

# RVG 5 - RVG 10 RVK 10 - RVK 20 RVK 25-40

*REFRIGERATING AIR DRYER*

**EN**

**USER'S MAINTENANCE AND SPARE PARTS MANUAL**

*Air - water Cooled*

Dear Customer,

thank you for choosing our product. In order to get the best performances out of this product, please read this manual carefully.

To avoid incorrect operation of the equipment and possible physical risk to the operator, please read and strictly follow the instructions contained in this manual.

Note, these instructions are in addition to the safety rules that apply in the country where the dryer is installed. Before packing for shipment each **RVG - RVK** series refrigerated air dryer undergoes a rigorous test to ensure the absence of any manufacturing faults and to demonstrate that the device can perform all the functions for which it has been designed.

Once the dryer has been properly installed according to the instructions in this manual, it will be ready for use without any further adjustment. The operation is fully automatic, and the maintenance is limited to few controls and some cleaning operations, as detailed in the following chapters.

**This manual must be maintained available in any moment for future references and it has to be intended as inherent part of the relevant dryer.**


Due to the continuous technical evolution, we reserve the right to introduce any necessary change without giving previous notice.

Should you experience any trouble, or for further information, please do not hesitate to contact us.

### DATA NAMEPLATE

The data nameplate is located on the back of the dryer and shows all the primary data of the machine. Upon installation, fill in the table on the previous page with all the data shown on the data nameplate. This data should always be referred to when calling the manufacturer or distributor.

The removal or alteration of the data nameplate will void the warranty rights.

|                            |   |                            |  |
|----------------------------|---|----------------------------|--|
| Model                      | ⇒ | Model                      | <input type="text"/>   |
| Serial No.                 | ⇒ | Serial No.                 | <input type="text"/>   |
| Code                       | ⇒ | Code                       | <input type="text"/>   |
| Nominal Flow Rate          | ⇒ | Nominal Flow Rate          | <input type="text"/> l/min   |
| Max Air Pressure           | ⇒ | Max Air Pressure           | <input type="text"/> barg  |
| Max Inlet Air Temp.        | ⇒ | Max Inlet Air Temp.        | <input type="text"/> °C  |
| Ambient Temp.              | ⇒ | Ambient Temp.              | <input type="text"/> °C  |
| Refrigerant (Type and qty) | ⇒ | Refrigerant                | <input type="text"/> type/kg   |
| Refrig. Design Pres. HP/LP | ⇒ | Refrig. Design Pres. HP/LP | <input type="text"/> barg  |
| Electric Supply            | ⇒ | Electric Supply            | <input type="text"/> ph/V/Hz   |
| Electric Nominal Power     | ⇒ | Electric Nominal Power     | <input type="text"/> W/A   |
| Fuse Max.                  | ⇒ | Fuse Max.                  | <input type="text"/> A   |
| Manufactured               | ⇒ | Manufactured               | <input type="text"/>  |



### WARRANTY CONDITIONS

For 12 months from the installation date, but no longer than 14 months from the delivery date, the warranty covers eventual faulty parts, which will be repaired or replaced free of charge, except the travel, hotel and restaurant expenses of our engineer.

The warranty doesn't cover any responsibility for direct or indirect damages to persons, animals or equipment caused by improper usage or maintenance, and it's limited to manufacturing faults only.

The right to warranty repairs is subordinated to the strict compliance with the installation, use and maintenance instructions contained in this manual.

The warranty will be immediately voided in case of even small changes or alterations to the dryer. To require repairs during the warranty period, the data reported on the identification plate must be notified.

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- 1.2. Warnings
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## 1. SAFETY RULES

### 1.1. DEFINITION OF THE CONVENTIONAL SIGNS USED IN THIS MANUAL



Carefully read instruction manual before attempting any service or maintenance procedures on the dryer.



Caution warning sign. Risk of danger or possibility of damage to equipment, if related text is not followed properly.



Electrical hazard. Warning message indicates practices or procedures that could result in personal injury or fatality if not followed correctly.



Danger hazard. Part or system under pressure.



Danger hazard. High temperature conditions exist during operation of system. Avoid contact until system or component has dissipated heat.



Danger hazard. Treated air is not suitable for breathing purposes; serious injury or fatality may result if precautions are not followed.



Danger hazard: In case of fire, use an approved fire extinguisher, water is not an acceptable means in cases of fire.



Danger hazard. Do not operate equipment with panels removed.



Maintenance or control operation to be performed by qualified personnel only <sup>1</sup>.



Compressed air inlet connection point.



Compressed air outlet connection point.



Condensate drain connection point.



Operations which can be worked out by the operator of the machine, if qualified <sup>1</sup>.

**NOTE :** Text that specifies items of note to be taken into account does not involve safety precautions.



In designing this unit a lot of care has been devoted to the environment protection:

- CFC free refrigerants
- CFC free insulation parts
- Energy saving design
- Limited acoustic emission
- Dryer and relevant packaging composed of recyclable materials

This symbol requests that the user heed environmental considerations and abide with suggestions annotated with this symbol.

<sup>1</sup> Experienced and trained personnel familiar with national and local codes, capable to perform the needed activities, identify and avoid possible dangerous situations while handling, installing, using and servicing the machine. Ensuring compliance to all statutory regulations.

## 1.2. WARNINGS



Compressed air is a highly hazardous energy source. Never work on the dryer with parts under pressure. Never point the compressed air or the condensate drain jet towards anybody. The user is responsible for the installation of the dryer, which has to be executed on the basis of the instructions given in the "Installation" chapter. Otherwise, the warranty will be voided and dangerous situations for the personnel and/or damages to the machine could occur.



Only qualified personnel can use and service electrically powered devices. Before attempting any maintenance action, the following conditions must be satisfied :

- Ensure that any part of the machine is under voltage and that it cannot be connected to the mains.
- Ensure that any part of the dryer is under pressure and that it cannot be connected to the compressed air system



These refrigerating air dryers contain R134a or R404A HFC type refrigerant fluid. Refer to the specific paragraph - maintenance operation on the refrigerating circuit.



Warranty does not apply to any unit damaged by accident, modification, misuse, negligence or misapplication. Unauthorized alterations will immediately void the warranty.



In case of fire, use an approved fire extinguisher, water is not an acceptable means in cases of electrical fire.

## 1.3. PROPER USE OF THE DRYER

This dryer has been designed, manufactured and tested for the purpose of separating the humidity normally contained in compressed air. Any other use has to be considered improper.

The Manufacturer will not be responsible for any problem arising from improper use; the user will bear responsibility for any resulting damage:

- Voltage and frequency of the mains.
- Pressure, temperature and flow-rate of the incoming air.
- Ambient temperature.

This dryer is supplied tested and fully assembled. The only operation left to the user is the connection to the plant in compliance with the instructions given in the following chapters.



The purpose of the machine is the separation of water and eventual oil particles present in compressed air. The dried air cannot be used for breathing purposes or for operations leading to direct contact with foodstuff.



This dryer is not suitable for the treatment of dirty air or of air containing solid particles.

## 1.4. INSTRUCTIONS FOR THE USE OF PRESSURE EQUIPMENT ACCORDING TO PED DIRECTIVE 97/23/EC

To ensure the safe operation of pressure equipments, the user must conform strictly to the above directive and the following :

1. The equipment must only be operated within the temperature and pressure limits stated on the manufacturer's name/data plate.
2. Welding on heat-exchanger is not recommended.
3. The equipment must not be stored in badly ventilated spaces, near a heat source or inflammable substances;
4. Vibration must be eliminated from the equipment to prevent fatigue failure.
5. Automatic condensate drains should be checked for operation every day to prevent a build up of condensate in the pressure equipment.
6. The maximum working pressure stated on the manufacturer's data plate must not be exceeded. Prior to use, the user must fit safety / pressure relief devices.
7. All documentation supplied with the equipment (manual, declaration of conformity etc.) must be kept for future reference.
8. Do not apply weights or external loads on the vessel or its connecting piping.



**TAMPERING, MODIFICATION AND IMPROPER USE OF THE PRESSURE EQUIPMENT ARE FORBIDDEN.** Users of the equipment must comply with all local and national pressure equipment legislation in the country of installation.

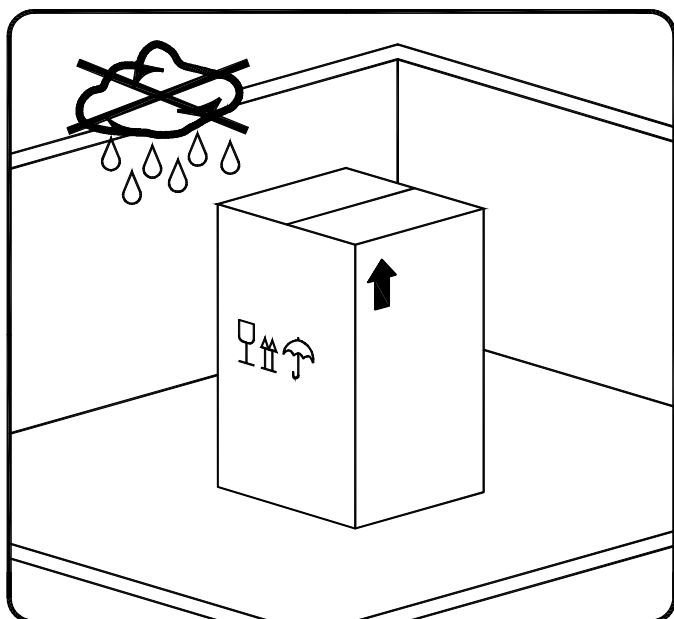
## 2. INSTALLATION

### 2.1. TRANSPORT

Once verified the integrity of the packaging, place the unit near the installation point and unpack the contents.

- To move the packaged unit we suggest to use a suitable trolley or forklift. Transportation by hands is discouraged.
- Keep the dryer always in vertical position. Turning it upside down some parts could be irreparably damaged.
- Handle with care. Heavy blows could cause irreparable damage.

### 2.2. STORAGE



Even when packaged, keep the machine protected from severity of the weather.

Keep the dryer in vertical position, also when stored. Turning it upside down some parts could be irreparably damaged.

If not in use, the dryer can be stored in its packaging in a dust free and protected site at a maximum temperature of 45 °C, and a specific humidity not exceeding 90%. Should the stocking time exceed 12 months, please contact the manufacturer.



The packaging materials are recyclable.

Dispose of material in compliance with the rules and regulations in force in the destination country..

### 2.3. INSTALLATION SITE



Failure to install dryer in the proper ambient conditions will affect the dryer's ability to condense refrigerant gas. This can cause higher loads on the compressor, loss of dryer efficiency and performance, overheated condenser fan motors, electrical component failure and dryer failure due to the following: compressor loss, fan motor failure and electrical component failure. Failures of this type will affect warranty considerations.

