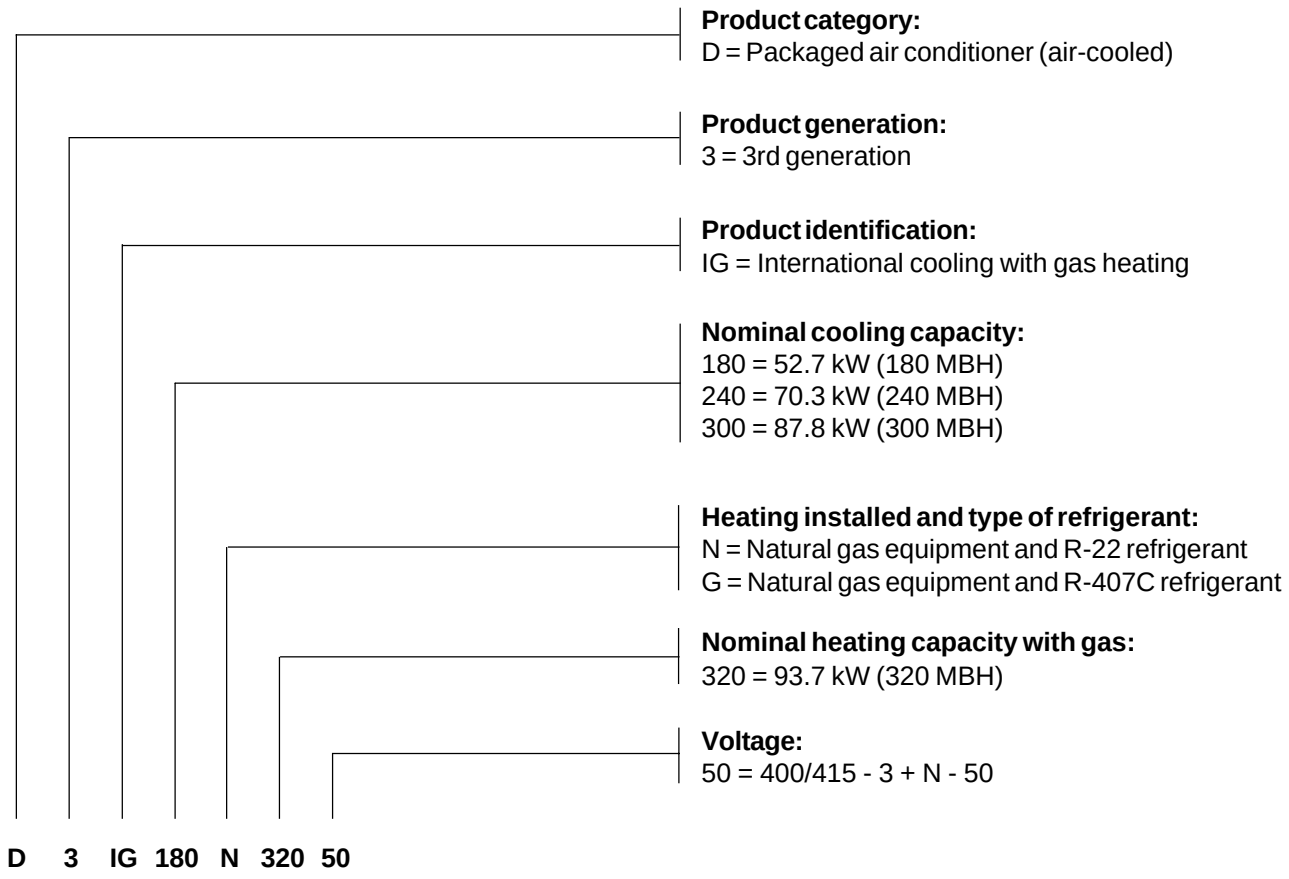
Sunline 2000™ packaged air conditioners with gas heating models D3IG 180, 240 and 300 (Euro 50 Hz)

Ref: Y-R24976 1001M

Operating Instructions

GB Index

General description
Nomenclature



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 gas outlet and a fixed outdoor air intake damper (for equipment without an economiser or motorised-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.

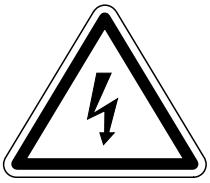
Environmental protection

Packing 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.



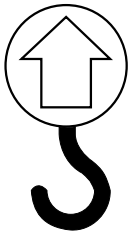
This symbol indicates an electrical danger or risk.

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, Local or Municipal Safety Standards in force.
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

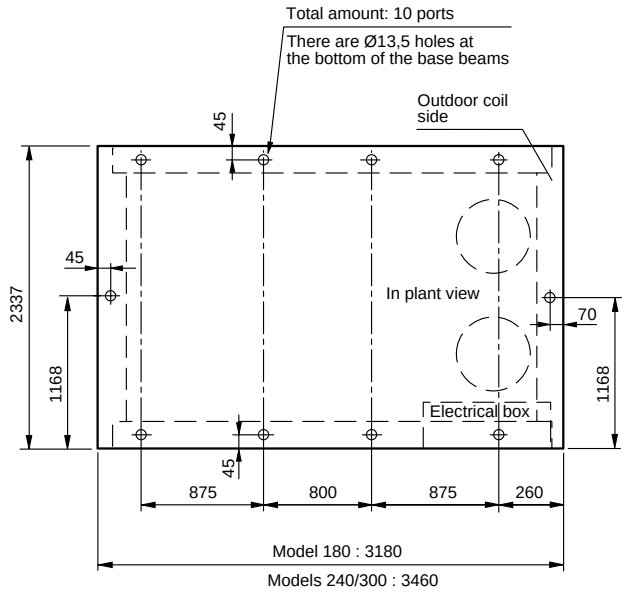
Voltage variation (Min. / Max.)	V	360 / 456
WB air temperature in the evaporating coil (Min. / Max.)	°C	15 / 23
	°F	59 / 73
DB air temperature in the condensing coil (Min. / Max.)	°C	-4 / 52
	°F	25 / 125

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 acces.	Increment per accessory		
		Motor-driven damper or econ.	Extraction fan	Barometric damper
180	96	7	6	2
240	107			
300	136			

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

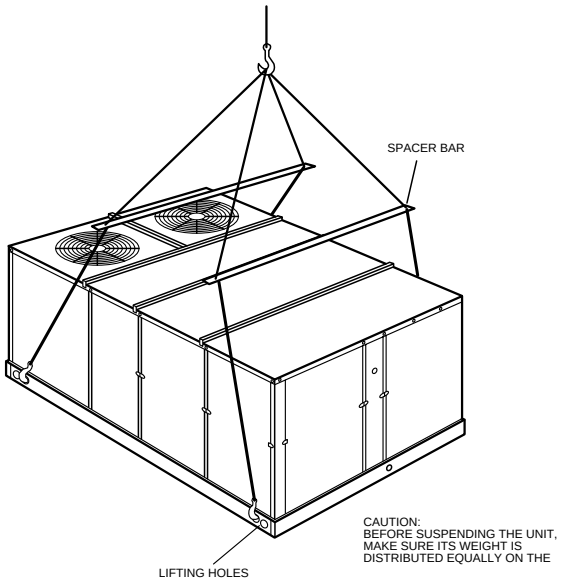
Installation and use

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, the length of which **should** surpass the longest measurement. See Fig. 1.

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).

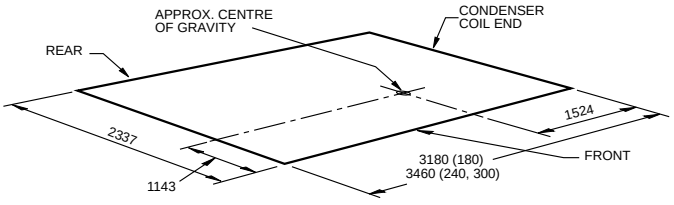
See Table 3 on the weights of the equipment, and Fig. 2 on the approximate centre of gravity.

Typical sling



- Fig. 1 -

Centre of gravity



- Fig. 2 -

Clearances

All units require certain clearances for optimum operation and servicing. See unit dimensions, Fig. 11, for clearances required for fuel, construction, maintenance and correct operation of the unit.

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. 11 for details concerning the side and bottom openings for the impulse and return air ducts.

Fixed outdoor air intake damper (optional accessory)

See the instructions included in the accessory. The hood contains an adjustable damper deflector so as to give variable amounts of outdoor air to the units not equipped with neither an economiser nor a motor-driven damper. See Fig. 3

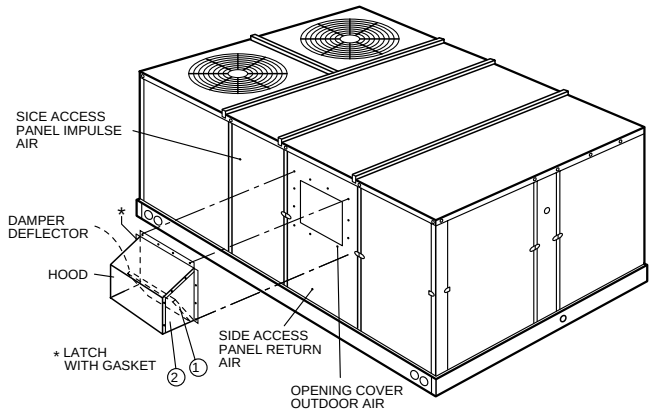
A bag fastened to the hood assembly contains mounting gaskets and screws. Place gaskets on the three hood flanges prior to installation. Have the gaskets extend approximately 6 mm. beyond the top and bottom of the latch so as to insure adequate sealing.

Adjustment of the desired air flow damper can be carried out before or after installing the hood. Position 1 of the damper deflector allows an air flow of approximately 10%, position 2 of about 15% and, to achieve about 25%, **remove** the damper deflector.

On units with **bottom** return air, install the damper assembly over the opening on the side access panel to the return air (supplied with the accessory). Fasten with the screws supplied.

On units with **side** return air, install the damper assembly in the return air duct network, as close to the unit as possible. Drill a hole, 400 mm. high by 455 mm. wide, in the duct so as to insert the damper. Using the holes in the hood flanges as a pattern, drill 3.5 mm. holes and fasten with the screws supplied.

Fixed outdoor air damper (optional accessory)



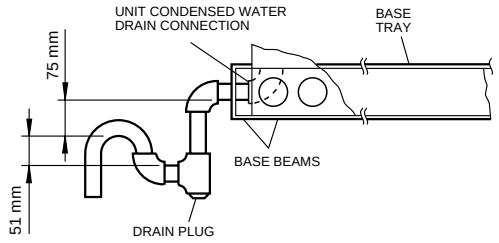
FRONT VIEW
- Fig. 3 -

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 female connection (1" BSP) 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.

CAUTION
Do not loosen the screws of the antivibratory supports.

Air filters

All units are supplied with 50 mm. filters. The filters should always be mounted before the indoor 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.

Combustion discharge

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

Table 2 - Application data with gas heating

Absorbed power (Nett) kW (Mbh)	Given power kW (Mbh)	Models	Gas consump.* m^3/h (cfm)	Temperature increase - Min./Max. at full absorbed power**	
				Min.	Max.
85 / 290	76 / 260	180, 240 300	8.5 / 302	17 / 30	33 / 60

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.

Gas pipes

The correct sizing of the gas pipes depends upon the flow required, density 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. 11 for the location. 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.

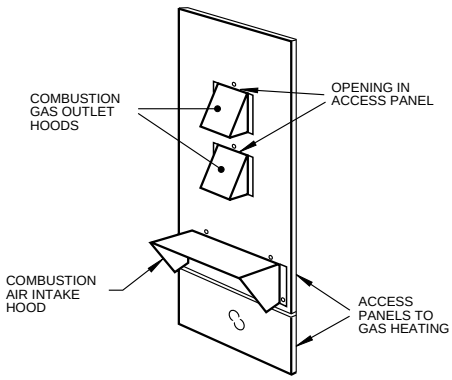
WARNING:
Natural gas may contain a small amount of propane. Due to the fact that propane is an excellent solvent, it would quickly dissolve the lead carbon or the majority of normal commercial type components. Therefore, a special sealing putty should be applied when wrought iron or steel pipes are used. 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 a 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 3.5 kPa (0.5 psi).
7. Immediately after the gas supply connection (upwards) to the boiler, a threaded 1/8" NPT hole should be drilled for the connection of a test pressure gauge.

