



REFRIGERATED AIR DRYER

- GB -

**USER'S,
MAINTENANCE MANUAL**

Targhetta Dati

RD 6 - 32

**ISSUE
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DK - Forsikrer p� eget ansvar, at produktet, der beskrives nedenfor, er i overensstemmelse med sikkerhedsforskrifterne i direktiverne: 98/37/EC, 97/23/EC, 73/23/EEC, 89/336/EEC	EST - Deklareerib omal vastutusel, et allpool kirjeldatud toode vastab direktiivide 98/37/E�, 97/23/E�, 73/23/EM� ja 89/336/EM� ohutusn�uetele.
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Dyrektor Zarz dzaj cy
Gener ln  ředitel
Gener lny riaditel'
Vez rigazgat 
Generalinis direktorius
Gener ldirektor
Pea direktor
Generalni direktor

Enrico Santoro

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 **RD** 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.

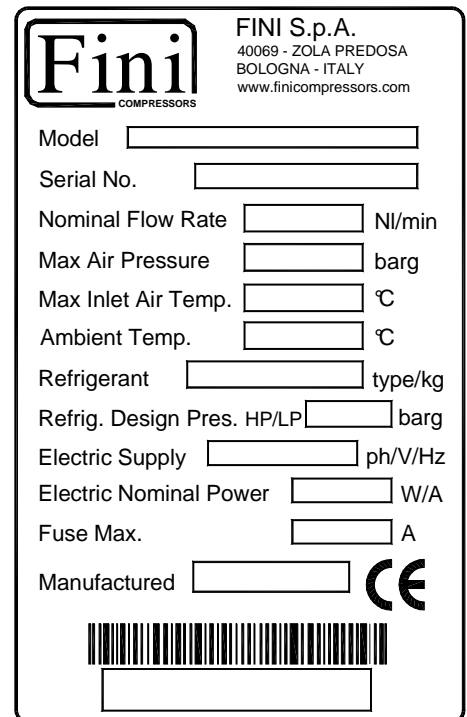
Should you experience any trouble, or for further information, please do not hesitate to contact us.

IDENTIFICATION PLATE

The product identification plate, on the back of the dryer, shows all the primary data of the machine. Upon installation, fill in the table copying the data shown on the identification plate. These data must always be referred to the manufacturer or to the dealer when information or spares are needed, even during the warranty period.

The removal or the alteration of the identification plate will void the warranty rights.

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



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.

1. SAFETY RULES

- 1.1 Definition of the Conventional Signs Used in This Manual
- 1.2 Warnings
- 1.3 Proper Use of the Dryer
- 1.4 Instructions for the use of pressure equipment according to PED Directive 97/23/EC

2. INSTALLATION

- 2.1 Transport
- 2.2 Storage
- 2.3 Installation site
- 2.4 Installation layout
- 2.5 Correction factors
- 2.6 Connection to the Compressed Air System
- 2.7 Connection to the Mains
- 2.8 Condensate Drain

3. START UP

- 3.1 Preliminary Operations
- 3.2 First Start Up
- 3.3 Operation and Switching-Off

4. TECHNICAL CHARACTERISTICS

- 4.1 Technical Features of Dryers Series RD /230V
- 4.2 Technical Features of Dryers Series RD /115V

5. TECHNICAL DESCRIPTION

- 5.1 Control panel
- 5.2 Operation
- 5.3 Flow Diagram
- 5.4 Refrigerating compressor
- 5.5 Condenser
- 5.6 Dehydration filter
- 5.7 Capillary tube
- 5.8 Alu-Dry Module
- 5.9 Hot gas by-pass valve
- 5.10 DMC15 Electronic Instrument

6. MAINTENANCE, TROUBLESHOOTING AND DISMANTLING

- 6.1 Controls and Maintenance
- 6.2 Troubleshooting
- 6.3 Maintenance operation on the refrigerating circuit
- 6.4 Dismantling of the Dryer

7. LIST OF ATTACHMENTS

- 7.1 Dryers Dimensions
- 7.2 Electric Diagrams
- 7.3 Exploded View

1.1 DEFINITION OF THE SAFETY SYMBOLS USED



Before attempting any intervention on the dryer, read carefully the instructions reported in this use and maintenance manual.



General warning sign. Risk of danger or possibility of damage to the machine. Read carefully the text related to this sign.



Electrical hazard. The relevant text outlines conditions which could result fatal. The related instructions must be strictly respected.



Danger hazard. Part or system under pressure.



Danger hazard. Component or system which during the operation can reach high temperature.



Danger hazard. It's absolutely forbidden to breathe the air treated with this apparatus.



Danger hazard. It's absolutely forbidden to use water to extinguish fire on the dryer or in the surrounding area.



Danger hazard. It's absolutely forbidden to operate the machine when the panels are not in place.