Do not install dryer in an environment of corrosive chemicals, explosive gasses, poisonous gasses; steam heat, areas of high ambient conditions or extreme dust and dirt.



In case of fire, use an approved fire extinguisher, water is not an acceptable means in cases of fire.

#### Minimum installation requirements:

- Select a clean dry area, free from dust, and protected from atmospheric disturbances.
- The supporting area must be smooth, horizontal and able to hold the weight of the dryer.
- Minimum ambient temperature +1 °C.
- Maximum ambient temperature +45 °C.
- Allow at least 1 meter of clearance on each side of the dryer for proper ventilation and circulation through the condenser. The space is also necessary to facilitate maintenance operations.

### 2.4. CONNECTION TO THE COMPRESSED AIR SYSTEM



**Operations to be performed by qualified personnel only.**

**Never work on compressed air system under pressure.**

**The user is responsible to ensure that the dryer will never be operated with pressure exceeding the maximum pressure rating on the unit data tag.**

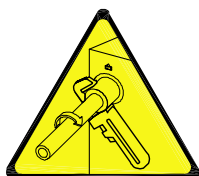
**Over-pressurizing the dryer could be dangerous for both the operator and the unit.**



**In case of heavily polluted inlet air (ISO 8573.1 class 3.-.3 or worse quality), we recommend the additional installation of a pre-filter (5 micron minimum) to prevent a clogging of the heat exchanger.**

The air temperature and the flow entering the dryer must comply within the limits stated on the data nameplate. The system connecting piping must be kept free from dust, rust, chips and other impurities, and must be consistent with the flow-rate of the dryer. In case of treatment of air at particularly high temperature, the installation of a Aftercooler could result necessary. In order to perform maintenance operations, it recommended that a dryer by-pass system be installed.

In realising the dryer, particular measures have been taken in order to limit the vibration which could occur during the operation. Therefore we recommend to use connecting pipes able to insulate the dryer from possible vibrations originating from the line (flexible hoses, vibration damping fittings, etc.).



#### CAUTION:

**PIPING THE DRYER, INLET/OUTLET CONNECTIONS MUST BE SUPPORTED AS SHOW IN THE DIAGRAM.**

**FAILING WILL RESULT IN DAMAGE**

## 2.5. ELECTRICAL CONNECTIONS



Qualified personnel should carry out connecting unit to the main power. Be sure to check the local codes in your area.

Before connecting the unit to the electrical supply, verify the data nameplate for the proper electrical information. Voltage tolerance is +/- 5%.

The dryers RVG, RVK come with a mains connecting cable already installed and ending with a VDE 16A - Shucko plug.

The mains socket must be provided with a **mains magneto-thermal differential breaker** ( $I_{\Delta n}=0.03A$ ), adjusted on the basis of the consumption of the dryer (see the nominal values on the data plate of the dryer).

The cross section of the power supply cables must comply with the consumption of the dryer, while keeping into account also the ambient temperature, the conditions of the mains installation, the length of the cables, and the requirements enforced by the local Power Provider.



Connect to a properly grounded outlet. Improper connection of the equipment-grounding conductor can result in risk of electric shock. Do not use adapters on the main socket- if it does not fit the outlet, have a proper outlet installed by a qualified electrician.

## 2.6. CONDENSATE DRAIN



The condensate is discharge at the system pressure.

Drain line should be secured.

Never point the condensate drain line towards anybody.

The dryer comes with a flexible plastic drain tube.

The condensate drain occurs through a solenoid valve protected with a mechanical strainer.

The condensate coming from the separator is previously filtered, then discharged.

The solenoid valve coil is operated by electronic instrument (dryer controller).

If an electronic drainer is installed, the intervention times are determined by the internal capacitive sensor (see specific paragraph).

The drainers cannot be connected to pressurized systems.



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.

## 3. START UP

### 3.1. PRELIMINARY OPERATION



Verify that the operating parameters match with the nominal values reported on the data plate of the dryer (voltage, frequency, air pressure, air temperature, ambient temperature, etc.).

This dryer has been thoroughly tested, packaged and inspected prior to shipment. Nevertheless, the unit could be damaged during transportation, check the integrity of the dryer during first start-up and monitor operation during the first hours of operation.



Qualified personnel must perform the first start-up.

When installing and operating this equipment, comply with all National Electrical Code and any applicable federal, state and local codes.



Who is operating the unit is responsible for the proper and safe operation of the dryer.

Never operate equipment with panels removed.



### 3.2. FIRST START-UP



This procedure should be followed on first start-up, after periods of extended shutdown or following maintenance procedures.

Qualified personnel must perform the start-up.

#### Sequence of operations (refer to paragraph 5.1 Control Panel) :

- Ensure that all the steps of the “Installation” chapter have been observed.
- Ensure that the connection to the compressed air system is correct and that the piping is suitably fixed and supported.
- Ensure that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Ensure that the by-pass system (if installed) is open and the dryer is isolated
- Ensure that the manual valve of the condensate drain circuit is open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Turn on the main switch - pos. 1 on the control panel.
- Ensure that the DMC15 electronic instrument is ON.
- Ensure the consumption matches with the values of the data plate.
- **Ensure the fan work properly - wait for its first interventions.**
- Allow the dryer temperature to stabilise at the pre-set value.
- Slowly open the air inlet valve.
- Slowly open the air outlet valve.
- Slowly close the central by-pass valve of the system (if installed).
- Check the piping for air leakage.
- Ensure the drain is regularly cycling - wait for its first interventions.

### 3.3. START-UP AND SHUT DOWN



#### Start-up (refer to paragraph 5.1 Control Panel) :

- Check the condenser for cleanliness.
- Verify that the system is powered.
- Turn on the main switch - pos. 1 on the control panel.
- Ensure that DMC15 electronic instrument is ON.
- Wait a few minutes; verify that the DewPoint temperature displayed on DMC15 electronic instrument is correct and that the condensate is regularly drained.
- Switch on the air compressor.



#### Shut down (refer to paragraph 5.1 Control Panel) :

- Verify that the DewPoint temperature displayed on DMC15 electronic instrument is correct.
- Shut down the air compressor.
- After a few minutes, switch off the main switch on the control panel of the dryer (pos. 1).

**NOTE : A DewPoint included in the green operating area of the electronic controller is correct according to the possible working conditions (flow-rate, temperature of the incoming air, ambient temperature, etc.)**

During the operation, the refrigerating compressor will run continuously. The dryer must remain on during the full usage period of the compressed air, even if the air compressor works intermittently.



**The number of starts must be no more than 6 per hour. The dryer must stop running for at least 5 minutes before being started up again.**

**The user is responsible for compliance with these rules. Frequent starts may cause irreparable damage.**

## 4. TECHNICAL SPECIFICATIONS

### 4.1. TECHNICAL SPECIFICATIONS RVG 5\_RVG 10\_RVK 10\_RVK 20\_RVK 25-40

| MODEL   | RVG 5                        | RVG 10 | RVK 10     | RVK 20       | RVK 25-40      | RVK 25-40/-E |
|---|------------------------------|--------|------------|--------------|----------------|--------------|
| Air flow rate at nominal condition <sup>1</sup>     |                              |        |            |              |                |              |
| [m³/h]  | 36                           | 75     | 60         | 126          | 240            | 270          |
| [l/min]   | 600                          | 1250   | 1000       | 2100         | 4000           | 4500         |
| [scfm]  | 21                           | 44     | 35         | 74           | 141            | 159          |
| Pressure DewPoint at nominal condition <sup>1</sup> | +3 equal to 0.73 g/m³ di H₂O |        |            |              |                |              |
| [°C]  |                              |        |            |              |                |              |
| Nominal ambient temperature (max.)                  | +25 (+45)                    |        |            |              |                |              |
| [°C]  |                              |        |            |              |                |              |
| Min. ambient temperature                            | +1                           |        |            |              |                |              |
| [°C]  |                              |        |            |              |                |              |
| Nominal inlet air temperature (max.)                | +35 (+55)                    |        |            |              |                |              |
| [°C]  |                              |        |            |              |                |              |
| Nominal inlet air pressure                          | 7                            |        |            |              |                |              |
| [barg]  |                              |        |            |              |                |              |
| Max. inlet air pressure                             | 16                           |        |            |              | 14             |              |
| [barg]  |                              |        |            |              |                |              |
| Air pressure drop - Δp                              | 0.06                         | 0.18   | 0.11       | 0.21         | 0.24           | 0.29         |
| [bar]   |                              |        |            |              |                |              |
| Inlet - Outlet connections                          | G 1/2" BSP-F                 |        | G 1" BSP-F |              | G 1.1/4" BSP-F |              |
| [BSP-F]   |                              |        |            |              |                |              |
| Refrigerant type                                    | R134.a                       |        |            |              |                |              |
|   | R404A                        |        |            |              |                |              |
| Refrigerant quantity <sup>2</sup>                   | 0.20                         | 0.25   | 0.25       | 0.40         | 0.48           | 0.67         |
| [kg]  |                              |        |            |              |                |              |
| Cooling air flow                                    | 200                          | 300    |            | 400          |                |              |
| [m³/h]  |                              |        |            |              |                |              |
| Standard Power Supply <sup>2</sup>                  | 1/230-240/50, 1/230/60       |        |            | 1/230-240/50 |                | 1/230/60     |
| [Ph/V/Hz]   |                              |        |            |              |                |              |
| Nominal electric absorption                         | 160                          | 280    | 210        | 400          | 790            | 1050         |
| [W]   |                              |        |            |              |                |              |
| [A]   | 1.1                          | 1.5    | 1.4        | 2.4          | 3.9            | 4.6          |
| Max. electric absorption                            | 180                          | 360    | 280        | 610          | 1050           | 1460         |
| [W]   |                              |        |            |              |                |              |
| [A]   | 1.2                          | 1.9    | 1.7        | 3.3          | 4.8            | 6.6          |
| Max. level noise at 1 m                             | < 70                         |        |            |              |                |              |
| [dbA]   |                              |        |            |              |                |              |
| Weight  | 25                           | 26     | 35         | 40           | 68             | 68           |
| [kg]  |                              |        |            |              |                |              |