Ventilation and combustion air hoods

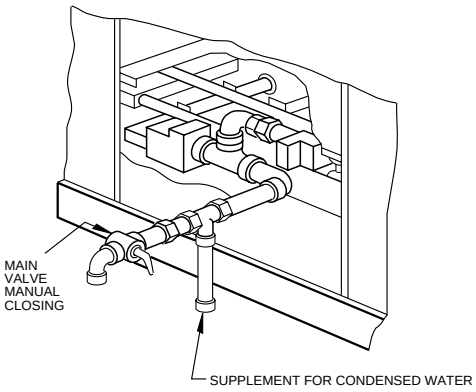
Two gas outlet and combustion air intake hoods are supplied fastened to the fan casing inside this compartment. These hoods should be installed so as to guarantee correct operation of the unit. All hoods should be fastened to the outside of the gas heating access panel, by means of the screws supplied 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)

Ventilation and combustion air hoods



- Fig. 5 -

External supply connection



- Fig. 6 -

CONNECTING TUBING	
MODEL	**DIG 180 - 240 - 300**
FEMALE GAS CONNECTION	1"

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 the evaporating tank, 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 a 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.

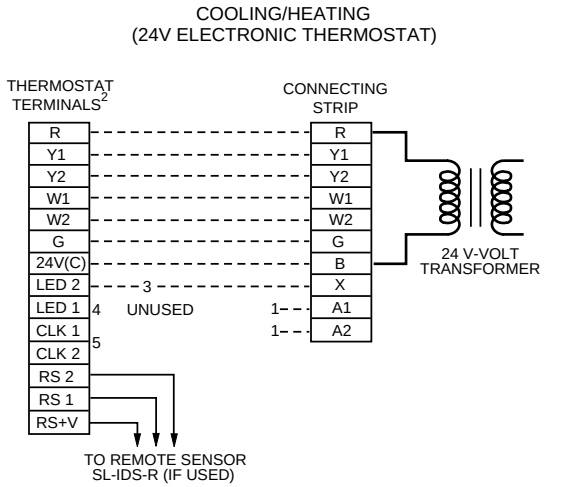
The power supply line should be adequately sized for the load. **Use only copper wires.** Each one of the units should be connected to an independent circuit with an automatic switch and a differential, supplied directly from the main panel.

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.

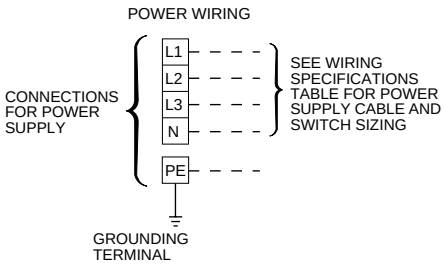
See Fig. 8 for typical wiring on site, and Fig. 9 for unit wiring diagram and information on the control circuit and power wiring.

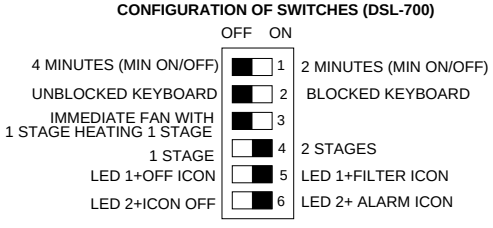
Typical site wiring

Control wiring



1 TERMINALS A1 AND A2 PROVIDE 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 -

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 H5V-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” contactor is factory adjusted to 4 seconds. The timer for the “KM 2” contactor is factory adjusted to 10 seconds.
8. To invert the rotation of the indoor fan, interchange wires 133 and 134 of the indoor fan “KM 3” connector.

Servicing access

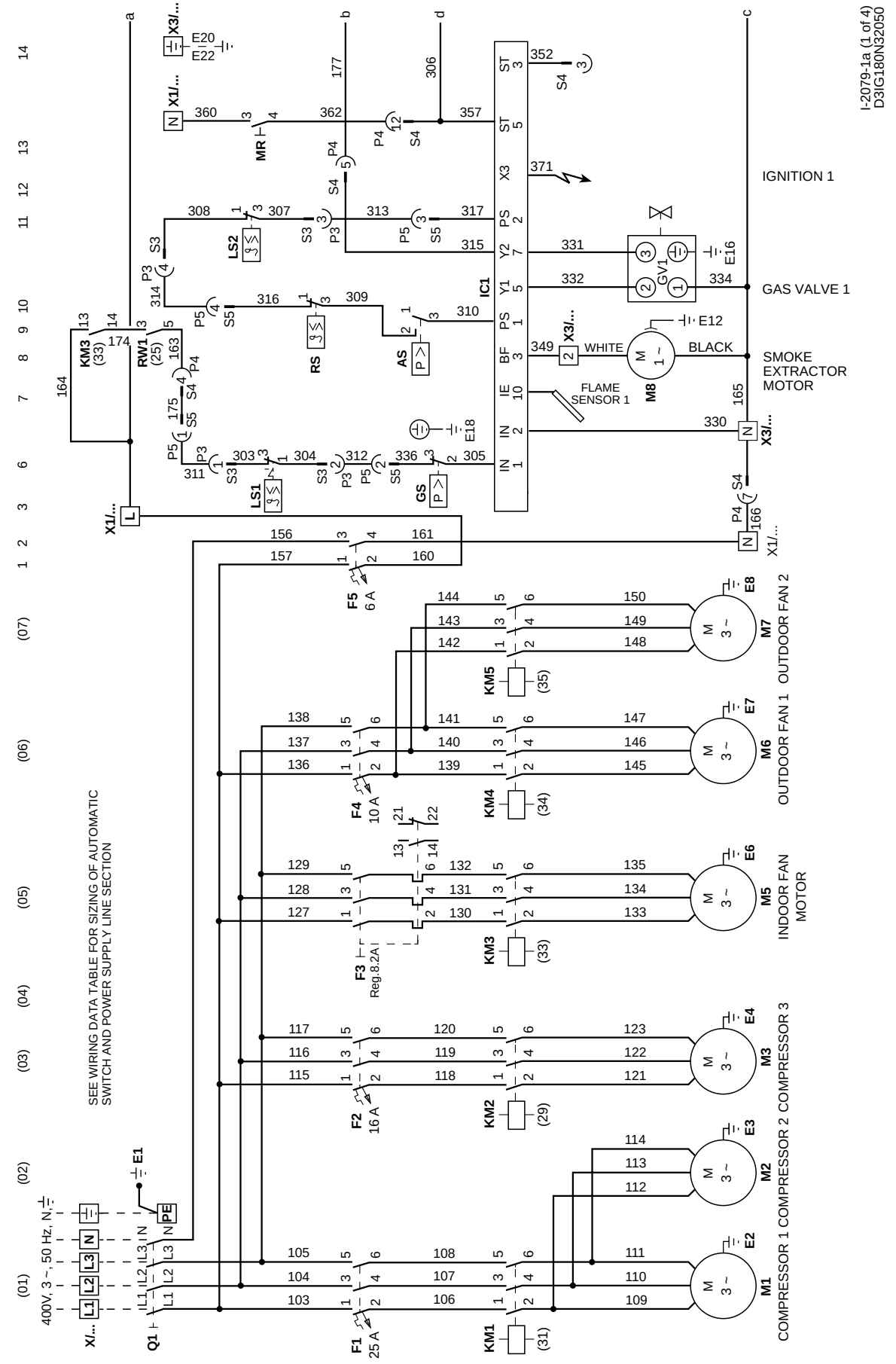
Upon removal of the following panels, the different components subject to revision, repairs or maintenance are accessible:

- Compressor compartment.
- Gas heating compartment (two panels).
- Side impulse and return air compartment (two panels).
- Fan compartment (three panels).
- Main electric panel.
- Filter compartment.
- Outdoor air compartment (two panels).

See Fig. 11 for the location of these access panels.

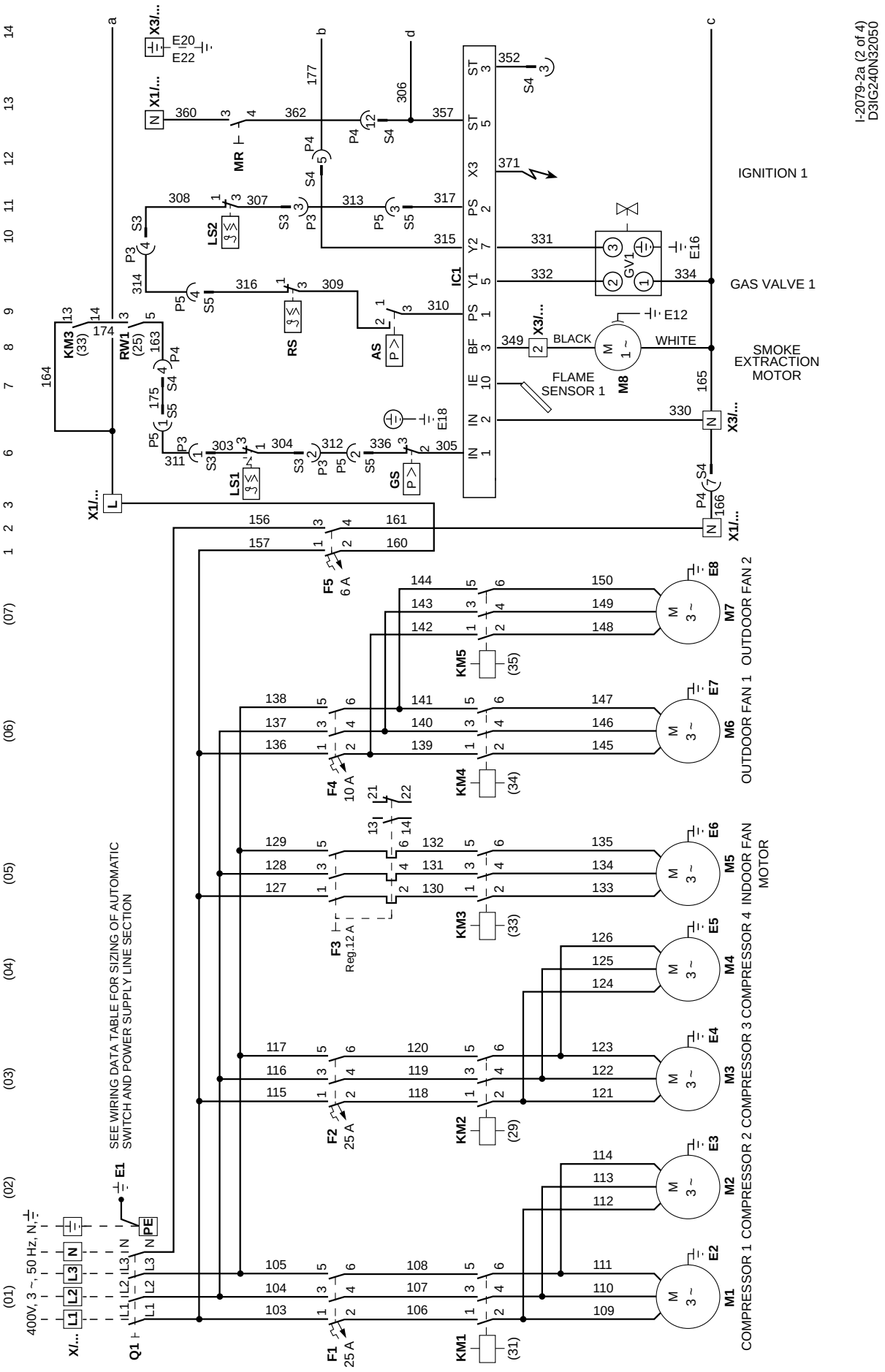
CAUTION:
Be sure to replace all screws, with their corresponding O-rings (located between the panel internal supporting surface and the base of the unit).

