



***Instruction and Maintenance Manual***

***DIRECT EXPANSION COMPRESSED AIR DRYERS***

**DRA 24 - 480**



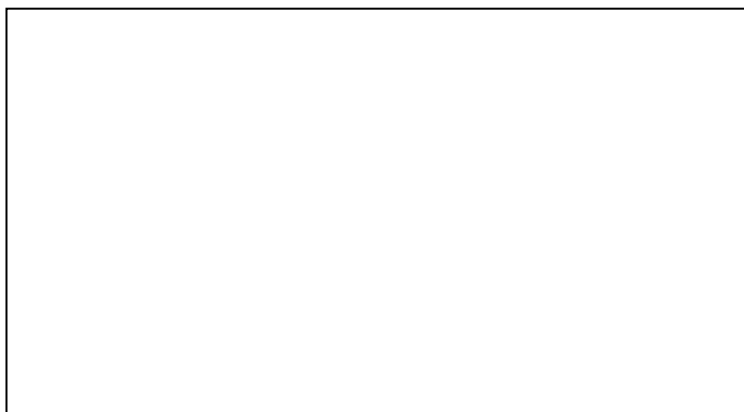
# EC DECLARATION OF CONFORMITY



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**Declare under our sole responsibility that the product which this declaration relates to in conformity with the following standards and other normative documents:**

- 2014/30/EU (Electromagnetic compatibility)
- 2006/42/CE (Machinery directive)
- 2014/35/UE (Low voltage directive)
- 2014/68/UE (Directive PED) - DRA 24-216 (Article 4.3) - DRA 300-480 (Module A – Category I)



Name / Surname

Joachim Kosinski

Position

Managing Director

Date

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Signature

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## 1. GENERAL INFORMATION

### 1.1 FUNCTIONAL DESCRIPTION

Drying systems with refrigeration cycle have been designed for effective cost elimination, with minimal overall dimensions, of the condensate contained in compressed air by cooling it down. The operation principle of the dryers described in this manual is shown in the air and refrigeration circuit diagrams (paragraph 2.2 and 2.3)

The air delivered to the services is virtually humidity free, and the condensate collected in the separator is discharged through appropriate draining devices. In order to limit the size of the machine and to avoid condensation on the external surface of the tubing, before exiting the dryer, treated air is counter current pre-heated by the air entering the system.

The dryer comes provided with all the control, safety and adjustment devices, therefore no auxiliary devices are needed.



A system overload not exceeding the maximum operative limits can worsen the operational performances of the dryer (high dew point), but it will not affect its safety.



The electric diagram (attached file E) shows the minimum protection degree IP 42. **The user must provide the dryer with a line protection and a ground terminal.**

### 1.2 USE OF THE MACHINE IN SAFE CONDITIONS

Symbols applied on the dryer and the manual

|  |   |  |   |
|--|---|--|---|
|  | General warning                           |  | Do not touch electrical hazard                      |
|  | Danger - high voltage, electrical current |  | Prohibition of maintenance to unqualified personnel |
|  | Danger point                              |  | Environmental requirements                          |
|  | Mandatory consulting the manual           |  | Recyclable materials                                |

This system has been designed and manufactured in compliance with the European safety directive in force, therefore any installation, use and maintenance operations must be performed respecting the instructions contained in this manual.



Any installation, use and maintenance operation requiring to access the internal parts of the dryer must be performed by qualified personnel.



The manufacturer will not be liable in case of uses different or not complying with those foreseen in this manual.



## 2. TECHNICAL DESCRIPTION

### 2.1 OPERATION

The dryer described in this manual basically consists of two separated circuits: a compressed air circuit, divided into two heat exchangers, and a refrigeration circuit.

The warm and humid entering air goes through an air-to-air exchanger before entering the evaporator (air-to-refrigerant exchanger) where, due to the contact with the refrigeration circuit, it cools down to allow the condensation of the humidity it contains.

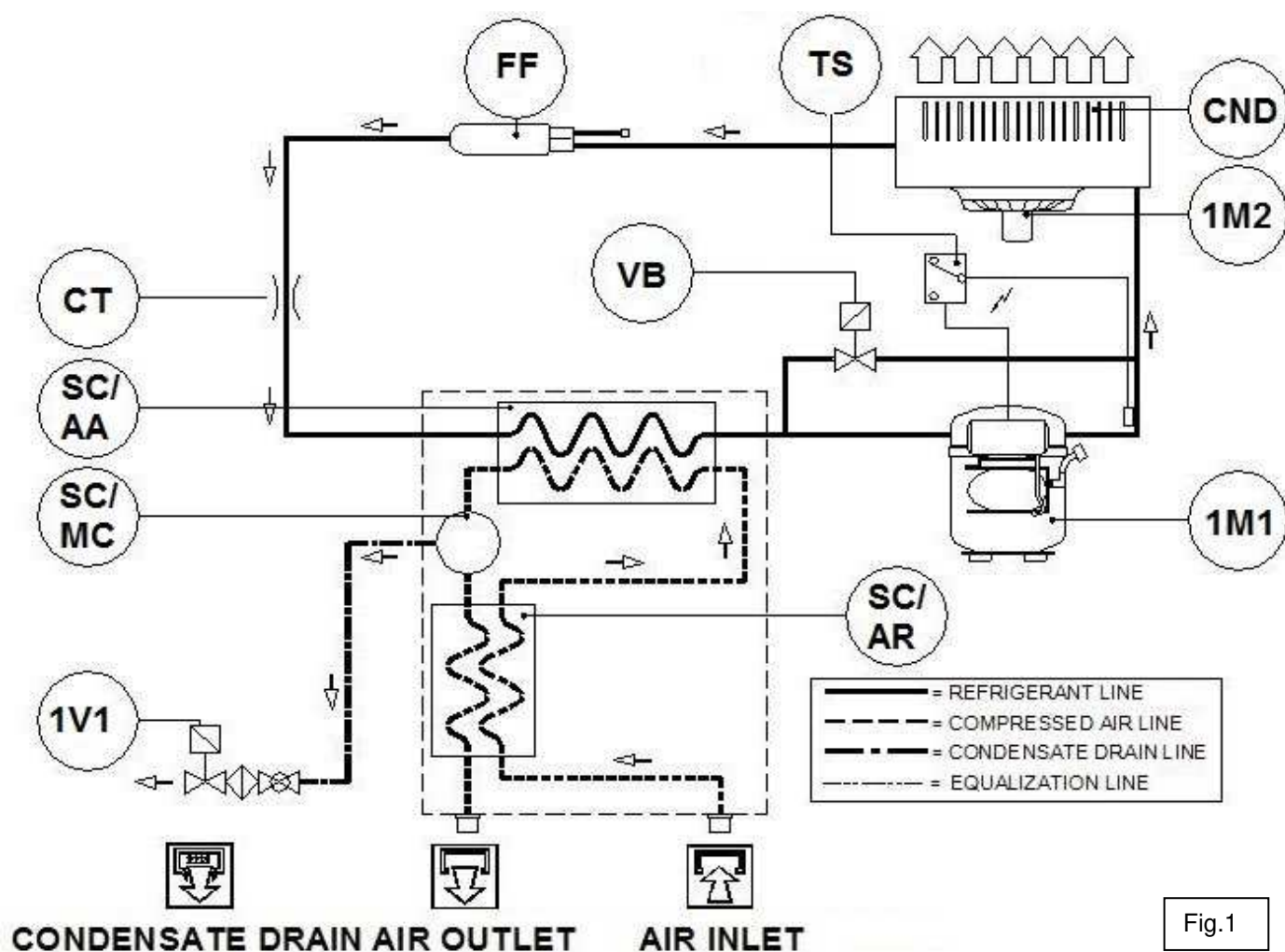
The condensed humidity is then separated and expelled into the separator.

The cooled air goes through the air-to-air exchanger, where it partially warms up in cooling down the entering warm air (pre-refrigeration).

The refrigeration circuit needed for these operations is basically composed of a refrigeration compressor, a condenser and the evaporator, also called air-to-refrigerant exchange.

## 2.2 REFRIGERANT CIRCUIT

### 2.2.1 DIAGRAM



### 2.2.2 REFRIGERATING COMPRESSOR (1M1)

The refrigerating compressor is the pump of the system where the gas coming from the evaporator (low pressure side) is compressed up to the condensation pressure (high pressure side). All the compressors used are manufactured by primary companies and are designed for applications where high compression ratios and wide temperature changes are present. The fully sealed construction is perfectly gas tight, so ensuring high-energy efficiency and long useful life. The pumping unit is supported by dumping springs, in order to consistently reduce the acoustic emission and the vibration diffusion. The electric motor is cooled down by the aspirated refrigerating gas, which goes through the coils before reaching the compression cylinders. The internal thermal protection protects the compressor from overheating and over currents. The protection is automatically restored as soon as the nominal temperature conditions are reached.

### 2.2.3 CONDENSER (CND)

The condenser is the element in which the gas coming from the compressor is cooled down and condensed becoming a liquid. Mechanically, it is formed by a copper tubing circuit (with the gas flowing inside) immersed in an aluminum blades package. The cooling operation occurs via a high efficiency axial ventilator which, in applying pressure on the air contained within the dryer, forces it into the blades package.