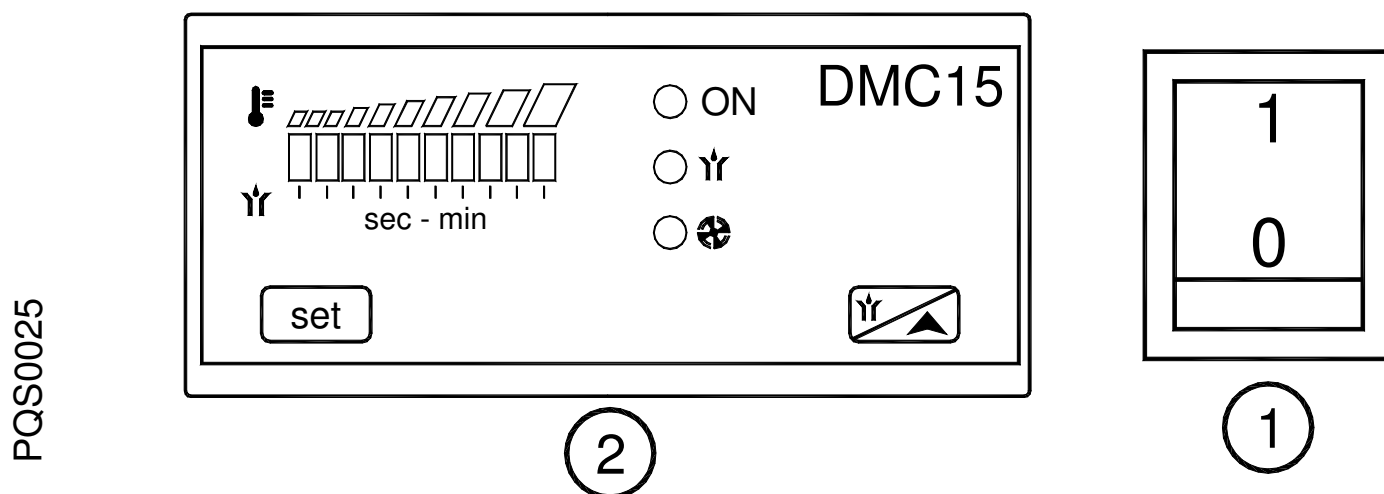
<sup>1</sup> The nominal condition refers to an ambient temperature of +25 °C with inlet air at 7 barg and +35 °C.

<sup>2</sup> Check the data shown on the identification plate.

## 5. TECHNICAL DESCRIPTION

### 5.1. CONTROL PANEL

The control panel illustrated below is the only dryer-operator interface.



① Main switch

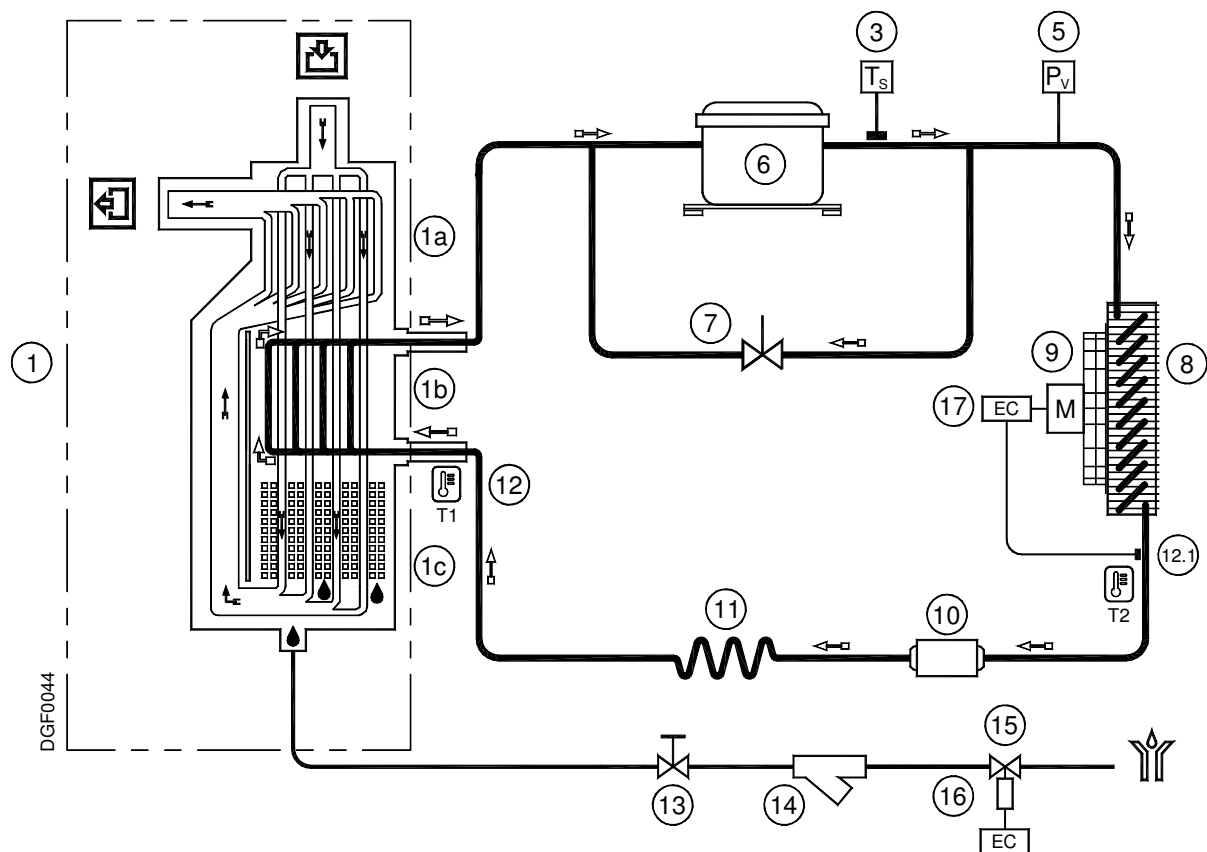
② DMC15 Electronic control instrument

### 5.2. OPERATION

**Operating principal** - The dryer models described in this manual operate all on the same principal. The hot moisture laden air enters an air to air heat exchanger. The air then goes through the evaporator, also known as the air to refrigerant heat exchanger. The temperature of the air is reduced to approximately 2°C, causing water vapor to condense to liquid. The liquid is continuously coalesced and collected in the separator for removal by the condensate drain. The cool moisture free air then passes back through the air to air heat exchanger to be reheated to within 8 degrees of the incoming air temperature as it exits the dryer.

**Refrigerant circuit** - Refrigerant gas is cycled through the compressor and exits at high pressure to a condenser where heat is removed causing the refrigerant to condense to a high-pressure liquid state. The liquid is forced through a capillary tube where the resulting pressure drop allows the refrigerant to boil off at a predetermined temperature. Low-pressure liquid refrigerant enters the heat exchanger where heat from the incoming air is transferred causing the refrigerant to boil; the resulting phase change produces a low pressure, low temperature gas. The low-pressure gas is returned to the compressor, where it is re-compressed and begins the cycle again. During those periods when the compressed air load is reduced the excess refrigerant is by-passed automatically back to the compressor via the hot gas by-pass valve circuit.

### 5.3. FLOW DIAGRAM



- |   |   |
|---|---|
| ① Alu-Dry Module  | ⑩ Filter drier                          |
| a - Air-to-air heat exchanger                                   | ⑪ Capillary tube                        |
| b - Air-to-refrigerant exchanger                                | ⑫ T1 Temperature probe (DewPoint)       |
| c - Condensate separator  | 12.1 T2 Temperature probe (fan control) |
| ③ Safety thermo-switch $T_s$ (RVK 25-40/E)                      | (RVG 5_RVG 10_RVK 10_RVK 20)            |
| ⑤ Refrigerant Fan pressure-switch $P_v$ (RVK 25-40_RVK 25-40/E) | ⑬ Condensate drain isolation valve      |
| ⑥ Refrigeration compressor                                      | ⑭ Condensate drain strainer             |
| ⑦ Hot gas by-pass valve   | ⑮ Condensate drain solenoid valve       |
| ⑧ Condenser   | ⑯ Coil for cond. drain solenoid valve   |
| ⑨ Condenser fan   | ⑰ Air Dryer Controller                  |

→ Compressed air flow direction

→ Refrigerating gas flow direction

#### **5.4. REFRIGERATING COMPRESSOR**

The refrigeration compressor is the pump in the system, gas coming from the evaporator (low pressure side) is compressed up to the condensation pressure (high pressure side). The compressors utilized are manufactured by leading manufacturers and are designed for applications where high compression ratios and wide temperature changes are present.

The hermetically sealed construction is perfectly gas tight, ensuring high-energy efficiency and long, useful life. Dumping springs support the pumping unit in order to reduce the acoustic emission and the vibration diffusion. The aspirated refrigeration gas, flowing through the coils before reaching the compression cylinders cools the electric motor. The thermal protection protects the compressor from over heating and over currents. The protection is automatically restored as soon as the nominal temperature conditions are reached.

#### **5.5. CONDENSER**

The condenser is the component in which the gas coming from the compressor is cooled down and condensed becoming a liquid. Mechanically, a serpentine copper tubing circuit (with the gas flowing inside) is encapsulated in an aluminum fin package.

The cooling operation occurs via a high efficiency fan, creating airflow within the dryer, moving air through the fin package. It's mandatory that the ambient air temperature does not exceed the nominal values. It is also important **TO KEEP THE CONDENSER UNIT FREE FROM DUST AND OTHER IMPURITIES.**

#### **5.6. FILTER DRIER**

Traces of humidity and slag can accumulate inside the refrigerating circuit. Long periods of use can also produce sludge. This can limit the lubrication efficiency of the compressor and clog the expansion valve or capillary tube. The function of the Filter Drier, located before the capillary tubing, is to eliminate any impurities from circulating through the system.

#### **5.7. CAPILLARY TUBE**

It consists of a piece of reduced cross section copper tubing located between the condenser and the evaporator, acting as a metering device to reduce the pressure of the refrigerant. Reduction of pressure is a design function to achieve optimum temperature reached within the evaporator: the smaller the capillary tube outlet pressure, the lower the evaporation temperature.

The length and interior diameter of the capillary tubing is accurately sized to establish the performance of the dryer; no maintenance or adjustment is necessary.

#### **5.8. ALU-DRY MODULE**

The heat exchanger module houses the air-to-air, the air-to-refrigerant heat exchangers and the demister type condensate separator. The counter flow of compressed air in the air-to-air heat exchanger ensures maximum heat transfer. The generous 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 flow allows full and complete evaporation of the refrigerant (preventing liquid return 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.

### 5.9. HOT GAS BY-PASS VALVE

This valve injects part of the hot gas (taken from the discharge side of the compressor) in the pipe between the evaporator and the suction side of the compressor, keeping the evaporation temperature/pressure constant at approx. +2 °C. This injection prevents the formation of ice inside the dryer evaporator at every load condition.