Unit wiring diagram - 180



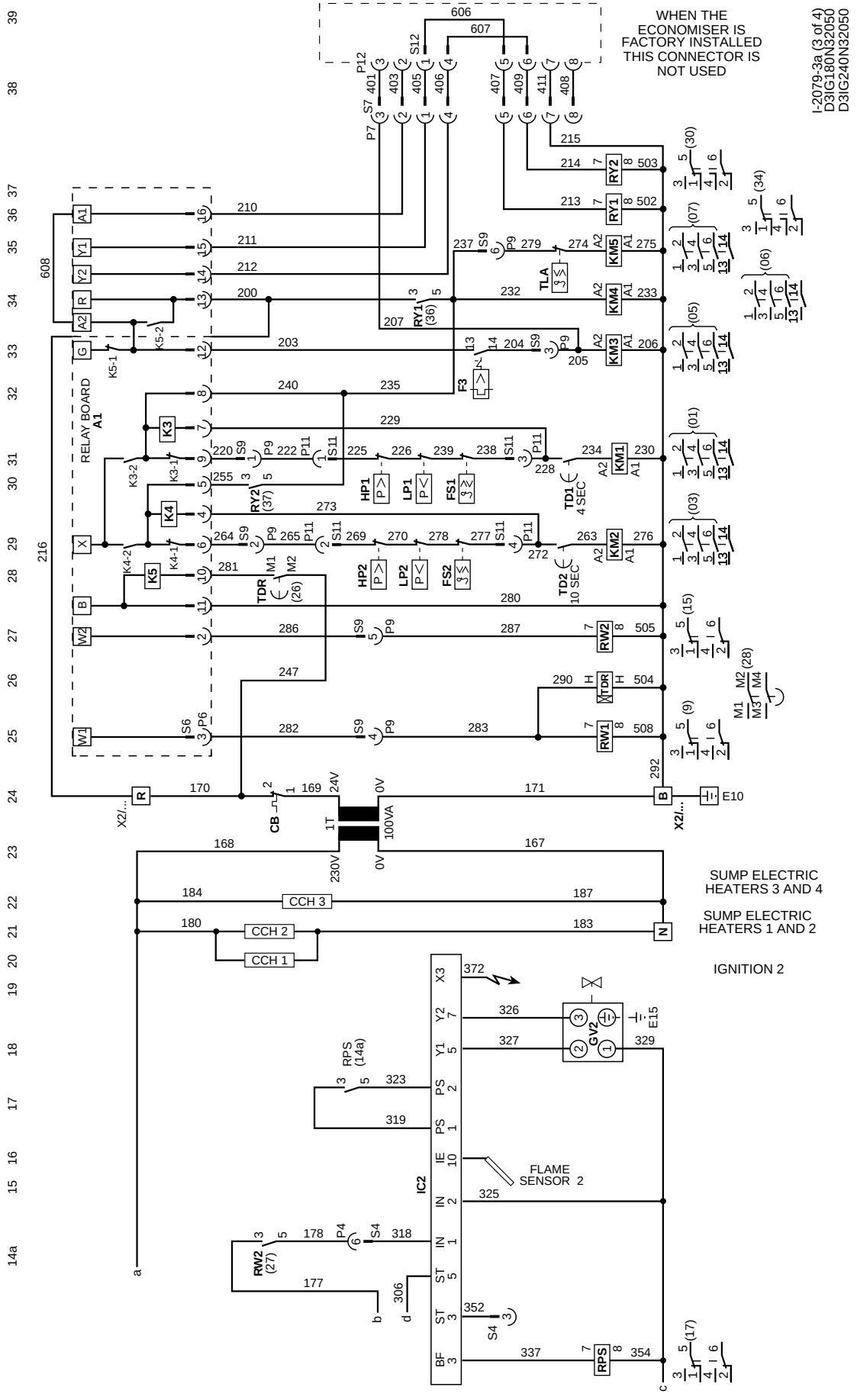
- Fig. 9 -

Unit wiring diagram - 240



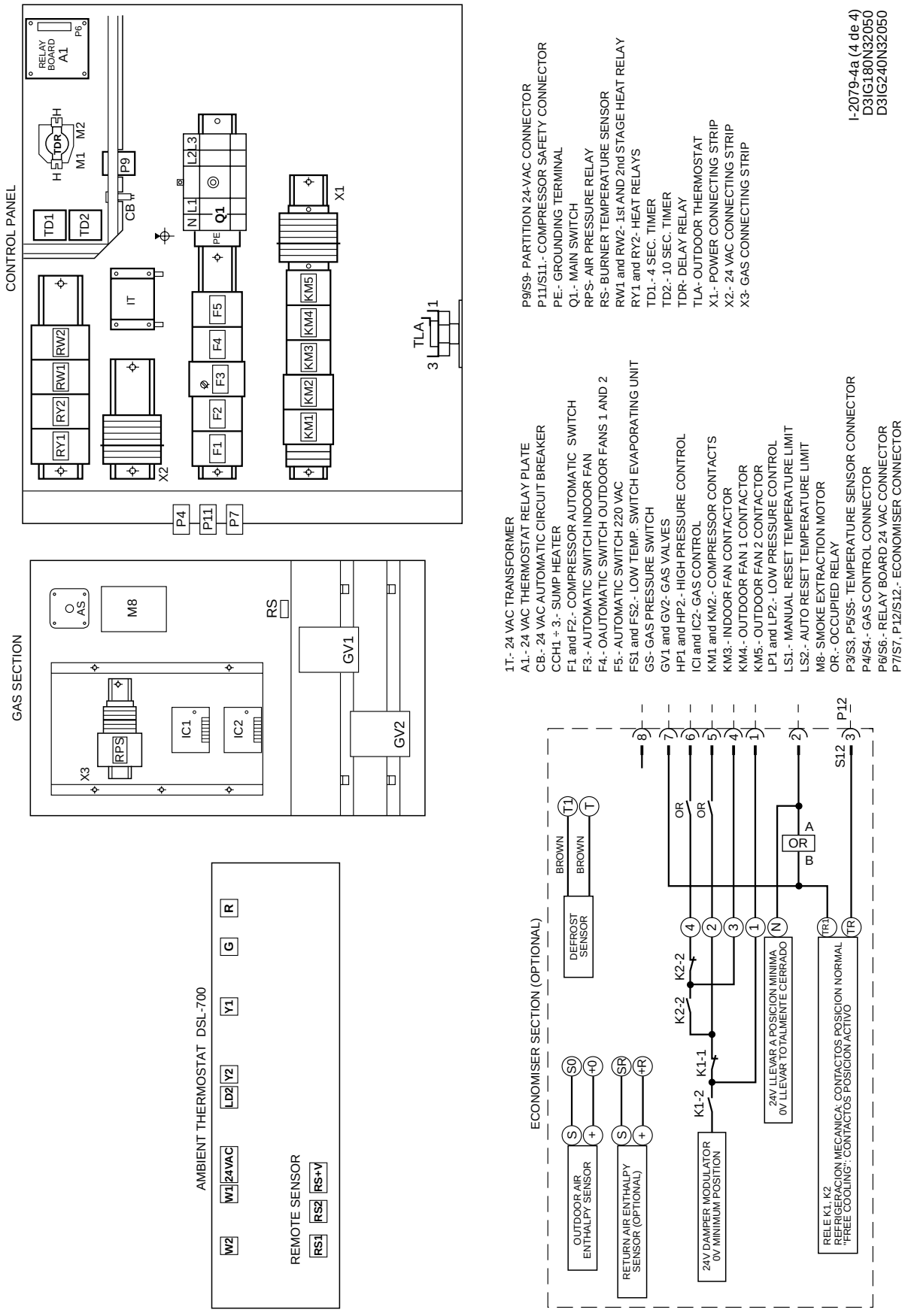
- Fig. 9 -

Unit wiring diagram - 180 and 240



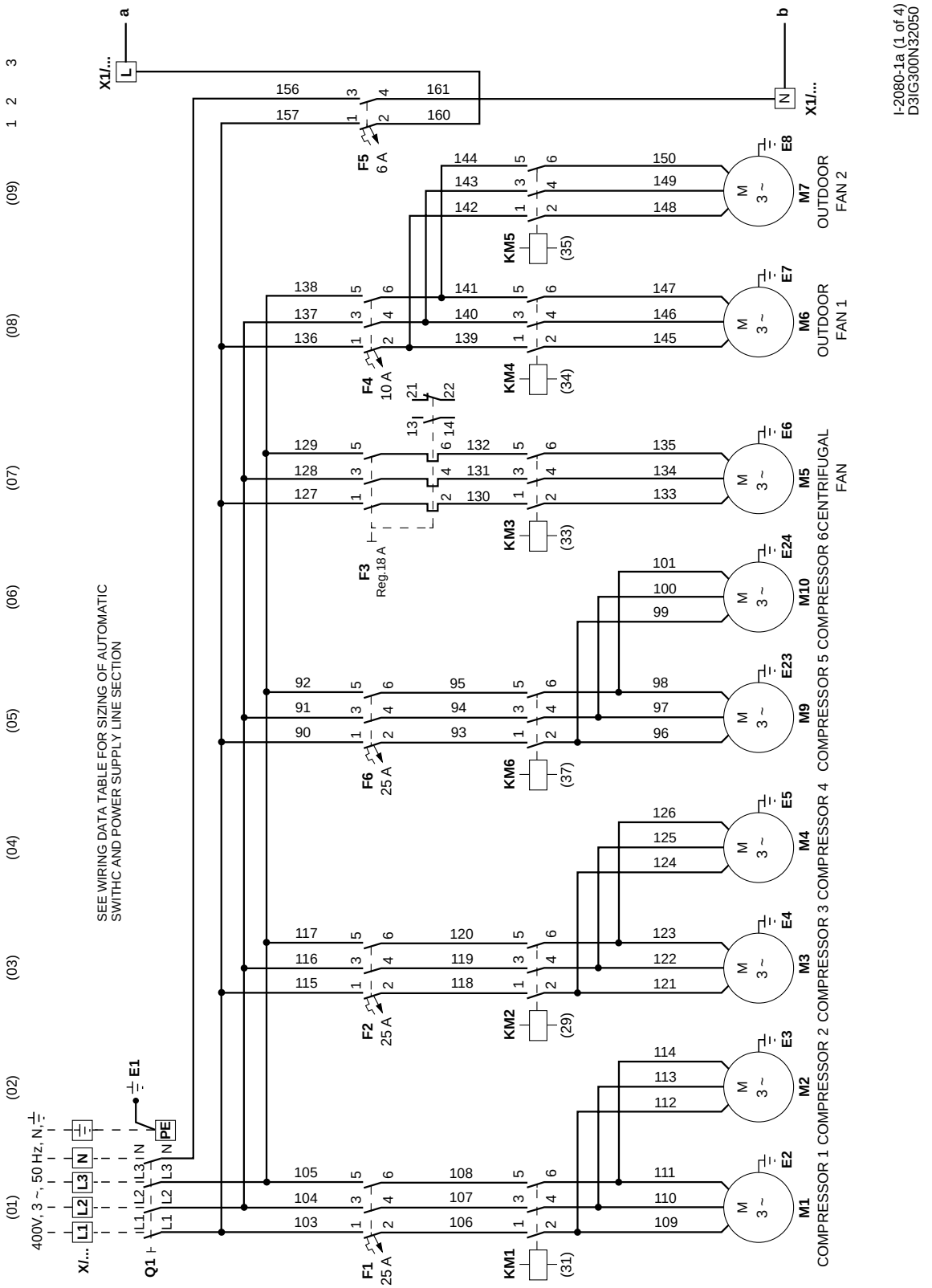
- Fig. 9 -

Unit wiring diagram - 180 and 240

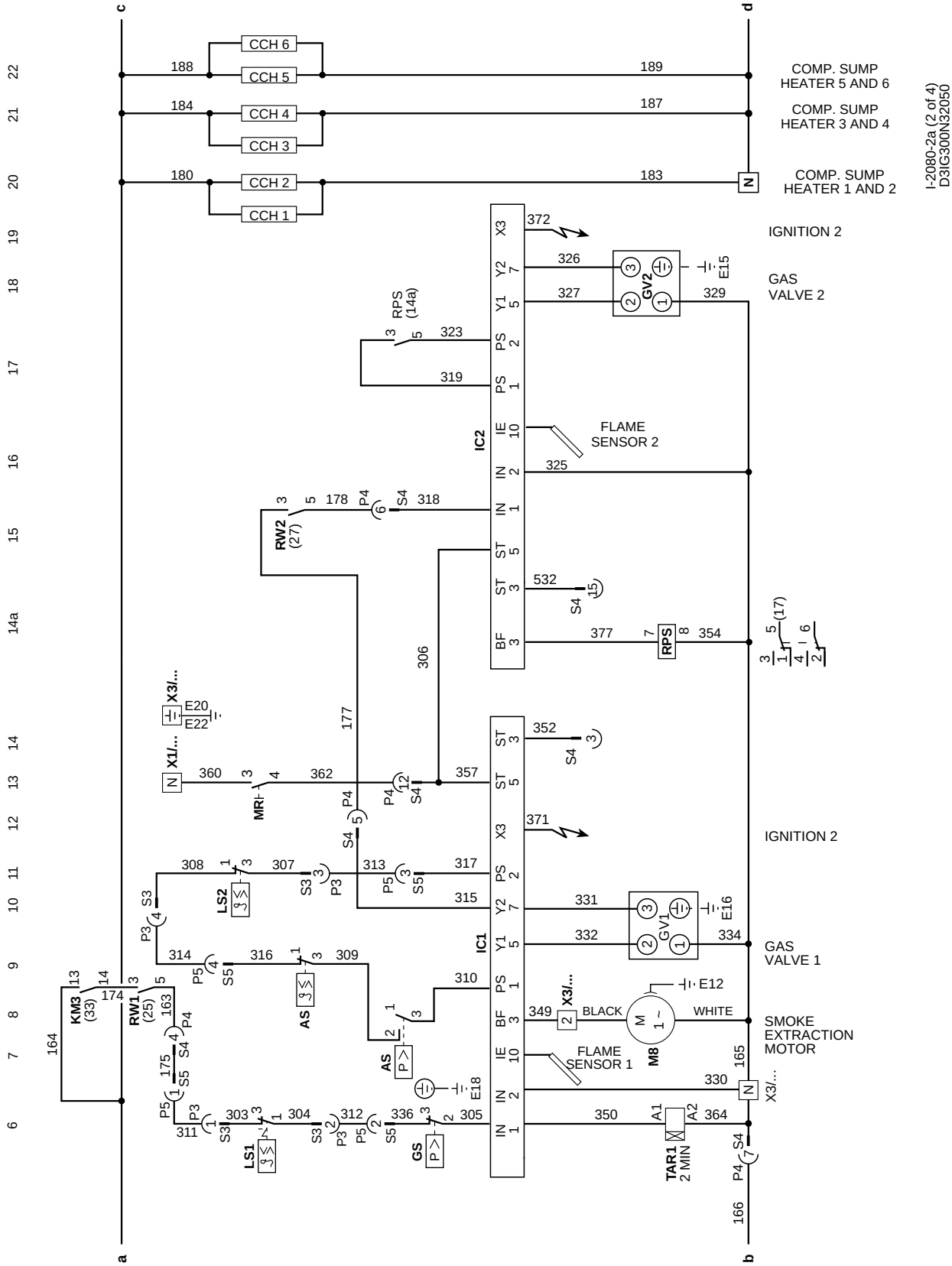


- Fig. 9 -

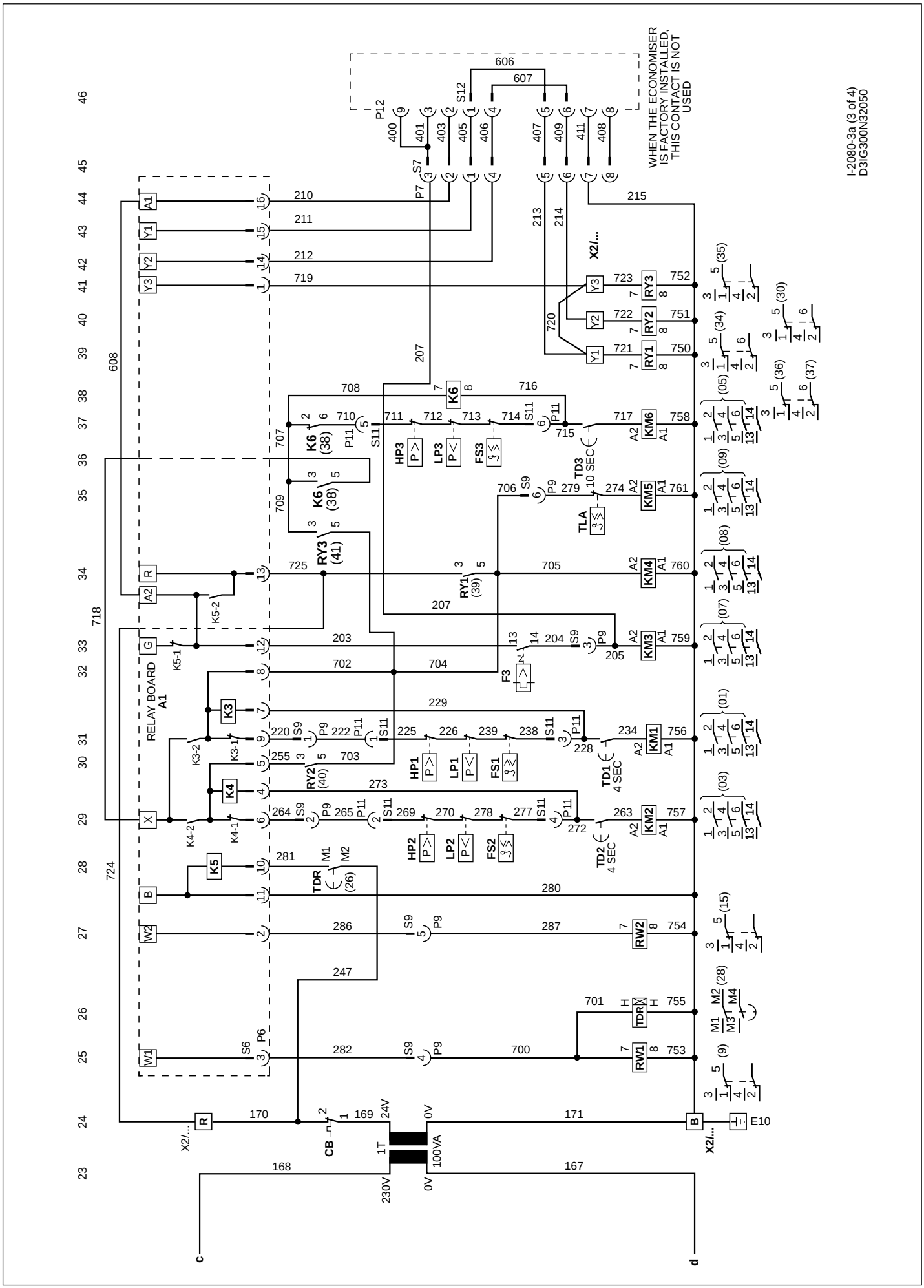
Unit wiring diagram - 300



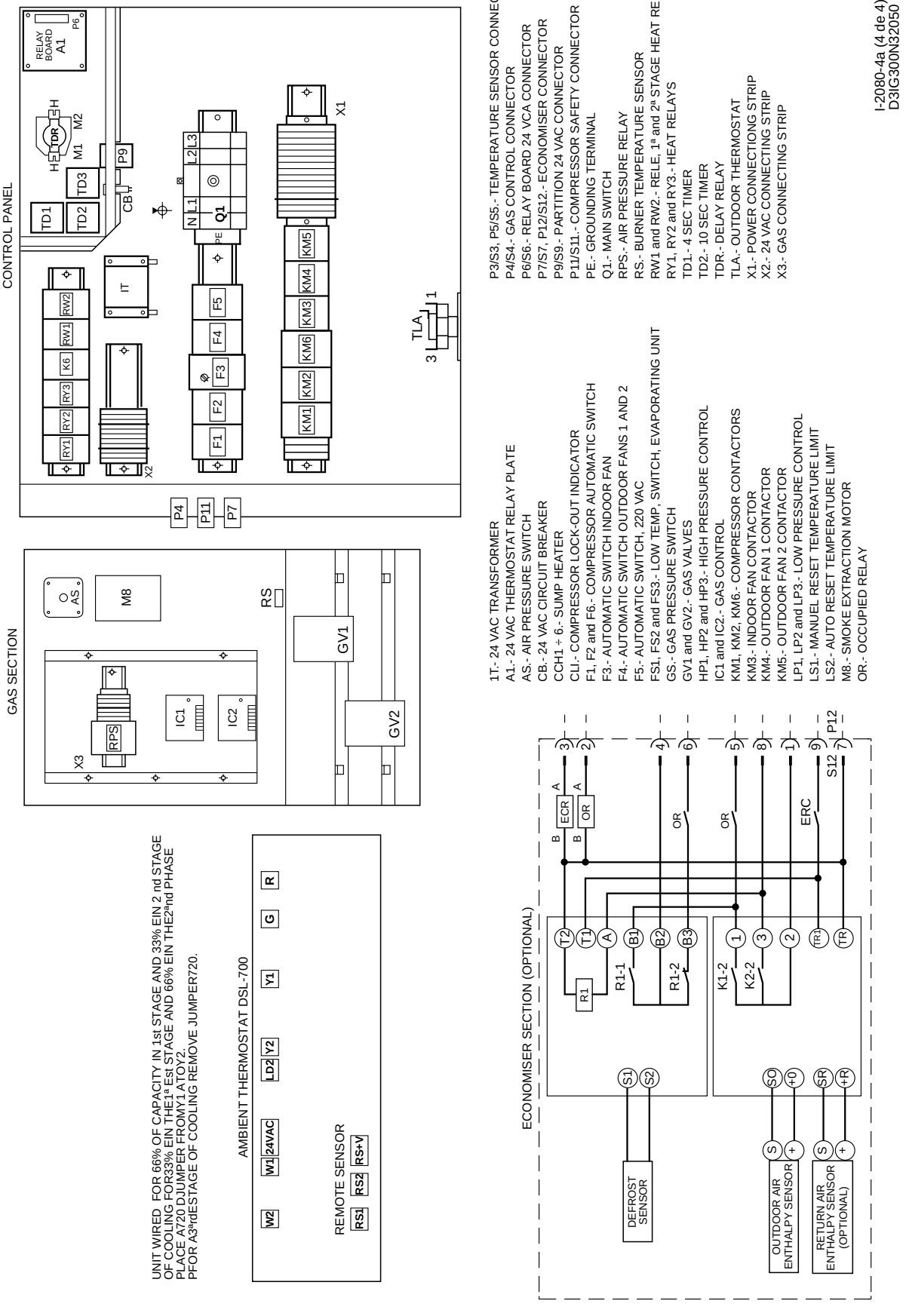
Unit wiring diagram - 300



Unit wiring diagram - 300



Unit wiring diagram - 300



1T.- 24 VAC TRANSFORMER
A1.- 24 VAC THERMOSTAT RELAY PLATE
AS.- AIR PRESSURE SWITCH
CB.- 24 VAC CIRCUIT BREAKER
CCH1 ÷ 6.- SUMP HEATER
CLI.- COMPRESSOR LOCK-OUT INDICATOR
F1, F2 and F6.- COMPRESSOR AUTOMATIC SWITCH
F3.- AUTOMATIC SWITCH INDOOR FAN
F4.- AUTOMATIC SWITCH OUTDOOR FANS 1 AND 2
F5.- AUTOMATIC SWITCH, 220 VAC
FS1, FS2 and FS3.- LOW TEMP, SWITCH, EVAPORATING UNIT
GS.- GAS PRESSURE SWITCH
GV1 and GV2.- GAS VALVES
HP1, HP2 and HP3.- HIGH PRESSURE CONTROL
IC1 and IC2.- GAS CONTROL
KM1, KM2, KM6.- COMPRESSOR CONTACTORS
KM3.- INDOOR FAN CONTACTOR
KM4.- OUTDOOR FAN 1 CONTACTOR
