DryGair
Making your greenhouse greener

DryGair Dehumidification Unit

Split Unit

Installation Instructions

November 2017
Ver. 11/17

DryGair Energies Ltd. — www.drygair.com
1 Hayozrim St., N. Industrial Zone, Lod, Israel
Tel.: 972-8-9283191, Fax: 972-8-9283171
skype: drygair.energies

Proprietary and Confidential

TABLE OF CONTENTS

LIST OF FIGURES

1. INTRODUCTION

This manual provides instructions for installing the DryGair split type dehumidification unit.

As DryGair continuously develops its machines to their maximum potential, this manual, though completely up to date when issued, is subject to changes without notice.

1.1 Before You Begin

Before you begin working with the DryGair dehumidification unit, read the following

- This manual: Installing the DryGair split unit.
- The DryGair dehumidification Operation and Maintenance Manual, which provides information and procedures for operating the unit, as well as maintenance, troubleshooting and repair procedures.
  - The safety instructions.
  - Conventions: explains the symbols used in this manual.

Before beginning a procedure:

- Read the procedure through to the end. Thorough understanding of the entire procedure prevents unnecessary loss of time and error.

1.2 Reference Documents

For further information, see the following document:

- **DryGair dehumidification unit Options:** It provides information and procedures to aid with using the various available options.

1.3 Conventions

The following conventions are used in this manual:

Warning

Information given in a “warning” message warns of possible hazard to personnel and extreme hazard to the unit.

Caution

Information given in a “caution” message refers to the safe operation of the unit and provides warning where the possibility for damage to the equipment exists.

Note

Information given in a note describes how the part/unit functions, or provides a tip on how best to use it.

2. SAFETY

DryGair Energies Ltd. believes that the safety of personnel working with and around the unit is the most important consideration. The DryGair unit is equipped with all the safety devices necessary to ensure risk-free use under standard conditions.

Machine installation, maintenance and adjustments must be performed only by a qualified technician with expert machine knowledge and that has read this manual.

Before operating the unit or performing maintenance operations, read and be familiarized with the safety information.

- Obey and follow all warnings and cautions given in this manual.
- Comply with all approved and established precautions for operating electrical and mechanical equipment.
- Only qualified and authorized personnel should perform maintenance or repair tasks.
- Verify the power, and any other connected facilities, are turned off and disconnected before beginning maintenance procedures, part replacements, or repairs.
- We advise strict observance of the work safety standard as defined by the authorities in each country.

DryGair cannot accept responsibility for injury to persons or damage to objects resulting from not observing safety standards.

2.1 Hazards

Danger: Electrical Shock Hazard. High voltage is present at points throughout the Unit. Contact with high voltage can result in injury or death. Before performing any operation related to electricity, open the electric compartment cover, switch off the Main Power switch and switch off the Circuit Breaker. Doing so ensures no voltage is present.

Danger: Hot Surface Hazard. The heat exchangers may have a high temperature during unit operation. Do not touch the heat exchanger coils while the unit is operating. Verify the unit has cooled down before touching them.

Danger: Bodily Injury Hazard. Be careful not to drop any of the unit parts. Dropping the Covers might cause bodily injury or damage to the parts.

2.2 Operation Safety Notes

The following safety practices must be complied with:

- **CAUTION** and **WARNING** notices posted on the machine and safety notes in this manual.
- Ensure that all compartment panels are closed.
- Do not start the unit if any of safety covers are missing.
- **MOVING PARTS** – Moving parts may bruise and cut.
- Do not permit smoking or food in the working area.
- Operating personnel must not remove covers or panels.
- Although the electrical compartment is closed by a door, operator access to the compartment is strictly forbidden without explicit authorization.
- Ensure that all personnel operating the unit know where the main power switch is located and what to do in case of electrical emergency.
- Locate approved types of fire extinguishers near the equipment.

2.3 Maintenance Safety Notes

Only authorized personnel are permitted to perform maintenance and repair tasks. Before performing such a task, read the instructions to ensure you understand them and that the required precautions and tools are available.