#### ADJUSTMENT

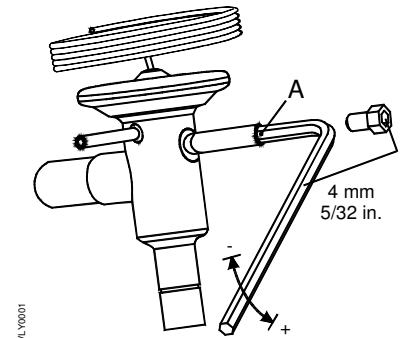
The Hot Gas By-pass Valve is adjusted during the manufacturing testing phase. As a rule no adjustment is required; anyway if it is necessary the operation must be carried out by an experienced refrigerating engineer.

**WARNING : the use of 1/4" Schrader service valves must be justified by a real malfunction of the refrigerating system. Each time a pressure gauge is connected, a part of refrigerant is exhausted.**

Without compressed air flow through the dryer, rotate the adjusting screw (position A on the drawing) until the following value is reached:

Hot gas setting (R134.a) : temperature 0.5 °C (+0.5 / -0 °K)  
pressure 2.0 barg (+0.1 / -0 bar)

Hot gas setting (R404A) : temperature 0.5 °C (+0.5 / -0 °K)  
pressure 5.2 barg (+0.1 / -0 bar)

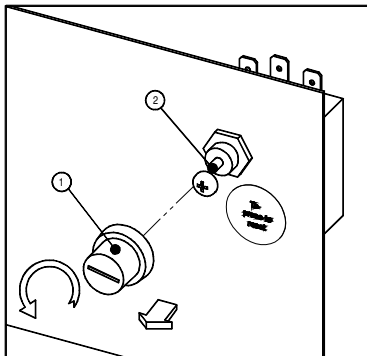


### 5.10. REFRIGERANT PRESSURE SWITCHES P<sub>V</sub> (RVK 25-40\_ RVK 25-40/E)

Fan control pressure switch is located at the pushing side of refrigerating compressor. It keeps the condensation temperature/pressure constant within preset limits.

**PV :** Calibrated pressure : R 404 A Start 20 barg (45°C) - Stop 16 barg (36°C) - Tolerance ± 1 bar

### 5.11. SAFETY THERMO-SWITCH T<sub>S</sub> (RVK 25-40/E)

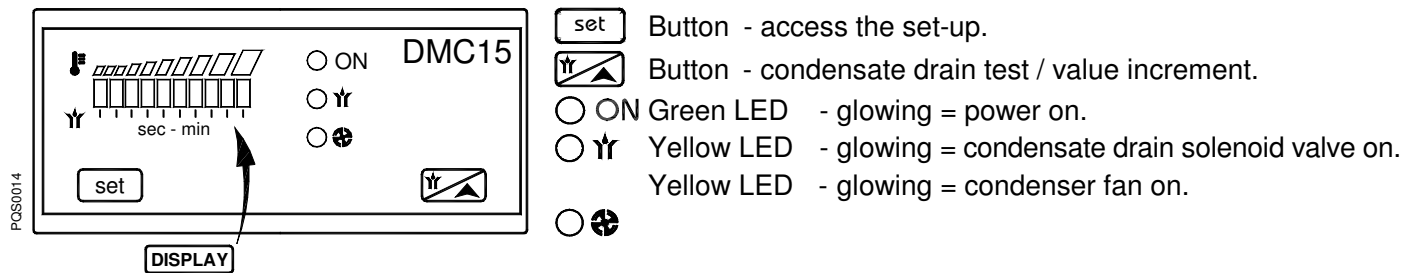


To protect the operating safety and the integrity of the dryer, a thermo-switch (TS) is installed on the refrigerant gas circuit. The thermo-switch sensor, in case of unusual discharge temperatures, stops the refrigerating compressor before it is permanently damaged.

Manually reset the thermo-switch only after the nominal operating conditions have been restored. Unscrew the relative cap (see pos.1 in the figure) and press the reset button (see pos.2 in the figure).

TS setting : temperature 100 °C (+2 / -2 °K)

## 5.12. DMC15 ELECTRONIC INSTRUMENT (AIR DRYER CONTROLLER)



The DMC15 electronic controller performs the following functions : it shows the current operating DewPoint through the digital led display which is detected from the (T1) probe located at the end of the evaporator, while a second (T2) probe, located on the discharge side of the condenser, activates the relevant fan (**RVG 5\_RVG 10\_RVK 10\_RVK 20**); eventually it controls the functioning of condensate drain solenoid valve through the cyclic electronic timer.

**OPERATION** - During the dryer operation, the LED ON is on.

**Thermometer** - The 10 LED display indicates the current operating DewPoint, shown by means of a two colours (green - red) bar over the display itself.

- Green section - operating conditions ensuring an optimal DewPoint;
- Red section - DewPoint of the dryer too high, the dryer is working with elevated thermal load (high inlet air temperature, high ambient temperature, etc.). The treatment of the compressed air may be improper. Too high DewPoint temperature, value exceeding the upper limit of the instrument range, is indicated by the intermittent flashing of the last LED; whereas the intermittent flashing of the first LED shows too low DewPoint temperature.

A possible (T1) probe failure is indicated by the intermittent flashing of the first and last LED of the display, whereas the dryer keeps on working correctly.

**Thermostat (RVG 5\_RVG 10\_RVK 10\_RVK 20)** - The fan condenser is activated when the condensate temperature reaches or exceeds 35°C (FAN<sub>ON</sub>) - LED on - and it is deactivated when the temperature goes down to 30°C (FAN<sub>ON</sub> - Hys) - LED off. In case of (T2) probe failure, the fan will run continuously and the LED will intermittent flash.

**Timer** - The condensate drain solenoid valve is activated for 2 seconds (T<sub>ON</sub>) - LED on - each minute (T<sub>OFF</sub>), if standard setting. To perform the manual test for the condensate drain, press the button.

**SET-UP** - The DMC15 is adjusted during the final test of the dryer. In case of particular requirements concerning the operation management, the user can change the setting of the programmed parameters. The parameters which can be set up are the following :

- FAN<sub>ON</sub> - activation temperature of condenser fan. It is adjustable inside the following range of values, with step of 1°K; whereas the Hys hysteresis is fixed and equal to -5°K.
- T<sub>ON</sub> - activation time of the condensate drain solenoid valve.
- T<sub>OFF</sub> - pause time between two consecutive activation of the condensate drain solenoid valve.

To access the set-up, keep the button pressed for at least 2 seconds; ON LED flashing confirms the command. First appears the (FAN<sub>ON</sub>) parameter; to access the other parameters, press sequentially the button. To change the value of the selected parameter, keep the button pressed and operate on button ; the current value is shown on the LED display. For the value range and the resolution (value of each single LED), see the following table :

| Parameter         | Description  | Display                                   | Value range | Resolution | Set value |
|-------------------|--|---|-------------|------------|-----------|
| FAN <sub>ON</sub> | Activation temperature of condenser fan                | Synchronous flashing<br>LED  ON + LED     | 31 - 40 °C  | 1°K        | 35°C      |
| T <sub>ON</sub>   | Activation time of the condensate drain solenoid valve | Synchronous flashing<br>LED  ON + LED     | 1 - 10 sec  | 1 sec      | 2 sec     |
| T <sub>OFF</sub>  | Pause time of the condensate drain solenoid valve      | Non-Synchronous flashing<br>LED  ON + LED | 1 - 10 min  | 1 min      | 1 min     |

To exit the set-up condition in any moment, press the button. If no operations are performed for 2 minutes, the system automatically exits the set-up condition.



## 6. MAINTENANCE, TROUBLESHOOTING, SPARES AND DISMANTLING

### 6.1. CONTROLS AND MAINTENANCE



Only qualified personnel should perform troubleshooting and or maintenance operations. Prior to performing any maintenance or service, be sure that:

- no part of the machine is powered and that it cannot be connected to the mains supply.
- no part of the machine is under pressure and that it cannot be connected to the compressed air system.
- Maintenance personnel have read and understand the safety and operation instructions in this manual.



Before attempting any maintenance operation on the dryer, shut it down and wait at least 30 minutes.



Some components can reach high temperature during operation. Avoid contact until system or component has dissipated heat.



#### DAILY

- Verify that the DewPoint displayed on the electronic instrument is correct.
- Check the proper operation of the condensate drain systems.
- Verify the condenser for cleanliness.

#### EVERY 200 HOURS OR MONTHLY



MAX 2 bars / 30 Psig

- With an air jet (max. 2 bar / 30 psig) blowing from inside towards outside clean the condenser; repeat this operation blowing in the opposite way; be careful not to damage the aluminium fins of the cooling package.



- Close the isolation valve for the condensate drain, remove the mechanical filter and clean it with compressed air and a brush. Reinstall the filter, make sure it is secure, and open the isolation valve.
- At the end, check the operation of the machine.



#### EVERY 1000 HOURS OR YEARLY

- Verify for tightness all the screws of the electric system and that all the "Faston" type connections are in their proper position, inspect unit for broken, cracked or bare wires.
- Inspect refrigerating circuit for signs of oil and refrigerant leakage.
- Measure and record amperage. Verify that readings are within acceptable parameters as listed in specification table.
- Inspect condensate drain flexible hoses, and replace if necessary.
- At the end, check the operation of the machine.



## 6.2. TROUBLESHOOTING



Only qualified personnel should perform troubleshooting and or maintenance operations.

Prior to performing any maintenance or service, be sure that:

- no part of the machine is powered and that it cannot be connected to the mains supply.
- no part of the machine is under pressure and that it cannot be connected to the compressed air system.
- Maintenance personnel have read and understand the safety and operation instructions in this manual.




Before attempting any maintenance operation on the dryer, shut it down and wait at least 30 minutes.




Some components can reach high temperature during operation. Avoid contact until system or component has dissipated heat.