It's mandatory that the temperature of the ambient air will not exceed the nominal values. It's as well important **TO KEEP THE UNIT FREE FROM DUST AND OTHER IMPURITIES.**

### 2.2.4 DEHYDRATION FILTER (FF)

Traces of humidity and slag which could accumulate inside the chilling plant, or smudge which could occur after a long use of the dryer, could limit the lubrication of the compressor and clog the capillary tube.

The function of the dehydration filter, located before the capillary tubing, is to stop the impurities, so avoiding their circulation within the system.

### **2.2.5 CAPILLARY TUBE (CT)**

It consists of a piece of reduced cross section copper tubing located between the capacitor and the evaporator to form a throttling against the flow of the refrigerating fluid. This throttling creates a pressure drop, which is a function of the temperature to be reached within the evaporator: the less is the capillary tube outlet pressure, the less is the evaporation temperature.

The length and the diameter of the capillary tubing are accurately sized with the performance to be reached by the dryer; no maintenance/adjustment operations are necessary.

### **2.2.6 ALUMINIUM HEAT EXCHANGER (SC)**

The air-to-air and the air-to-refrigerant heat exchangers plus the demister type condensate separator are housed in a unique module. The counter flows of compressed air in the air-to-air heat exchanger ensure maximum heat transfer. The large cross section of flow channel within the heat exchanger module leads to low velocities and reduced power requirements.

The generous dimensions of the air-to-refrigerant heat exchanger plus the counter flow gas streams allow full and complete evaporation of the refrigerant (preventing liquid returning to the compressor).

The high efficiency condensate separator is located within the heat exchanger module. No maintenance is required and the coalescing effect results in a high degree of moisture separation.

### **2.2.7 ETY THERMAL SWITCH (TS)**

Applied to protect the compressor. When the dryer is operated with a proper amount of refrigerant, the discharge temperature is stable, while if the amount of refrigerant is not correct the discharge temperature increases beyond the standard and the safety thermostat cuts off the power to the compressor. The discharge temperatures also increase with dirty condenser or fan failure.

## **2.3 AIR CIRCUIT**

The dryer has been manufactured in order to dry compressed air; every application of the machine in conditions other than those described in Annex A must be authorized by the manufacturer.

## **3. INSTALLATION**

### **3.1 ACCEPTANCE AND TRANSPORTATION**

At the moment the customer accepts the delivery, he must fully inspect the dryer to verify its integrity and the presence of all the items listed in the shipping documentation.

Eventual claims for missing and/or damaged parts must be addressed directly to our facility or to the closest reseller, within 8 (eight) days from the date on which the goods have been received.

It is mandatory to keep the dryer always in vertical position, as indicated by the symbols present on the packaging. For eventual displacements, use devices having sufficient capacity for the weight of the machine.



Remove the packaging after having positioned the dryer in the installation site. We suggest to keep the original packaging at list for the duration period of the warranty of the machine. Anyhow, do not forget to dispose the various materials in compliance with the relevant rules locally in force.

It's avoided removing any panels during transportation and positioning of dryer.

If not in use, the dryer can be stored in its packaging in a dust free and protected site at a maximum temperature of 50 °C, and a specific humidity not exceed the 90 %. Should the stocking time exceed 12 months, please contact the manufacturer

### 3.2 INSTALLATION SITE

While preparing a proper site for the installation of the dryer, please take into account the following requirements



- The machine must be protected from atmospheric agents and not directly exposed to sun light.
- A seating base flat and capable to hold the weight of the machine.
- Ambient temperature complying with the nominal data of the dryer.
- A clean, dry and without forced draft (we suggest to blow the warm air outside the installation site).
- Make sure to leave sufficient clearance around the dryer in order to allow an adequate cooling of the machine and for maintenance and/or control operations.



The incoming air must be free from smoke or flammable vapors which could lead to explosion or fire risks.

### 3.3 INSTALLATION LAYOUT

Before attempting any installation operation, make sure that



- **No part of system is under pressure.**
- **No part of the system is electrically powered.**
- **Tubing to be connected to the dryer are impurities free.**



After having verified the points listed above, you can proceed to the installation of the machine.



Connect the dryer to the compressed air lines indicated in the diagrams below. Check out the above conditions we recommend:



- **Direct the dryer so that all the instruments of control of the machine are clearly visible in order to optimize utilization.**



- **Install an anti-dust filter of 3µm because it is necessary to warrant a good operation of internal components of machine.**
- **Install a by-pass group valve that allows to isolate dryer from plant and to facilitate any maintenance operations**

|    |   |
|----|---|
| 1  | Air Compressor                                  |
| 2  | After cooler                                    |
| 3  | Condensate separator                            |
| 4  | Receiver  |
| 5  | Automatic Drain                                 |
| 6  | Dust Filter 3µ                                  |
| 7  | <b>Dryer</b>                                    |
| 8  | Solenoid drain valve                            |
| 9  | Coalescing Filter 1µ                            |
| 10 | Coalescing Filter 0.01µ                         |
| 11 | Activated carbon filter 0.003 mg/m <sup>3</sup> |
| 12 | Water/Oil Separator                             |

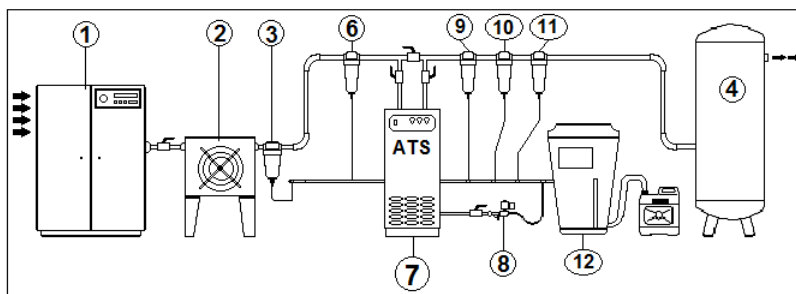
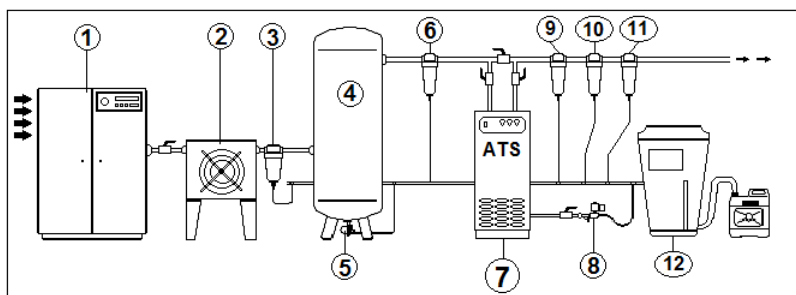


Fig.2



### 3.4 CONNECTION TO THE MAINS

**DANGER- High Voltage is present.**  
**PROPERLY HANDLING PROCEDURES MUST BE USED OF ELECTRICAL SHOCK.**



The connection to the mains, to be carried out by qualified personnel, and the safety systems must comply with local rules and laws.

Before connecting the unit to the electric power, verify that the voltage and the frequency available on the mains correspond to the data reported on the data plate of the dryer. In terms of voltage, a  $\pm 5\%$  tolerance is allowed.

The dryers come with a main connecting cable already installed.

The mains socket must be provided with a **mains magneto-thermal differential breaker** and the cross section of the power supply cables must be suitable sized by qualified staff in compliance to rules in force and to the consumption of the dryer (see the nominal values on the data plate of the dryer).

Power the dryer after having checked that the nominal voltage and line frequency are constant and matching the nominal values of the machine. **The user must provide the installation with an adequate line protection and a ground terminal complying with the electrical rules locally in force.**

### 3.5 CONDENSATE DRAIN



The condensate is discharged at the same pressure of the air entering the dryer.

Never point the condensate drain jet towards anybody.

Don't dispose the condensate in the environment.



The condensate collected in the dryer contains oil particles released in the air by the compressor.

Dispose the condensate in compliance with the local rules.

We suggest to install a water-oil separator where to convey all the condensate drain coming from compressors, dryers, tanks, filters, etc.

The dryer can be provided with a timed drain operated by electronic board or it can be supplied with a capacitive drain (see ANNEX G).

## 4. START UP

### 4.1 BEFORE START UP



Before starting the machine, make sure that all operating parameters correspond to the nominal data.



The dryer is supplied already tested and present for normal operation, and it doesn't require any calibration. Nevertheless, it's necessary to check the operating performances during the first working hours.

### 4.2 START UP


The operations specified below must be performed after the first start up and at each start up after a prolonged inactive period of time due to maintenance operations, or any other reason.



1. Make sure that all instructions contained in chapters INSTALLATION SITE (par. 3.2) and INSTALLATION LAYOUT (par. 3.3) have been respected.

2. Activate current supply and press the ON/OFF main switch from the control panel only for the models DRA365 up to DRA480.



3. If display is OFF, press the START / STOP key  for at least 3 seconds to start the machine display will show temperature.