- For high mounted maintenance procedures, use a stable ladder to avoid high fall injuries.
- Flammable fluids are present. Do NOT use matches, cigarette lighters or torches as a means of lighting when working on the machine.
- To avoid getting caught in moving parts do not lubricate, repair or adjust the machine while in operation, unless expressly written in the manual. Stop the machine according to the machine stopping procedure before lubricating or performing other maintenance tasks.
- Secure electrical wires and cables to prevent damage.
- The protecting doors and covers should not be opened during machine operation.
- Replace all safety shields after completing set-up, troubleshooting and maintenance procedures.

2.4 Unit Labels

The following identification and warning labels are adhered to the DryGair unit:

- **Identification Label**

  The identification label is located on the right panel and contains the following information:

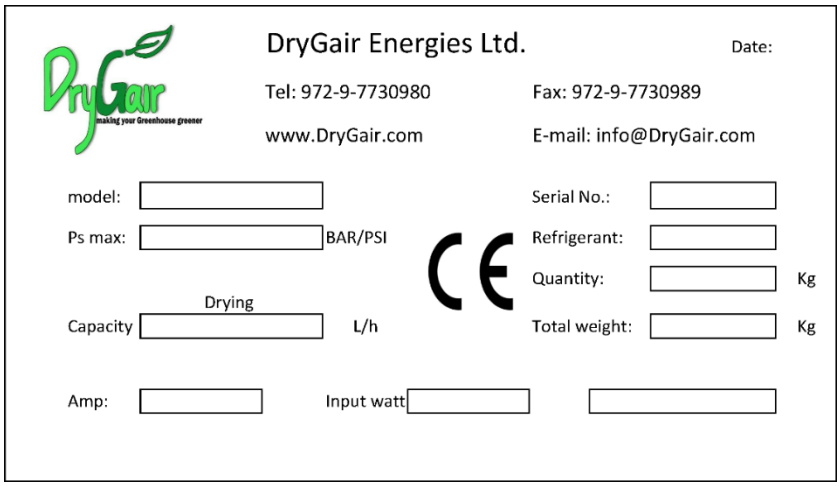

Figure 2-1. DryGair identification label

  - **Model:** The model number provides information on the specific unit
  - **Ps max:** The maximum operating pressure
  - **Capacity:** The drying capacity of the unit (at design conditions)
  - **Amp:** The maximum required current
  - **Input watt:** The power required by the unit (at 18°C and 80% RH)
  - **Serial No.:** The serial number of the specific unit
  - **Refrigerant:** The type of refrigerant used in the unit
  - **Quantity:** The amount of refrigerant to fill in the unit
  - **Total weight:** The overall weight of the unit

- **Warning Labels**

  - High Voltage Warning 
  - Hearing Protection Required 

  - Hot Surface Caution 
  - Lift from here 

3. UNIT OVERVIEW

The DryGair dehumidifying unit, designed and manufactured by DryGair Energies Ltd., is designed for the dehumidification of greenhouses, but can also be used in any other closed structure.

The unit reduces the greenhouse humidity according to a defined set-point by pulling the wet cold air from the bottom of the greenhouse, extracting the water, heating the air, and blowing the drier and warmer air back into the greenhouse through an air distribution module.
The unit can also be configured to heat or cool the dried air.

The water that is condensed during the dehumidification process is removed from the greenhouse through water drainage, and can be reused for other purposes such as hydroponic systems.

- For locations where the unit cannot be placed on the floor, due to operative or location requirements, the upper and lower sections of the unit can be separated.

Note
The two sections must be placed no farther than 4 meters apart.

3.1 Standard Features

The standard unit includes the following features:

- **Humidification Set-Point** – ensures the humidity in the greenhouse is kept at this set-point.
- **Temperature Control** –stops the unit when the temperature drops down to 10°C, and goes through a defrost cycle when reaching 6°C.