### SYMPTOM

### POSSIBLE CAUSE - SUGGESTED ACTION

|   |  |
|---|--|
| ◆ The dryer doesn't start.                  | ⇒ Verify that the system is powered.<br>⇒ Verify the electric wiring.  |
| ◆ The compressor doesn't work.              | ⇒ Activation of the compressor internal thermal protection - wait for 30 minutes, then retry.<br>⇒ Verify the electric wiring.<br>⇒ <b>Where installed</b> - Replace the internal thermal protection and/or the start-up relay and/or the start-up capacitor and/or the working capacitor.<br>⇒ <b>RVK 25-40/E</b> - The safety thermo-switch TS has been activated - see specific point.<br>⇒ If the compressor still doesn't work, replace it.   |
| ◆ The fan of the condenser doesn't work.    | ⇒ Verify the electric wiring.<br>⇒ <b>RVG 5_RVG 10_RVK 10_RVK 20</b> - The DMC15 electronic controller is faulty - replace it.<br>⇒ <b>RVK 25-40_RVK 25-40/E</b> - PV pressure switch is faulty - replace it.<br>⇒ If the fan still doesn't work, replace it.  |
| ◆ DewPoint too low.                         | ⇒ <b>RVG 5_RVG 10_RVK 10_RVK 20</b> - The fan is always ON - the  yellow LED of DMC15 controller is glowing continuously - see specific point.<br>⇒ <b>RVK 25-40_RVK 25-40/E</b> - The fan is always ON - PV pressure switch is faulty - replace it.<br>⇒ Ambient temperature is too low - restore de nominal condition.<br>⇒ The hot gas by-pas<br>⇒ s valve is out of setting - contact a refrigeration engineer to restore the nominal setting.  |
| ◆ DewPoint too high.                        | ⇒ The dryer doesn't start - see specific point.<br>⇒ The T1 DewPoint probe doesn't correctly detect the temperature - ensure the sensor is pushed into the bottom of copper tube immersion well.<br>⇒ The refrigerating compressor doesn't work - see specific point.<br>⇒ The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation.<br>⇒ The inlet air is too hot - restore the nominal conditions.<br>⇒ The inlet air pressure is too low - restore the nominal conditions.<br>⇒ The inlet air flow rate is higher than the rate of the dryer - reduce the flow rate - restore the normal conditions.<br>⇒ The condenser is dirty - clean it.<br>⇒ The condenser fan doesn't work - see specific point.<br>⇒ The dryer doesn't drain the condensate - see specific point.<br>⇒ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore the nominal setting.<br>⇒ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer. |
| ◆ Excessive pressure drop within the dryer. | ⇒ The dryer doesn't drain the condensate - see specific point.<br>⇒ The DewPoint is too low - the condensate is frost and blocks the air - see specific point.<br>⇒ Check for throttling the flexible connection hoses.  |

|  |   |
|--|---|
| ◆ The dryer doesn't drain the condensate.  | ⇒ The condensate drain service valve is closed - open it.<br>⇒ The condensate drain strainer is clogged - remove and clean it.<br>⇒ The drain solenoid valve is jammed - remove and clean it.<br>⇒ Verify the electric wiring.<br>⇒ The coil of the condensate drain solenoid valve burned out - replace it.<br>⇒ The DewPoint is too low - the condensate is frozen - see specific point.<br>⇒ The DMC15 electronic controller is faulty - replace it.   |
| ◆ The dryer continuously drains condensate.  | ⇒ The drain solenoid valve is jammed - remove and clean it.<br>⇒ Try to remove the electric connector on the solenoid valve - if drain stops verify the electric wiring or the electronic instrument is faulty - replace it.  |
| ◆ Water within the line.   | ⇒ The dryer doesn't start - see specific point.<br>⇒ <b>Where installed</b> - Untreated air flows through the by-pass unit - close the by-pass.<br>⇒ The dryer doesn't drain the condensate - see specific point.<br>⇒ DewPoint too high - see specific point.  |
| ◆ <b>RVK 25-40/E</b> - The TS safety thermo-switch has been activated.   | ⇒ Check which of the following has caused the activation :<br>1. Excessive thermal load – restore the standard operating conditions.<br>2. The inlet air is too hot - restore the nominal conditions.<br>3. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation.<br>4. The condenser unit is dirty - clean it.<br>5. The fan doesn't work - see specific point.<br>6. There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer.<br>⇒ Reset the thermo-switch by pressing the button on the thermo-switch itself – verify the correct operation of the dryer.<br>⇒ The TS thermo-switch is faulty - replace it. |
| ◆ <b>DMC15</b> - The first and the last LED of the display of electronic instrument blink simultaneously.  | ⇒ Verify the electric wiring of (T1) DewPoint probe.<br>⇒ The (T1) DewPoint probe is faulty - replace it.<br>⇒ The DMC15 electronic controller is faulty - replace it.  |
| ◆ <b>DMC15</b> - The  yellow LED of the electronic controller is flashing continuously. | ⇒ <b>RVG 5_RVG 10_RVK 10_RVK 20</b> - Verify the electric wiring of (T2) fan control probe.<br>⇒ <b>RVG 5_RVG 10_RVK 10_RVK 20</b> - The (T2) fan control probe is faulty - replace it.<br>⇒ <b>RVK 25-40_RVK 25-40/E</b> – Verify the electric wiring of resistance on terminal 1 and 2.<br>⇒ The DMC15 electronic controller is faulty - replace it.  |
| ◆ <b>DMC15</b> - The first LED of the display of electronic instrument is flashing continuously.   | ⇒ DewPoint too low - see specific point.<br>⇒ The (T1) DewPoint probe is faulty - replace it.<br>⇒ The DMC15 electronic controller is faulty - replace it.  |
| ◆ <b>DMC15</b> - The last LED of the display of electronic instrument is flashing continuously.  | ⇒ DewPoint too high - see specific point.<br>⇒ The (T1) DewPoint probe is faulty - replace it.<br>⇒ The DMC15 electronic controller is faulty - replace it.   |

### 6.3. MAINTENANCE OPERATION ON THE REFRIGERATING CIRCUIT



Maintenance and service on refrigerating systems must be carried out only by certified refrigerating engineers only, according to local rules.

All the refrigerant of the system must be recovered for its recycling, reclamation or destruction. DO NOT DISPOSE THE REFRIGERANT FLUID IN THE ENVIROMENT.

This dryer comes ready to operate and filled with R134a or R404A type refrigerant fluid.



In case of refrigerant leak contact a certified refrigerating engineers. Room is to be aired before any intervention.

If is required to re-fill the refrigerating circuit, contact a certified refrigerating engineers.

Refer to the dryer nameplate for refrigerant type and quantity.

Characteristics of refrigerants used:

| Refrigerant | Chemical formula   | TLV      | GWP  |
|-------------|--|----------|------|
| R134a - HFC | CH <sub>2</sub> FCF <sub>3</sub>   | 1000 ppm | 1300 |
| R404A - HFC | CH <sub>2</sub> FCF <sub>3</sub> /C <sub>2</sub> HF <sub>5</sub> /C <sub>2</sub> H <sub>3</sub> F <sub>3</sub> | 1000 ppm | 3784 |

### 6.4. 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        | R404A, R134a, Oil                                    |
| Canopy and Supports      | Carbon steel, Epoxy paint                            |
| Refrigerating compressor | Steel, Copper, Aluminium, Oil                        |
| Alu-Dry Module           | Aluminium  |
| Condenser Unit           | Aluminium, Copper, Carbon steel                      |
| Pipe                     | Copper   |
| Fan                      | Aluminium, Copper, Steel                             |
| Valve                    | Brass, Steel   |
| Electronic Level Drain   | PVC, Aluminium, 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 centre where it will be processed to make it reusable.

## 7. LIST OF ATTACHMENTS

### 7.1. DRYERS DIMENSIONS

7.1.1 RVG 5\_RVG 10 Dryers Dimensions

7.1.2 RVK 10\_RVG 20 Dryers Dimensions

7.1.3 RVK 25-40\_RVK 25-40/E Dryers Dimensions

## 7.2. EXPLODED VIEW

- 7.2.1 *Exploded view of Dryers RVG 5*  
 7.2.2 *Exploded view of Dryers RVG 10*  
 7.2.3 *Exploded view of Dryers RVK 10*  
 7.2.4 *Exploded view of Dryers RVK 20*  
 7.2.5 *Exploded view of Dryers RVK 20-40*  
 7.2.6 *Exploded view of Dryers RVG 20-40/E*

### Exploded view table of components

|     |                                     |     |                               |
|-----|-------------------------------------|-----|-------------------------------|
| ①   | Alu-Dry Module                      | ①7  | Electronic control instrument |
| ①.1 | Insulation Material                 | ... |                               |
| ... |                                     | ②2  | Main switch                   |
| ⑥   | Refrigerating compressor            | ... |                               |
| ⑦   | Hot gas by-pass valve               | ⑤1  | Front panel                   |
| ⑧   | Condenser                           | ⑤2  | Back panel                    |
| ⑨   | Condenser fan                       | ... |                               |
| ⑨.1 | Motor                               | ⑤4  | Left lateral panel            |
| ⑨.2 | Blade                               | ⑤5  | Cover                         |
| ⑨.3 | Grid                                | ⑤6  | Base plate                    |
| ⑩   | Filter Drier                        | ... |                               |
| ⑪   | Capillary tube                      | ⑤9  | Support bracket               |
| ⑫   | T1 Temperature probe (DewPoint)     | ⑥0  | Control panel                 |
| ⑬   | Condensate drain isolation valve    | ⑥1  | Electric connector            |
| ... |                                     | ... |                               |
| ⑮   | Condensate drain solenoid valve     | ⑧0  | Compression fitting           |
| ⑯   | Coil for cond. drain solenoid valve | ⑧1  | Flow diagram sticker          |

## 7.3. ELECTIC DIAGRAMS

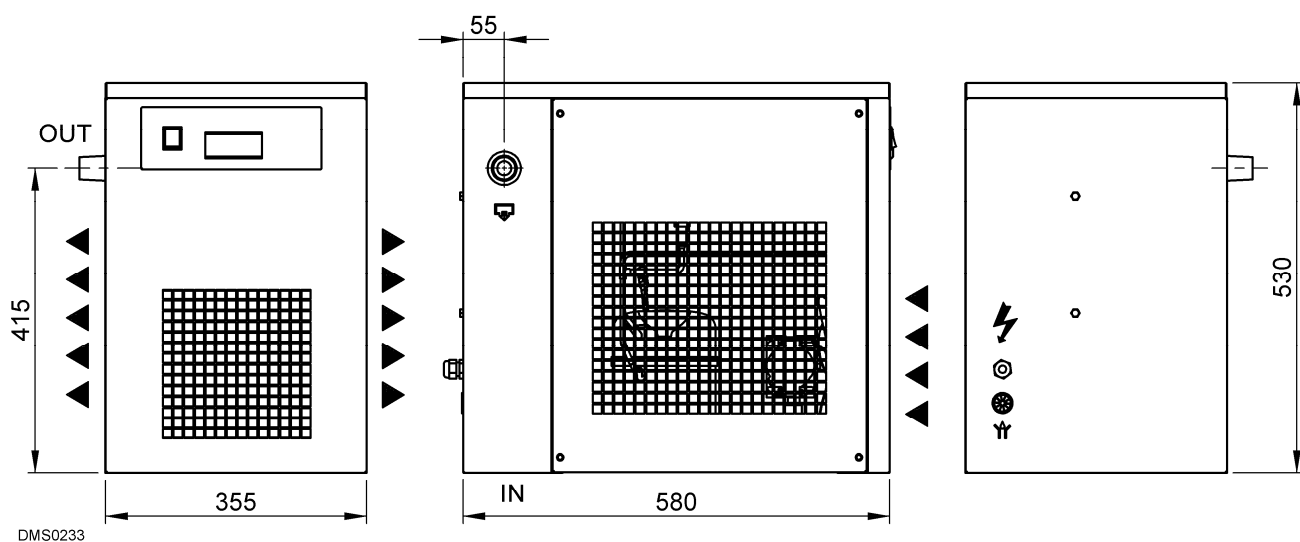
- 7.3.1 *Electrical Diagram of Dryers RVG 5\_RVG 10\_RVK 10\_RVK 20*  
 7.3.2 *Electrical Diagram of Dryers RVK 25-40*  
 7.3.2 *Electrical Diagram of Dryers RVK 25-40/E*