4. The unit will start after 1 minute safety delay.

5. Wait 5 to 10 minutes until machine has achieved its standard operating parameters.

6. Slowly open the air outlet valve and successively open the air inlet valve.

7. Let go in slowly the air through dryer.

8. Check if all connecting pipes are properly tightened and fixed.

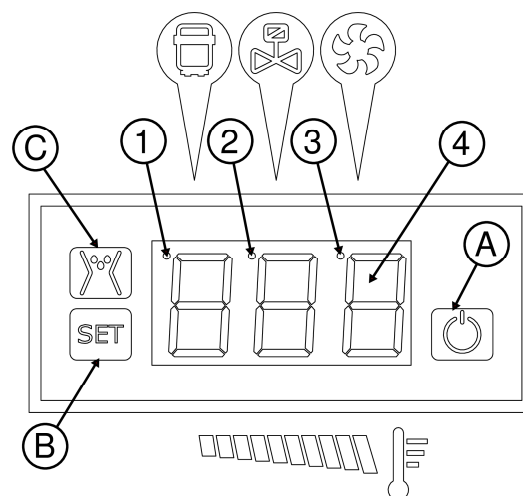
Before disconnecting the dryer from electrical power supply, press START/STOP key  for at least 3 seconds and for the models DRA365-480 turn off the main switch as well. After that wait 10 minutes before switching the dryer on again, in order to allow freon pressure re-balance.

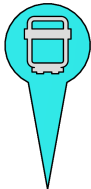


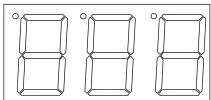



## 5. OPERATION

### 5.1 CONTROL PANEL

The machines belonging to this series are provided with an electronic system so eventual reset operations can be performed by digital panel located on the front of the dryer. The control panel illustrated in the picture is composed of

3 keys (START / STOP , SET , DRAIN TEST ) and 3 signaling LEDs indicated by icons.



| No | LED              | ICON  | STATUS     | DESCRIPTION   |
|----|------------------|---|------------|---|
| 1  | LED COMP         |   | <b>ON</b>  | Compressor energized                                    |
| 2  | LED VALVE        |  | <b>ON</b>  | Condensate drain energized                              |
| 3  | LED FAN          |  | <b>ON</b>  | Fan energized   |
| 4  | DISPLAY          |  | <b>OFF</b> | UNIT SWITCH OFF   |
|    |                  |   | 3          | DEWPOINT TEMPERTURE                                     |
| A  | START / STOP key |  |            | Activates and deactivates the process                   |
| B  | SET key          |  |            | Parameter setting entry (depend on the current display) |
| C  | DRAIN TEST key   |  |            | Manual drain test                                       |





## 5.2 STANDARD OPERATION

**START / STOP key:** Pushed for 3 seconds, it activates or deactivates the process. When the process is deactivated, the display not shows. During the dryer operation, the COMP LED (1) is on.

## 5.3 SET-UP

The device controls the compressor, fan and condensate drain solenoid of the dryer, and allows the calibration of the operating parameters. In case of particular requirements concerning the operation management the user can change the setting of the programmed parameters. The parameters (Pr1-8), which can be set up, are show on table.

### How to set-up

- To access the set-up mode, keep pressed the SET button  for at least 3 seconds.
- The first parameter Pr1 will be display
- Use DRAIN button  to increase or reduce value.
- To confirm and move to next parameter press SET button .
- To save and out to normal display, keep press  button for 3 seconds. Display will show "SA".
- In case no operations are made during 30 seconds, the system exits automatically the set-up condition.

| Parameter | Description      | Unit | Range   | Default | Note                          |
|-----------|------------------|------|---------|---------|-------------------------------|
| Pr1       | Drain time       | sec  | 1-10    | 1       | Adjust depending on condition |
| Pr2       | Drain cycle time | sec  | 0-600   | 120     | 0 to use with no loss drain   |
| Pr3       | Auto reset time  | min  | 1-19    | 5       | Manufactory use only          |
| Pr4       | Sensor type      |      | 0-3     | 0       |                               |
| Pr5       | Fan set point    | °C   | 25-52   | 42/46*  |                               |
| Pr6       | Fan hysteresis   | °C   | 1-10    | 1/2**   |                               |
| Pr7       | Fan offset       | °C   | -5 / +5 | 0       |                               |
| Pr8       | Dew point offset | °C   | -5 / +5 | 0       |                               |

\*Fan set point 42°C for DRA24-216; Fan set point 46°C for DRA300-480

\*\*Fan hysteresis 1°C for DRA24-216; Fan hysteresis 2°C for DRA300-480





## 5.4 Display Message





| Message | Description          | Conditions                                | Actions   |
|---------|----------------------|---|---|
| ES      | Energy saving        | Dewpoint lower than -1 °C over 6 minutes  | Wait 5 minutes for auto restart working function                  |
| AdP     | High dewpoint alarm  | Dewpoint higher than 17 °C Over 6 minutes | Switch off the unit to reset if alarm persists contact service    |
| P1      | Dewpoint probe alarm | All problem with dewpoint probe           | Change probe / dryer will not stop to work                        |
| P2      | Fan probe alarm      | All problem with fan probe                | Change probe / dryer will not stop to work fan motor keep running |

## 5.5 ALARM HISTORY

The device can display the alarm history. To know how many alarm event occur on the last operation.

### How to entry to alarm history display:

- Press and hold SET  and DRAIN TEST  buttons for 2 seconds
- You will see E and the numbers of time energy saving occur.
- Press set  for 1 second to reset.
- Press drain  for 1 second to move to next alarm history.
- You will see S and the numbers of time sensors problem occur.

- Press set  for 1 second to reset.
- Press drain  for 1 second to move to next alarm history.
- You will see d and the numbers of time high dew point alarm occur.
- Press and hold SET  and DRAIN TEST  buttons for 2 seconds to back to normal display.

## 6. MAINTENANCE, TROUBLESHOOTING, SPARES AND DISMANTLING

### 6.1 CONTROLS AND MAINTENANCE

Before attempting any maintenance operation, make sure that:

1. No part of the system is under pressure.
2. No part of the system is electrically powered.



#### → WEEKLY OR EVERY 40 HOURS OF OPERATION

- Verify the temperature on the control panel display.
- Visually check if the condensate is drained regularly.



#### → MONTHLY OR EVERY 200 HOURS OF OPERATION

- Clean the condenser with a compressed air jet, taking care not to damage the cooling battery aluminum wings.
- At the end of the above operations, check if the dryer is working properly.

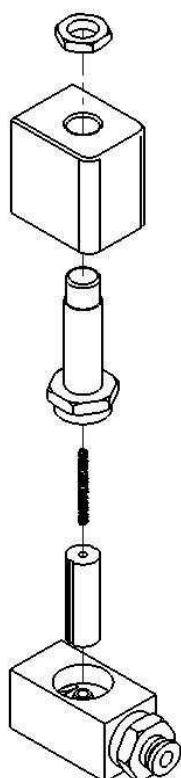


#### → YEARLY OR EVERY 2000 HOURS OF OPERATION

- Check if the flexible tube used for condensate drainage is damaged and replace it if necessary.
- Check if all connecting pipes are properly tightened and fixed.
- At the end of the above operations, check if the dryer is working properly.




#### 6.1.1 CLEANING OF THE DRAIN SOLENOID VALVE



1. Close the ball valve located on the filter/stop installed at the drain trap inlet.



2. Depressurize the trap by pushing the  button on the control panel.



3. Unscrew the plug in the end of the filter/stop to access the filter screen and clean it with a compressed air jet.
4. Reassemble and open filter/stop valve.





## 6.2 TROUBLESHOOTING

Troubleshooting and eventual control and/or maintenance operations must be performed by qualified personnel.

For maintaining the refrigerating circuit of the machine, contact a refrigeration engineer.

### TROUBLE

### POSSIBLE CAUSE AND REMEDY

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>▪ Luminous switch / Display of the control panel OFF.</li> <li>▪ The compressor doesn't start.</li> <li>▪ The fan doesn't work.</li> <li>▪ Condensate drain absent (no water nor air).</li> <li>▪ Air flows continuously through the condensate drainage.</li> <li>▪ Water in the pipes downstream the dryer.</li> <li>▪ The temperature on the control panel display is higher than the nominal value.</li> </ul> | <ol style="list-style-type: none"> <li>1. Check if the line is electrically powered.</li> <li>2. Check cabling.</li> <li>3. Check the electronic control board; if the trouble persists, replace it.</li> <li>1. Check cabling and control.</li> <li>2. Activation of compressor's internal thermal protection or 1T1 thermal protection; wait one hour and check again. If the fault persists: stop dryer and call a refrigeration engineer.</li> <li>3. Check the compressor's electrical components.</li> <li>4. Short circuit in the compressor. Replace it.</li> <li>1. Check the protection fuse (if present), and in case replace it.</li> <li>2. Check cabling.</li> <li>3. Check the electronic control board; if the trouble persists, replace it.</li> <li>4. Short circuit in the fan. Replace it.</li> <li>1. Check cabling.</li> <li>2. Pre-filter of the drainage system dirty, clean it.</li> <li>3. The coil of the drainage solenoid vale is burned out, replace it.</li> <li>4. Drainage solenoid valve clogged/jammed, clean or replace it.</li> <li>5. Check the electronic card, if the trouble persists, replace it.</li> <li>6. The temperature on the display of the control panel is lower then the nominal value, call a refrigeration engineer.</li> <li>1. Drainage solenoid valve jammed, clean or replace it.</li> <li>2. Verify the condensate drainage times.</li> <li>3. Check the electronic control. If the trouble persists, replace it.</li> <li>1. The dryer is off; turn it on.</li> <li>2. Close by-pass (if present).</li> <li>3. Condensate drainage absent; see specific section.</li> <li>4. The temperature on the control panel display is higher than the nominal value; see specific section.</li> <li>1. Check if the compressed air inlet/outlet is connected properly.</li> <li>2. The compressor doesn't start; see specific section.</li> <li>3. The fan doesn't turn; see specific section.</li> <li>4. The flow rate and/or temperature of the air entering the dryer are higher than the nominal values; restore the nominal conditions.</li> <li>5. The ambient temperature is higher than the nominal values; restore the nominal conditions.</li> <li>6. The condenser is dirty; clean it.</li> <li>7. Condensate drain absent (no water nor air); see specific section.</li> <li>8. Check if the temperature control probe in the evaporator is positioned improperly or faulty.</li> <li>9. Gas leakage in the refrigerating circuit: stop dryer and call a refrigeration engineer.</li> <li>10. Check cabling.</li> </ol> |
|---|--|