4. SPLIT UNITS INSTALLATION PROCEDURE

The DryGair split unit includes two sections:

- Lower section that includes the compressor and the electrical switchboard.
- Upper section in which the air treatment is performed.

Figure 4-1. DryGair split unit

Both the upper and lower sections have a pair of copper tubes that should be connected between them, connecting the compressor to the air handling section of the unit

The following figure shows the lower section connecting tubes; each with a Schrader valve that is used for the connecting procedure.

Figure 4-2. Connecting copper tubes (lower section)

- **Discharge**: 1⅛" dia. tube, marked red.
- **Suction**: 1⅝" dia. tube, usually isolate, marked blue.

Note

The compressor discharge and suction tubes can be on either side of the electrical compartment, or on its top; according unit configuration.

4.1 Connecting the Unit Sections

The split unit sections can be placed one next to each other, or one above the other (air treatment section above the compressor and electrical switchboard). In both cases, the upper unit must be at a height of at least 50–60 cm from the floor.

> ***Note***
> The distance between the split unit upper and lower sections must be no more than 4-meters apart.

On the upper and lower sections of each tube is a valve inside the unit. **This valve is closed during transportation and is only opened after completing the tubes soldering process** (see section 4.1.1). Its purpose is to prevent refrigerant leakage from the unit sections during transportation, and prior to the connecting the two sections at customer site.

Figure 4-3. Tube stop valves

4.1.1 Soldering the Tubes

Caution

Soldering the copper tubes must be performed by a qualified refrigeration technician or by a copper soldering expert, who knows how to solder copper tubes. If the tube soldering is not performed properly, gas may be released / discharged, and the unit and will not work.

4.1.1.1 Required Parts

- Tubes compatible in size with the tubes to be connected.
- Isolating material, 19 mm thick, for isolating the copper suction tube.
- Copper soldering materials.

To solder the tubes of both sections:

1. Place both sections of the unit on the ground, in their final location.
2. Solder both pairs of the copper tubes.
3. Perform a pressure and leakage test:
   a. Insert Nitrogen at a pressure of up to 400 psi (28 bars) into the connected tube (see Figure 4-2).
   b. Check for leaks with a leak detection device, or even better, with soapy water (bubbles at the leak point).
   c. If a leak is found- fix it.
4. Evacuate the Nitrogen from the tested section, and remove the remaining air with the aid of a vacuum pump; until it is completely empty.
5. Open the stop valves of both sections of the unit.

4.2 Connecting the Electrical Cables

The electrical switchboard is located in the lower section of the unit, behind the door with the **Electric Board** sticker and the **High Voltage** warning sign.

Figure 4-4. Electrical switchboard cover

Caution

All electrical connections must be performed by a qualified electrician.

To connect the electrical cables:

1. Open the service door on the side of the upper unit, and release the electrical cables:
   - Two green cables that are connected to the axial fans.
   - White cable that connects to the temperature and humidity sensors.
   - Thin black cable that connects to the defrost end sensor.

Figure 4-5. Electrical cables

The cables are about 5 meters long, and should be connected to the electrical switchboard **according to the electrical diagram attached inside the electrical compartment**.

2. Connect the green cable brown wires (fans power supply) to the electrical switchboard terminal block, marked U, V and W.