### Electrical Diagram table of components

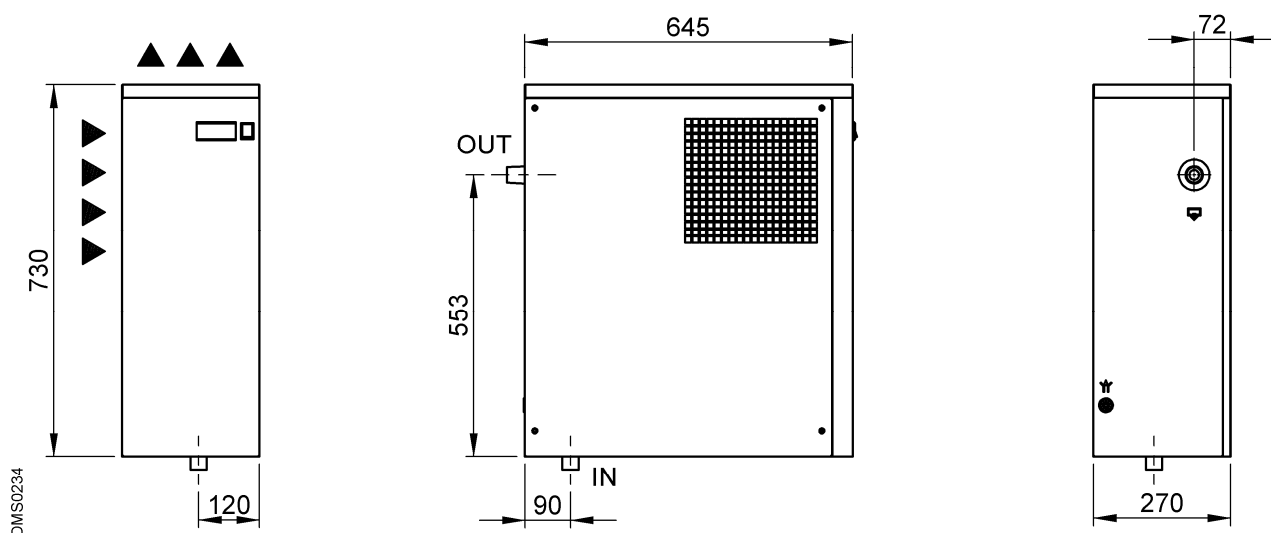
|              |   |
|--------------|---|
| <b>IG</b>    | : Main switch   |
| <b>K</b>     | : Refrigerating compressor                                    |
| <b>KT</b>    | : Compressor thermal protection                               |
| <b>KR</b>    | : Compressor starting relay (if installed)                    |
| <b>CS</b>    | : Compressor starting capacitor (if installed)                |
| <b>CR</b>    | : Compressor run capacitor (if installed)                     |
| <b>V</b>     | : Condenser fan   |
| <b>CV</b>    | : Fan starting capacitor (if installed)                       |
| <b>DMC15</b> | : DMC15 Electronic Instrument - Air Dryer Controller          |
| <b>T1</b>    | : T1 Temperature probe (DewPoint)                             |
| <b>T2</b>    | : T2 Temperature probe (Fan control)                          |
| <b>PV</b>    | : Pressure switch - Fan control                               |
| <b>PA</b>    | : Pressure switch - Compressor discharge side - high-pressure |
| <b>PB</b>    | : Pressure switch - Compressor suction side - low-pressure    |
| <b>TS</b>    | : T <sub>s</sub> safety thermo-switch                         |
| <b>BOX</b>   | : Electric box  |
| <b>EVD</b>   | : Condensate drain solenoid valve                             |
| <b>ELD</b>   | : Electronic level drain                                      |