KM5.- OUTDOOR FAN 2 CONTACTOR
LP1, LP2 and LP3.- LOW PRESSURE CONTROL
LS1.- MANUEL RESET TEMPERATURE LIMIT
LS2.- AUTO RESET TEMPERATURE LIMIT
M8.- SMOKE EXTRACTION MOTOR
OR.- OCCUPIED RELAY

P3/S3, P5/S5.- TEMPERATURE SENSOR CONNECTOR
P4/S4.- GAS CONTROL CONNECTOR
P6/S6.- RELAY BOARD 24 VCA CONNECTOR
P7/S7, P12/S12.- ECONOMISER CONNECTOR
P9/S9.- PARTITION 24 VAC CONNECTOR
P11/S11.- COMPRESSOR SAFETY CONNECTOR
PE.- GROUNDING TERMINAL
Q1.- MAIN SWITCH
RPS.- AIR PRESSURE RELAY
RS.- BURNER TEMPERATURE SENSOR
RW1 and RW2.- RELE, 1ª and 2ª STAGE HEAT RELAY
RY1, RY2 and RY3.- HEAT RELAYS
TD1.- 4 SEC TIMER
TD2.- 10 SEC TIMER
TDR.- DELAY RELAY
TLA.- OUTDOOR THERMOSTAT
X1.- POWER CONNECTIONG STRIP
X2.- 24 VAC CONNECTING STRIP
X3.- GAS CONNECTING STRIP

I-2080-4a (4 de 4)
D3IG300N32050

Optional economiser rain-hood/motor-driven damper

The instructions for the optional economiser rain-hood/motor-driven damper are on the accessory itself. When an economiser rain-hood is installed, proceed as described in said instructions. 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 “factory-assembled” economiser option.