- The dryer does not let compressed air flow through.
  1. Check if the compressed air inlet/outlet is connected properly.
  2. The temperature on the control panel display is lower than the nominal value; call a refrigeration engineer.
  3. Check if the temperature control probe in the evaporator is positioned improperly or faulty.
  4. Check if the connecting tubing are clogged; eventually proceed accordingly.
  5. Check if by-pass (if present) is installed properly.
  6. Check electronic control board. If the trouble persists, replace it.

**IMPORTANT:**

***1-The temperature control probe is extremely delicate. Do not remove the probe from its position. In case of any kind of problem, please contact your "Service Center"***

**6.3 DISMANTLING OF THE DRYER**

If the dryer is to be dismantled, it has to be split into homogeneous groups of materials.



| Part                     | Material   |
|--------------------------|--|
| Refrigerant fluid        | R134a, R407C – HFC, Oil                              |
| Canopy and Supports      | Carbon steel, Epoxy paint                            |
| Refrigeration Compressor | Steel, Copper, Aluminum, Oil                         |
| Aluminum heat exchanger  | Aluminum   |
| Condenser Unit           | Aluminum, Copper, Carbon steel                       |
| Pipe                     | Copper   |
| Fan                      | Aluminum, Copper, Steel                              |
| Valve                    | Brass, Steel   |
| Electronic Level Drain   | PVC, Aluminum, Steel                                 |
| Insulation Material      | Synthetic gum without CFC, Polystyrene, Polyurethane |
| Electric cable           | Copper, PVC  |
| Electric Parts           | PVC, Copper, Brass                                   |



We recommend to comply with the safety rules in force for the disposal of each type of material. The chilling fluid contains droplets of lubrication oil released by the refrigerating compressor. Do not dispose this fluid in the environment. It has to be discharged from the dryer with a suitable device and then delivered to a collection center where it will be processed to make it reusable.

# **ATTACHMENTS**

## A. TECHNICAL FEATURES SERIES DRA 24-480

| <b>Dryers</b>              | <b>DRA</b> | <b>24</b>           | <b>36</b> | <b>54</b> | <b>78</b> | <b>106</b> | <b>144</b> | <b>180</b> | <b>216</b> | <b>300</b>           | <b>365</b> | <b>480</b> |
|----------------------------|------------|---------------------|-----------|-----------|-----------|------------|------------|------------|------------|----------------------|------------|------------|
| Air flow rate              | l/min      | 400                 | 600       | 900       | 1300      | 1767       | 2400       | 3000       | 3600       | 5000                 | 6083       | 8000       |
|                            | scfm       | 14                  | 21        | 32        | 46        | 62         | 85         | 106        | 127        | 177                  | 215        | 282        |
| Air connections            | BSP-F      | G 3/4"              |           |           |           |            | G 1"       |            |            | G 1.1/2"             |            |            |
| Refrigerant                |            | R134a               |           |           |           |            |            |            |            | R407C                |            |            |
| Fan motor working pressure | barg       | Running 11 / Stop 8 |           |           |           |            |            |            |            | Running 20 / Stop 16 |            |            |
| Weight                     | kg         | 23                  | 23        | 24        | 25        | 26         | 27         | 30         | 35         | 40                   | 85         | 90         |
| Air inlet temperature      | °C         | 35° (Max 70°)       |           |           |           |            |            |            |            |                      |            |            |
| Ambient temperature        | °C         | 25° (Max 50°)       |           |           |           |            |            |            |            |                      |            |            |
| Working pressure           | barg       | 7 (Max 16)          |           |           |           |            |            |            |            |                      |            |            |
| Pressure dew point         | °C         | 3° (Max 10°)        |           |           |           |            |            |            |            |                      |            |            |

| <b>Power supply</b>  | <b>V/Ph/Hz</b> | <b>230/1/50</b> |       |      |      |      |      |      |      |      |      |      |
|----------------------|----------------|-----------------|-------|------|------|------|------|------|------|------|------|------|
| Nominal consumption  | kW             | 0.175           | 0.175 | 0.22 | 0.25 | 0.32 | 0.35 | 0.42 | 0.73 | 0.78 | 1.11 | 1.52 |
| Nominal current      | A              | 1.15            | 1.15  | 1.30 | 1.33 | 1.45 | 1.47 | 1.86 | 3.30 | 3.50 | 5.00 | 7.20 |
| Full load current    | A              | 1.38            | 1.38  | 1.52 | 1.55 | 1.66 | 1.69 | 2.15 | 3.80 | 4.10 | 5.80 | 7.90 |
| Locked rotor current | A              | 8               | 8     | 4    | 4    | 6    | 6    | 10   | 17   | 17   | 28   | 33   |

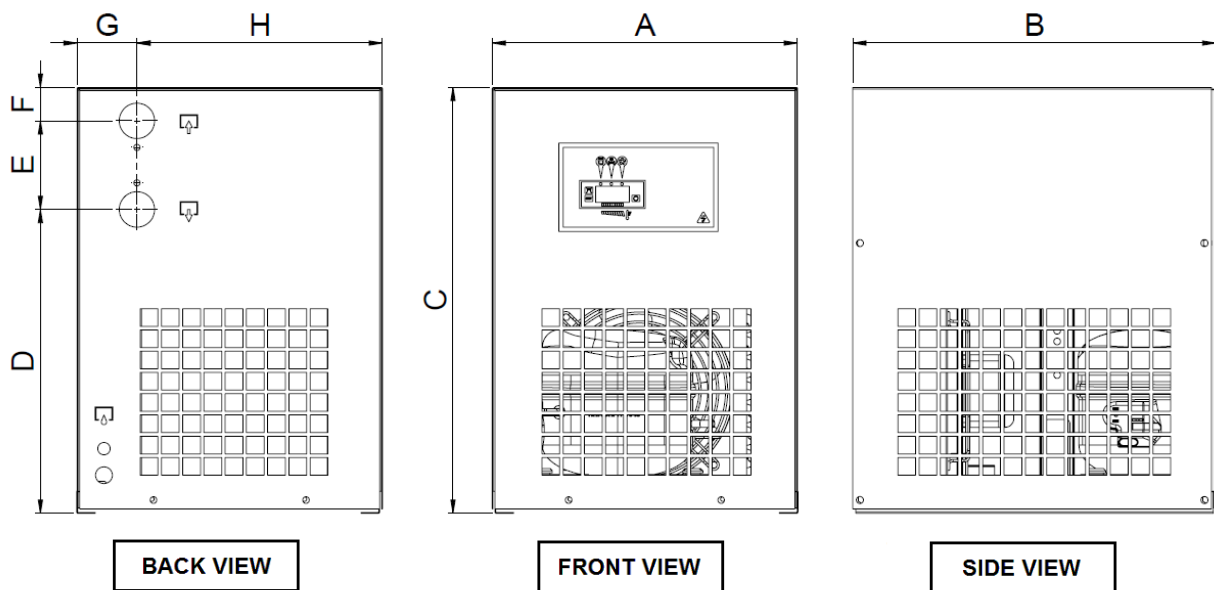





**B. LEGEND**

|            |   |
|------------|---|
| <b>1A1</b> | Electronical controller                             |
| <b>1S1</b> | Main switch   |
| <b>1M1</b> | Refrigerant compressor                              |
| <b>1M2</b> | Fan motor   |
| <b>1R1</b> | NTC probe L=0.8m                                    |
| <b>1R2</b> | NTC probe L=2.5m                                    |
| <b>CND</b> | Condenser   |
| <b>FF</b>  | Filter dryer  |
| <b>SC</b>  | Aluminum heat-exchanger                             |
|            | <b>SC / AA</b> Aluminum exchanger air - air         |
|            | <b>SC / AR</b> Aluminum exchanger air - refrigerant |
|            | <b>SC / MC</b> Mixing chamber                       |
| <b>VB</b>  | By-pass valve                                       |
| <b>TS</b>  | Thermal switch                                      |
| <b>1B1</b> | Coil drain valve                                    |
| <b>RBF</b> | Filter  |
| <b>1V1</b> | Solenoid valve                                      |
| <b>CT</b>  | Capillary tube                                      |