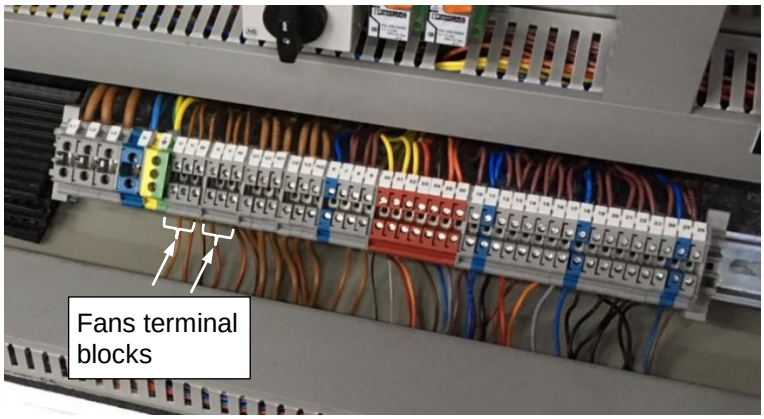

Figure 4-6. Fan connections

3. Connect the ground wires (yellow/green) to the switchboard ground bus.
4. Connect the white and black cables to the brown terminal block, to which the temperature, humidity and defrost sensors are connected.
   a. Connect the thin black cable white and black wires to terminal blocks 50 and 51 (the connection order has no meaning).
   This connects to the defrost end sensor.
   b. Connect the white cable six colored wires to terminal blocks 51–56, according to color scheme shown on the electrical diagram.
   These connect to the temperature and humidity sensors.

   See wire connections by color code in following Figure 4-7.

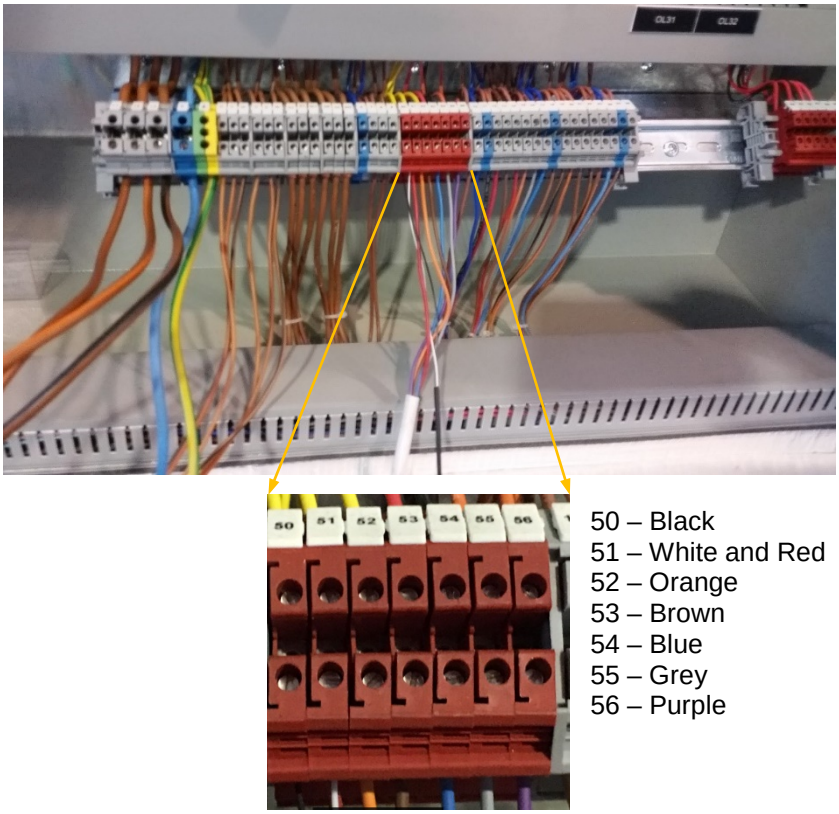

Figure 4-7. Brown terminal block (50–56)

4.3 Connecting the Drainage

Water is condensed during unit operation, and needs to be removed from the unit. In some environments, depending on the air temperature and humidity, this could be a large quantity of water.

Warning
The unit condensation water is not for drinking!

Connecting the unit to a water drain shall be performed by the customer.

The water can be further used for various purposes, as a hydroponic system.

Note
The drain water is distilled water. To use the water for irrigation, add minerals and fertilizers.

Figure 4-8. Water drainage

Note
To prevent water accumulation, the water drain tube should be connected by a plumber to a drainage line leading outside the greenhouse or to any other place the water should be collected (as a container).

4.4 Final Installation

1. Position/hang the unit upper section at a distance of less than 4 meters from the lower section.
2. Verify the unit main switch is in its OFF position.