Enthalpy set point adjustment

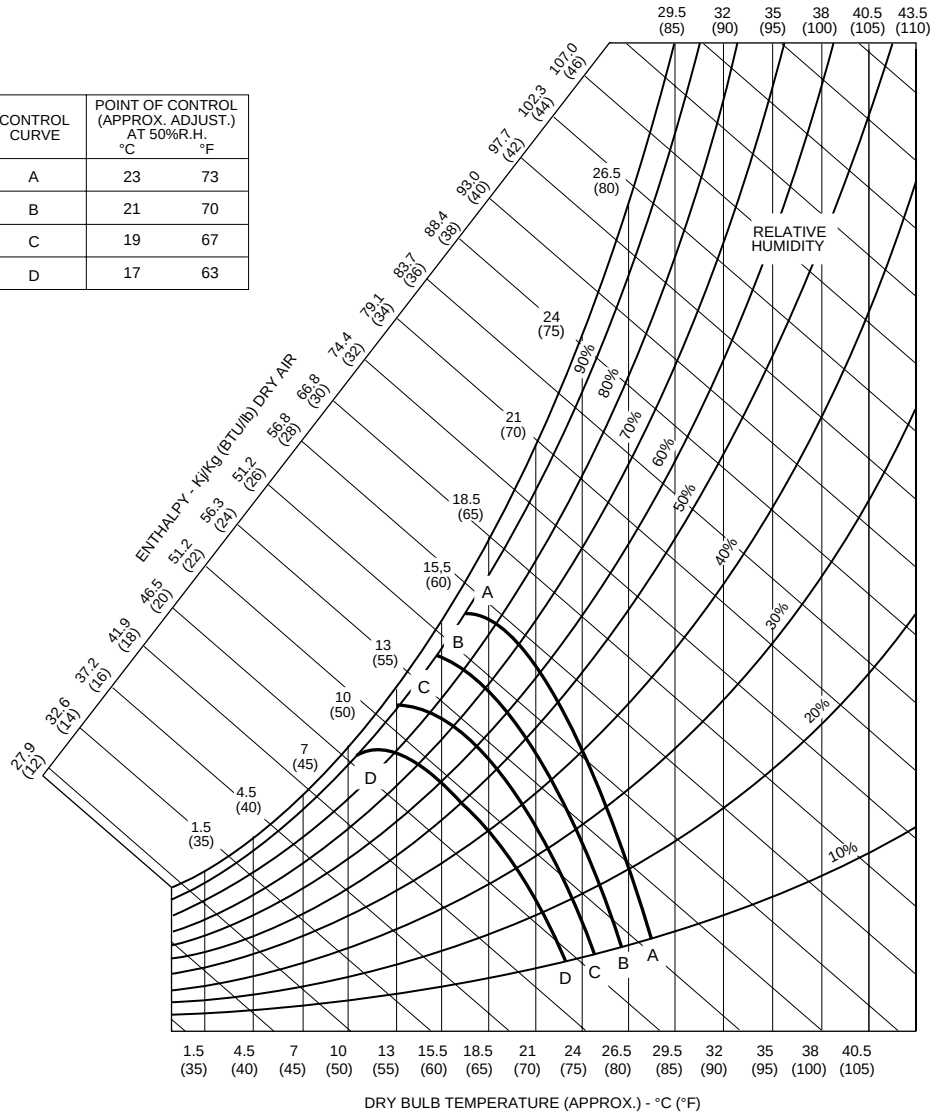
Remove the economiser access panel from the unit to check the following adjustments. Loosen, but do not remove the two panel latches.

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.

1. At this point, the damper enthalpy set point can be adjusted by selecting the desired position, as shown in Fig. 10. Proceed as follows:
- For operation in single enthalpy, carefully turn the set point adjustment screw to settings “A”, “B”, “C” or “D” that correspond to the curve with letters.
- For operation in dual enthalpy, carefully turn the set point adjustment screw all the way to the right, past position “D”.
2. 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 to the left until the desired minimum setting is reached.
3. Replace the economiser access panel. Set the two latches horizontally and tighten the screws.

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. 10 -

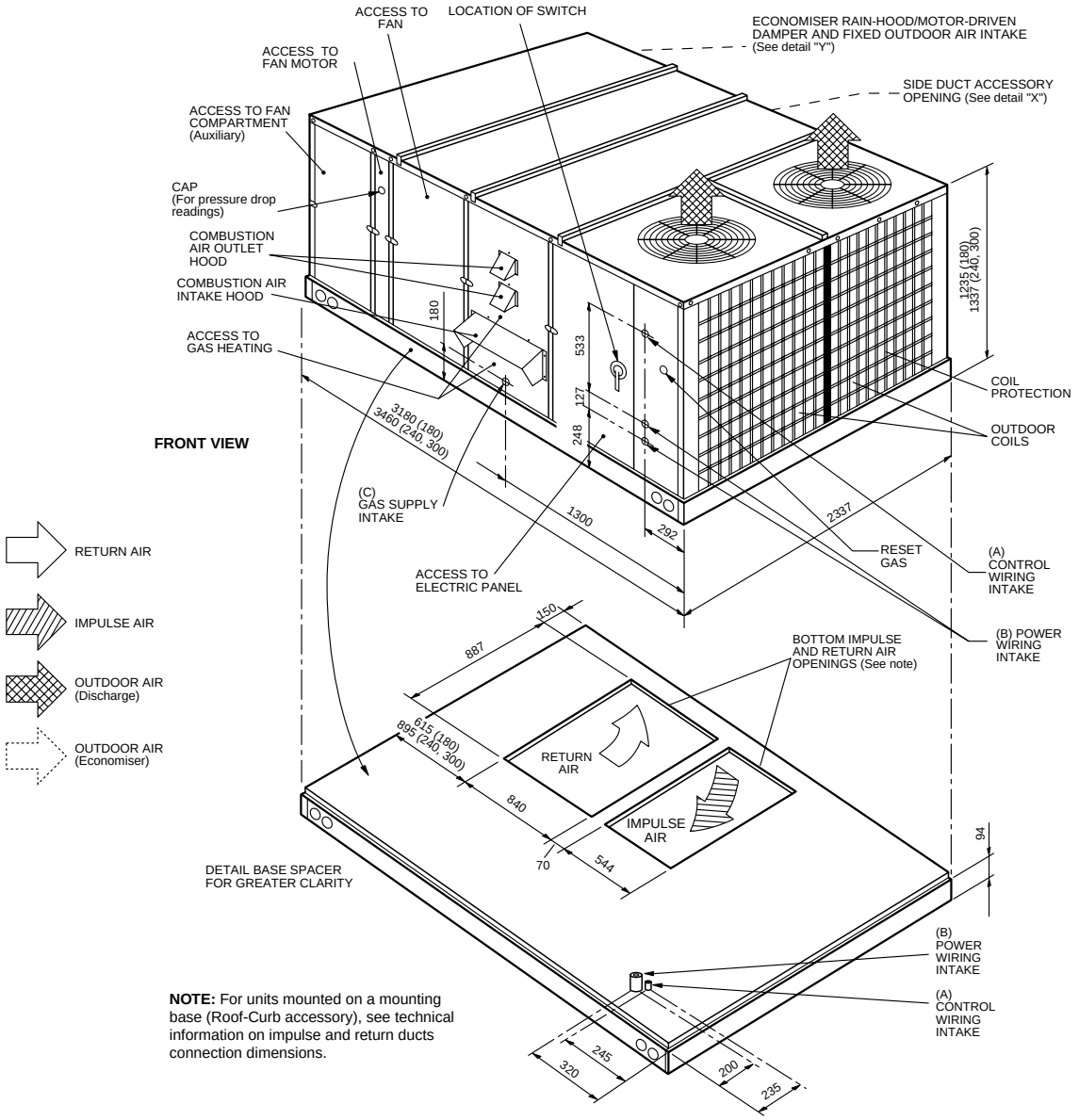
Table 3 - Physical data

Description of components			Unit model		
			180	**240**	**300**
Impulser air fan	Centrifugal fan	Dia. x Width (mm)	381 x 381	457 x 381	457 x 381
	Fan motor	kW	4	5.5	7.5
Indoor coil	Tubing depth		3	3	4
	Fins per inch		13.5	13.5	13
	Front surface	m^2	1.45	1.92	2.14
Outdoor fans (two per unit)	Dia. propeller	mm (per unit)	762	762	762
	Fan motor	kW (per unit)	1.5	1.5	1.5
	Nominal air flow	m^3 / s (per unit)	2.83	3.78	3.78
		CFM (per unit)	6 000	8 000	8 000
Outdoor coil	Tubing depth		2	2	3
	Fins per inch		13	20	15
	Front surface	m^2	3.35	4.02	4.02
Compressor (Amount per unit)	Tandem		1*	2	3
	Single		1	-	-
Air filters	Amount per unit	404 x 498 (mm)	-	4	4
		404 x 632 (mm)	-	4	2
		442 x 594 (mm)	5	-	-
		350 x 498 (mm)	-	-	3
	Total front surface	m^2	1.40	1.87	1.9
Load	Refrigerant 22 or 407C	SYS. Nº 1 (kg.)	7.94	8.16	7.7
		SYS. Nº 2 (kg.)	3.86(R-22) 3.5(R-407C)	8.16	7.3
		SYS. Nº 3 (kg.)	-	-	8.2

* This compressor will be activated first.

Weight accessories (kg)		
Basic unit	**180**	960
	240	1 066
	300	1 353
Options / Accessories		
Economiser		73
Motor-driven damper		68
Mounting base (fixed/adjustable)	**180**	81/157
	240 / 300	85/165
Barometric damper		20
Fua outdoor air intake		9
Extraction fan		55

Dimensions and clearances - D*IG180, 240 and 300



- Fig. 11 -

Clearances (mm.)

Front[1]	915
Back	610 (without economiser) 1 245 (with economiser)
Left side (access to filter)	610 (without economiser) 1 370 (with economiser)
Right side (outdoor coil)	915
Beneath unit[2]	0
Over unit[3]	1 830 with 915 maximum horizontal overhand (For outdoor air discharge)

[1] Locate the unit in such a way that the hood of the ventilation air outlet is at least:
- 0.9 m. above any forced air intake located horizontally at a distance of 3 m. (excluding those that form an integral part of the unit).
- 1.2 m. below or horizontally, or 0.31 m. above any door or normal air intake of the building.
- 1.2 m. from electric metres, gas metres, regulators and safety devices.