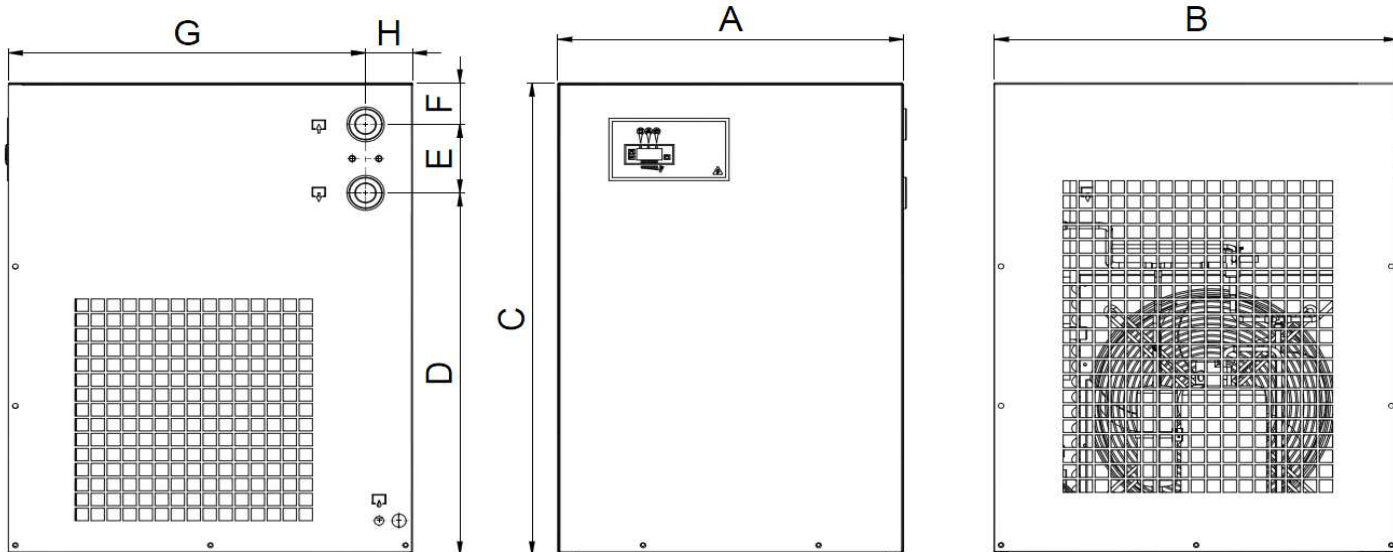
**C. DRYERS DIMENSIONS**

**DRA 24-216**



| MODEL          | A   | B   | C   | D   | E   | F  | H  |  |  |  |
|----------------|-----|-----|-----|-----|-----|----|----|--|---|---|
| <i>DRA</i>     | mm  | mm  | mm  | mm  | mm  | mm | mm | inch   | mm  | V/ph/Hz   |
| <b>24-54</b>   | 305 | 373 | 440 | 340 | 65  | 35 | 45 | BSP 3/4"   | D.6   | 230/1/50  |
| <b>78-106</b>  | 345 | 409 | 480 | 343 | 100 | 37 | 67 | BSP 3/4"   |   |   |
| <b>144-180</b> | 396 | 462 | 536 | 363 | 100 | 73 | 68 | BSP 1"   |   |   |
| <b>216</b>     | 396 | 462 | 536 | 393 | 100 | 43 | 64 | BSP 1"   |   |   |





**DRA 300**



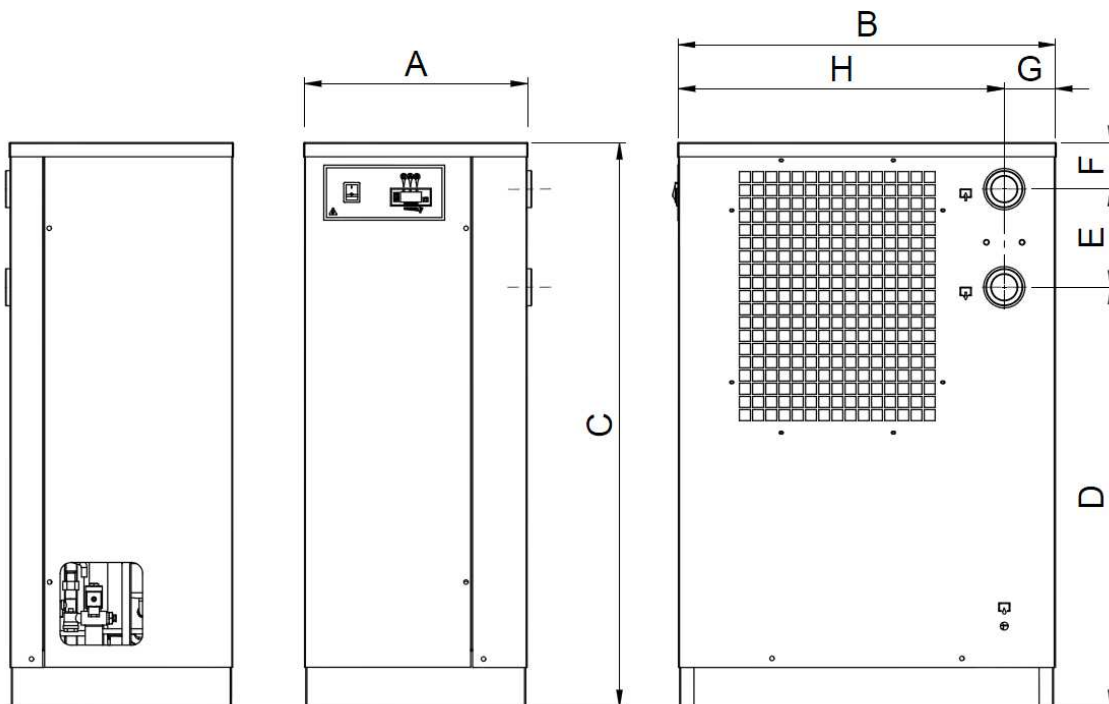
**SIDE VIEW**

**FRONT VIEW**

**SIDE VIEW**

| MODEL | A   | B   | C   | D   | E   | F  | G   | H  |  &  |  |  |
|-------|-----|-----|-----|-----|-----|----|-----|----|---|---|---|
| DRA   | mm  | mm  | mm  | mm  | mm  | mm | mm  | mm | inch  | mm  | V/ph/Hz   |
| 300   | 517 | 606 | 667 | 491 | 110 | 66 | 535 | 71 | BSP 1.1/2"  | D.6   | 230/1/50  |