BN = BROWN  
 BU = BLUE  
 BK = BLACK  
 YG = YELLOW/GREEN

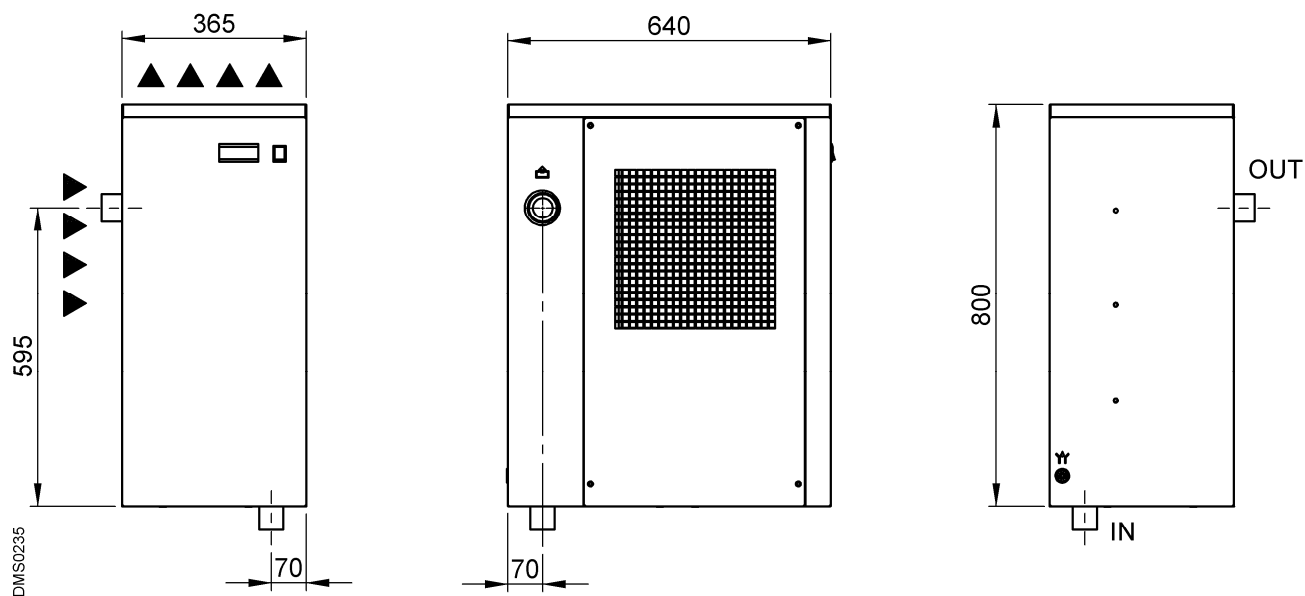
### 7.1.1 RVG 5\_ RVG 10



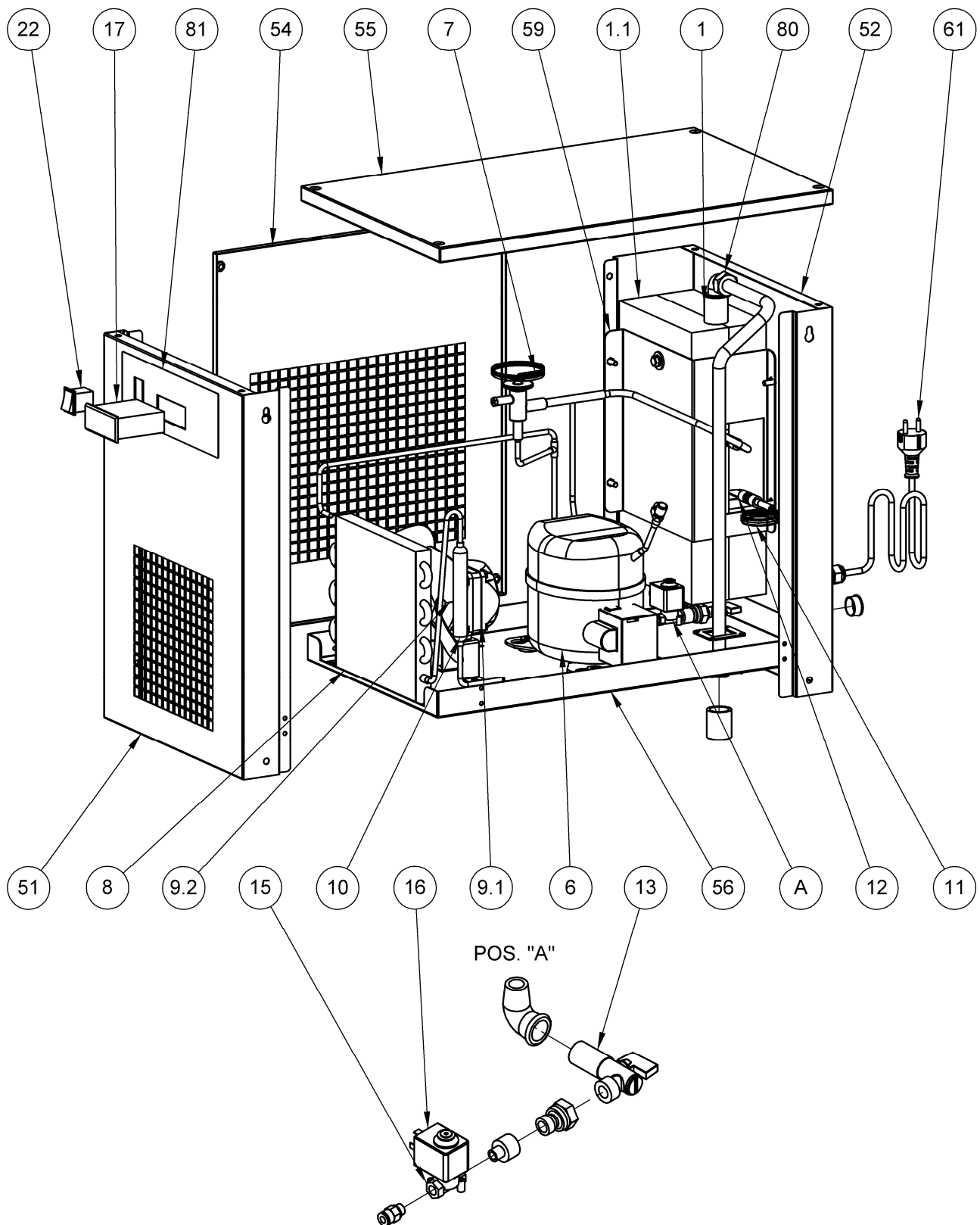
### 7.1.2 RVK 10\_ RVK 20



### 7.1.3 RVK 25-40\_ RVK 25-40/E



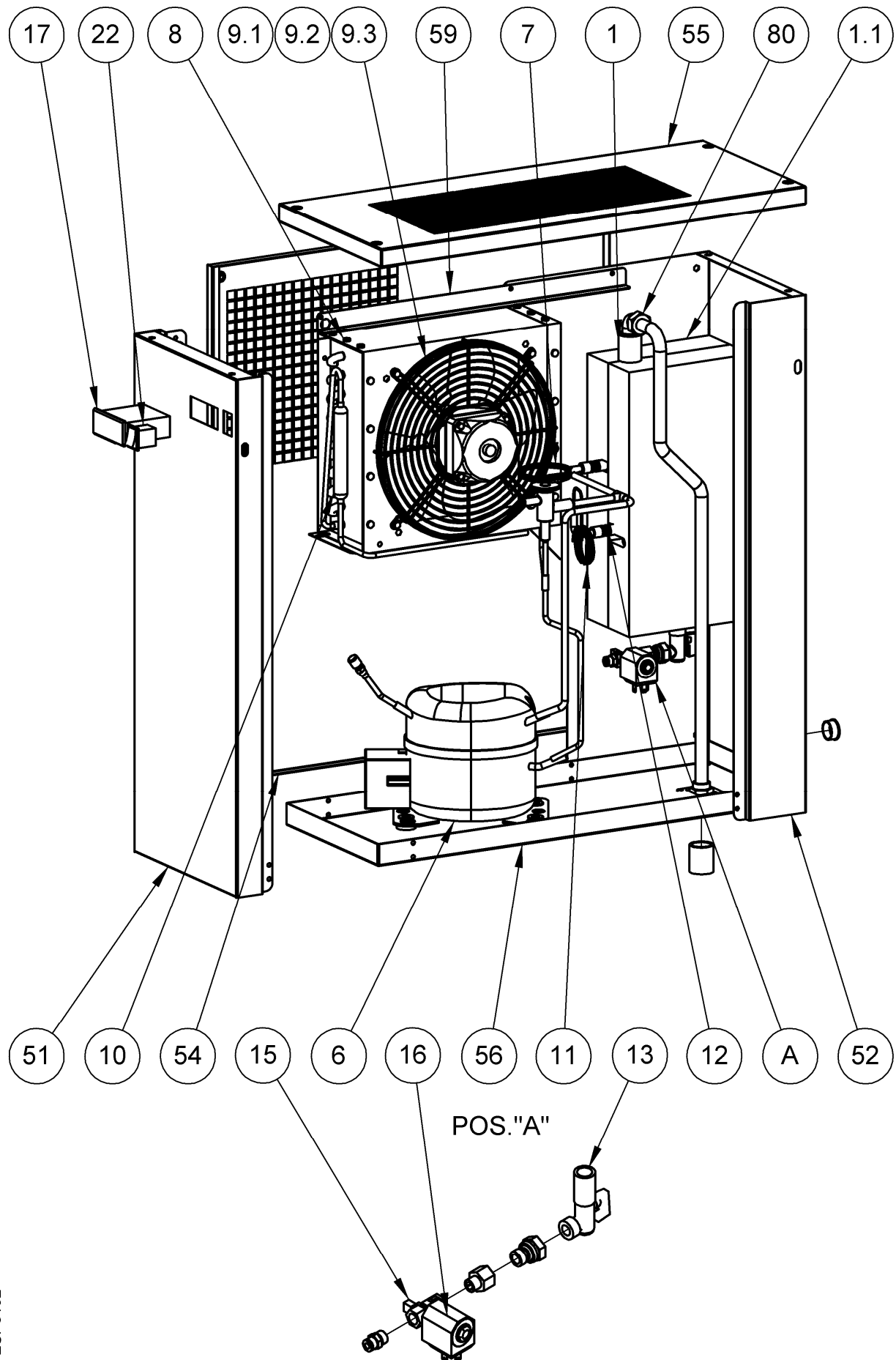
## 7.2.1 RVG 5



|                     |
|---------------------|
| <b>7.2.2 RVG 10</b> |
|---------------------|