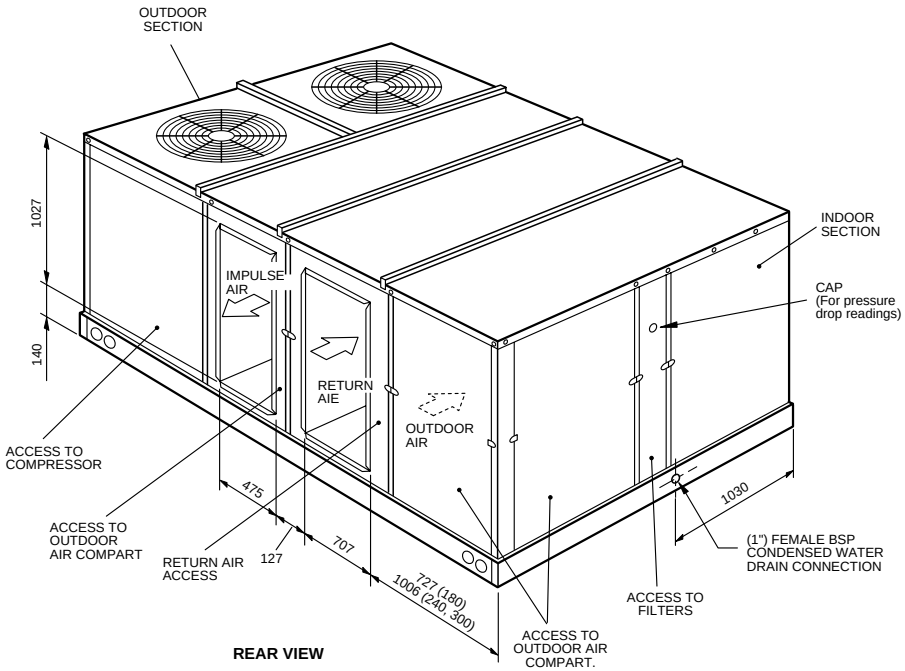
[2] The units can be installed on combustible materials capable of withstanding temperatures of up to 92º C (197º F), with an intermittent exposure to temperatures of up to 124º C (255º F).

[3] These units are to be installed outdoors. Do not allow any overhanging structure or element to obstruct the air discharge outlet.
NOTE: A space of 25 mm. should be left between any combustible material and the network of impulse air ducts at a distance of 0.9 m. from the unit.
The accumulation or recirculation of combustible products should not be allow in closed areas.

Supply entry data

Hole	Opening diameter (mm)	Used for	
A	29	Control wiring	Front
	PG-21		Bottom
B	38 + 29	Power wiring	Front
	PG-48		Bottom
C	58	Gas pipes	

Dimensions and clearances - D*IG180, 240 and 300 (Cont.)



DUCT COVERS - The units are supplied with all air duct openings covered. An accessory kit with flanges is available for connecting the side ducts.

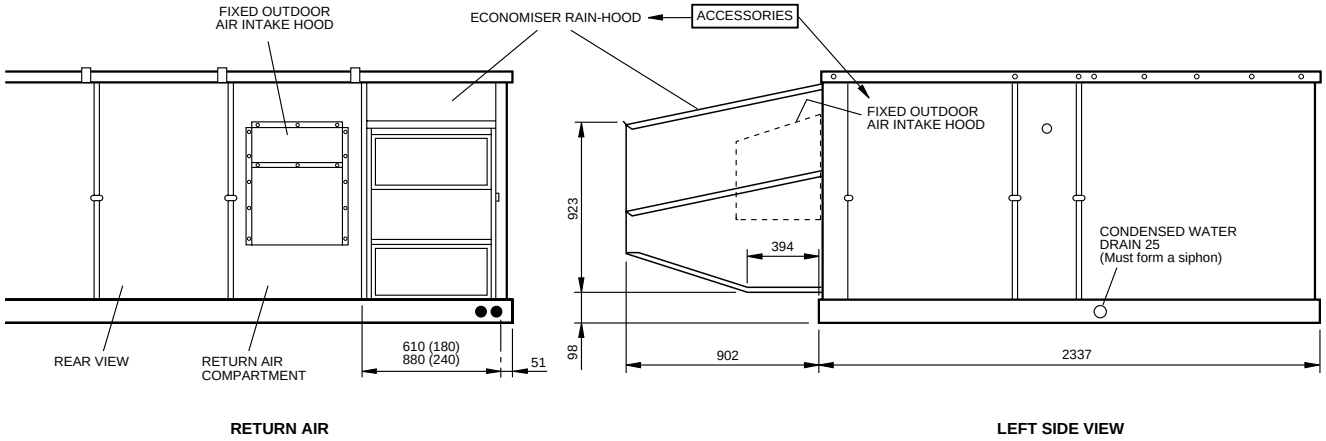
In applications with **bottom discharge:**

1. Remove the side covers of the impulse and return air compartments so as to have access to the bottom impulse and return air covers, making sure they are airtight.
2. Remove and discard the bottom duct covers.
3. Replace the side panels of the impulse and return air compartments.

In applications with **side discharge:**

1. Replace the side panels of the impulse and return air compartments with the set of accessory panels, making sure they are airtight.
2. Connect the duct network to the flanges of these panels.

DETAIL "X"
SIDE ACCESSORY OPENINGS, IMPULSE AND RETURN AIR DUCT



DETAIL "Y"
UNIT WITH ECONOMISER AND FIXED OUTDOOR AIR HOODS

- Fig. 11 -

Table 4 - Wiring specifications

Model	Power supply	Compressor (Nº1, Nº2 & Nº3 Mod.300)		Outdoor fan motor x 2		Impulse air fan motor		Total unit consum. (A)	Max. auto. switch (Curve K)[1]	Min. section cables (mm^2)
		Operating intensity of each one (A)	Start intensity of each one (A)	kW	Intensidad de cada uno (A)	kW	Nom. (A)			
180	400/3/50	16.6 / 9.6	146 / 66	1.5	2.9	4	8.9	40.9	50	10
240	400/3/50	2 x 16.6	146	1.5	2.9	5.5	12	51	63	16
300	400/3/50	3 x 15.4	146	1.5	2.9	7.5	15.3	67.3	80	25

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

Table 5 - Impulse air fan performances (Mod. D*GI180) - with application of downward discharge ducts

Standard operation (m³/s)

Fan speed RPM	Flow									
	2.10 m³/s		2.45 m³/s		2.80 m³/s		3.10 m³/s		3.40 m³/s	
	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)
845	173	2.2	138	2.6	83	3.1	18	3.5	-	-
885	208	2.3	172	2.8	115	3.3	49	3.7	-	-
925	245	2.4	208	2.9	149	3.4	82	3.9	-	-
960	281	2.6	242	3.1	182	3.6	114	4.1	30	4.6
1 000	323	2.7	283	3.2	222	3.8	152	4.3	67	4.8
1 040	369	2.9	327	3.4	264	4	193	4.5	107	5.1

High speed operation (m³/s)

Fan speed RPM	Flow									
	2.10 m³/s		2.45 m³/s		2.80 m³/s		3.10 m³/s		3.40 m³/s	
	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)
1 030	357	2.8	316	3.4	253	3.9	183	4.5	97	5.0
1 070	405	3	362	3.6	298	4.2	226	4.7	-	-
1 115	461	3.2	416	3.8	351	4.4	278	5.0	-	-
1 155	514	3.4	468	4.0	401	4.7	-	-	-	-
1 200	577	3.7	529	4.3	461	5.0	-	-	-	-
1 240	636	3.9	587	4.5	-	-	-	-	-	-

Table 6 - Impulse air fan performances (Mod. D*IG240) - with application of downward discharge ducts

Standard operation (m³/s)

Fan speed RPM	Flow									
	2.80 m³/s		3.30 m³/s		3.80 m³/s		4.10 m³/s		4.40 m³/s	
	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)
765	137	3.3	93	3.3	23	3.7	-	-	-	-
795	176	3.4	132	3.5	62	3.9	-	-	-	-
820	209	3.6	165	3.7	95	4.1	40	4.5	-	-
850	250	3.8	206	3.9	136	4.4	81	4.8	16	5.3
875	284	3.9	240	4.1	170	4.6	115	5	51	5.6
905	327	4.1	283	4.3	212	4.9	157	5.3	93	5.9

High speed operation (m³/s)

Fan speed RPM	Flow									
	2.80 m³/s		3.30 m³/s		3.80 m³/s		4.10 m³/s		4.40 m³/s	
	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)
895	312	4	268	4.3	198	4.8	143	5.2	79	5.8
930	362	4.3	318	4.5	248	5.1	193	5.6	129	6.2
970	421	4.5	377	4.9	306	5.5	252	6.0	187	6.6
1 005	473	4.8	429	5.1	359	5.8	304	6.4	240	7.0
1 045	535	5	491	5.5	420	6.2	365	6.8	-	-
1 080	590	5.3	596	5.8	475	6.5	420	7.1	-	-

NOTES:
1. The fan performances comprise fixed outdoor air, a dry indoor coil, standard filters and heat exchangers.
2. See Table 8 for the resistance of all other unit options or 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*IG300) - with application of downward discharge

Standard operation (m³/s)

Fan speed RPM	Flow									
	3.78 m³/s		4.25 m³/s		4.72 m³/s		5.19 m³/s		5.66 m³/s	
	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)
1 010	375	6.4	225	7.5	102	8.7	-	-	-	-
1 064	448	6.9	325	8	203	9.3	50	10.6	-	-
1 118	548	7.4	423	8.6	305	10	224	11.4	25	12.9
1 172	648	7.9	523	9.2	410	10.6	249	12.2	105	13.7

High speed operation (m³/s)

Fan speed RPM	Flow									
	3.78 m³/s		4.25 m³/s		4.72 m³/s		5.19 m³/s		5.66 m³/s	
	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)	E.S.P. (Pa)	(kW)
1 080	483	6.9	356	9	229	9.3	76	10.6	-	-
1 130	610	7.9	505	9.2	400	10.6	230	12.2	100	13.7
1 180	737	8.1	610	9.6	483	11.1	330	12.6	178	14.2
1 235	787	8.4	660	9.9	533	11.4	381	13	-	-
1 270	-	-	762	10.8	635	12.2	508	13.9	-	-

NOTES:
1. The fan performances comprise fixed outdoor air, a dry indoor coil, standard filters and heat exchangers.
2. See Table 8 for the resistance of all other unit options or 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 - Static resistances

Description		External static pressure drop - Resistance, Pa /inch									
		m³/s / CFM									
		Model 180					Model 240 - 300				
		2.10/4 450	2.45/5 190	2.80/5 930	3.10/6 565	3.40/7 200	2.80/5 930	3.30/6 990	3.80/8 050	4.10/8 685	4.40/9 320
Wet indoor coil[1]		25 / 0.10	25 / 0.10	25 / 0.10	25 / 0.10	25 / 0.10	25 / 0.10	25 / 0.10	25 / 0.10	25 / 0.10	25 / 0.10
Economiser[1]		6 / 0.02	8 / 0.03	10 / 0.04	12 / 0.05	15 / 0.06	10 / 0.04	14 / 0.06	18 / 0.07	21 / 0.09	24 / 0.10
Side discharge applications	Impul. air duct[2]	150 / 0.60	126 / 0.50	106 / 0.42	92 / 0.37	81 / 0.32	106 / 0.42	84 / 0.34	70 / 0.28	66 / 0.26	64 / 0.26
	Return air duct[2]	12 / 0.05	12 / 0.05	12 / 0.05	12 / 0.05	12 / 0.05	12 / 0.05	12 / 0.05	12 / 0.05	12 / 0.05	12 / 0.05

[1] **Subtract** these resistance values from the external static pressure available indicated shown in the Fan Performance Table.
[2] Since the air flow resistance will be lower for connections with side discharge ducts than for downward discharge, **add** these pressures to the External Static Pressure values that appear in the corresponding fan performance table.

Table 9 - Fan motor and drive specifications

Model		Fan range (RPM)	Motor[1]	Adjustable motor pulley[2]		Fixed fan pulley		Belt (geared)		
			kW	Ø Prim. (mm)	Ø (mm)	Ø Prim. (mm)	Ø (mm)	Prim. length	Denomination	Amount
Standard operation	180	845-1 040	4	109-135	28	188	25	1 790	BX69	1
	240	765-905	5.5	124-150	28	236	25	2 040	BX79	1
	300	980/1 170	7.5	152-190	38	235	35	2 123	BX82	2
High speed operation	180	1 030-1 240	4	147-178	28	188	25	1 840	BX71	1
	240	895-1 080	5.5	147-178	28	236	25	2 123	BX82	1
	300	1 080-1 270	11	152-190	38	212	35	2 123	BX82	2

[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.

Operation

Cooling system

The cooling system is a complete factory-mounted assembly that uses an air-cooled condenser. The system is delivered loaded with R-22 refrigerant.