**DRA 365-480**



**BACK VIEW**

**FRONT VIEW**

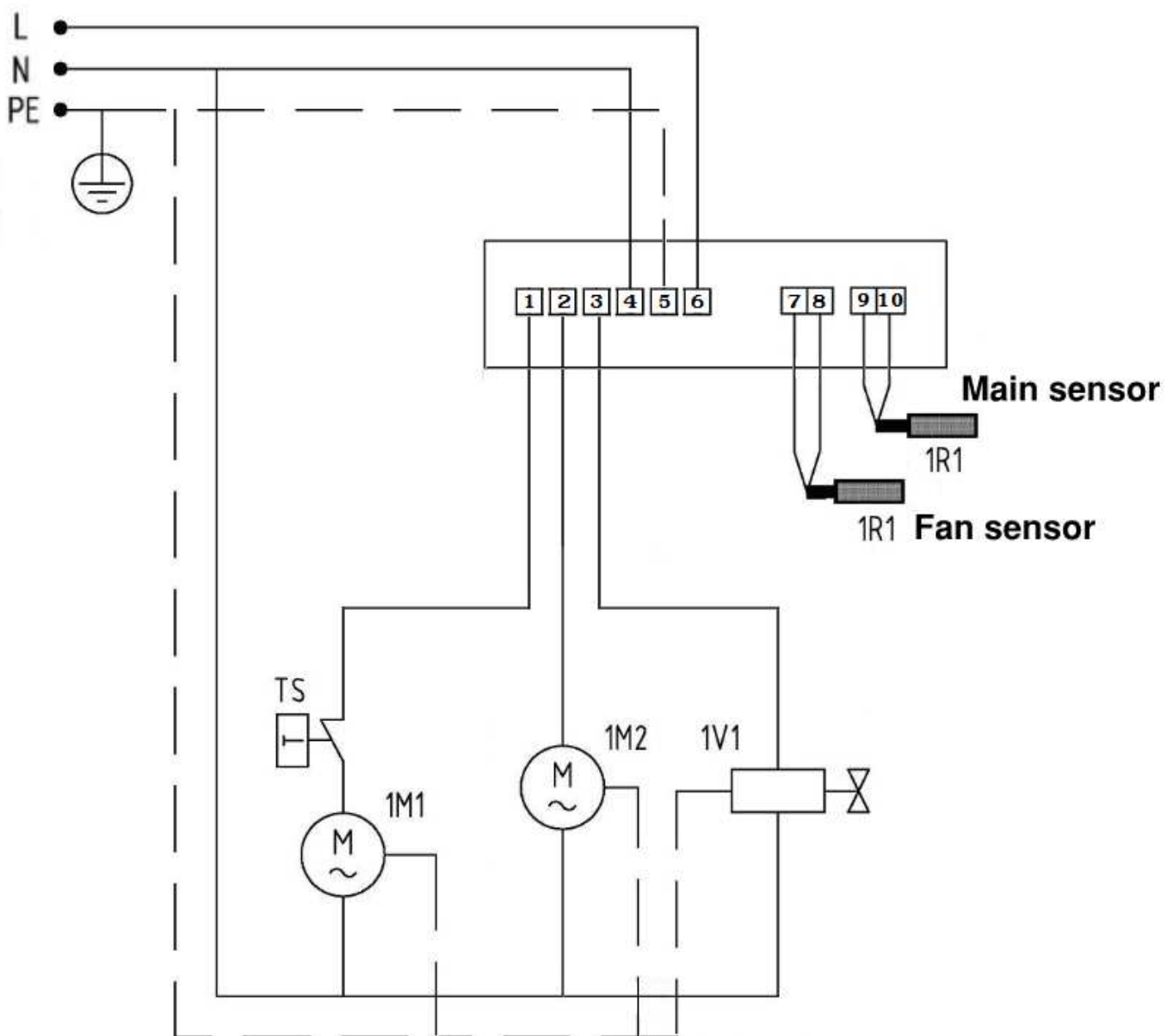
**SIDE VIEW**

| MODEL      | A   | B   | C    | D   | E   | F   | G  | H   |  &  |  |  |
|------------|-----|-----|------|-----|-----|-----|----|-----|--|---|---|
| DRA365-480 | mm  | mm  | mm   | mm  | mm  | mm  | mm | mm  | inch   | mm  | V/ph/Hz   |
| DRA365-480 | 405 | 685 | 1045 | 761 | 178 | 106 | 93 | 592 | BSP 1.1/2"   | D.6   | 230/1/50  |

## D. WIRING DIAGRAMS

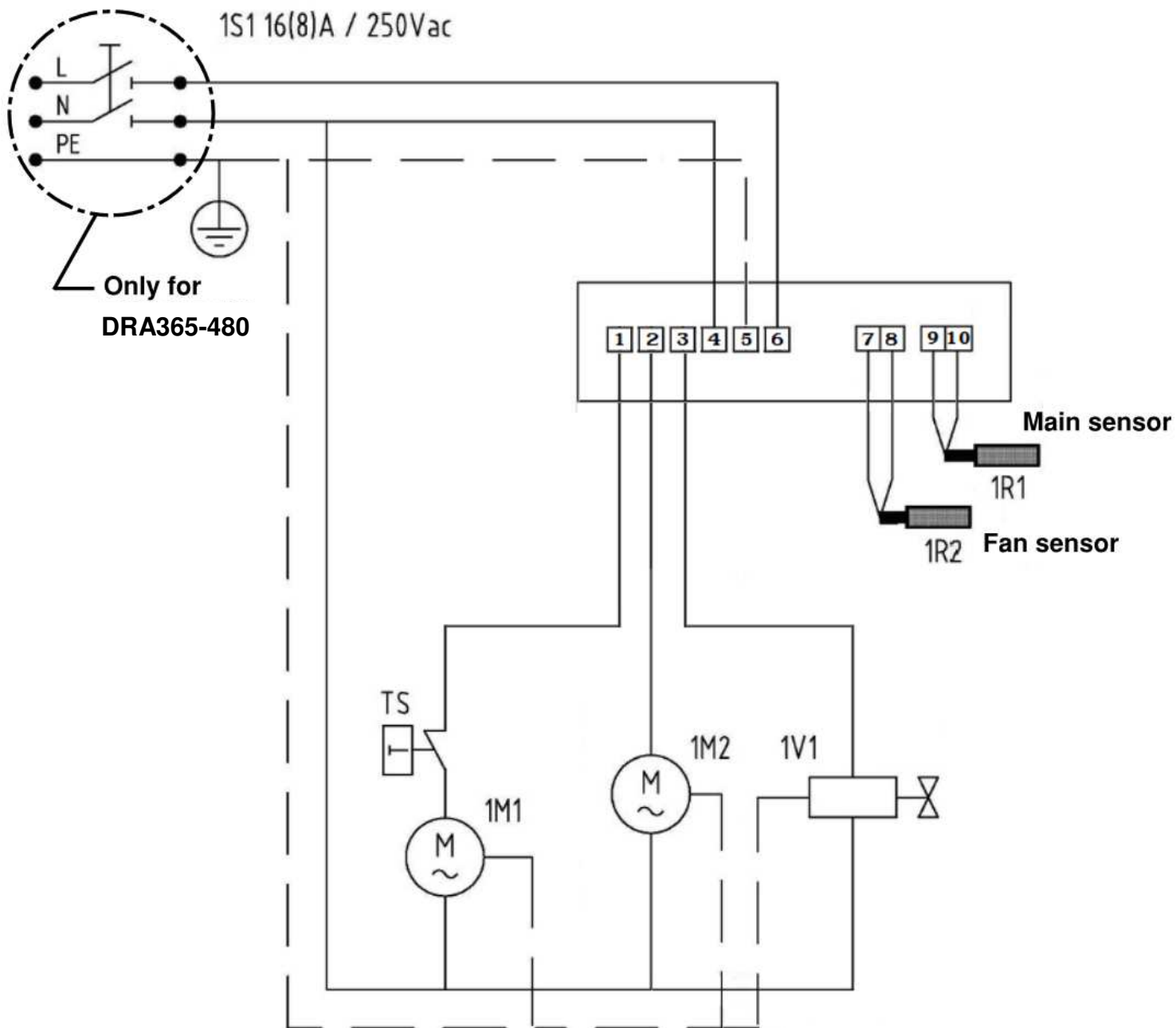
DRA 24-180

DOUBLE PROBE VERSION



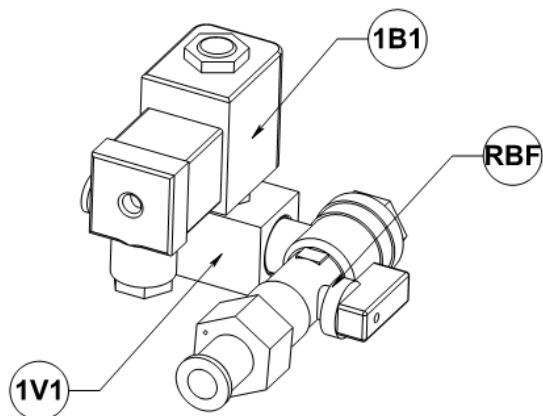
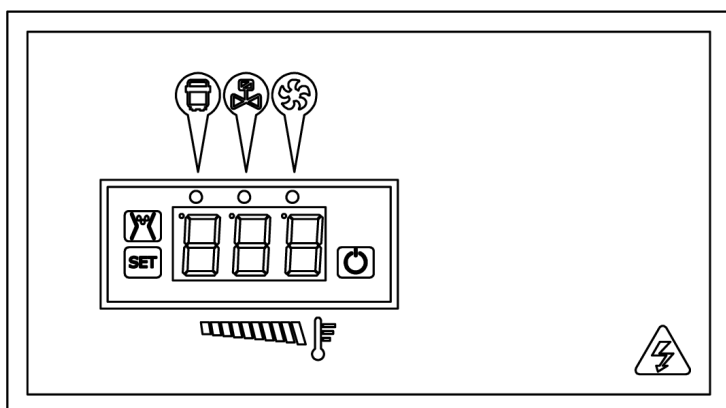
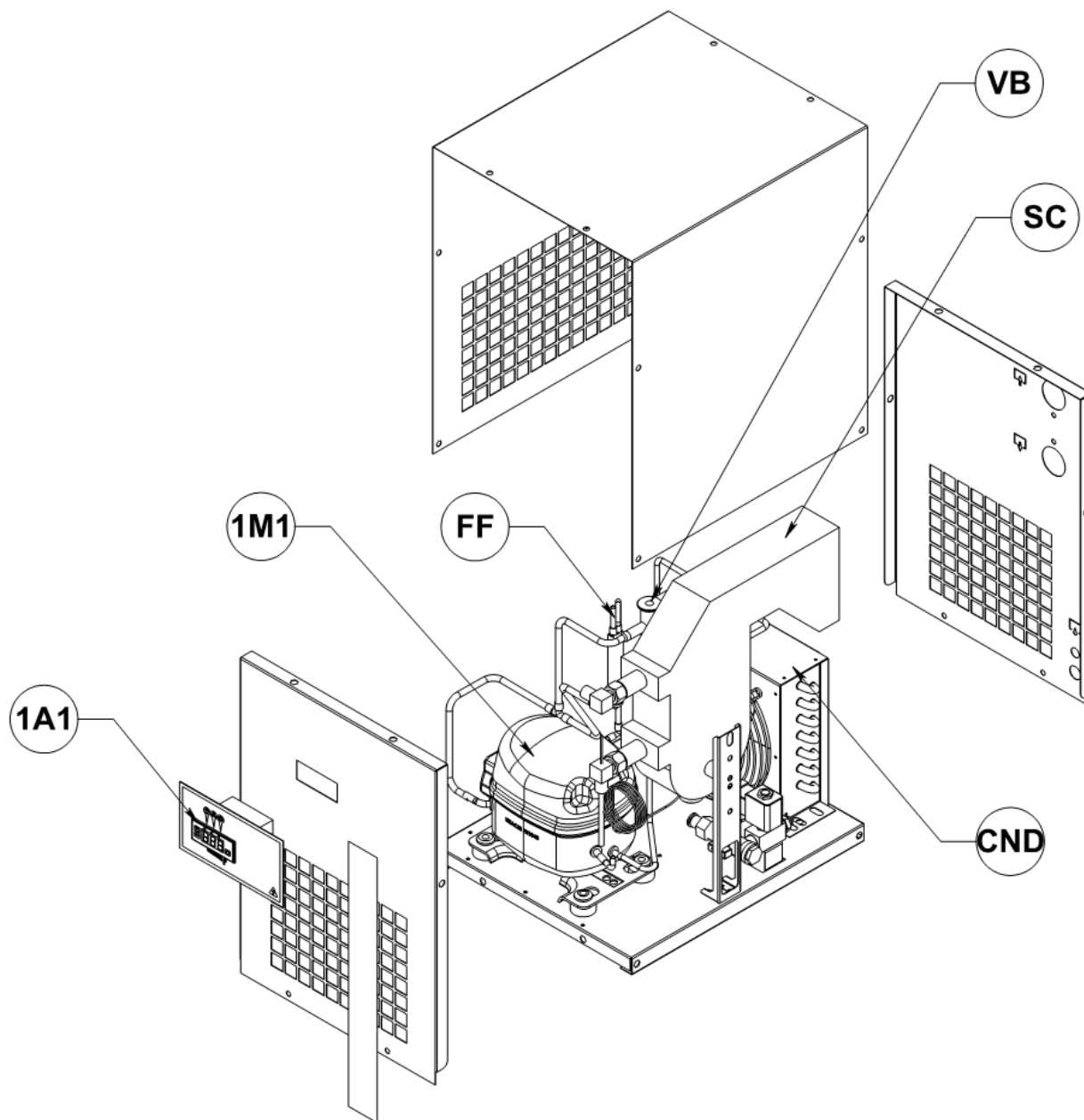
DRA 216-480