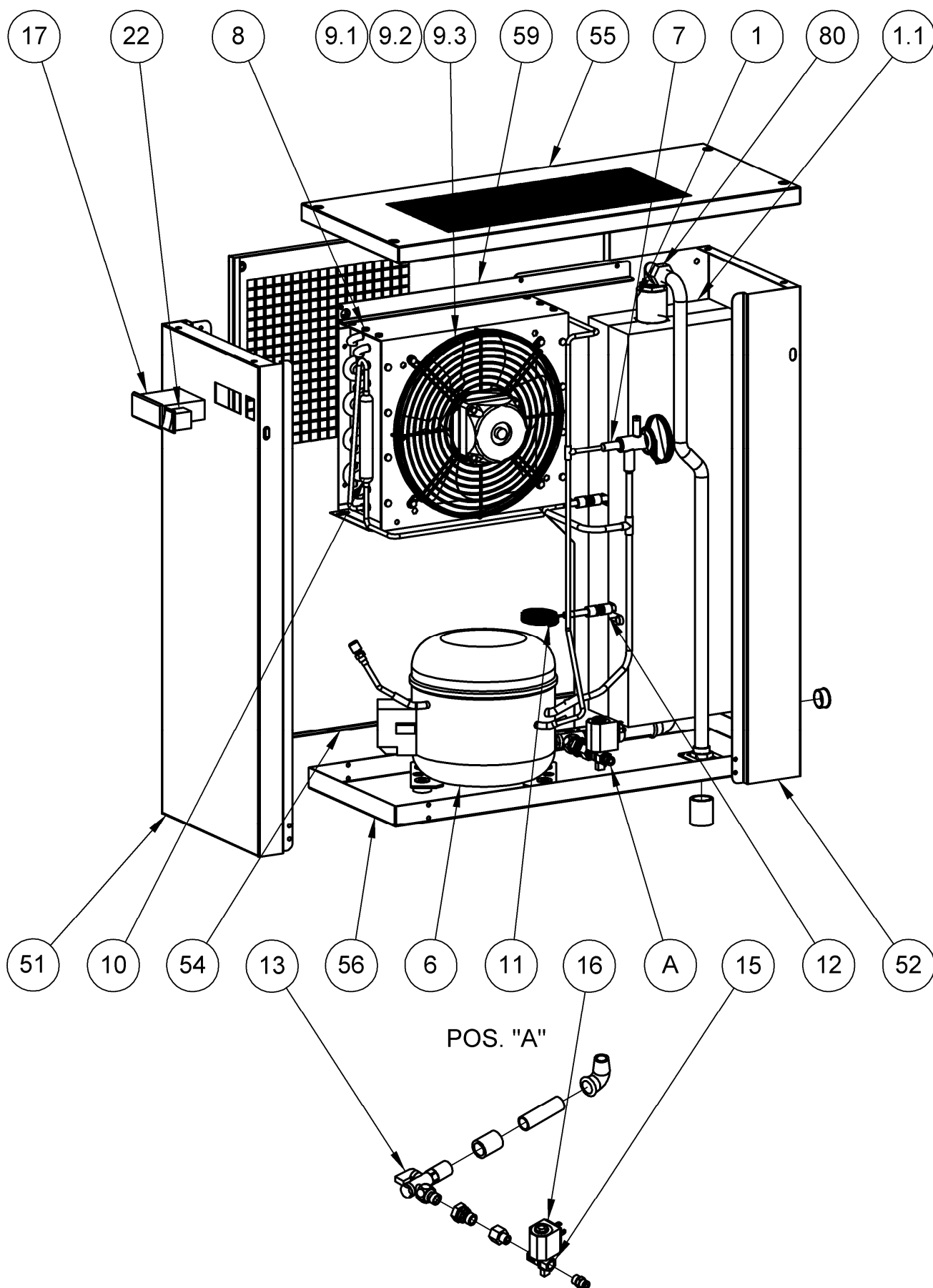


## 7.2.3 RVK 10

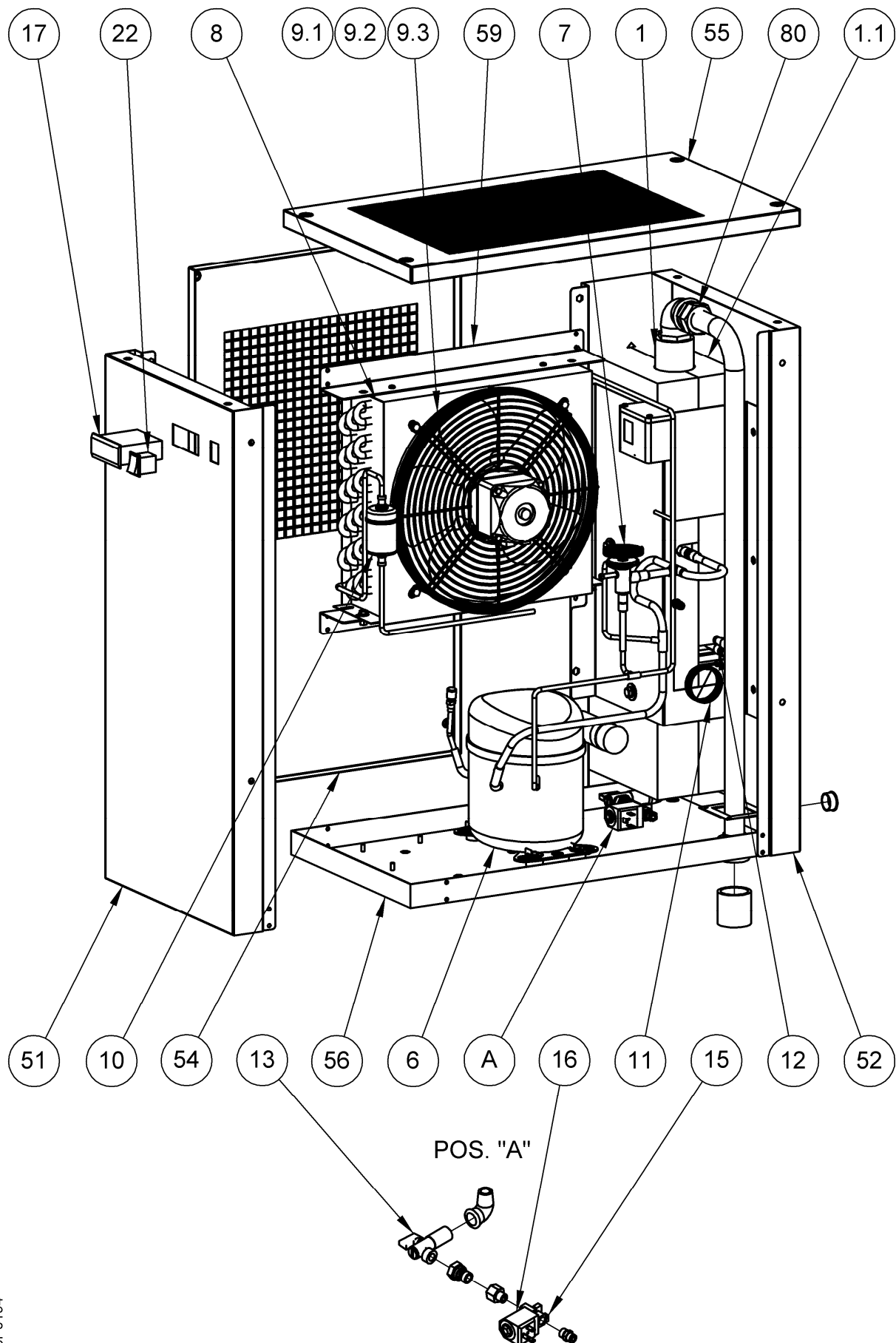




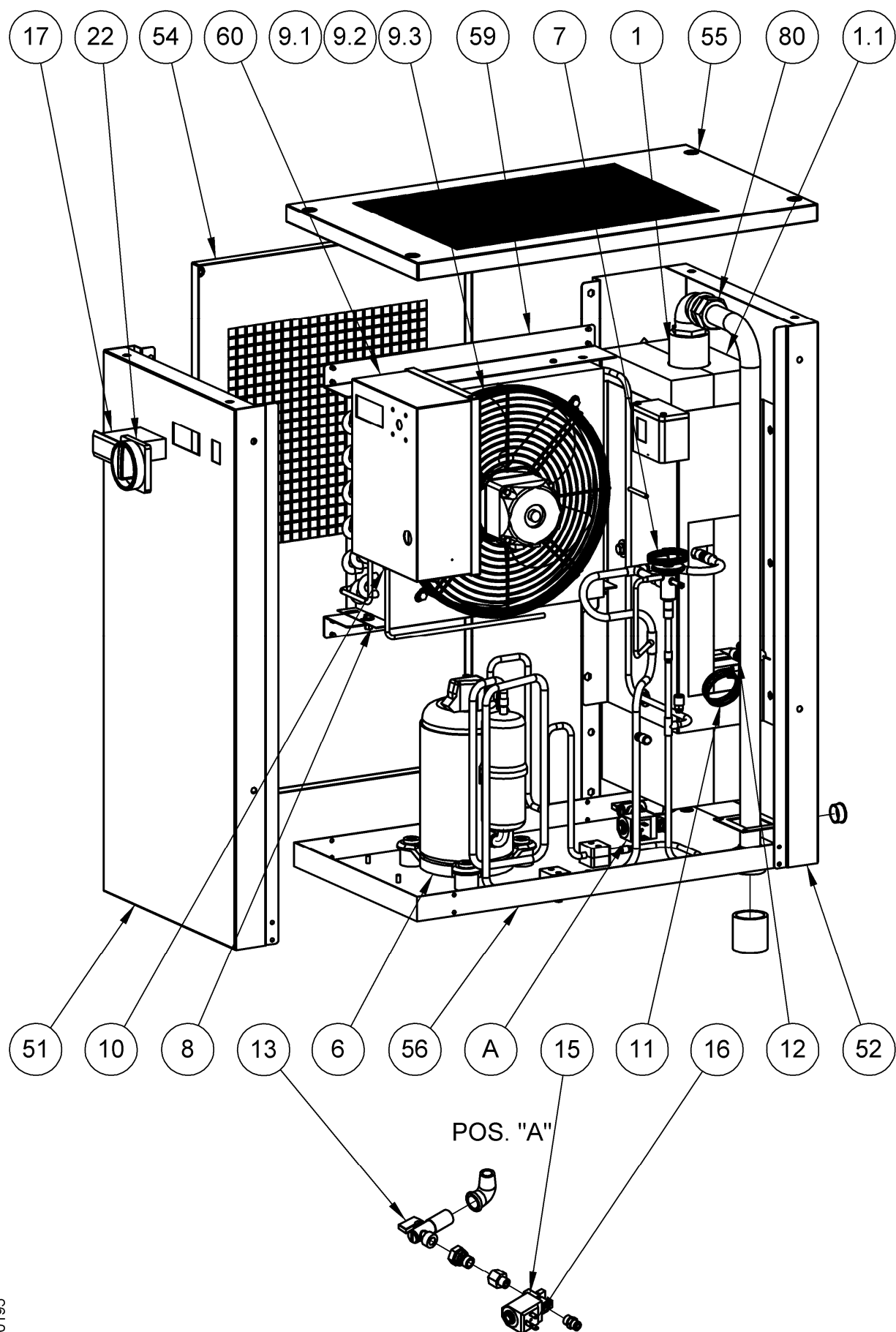
# 7.2.4 RVK 20



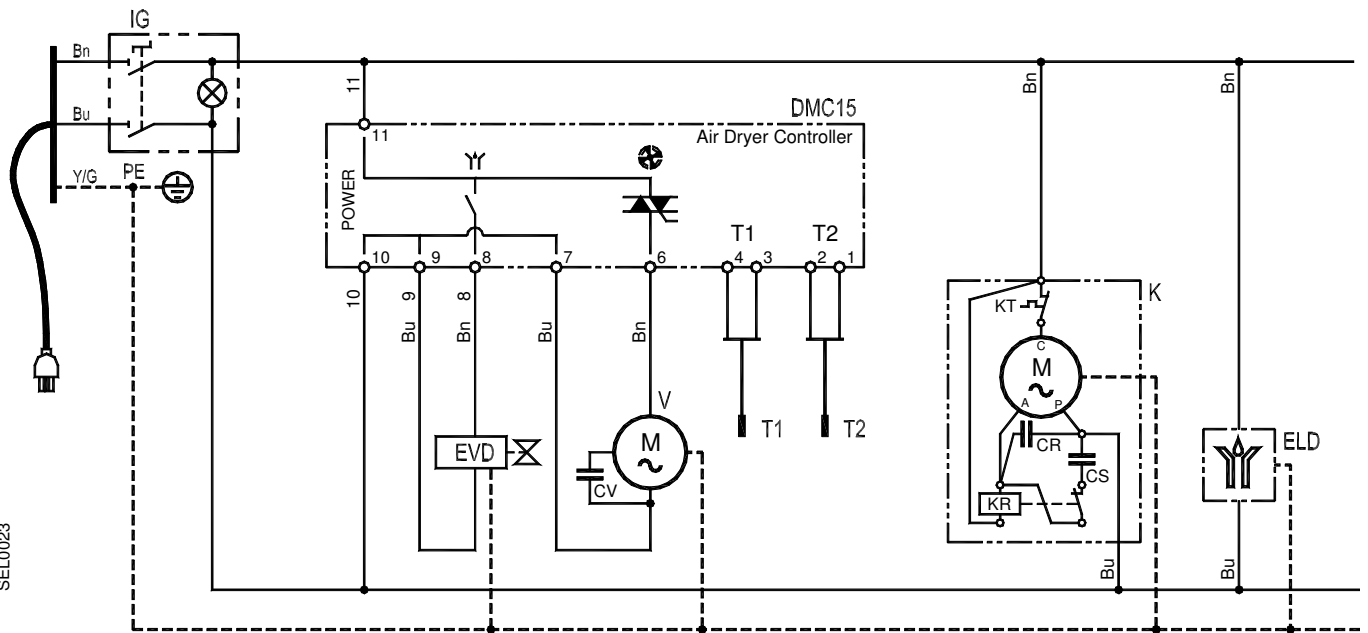
## 7.2.5 RVK 25-40



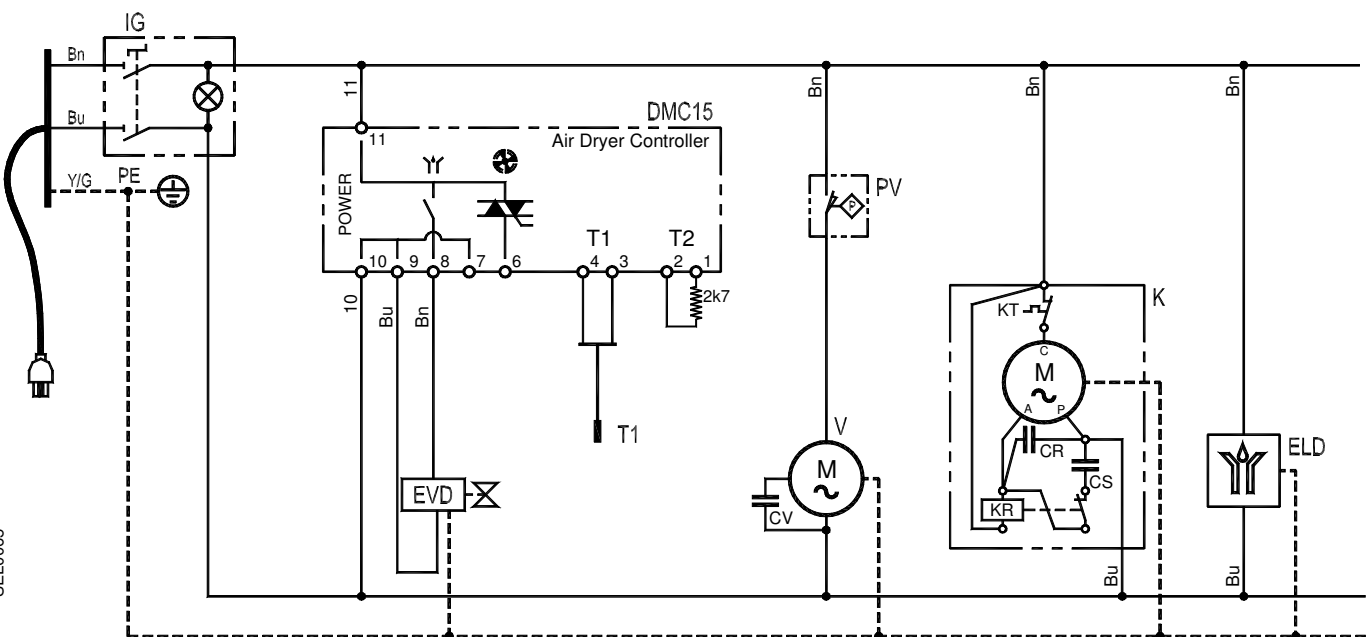
## 7.2.6 RVK 25-40/E



## SEL0023



## SEL0065



### 7.3.3 RVK 25-40/E