Warning

Connecting the unit to the facility mains power supply should be performed only by a qualified electrician.

3. Connect the unit to the facility mains power supply.

4.5 Connecting Split Units with Heating/Cooling

Units with the heating/cooling option use hot or cold water, supplied from an external source, which flows through a horizontal heat exchanger located between the unit's heat exchangers and the unit fans.

4.5.1 Electrical Connections

Units with the heating/cooling option include an additional thermostat on the electrical switchboard, which controls the 3-position rotary actuator.

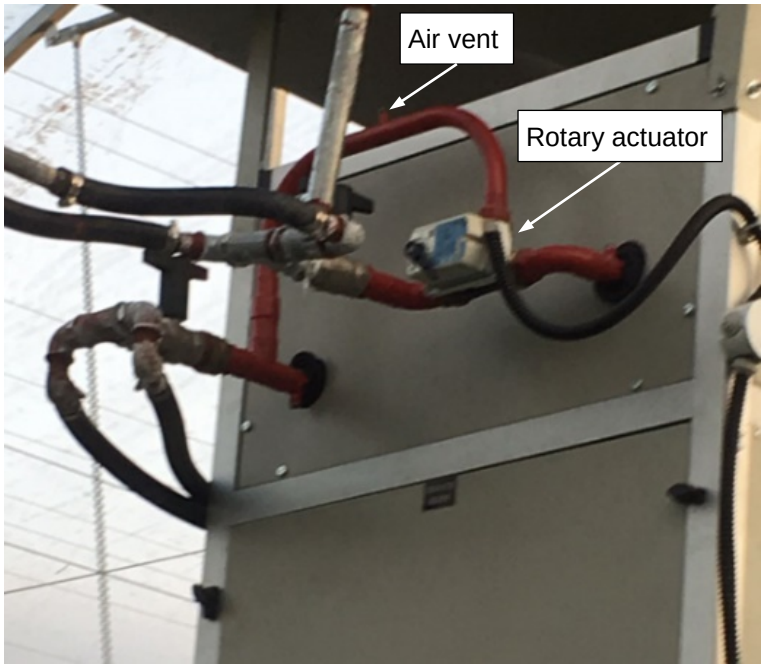

Figure 4-9. Unit with heating/cooling

Split units with the heating/cooling option come with three additional wires; usually blue, brown and green/yellow. These wires should be connected to the electrical switchboard terminal blocks according to the electrical diagram.

The temperature adjustments are done according to customer's demands, by following the instructions provided in the unit's Manual.

4.5.2 Water Connections

The water connections shall be performed by the customer.

The pipes will be supplied by the customer. There is no specific requirement for the type of material from which the pipes are made of.

Note

The water connections should be done by a certified plumber or by a qualified piping person.

Connect the hot/cold water inlet and outlet supply pipes to the unit valves. They have an internal pipe threading of 1¼" BSP.