DOUBLE PROBE VERSION

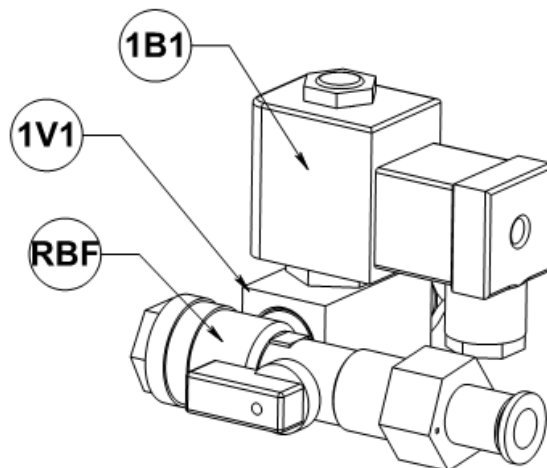
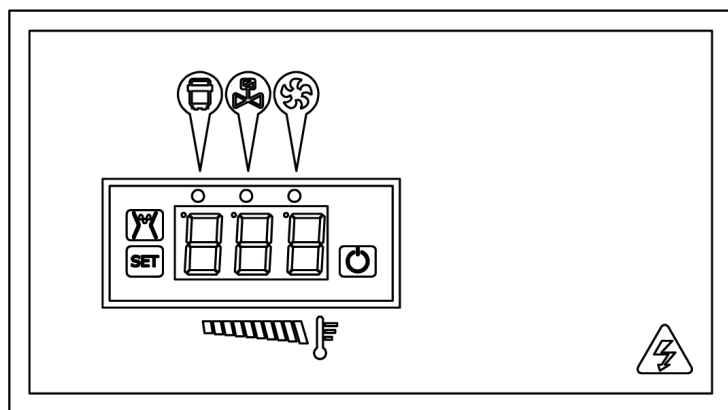
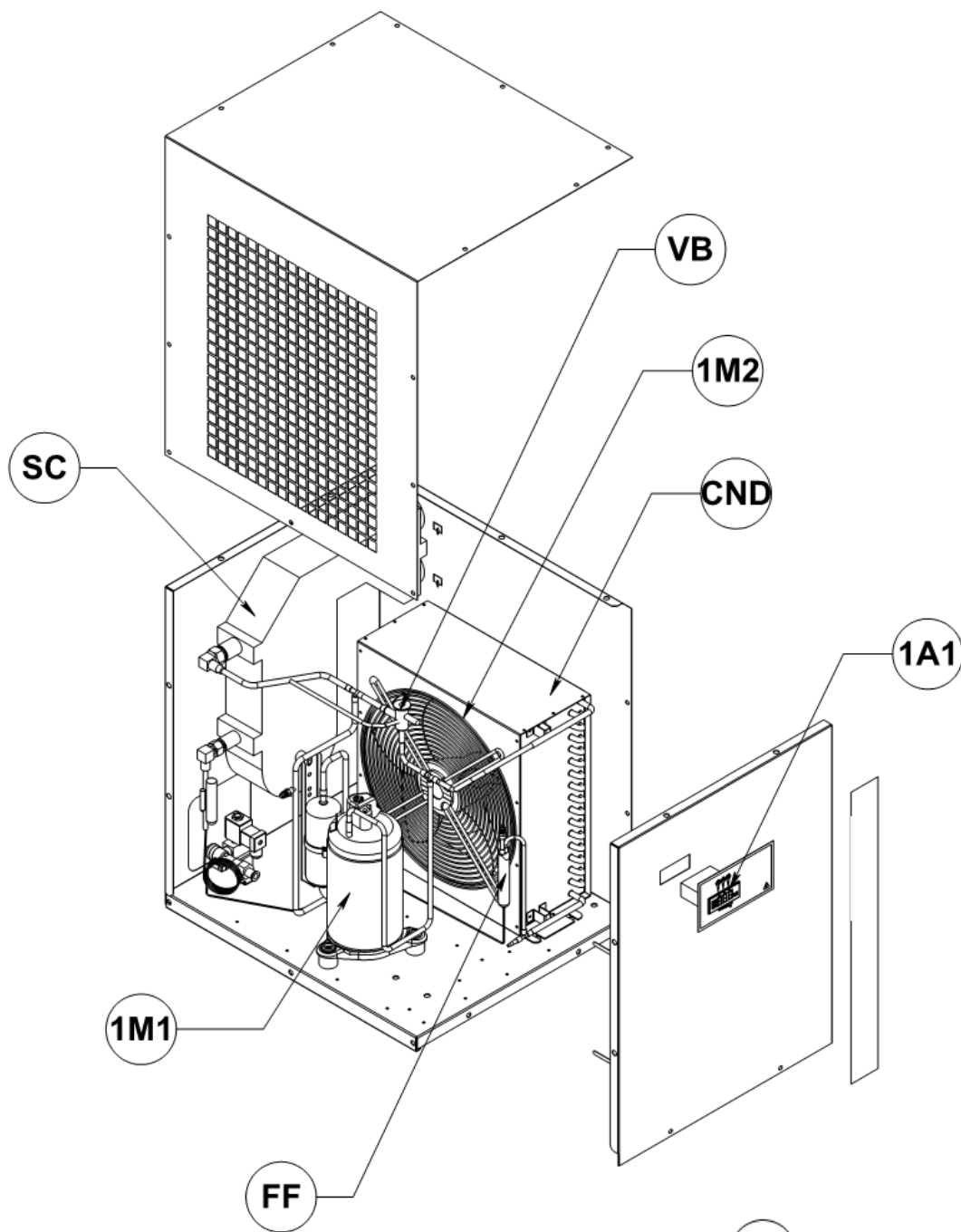