The compressors are sealed airtight, have internal shock absorbency and are mounted onto their base by means of isolated fixing screws.

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 about four 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. Generally, there is a differential of 1º C between the cool and heat set points (this value can be increased on 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 P7 plug of the economiser wiring hose will be jumped in such a way that terminals P7-1 and P7-5, and P7-4 and P7-6 will be connected. In this way, upon the request for cooling, Signal Y1 goes to the cooling relay RY-1/RY-3, and Signal Y2 to cooling relay RY-2.

NOTE: These units are factory- wired for 66% of capacity in 1st stage, and 33% in 2nd stage of cooling.
For 33% in the 1st stage and 66% in the 2nd phase, place a 720 jumper from Y1 to Y2. For the 3rd phase of cooling, remove jumper 720.

REQUEST FOR COOLING, Y1: Signal Y1 of the thermostat activates cooling relays RY-1/RY-3. Contact RY-1 activates contacts KM4 and KM5 of the outdoor fan, and activates the timer to connection TD1 through P6-8 on the Relay Board.

After a 4-second delay, TD1 activates contact KM1, which in turn starts compressor No. 1 of the system in tandem.

Contact RY3-1 activates the Timer to contact TD3. After 10 seconds, TD3 activates compressor contact KM6, which starts the compressor (hermetic in tandem) No. 3 of the system. Signal G of the thermostat activates contact KM3 of the indoor fan and starts the indoor fan motor. Contact RY1-1 also supplies voltage to cooling relay RY2-1, thus allowing operation of the second stage.

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 Cooling Relay RY2. Contact RY2-1 activates the Timer to connection TD2 through terminal P6-5 of the Relay Board and, after a 10-second delay, activates Contact KM2 of the Compressor (mod. 300, TD2 delays 4 sec.), which starts Compressor No. 2 of the system (only hermetic in mod. 180, and hermetic in tandem in mod. 240 and 300).

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 with the warm return air so as to reach the selected temperature of the impulse air, 10-13º C (50-55º F).

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 to Cooling Relay RY1, activating cooling circuit No. 1 of the system (mod. 300, circuits Nos. 1 and 3), as described above.

Occupation relay, OR: Occupation Relay OR is activated by the thermostat through terminal G, or by Fan Lock-out Relay K5 of the Relay Board. This occurs every time that Contact 3M of the indoor fan is activated, as long as the Occupied Switch (if installed) is closed, or through jumper A1-A2 if this switch is not installed. When OR is activated, contacts OR-1 and OR-2 close, allowing Signals Y1 and Y2 of the thermostat to activate Cooling Relays RY1 and RY2.

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.

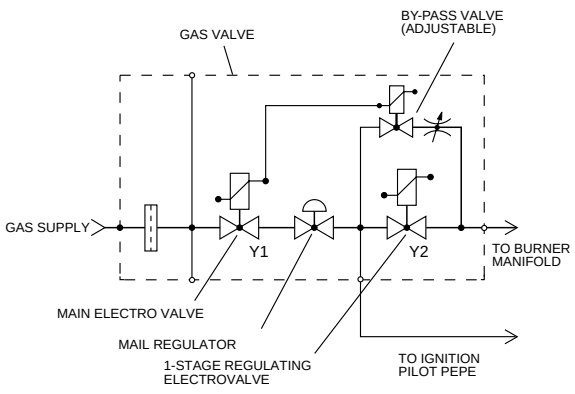
If the Occupation Switch is open (unoccupied), the economiser operates as described above, but mechanical cooling cannot be produced since contacts OR-1 and OR-2 are open. This device allows free cooling by the economiser of the unoccupied and air conditioned space, but avoids the expense of the mechanical cooling of that unoccupied space.

Low temperature operation: If the outdoor temperature is above 21º C (70º F), Low Temperature Thermostat TLA is closed, and Contact KM5 of the outdoor fan operates as described above. TLA opens below 16º C (60º F), avoiding operation of KM5 and the fan of condenser No. 2. The limited air flow on the front of the condensing coil allows cooling operation up to -4º C (25º F).

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 KM5 (on the relay board). Contact K5-2 of relay K5 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 cooling circuit of the thermostat.
If the gas supply pressure is above the set point of the Gas Pressure Switch (GS) (located in gas valve No. 1), the Ignition Control (IC1)is activated and the ignition sequence of the first stage begins. See Fig. 12.

Typical gas valve diagram



- Fig. 12 -

IGNITION SEQUENCE: Once contacts RW1 and GS have closed, Ignition Control (IC1) 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 Ignition Transformer No. 1, which gives a high frequency arc at ignition electrode No. 1 of the system (located in the burner on the right of the upper manifold).
The main gas valve No. 1 (GV1) is activated at a low flow rate through terminal Y1-5 of the IC1. The burner on the right ignites and assures that all burners ignite correctly. If the flame detector No. 1 of the system (of the ionisation electrode type, located within the burner on the left of the upper manifold) does not supply an adequate current to terminal IE-10 of the IC1 within a 5-second interval, Ignition Control No. 1 is locked out.
If ignition sequence is correct and the flame goes out afterwards, the Ignition Control IC1 tries to start again. If no flame presence is detected at the end of the cycle, the IC1 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), Ignition Control No. 1 is locked out.
Request for heat, W2: If the thermostat is not satisfied by signal W1 and the conditioned area temperature continues to drop, contact RW2 of the Heat Relay closes, activating the second ignition phase. Ignition Control No. 2 (IC2) operates the same as IC1, previously described, except for: SEQUENCE OF IGNITION No. 2 OF THE SYSTEM: Ignition Control IC2 is supplied from terminal Y2-7 of IC1. Ignition Control No. 2 makes sure contacts 3 and 5 of relay RPS are connected to terminals PS1 and PS2 of IC2. In this case, a 30-second delay period is begun; if not, IC2 is locked out. Ignition Transformer No. 2 gives a high frequency arc to ignition electrode No. 2 of the system (located in the burner to the left of the bottom manifold). The burner on the left ignites and the ignition tube assembly assures that all burners ignite correctly. If flame detector No. 2 (of the ionisation electrode type, located within the burner on the right of the bottom manifold) does not supply an adequate current to terminal IE10 of IC2 within a 5-second interval, Ignition Control No. 2 is locked out.
If ignition is correct, Ignition Control No. 2 is locked out.
If the ignition sequence is correct and, afterwards, the flame goes out, ignition control IC2 tries to start up again. If the presence of a flame is not detected at the end of the cycle,

Table 10 - Gas valve/heat switch adjustment

Boiler model Nº	Capacity kW (Mbh)			Type of gas	Gas valve adjustments mbar (inch each)		Heat switch limits °C (°F)	
	Absorbed (Gross)*	Absorbida (Nett)*	Given		Main regulator	Second flame	Automatic reset	Manual reset
N320	94.5 (322)	85.2 (291)	75.6 (258)	2ND-H (G-20) 2ND-L (G-25)	10.5 (4.2) 15.2 (6.1)	9.9 (4.0) 14.6 (5.9)	82 (180) 82 (180)	93 (200) 93 (200)

* Heating value.

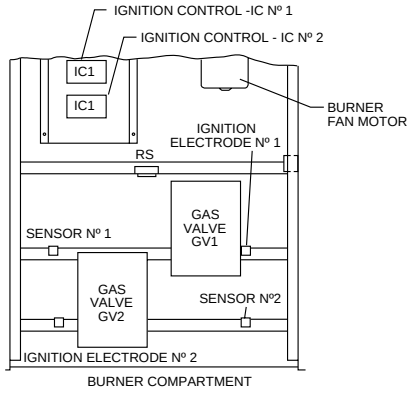
control IC2 is locked out.

NOTE:
Since IC2 is controlled by IC1, any limiting device or failure that may lock out IC1, also disactivates out IC2.

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 voltage drop in high impedance relay K3 avoids the activation of 1M. 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 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 will not unlock until it is reset. In the case of a lock-out due to a lack of flame detection, control IC1 generates an alarm signal at terminals ST-3 and ST-4 (230 VAC current appears). To unlock IC1 press manual reset button MR located on the outside of the unit. The IC No. 1 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).
Ignition Control IC2 locks out in the case of a flame failure. IC2 lock-out does not lock out IC1. See Fig. 13 for the location of controls and gas valves.
Low gas pressure: If the gas supply pressure drops below the set point of the gas pressure switch (GS), the electric power supply to the IC1 and IC2 is interrupted, and this unit becomes inoperative. The gas equipment will reset automatically once the gas supply pressure surpasses the pressure switch set point, and the ignition sequence will begin once again.
Motor overload protection: All motors of the sealed compressors and outdoor 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 F6), 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.

Controls and gas valves



- Fig. 13 -

Check list prior to start up

Check the following before starting the unit.

1. Make sure all valves are installed at unit intakes and their location is clear. Make sure the gas outlet and combustion air hoods have been installed correctly.
2. Make sure the gas to be used is of the required type and appears on the Identification Plate of the unit. Also make sure that the calibre of the jets are in accordance with the information appearing on the Identification Plate.
3. Purge all air from the unit gas supply to (and including) the gas valve. Purge this air through pressure intakes “Pa” of the valve. Once all air is purged, close connection “Pa” once again.
4. While gas is supplied to the unit and the valve is under pressure, check for gas leaks using a soap solution.
5. Use the pressure intakes designated for measuring devices; for example, pressure gauge or low pressure gauge so as to follow up operating pressures.
6. Check gas supply pressure. It should be within the limits shown on the Identification Plate. Gas supply pressure should be checked with all gas-powered equipment in the building operating at full force. The auxiliary gas line operating pressure should never surpass 25 mbar (10" each), nor the operating pressure be below 12.5 mbar (5" each) when operating with natural gas. If the gas pressure is not within these limits, contact your local gas company for adequate corrective measures.
7. Make sure the gas intake pressure switch operates at the pressure selected on the variable dial, which is normally 12.5 mbar (5" each). To adjust this switch, remove the transparent cover and set the switching point at the adjustment flywheel. The nominal value on the scale corresponds to the real value, with a ±15% tolerance.
8. Make sure the setting of the extraction air pressure switch

of the heat exchanger is 1 mbar (2.5" each).
9. Make sure all wiring connections of the gas chamber are correct.

Start up

Operating instructions

CAUTION:
This burner is equipped with automatic ignition systems. **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.)
5. If there is any trouble with the start up, see “Trouble Shooting”.

To turn them off:
1. Disconnect the power supply to the unit.

Check list after start up (gas)

After having activated the control circuit and the heating section is operating normally, check the following:
1. Make sure there are no leaks at the gas manifold, using a soapy solution.
2. Make sure the gas pressures in the manifold are correct and correspond to those appearing on the Identification Plate.
3. At the discharges of the smoke ducts, check CO, CO2 and NOX content, if possible, with regard to combustible products. CO content should be less than 0.1%; that is to say, 1.000 ppm. Make sure the CO/CO2 ratio is less than 0.02.

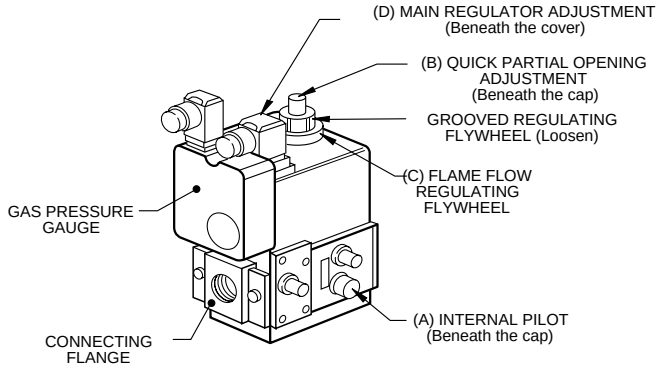
Gas pressure adjustment in the manifold

This equipment is dispatched from the factory prepared for natural gas of the 2ND-H group (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 five turns open, to the right, from maximum value.
2. Turn the Quick Partial Opening Regulation flywheel (B) one complete turn backwards.
3. With the gas valve in operation, loosen the Flow Regulating Flywheel of the second flame V2 (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. Tighten the Regulating Flywheel to fix the settings permanently. Close the small cover located on the main regulator.