5. APPENDICES

Appendix A. Unit Drawings

A.1. Standard Split Unit

Figure 5-1. Standard split unit

A.2. Small Split Unit

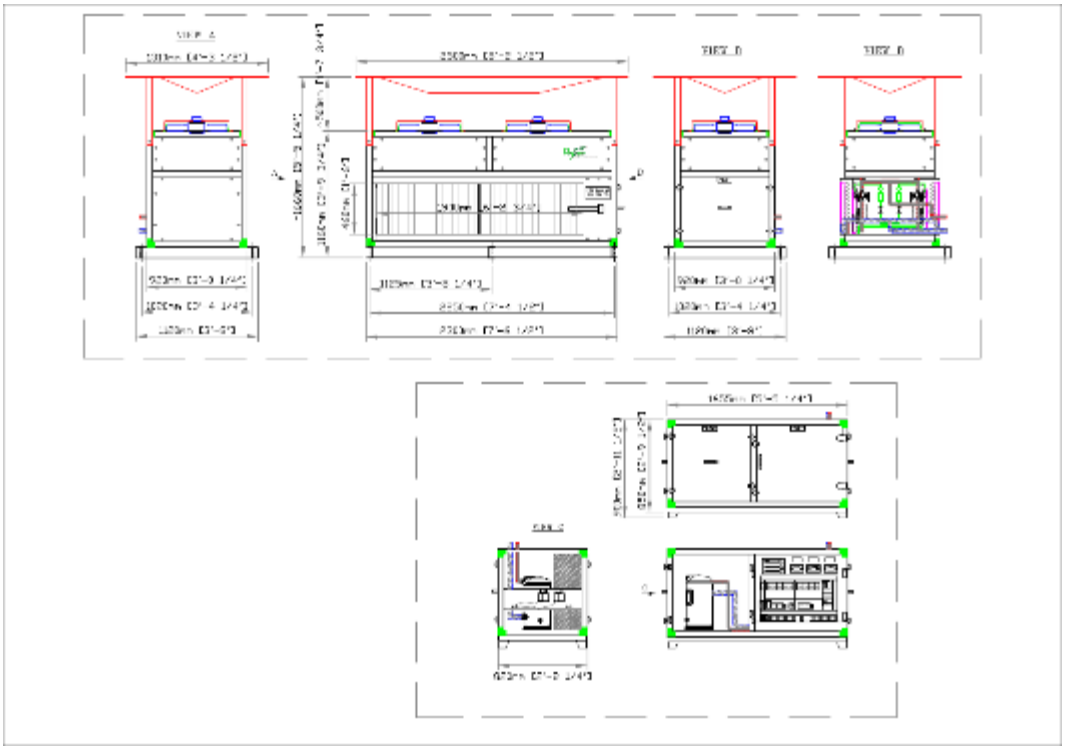

Figure 5-2. Small split unit

A.3. Standard Split Unit with Heating & Cooling

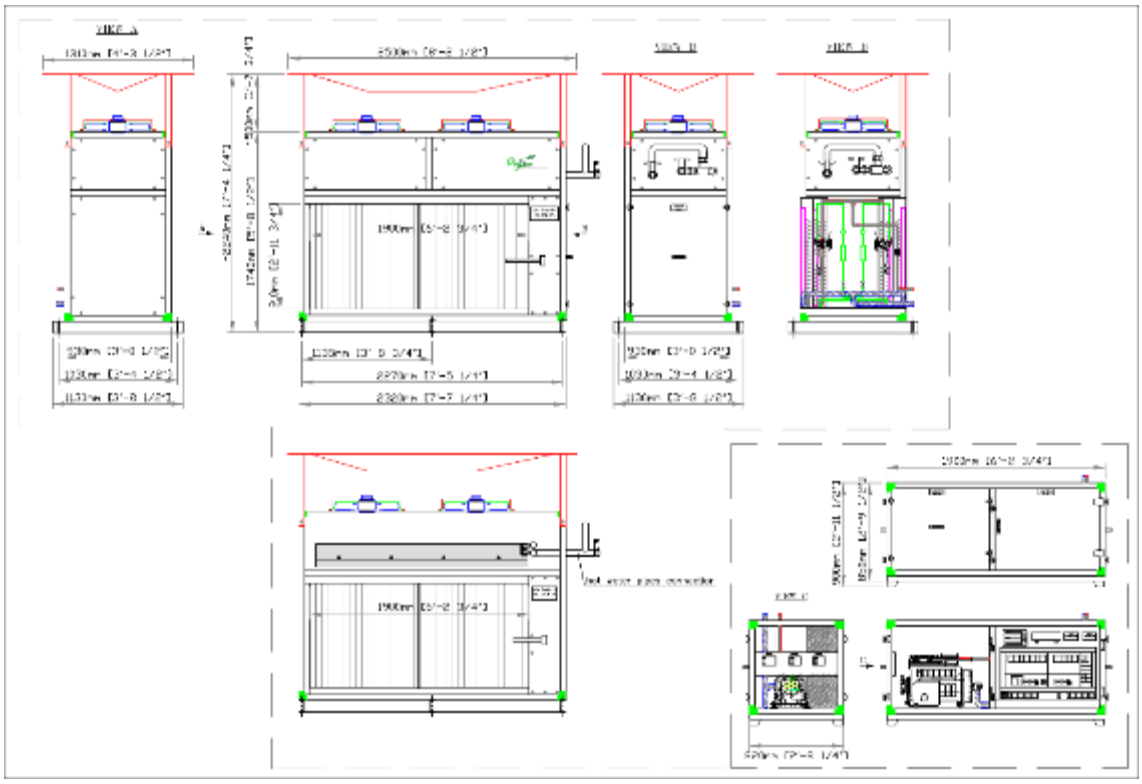

Figure 5-3. Standard split unit with heating & cooling