**E. EXPLODED VIEW**

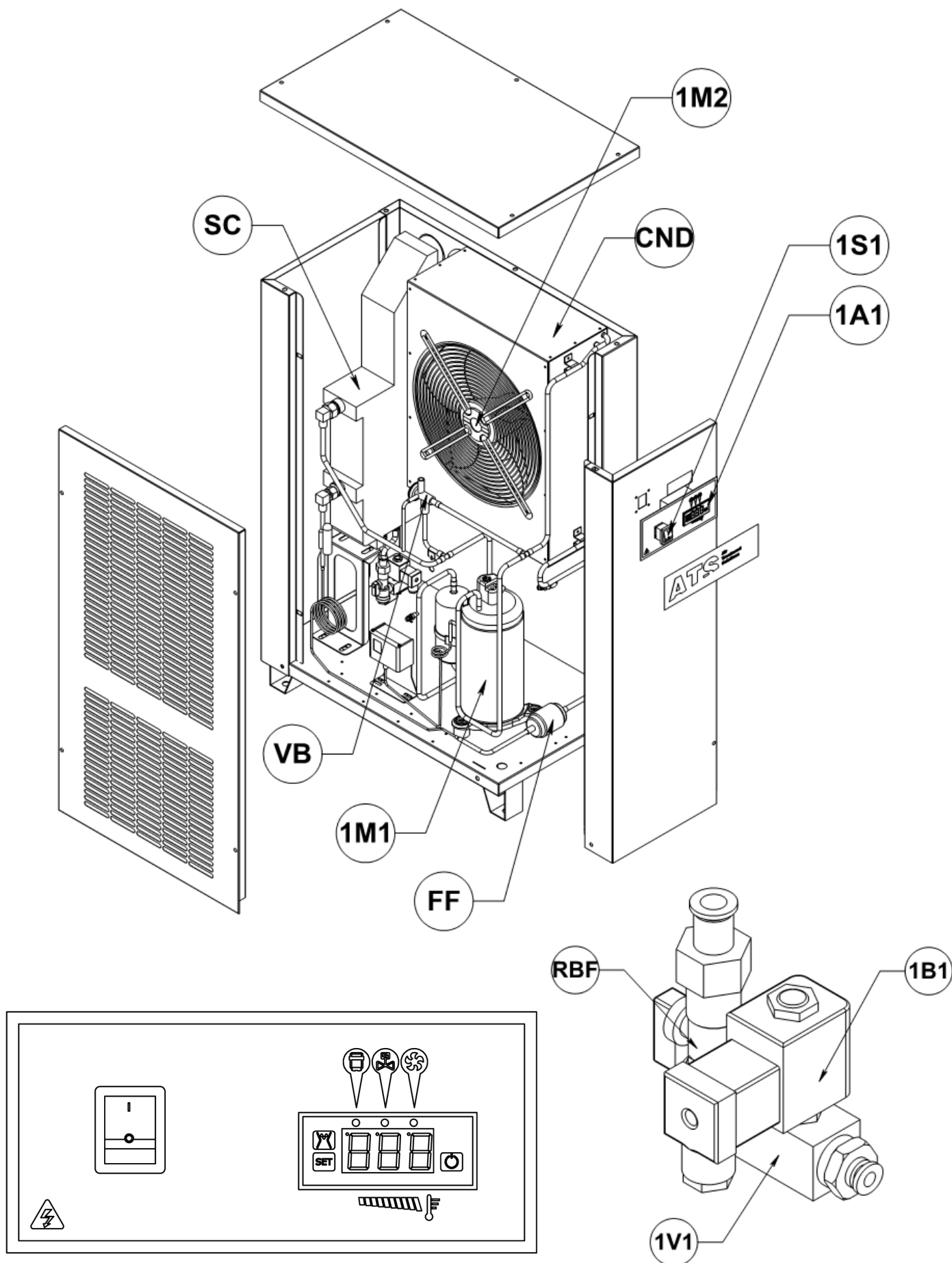
DRA 24-216



DRA 300



DRA 365-480



### F. SUGGESTED SPARE PARTS

The suggested spare parts list will enable you to promptly intervene in case of abnormal operation, so avoiding to wait for the spares delivery. In case of failure of other parts, for example inside the refrigerating circuit, the replacement must mandatory be worked out by a refrigerating systems specialist or in our factory.

|     | DESCRIPTION OF THE SPARE PARTS | CODE               | 24 | 36 | 54 | 78 | 106 | 144 | 180 | 216 | 300 | 365 | 480 |   |
|-----|--------------------------------|--------------------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|---|
| 1A1 | Electronic controller          | 305.0EB.00004      | 1♦ | 1♦ | 1♦ | 1♦ | 1♦  | 1♦  | 1♦  | 1♦  | 1♦  | 1♦  | 1♦  |   |
| 1S1 | Main switch                    | 250.0016.00.00-00  |    |    |    |    |     |     |     |     |     | 1   |     |   |
|     |                                | 332.TSWO.21.00-00  |    |    |    |    |     |     |     |     |     |     |     | 1 |
| 1R1 | NTC probe L=0.8m               | 243.0080.00.00-00  | 2♦ | 2♦ | 2♦ | 2♦ | 2♦  | 2♦  | 2♦  | 2♦  | 1♦  | 1♦  | 1♦  |   |
| 1R2 | NTC probe L=2.5m               | 243.0250.00.00-00  |    |    |    |    |     |     |     |     | 1♦  | 1♦  | 1♦  |   |
| VB  | By pass valve                  | 142.2950.00.00-00  | 1  | 1  | 1  | 1  | 1   | 1   | 1   | 1   |     |     |     |   |
|     |                                | 142.4536.00.00-00  |    |    |    |    |     |     |     |     |     | 1   | 1   | 1 |
| 1B1 | Coil CS728 220-240V 50/60 Hz   | 240.T100.01.00-00  | 1♦ | 1♦ | 1♦ | 1♦ | 1♦  | 1♦  | 1♦  | 1♦  | 1♦  | 1♦  | 1♦  |   |
| 1V1 | Solenoid CS728 Conn 1/2" mm    | 240.T100.02.00-00  | 1♦ | 1♦ | 1♦ | 1♦ | 1♦  | 1♦  | 1♦  | 1♦  | 1♦  | 1♦  | 1♦  |   |
| RBF | Strainer CS728 Conn1/2",6 mm   | 240.T100.03.00-00  | 1  | 1  | 1  | 1  | 1   | 1   | 1   | 1   | 1   | 1   | 1   |   |
| 1M2 | Fan motor                      | 210.0130.00.00-00  | 1  | 1  | 1  | 1  |     |     |     |     |     |     |     |   |
|     |                                | 210.0131.00.00-00  |    |    |    |    | 1   | 1   |     |     |     |     |     |   |
|     |                                | 210.0132.00.00-00  |    |    |    |    |     |     | 1   | 1   |     |     |     |   |
|     | Fan blade                      | 213.0061.00.00-00  | 1  | 1  | 1  | 1  |     |     |     |     |     |     |     |   |
|     |                                | 213.0062.00.00-00  |    |    |    |    | 1   | 1   |     |     |     |     |     |   |
|     |                                | 213.0063.00.00-00  |    |    |    |    |     |     | 1   | 1   |     |     |     |   |
|     | Fan grid                       | 213.0065.00.00-00  | 1  | 1  | 1  | 1  |     |     |     |     |     |     |     |   |
|     |                                | 213.0066.00.00-00  |    |    |    |    | 1   | 1   |     |     |     |     |     |   |
|     | 213.0067.00.00-00              |                    |    |    |    |    |     | 1   | 1   |     |     |     |     |   |
|     | Fan motor unit                 | 210.D350.02.B0-00  |    |    |    |    |     |     |     |     | 1   | 1   | 1   |   |
| FF  | Dehydration filter             | 630.0049.00.00-00  | 1  | 1  | 1  | 1  | 1   | 1   | 1   |     |     |     |     |   |
|     |                                | 630.0050.00.00-00  |    |    |    |    |     |     |     | 1   | 1   |     |     |   |
|     |                                | 630.0075.00.00-00  |    |    |    |    |     |     |     |     |     | 1   | 1   |   |
| CND | Condenser                      | 921.0020.D0.00-BOI | 1  | 1  |    |    |     |     |     |     |     |     |     |   |
|     |                                | 921.0035.D0.00-BOI |    |    | 1  | 1  |     |     |     |     |     |     |     |   |
|     |                                | 921.0108.D0.00-BOI |    |    |    |    | 1   | 1   |     |     |     |     |     |   |
|     |                                | 921.0150.D0.00-BOI |    |    |    |    |     |     | 1   |     |     |     |     |   |
|     |                                | 921.0195.D0.00-BOI |    |    |    |    |     |     |     | 1   |     |     |     |   |
|     |                                | 921.0013.01.00-03  |    |    |    |    |     |     |     |     | 1   |     |     |   |
|     |                                | 921.0365.00.00-BOI |    |    |    |    |     |     |     |     |     |     | 1   |   |
|     | 921.0480.00.00-BOI             |                    |    |    |    |    |     |     |     |     |     |     | 1   |   |
| 1M1 | Refrigerant compressor         | 201.0102.00.00-00  | 1  | 1  |    |    |     |     |     |     |     |     |     |   |
|     |                                | 201.0100.00.00-00  |    |    | 1  | 1  |     |     |     |     |     |     |     |   |
|     |                                | 201.0101.00.00-00  |    |    |    |    | 1   | 1   |     |     |     |     |     |   |
|     |                                | 201.0110.00.00-CH  |    |    |    |    |     |     | 1   |     |     |     |     |   |
|     |                                | 201.T135.VH.SM-T   |    |    |    |    |     |     |     | 1   | 1   |     |     |   |
|     |                                | 201.T102.00.00-00  |    |    |    |    |     |     |     |     |     | 1   |     |   |
|     | 201.T103.00.00-00              |                    |    |    |    |    |     |     |     |     |     | 1   |     |   |
| SC  | Aluminum heat exchanger        | 920.5088.00.00-T   | 1  | 1  | 1  |    |     |     |     |     |     |     |     |   |
|     |                                | 920.5105.00.00-T   |    |    |    | 1  | 1   |     |     |     |     |     |     |   |
|     |                                | 920.5089.00.00-T   |    |    |    |    |     | 1   | 1   |     |     |     |     |   |
|     |                                | 920.5161.00.00-T   |    |    |    |    |     |     |     | 1   |     |     |     |   |
|     |                                | 920.5090.00.00-T   |    |    |    |    |     |     |     |     | 1   |     |     |   |
|     |                                | 920.1326.00.00-T   |    |    |    |    |     |     |     |     |     |     | 1   |   |
|     | 920.1327.00.00-T               |                    |    |    |    |    |     |     |     |     |     |     | 1   |   |
| TS  | Safety Thermostat              | 242.0075.00.00-00  | 1  | 1  | 1  | 1  | 1   | 1   | 1   | 1   | 1   | 1   | 1   |   |

♦ Suggested spare part.

**NOTE :** To order the suggested spare parts or any other part, it's necessary to quote the data reported on the identification plate.