Typical gas valve



- Fig. 14 -

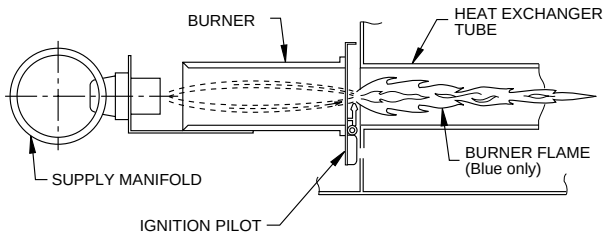
5. To check operation of the extraction air pressure gauge, partially cover the gas outlet duct until the switch turns the gas system off. Reset the ignition control and proceed. Make sure the CO content in combustion gas is below 0.2%.
6. Disconnect the flame sensor connection and make sure the system turns off immediately. Reconnect the sensor connection; reset the ignition control lock-out and proceed.

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 to the gas valve intake.
3. Disconnect the gas valve and ignition electrode cables. Remove the connector-gas valve assembly 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 rear of the heat exchanger.

View of typical flame



- Fig. 15 -

Checking air flow

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

High speed operation accessories are available (containing a smaller fan pulley and a larger motor pulley) for applications which require the impulse air fan to supply greater flows and lower static pressures. See Table 9 on fan motor and drive data.

With the value of the RPMs required and the fan motor HP, the adjustment (turns open) of the impulse air motor pulley can be determined by means of Table 11.

Check the following:

1. Impulse air flow should be within the limits appearing in Table 1.
2. Pulleys can be adjusted in increments of half a turn.
3. Belt tensing should be carried out as shown in Fig. 16.

Turn the impulse air fan motor 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 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. 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 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 50 mm. filters of 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 removed in Step 1.

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.

Table 11 - Impulse air fan motor pulley adjustment

Turns open	Fan operating range (RPM)					
	180 unit		240 unit		300 unit	
	Standard operation	High speed operation	Standard operation	High speed operation	Standard operation	High speed operation
6	845	1 030	765	895	1 010	1 080
5	885	1 070	795	925	1 064	1 130
4	925	1 115	820	955	1 118	1 180
3	960	1 155	850	990	1 172	1 236
2	1 000	1 200	875	1 020	-	1 270
1	1 040	1 240	905	1 050	-	-
0	-	-	-	1 080	-	-

Once the temperature increase is determined, the flow can be calculated as follows:

$$m^3/s = \frac{0.8 \times kW\ Gas\ intake^*}{1.2072 \times °C\ Temp.\ increase} \text{ o } CFM = \frac{0.8 \times Btu\ Gas\ intake}{1.08 \times °F\ Temp.\ increase}$$

* 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 less, 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 8 for fan motor and data on operation of same.

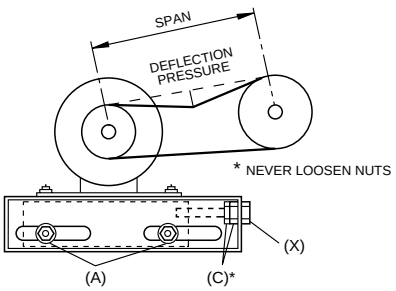
Tensing belts

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).

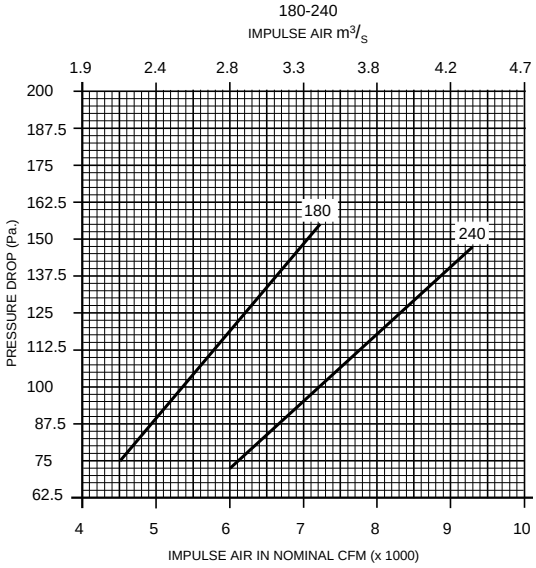
- Fig. 16 -

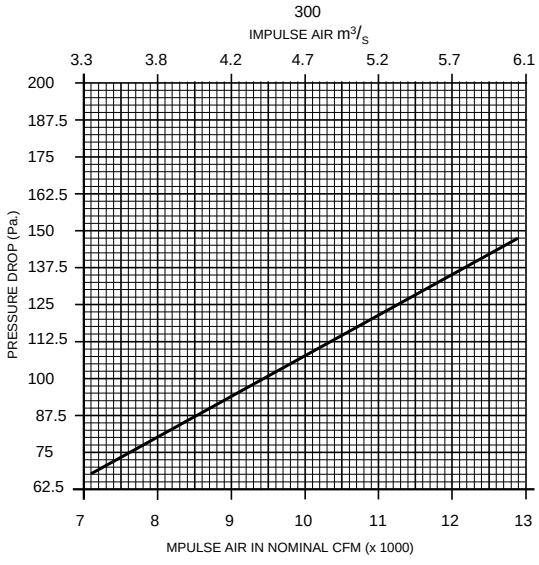
Tensing belts

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.

NOTE:
Disconnect compressors before test readings so as to insure a dry indoor coil.

Pressure drop in dry indoor coil vs. impulse air flow





- Fig. 17 -

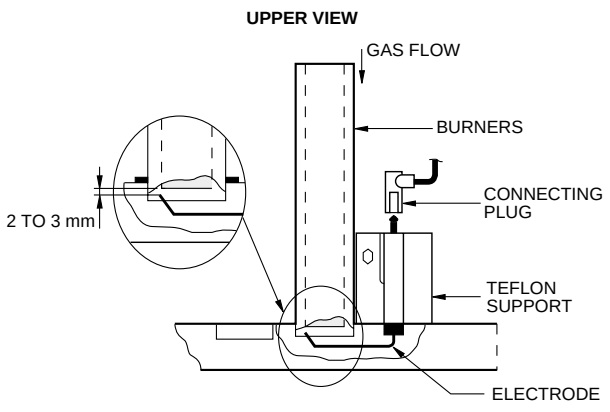
Maintenance
Normal maintenance

CAUTION:
Before carrying out any of the following operations, disconnect all electric power supply to the unit. Not doing this could cause personal injuries.

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 COILS: Dirt should not accumulate on the surface of the outdoor coils, or on other parts of the air circuit. They should be cleaned as frequently as required to keep the coils clean, making sure all electrical power supplies to the unit are disconnected before carrying out this cleaning operation.

NOTE
When cleaning the coils, 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.
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. 18.



- Fig. 18 -

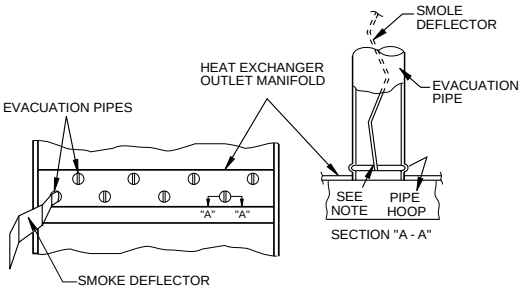
COMBUSTION AIR DISCHARGE: Regularly, visually check the discharge outlet to make sure there is no excess of soot and dirt. If necessary, clean to keep the combustion air discharge in adequate condition.

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. On the top plate, remove the screws from the casing and from the top turbine of the combustion gas extraction fan.
4. Remove the screws that fasten the top to the smoke stack, without tearing the insulation next to it. Then remove the central dividing plate that separates the upper and lower smoke stacks.
5. Inside the smoke stack, remove the smoke deflectors inside the tubes. Make sure the last curve of the deflector fits tightly with the pipe, holding the end of the deflector tightly in the pipe hoop. This hoop is formed when the pipe is expanded at an end plate. To remove, move the end of the deflector towards the centre of the pipe, thus releasing the deflector end from the pipe hoop, and then pull straight out. See Fig. 18.
6. 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.
7. Sweep the inside of the smoke stacks and the smoke deflectors.
8. Pass the metal brush through the ventilation hoods downwards, from the end of the smoke stack.
9. 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.
10. Once brushing is concluded, clean out with air or nitrogen. If necessary, use a vacuum cleaner.
11. Reassemble all parts in the same order as disassembly, following steps 1 to 4.
12. When replacing the centre and top of the smoke stack, be sure not to tear the insulation next to them.
13. Make sure all gaskets on the ventilation side of the combustion system are airtight. Apply high-temperature sealing putty (260ºC/+500ºF) wherever necessary.

Typical installation of smoke deflector

NOTE: One end of each smoke deflector has a tighter curve than the other end. This curve should be located at the pipe outlet so that its spring action will keep it in place.



- 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, etc. Make sure both the thermostat as well as the 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 and lock out the ignition control. Check and correct this lack of impulse air before checking other possible trouble.

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:

See Fig. 20 for the **Trouble Shooting Diagram.**

SEC. 1: No cooling; presence of impulse air; contacts KM1/ KM2/KM6 (300) closed.

A. Compressor motor protection open. Wait for protection to reset.
B. One or more phases open. Check power supply.
C. Contacts of Contact KM1/KM2/KM6 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/KM6 (300) open.

A. Cooling relay RY1/RY2/RY3 defective.
B. Lock out due to high 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.

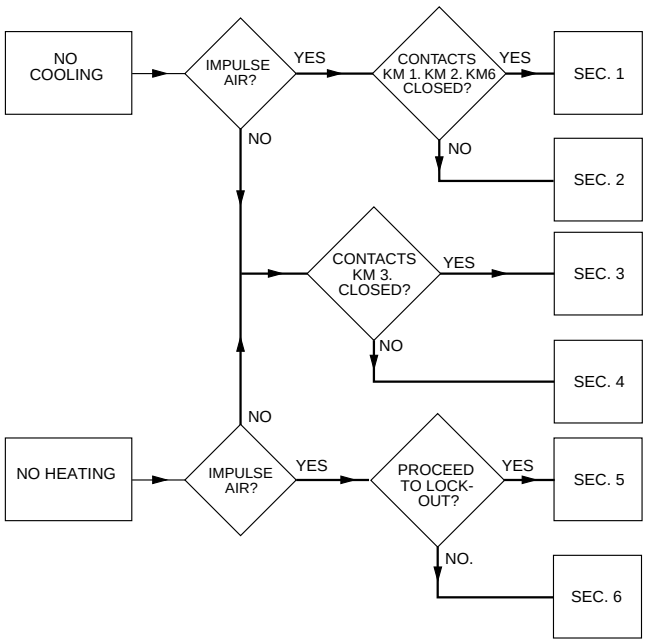
CAUTION:
From a lock-out position, do no reset repeatedly since this could damage the unit.

C. Inadequate connection at Contact KM1/KM2/K6 coil, or failure of this coil. Repair or replace.
D. Relay timed to connection TD1/TD2/TD3 in default.
E. Contacts K3-1 or K4-1 of the relay board are open when the relay K3/K4 is inoperative. Replace relay board.
F. 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 of contactor KM3 closed.

A. One or more phases open. Check the automatic switch and power supply.
B. Failure of contacts of Contactor KM3. Check voltage at charge side and replace contactor, 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 automatic switch F5 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 contactor 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 closed, relay K5-

2 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 of IC1 and IC2.

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 KW1 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 heat switch (LS2) or the heat contacts (RS) 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 to one side very carefully. Remove the four screws from the condenser dividing wall cover and, very carefully, withdraw the Stroke End switch, resetting the switch as previously described. Be sure not to damage or loosen cables. Reassemble the Stroke End 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 of not producing heat or cool.
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.
      Apply a 24 VAC current again 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, KM2 and KM3 operate only after a short pause. See notes on UNIT CONTROL WIRING on page 10 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. 10. If the output current value is not within these 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 10 to 13ºC (50 and 56ºF), check the discharge air sensor resistance. After a 15-minute pause at the specified temperatures, this resistance should be within the range shown in the following Fig. Should this not be the case, replace the discharge air sensor.

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

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 or resistances used during the tests. Restore maximum position and set the enthalpy set point potentiometers to their original settings.

DECLARATION OF COMPLIANCE ON MACHINERY

CE

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 180, 240 & 300**

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