A.4. Small Split Unit with Heating & Cooling

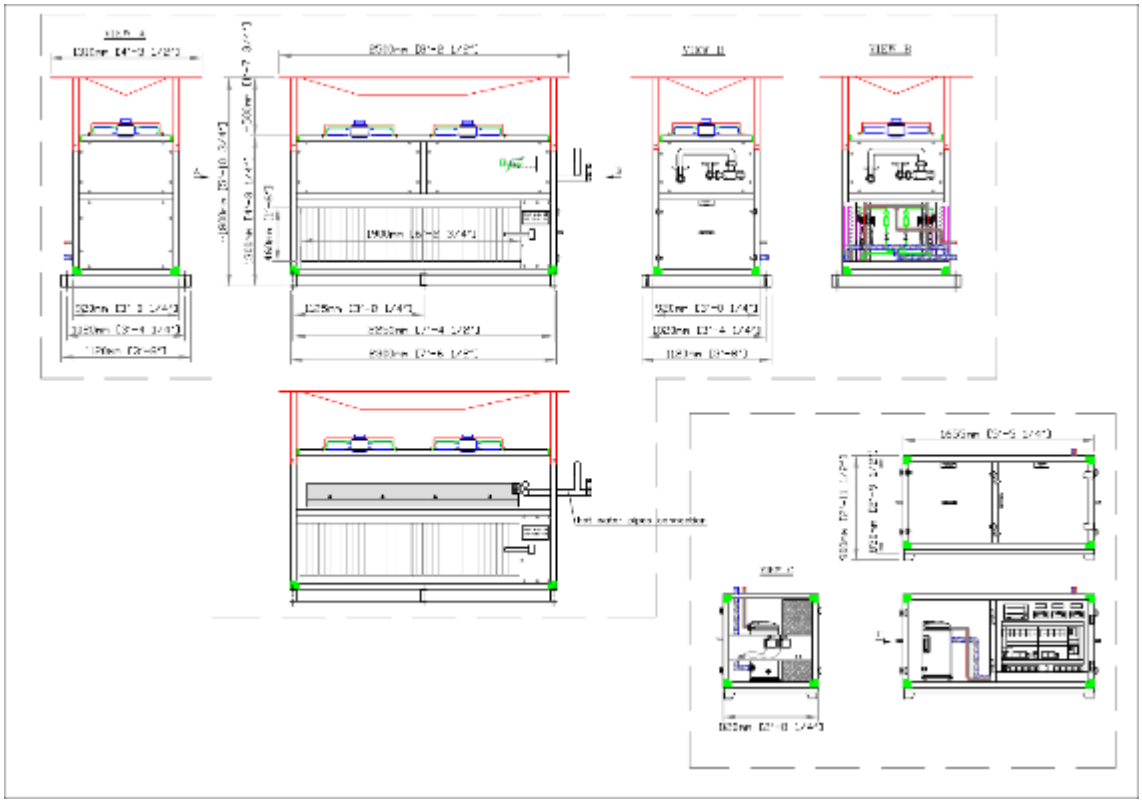

Figure 5-4. Small split unit with heating & cooling

6. COMMENTS AND NOTES

The following page are intentionally left blank and can be used for adding personal comments and notes related to the installed DryGair split unit.