Maintenance or control operation to be very carefully performed by qualified personnel ¹.



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 ¹.

NOTE : Text to be taken into account, but not involving 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

Not to spoil our commitment, the user should follow the few ecological suggestions marked with this sign.

¹ Experienced and trained personnel acquainted with the relevant rules and laws, capable to perform the needed activities and to identify and avoid possible dangerous situations while handling, installing, using and servicing the machine.

1.2 WARNINGS



Compressed air is a highly hazardous energy source.

Never work on the dryer with pressure in the system.

Never point the compressed air or the condensate drain outlet hoses towards anybody.

The user is responsible for the proper installation of the dryer. Failure to follow instructions given in the "Installation" chapter will void the warranty. Improper installation can create dangerous situations for personnel and/or damages to the machine could occur.



Only qualified personnel are authorized to service electrically powered devices. Before attempting maintenance, the following conditions must be satisfied :

- Ensure that main power is off, machine is locked out, tagged for service and power cannot be restored during service operations.
- Ensure that valves are shut and the air circuit is at atmospheric pressure. De-pressurize the dryer.



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.

Moreover, the correct use requires the adherence to the installation instructions, specifically:

- Voltage and frequency of the main power.
- Pressure, temperature and flow-rate of the inlet 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 identification 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 identification 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.



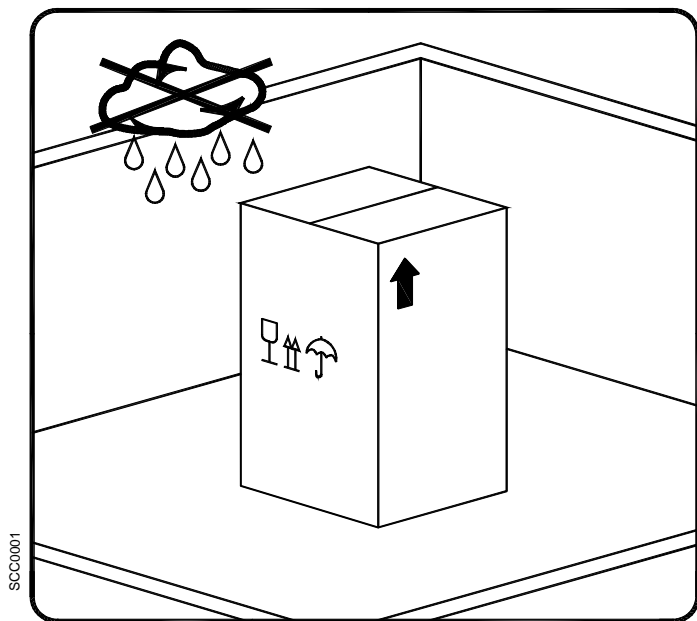
TAMPERING, MODIFICATION AND IMPROPER USE OF THE PRESSURE EQUIPMENT ARE FORBIDDEN. Users of the equipment must comply with all local and national pressure equipment legislation in the country of installation.

2.1 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.

Each single material must be properly disposed in a manner complying with the rules in force in the destination country.

2.3 INSTALLATION SITE



Particular care is required in selecting the installation site, as an improper location could jeopardise the proper operation of the dryer.

This unit is not suitable to be used in explosive atmosphere, where risk of fire could exist, or in presence of gaseous or solid polluting material.

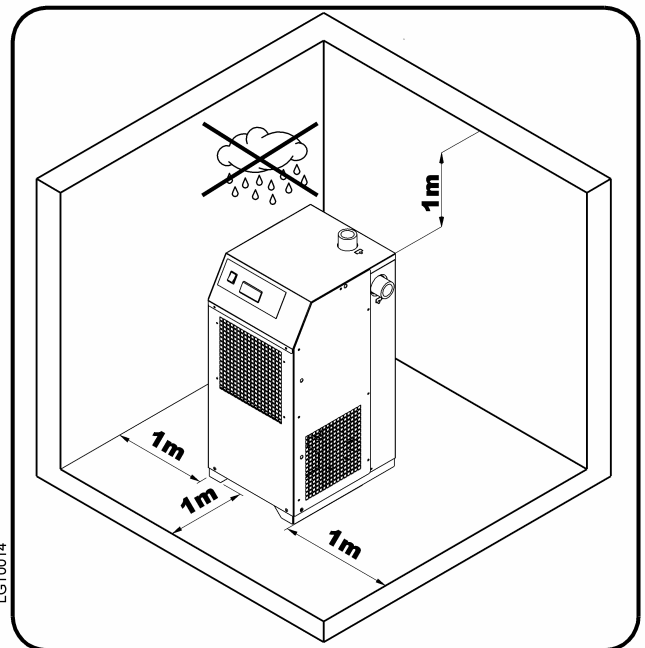


Don't use water to extinguish fire on the dryer on in the surrounding area.

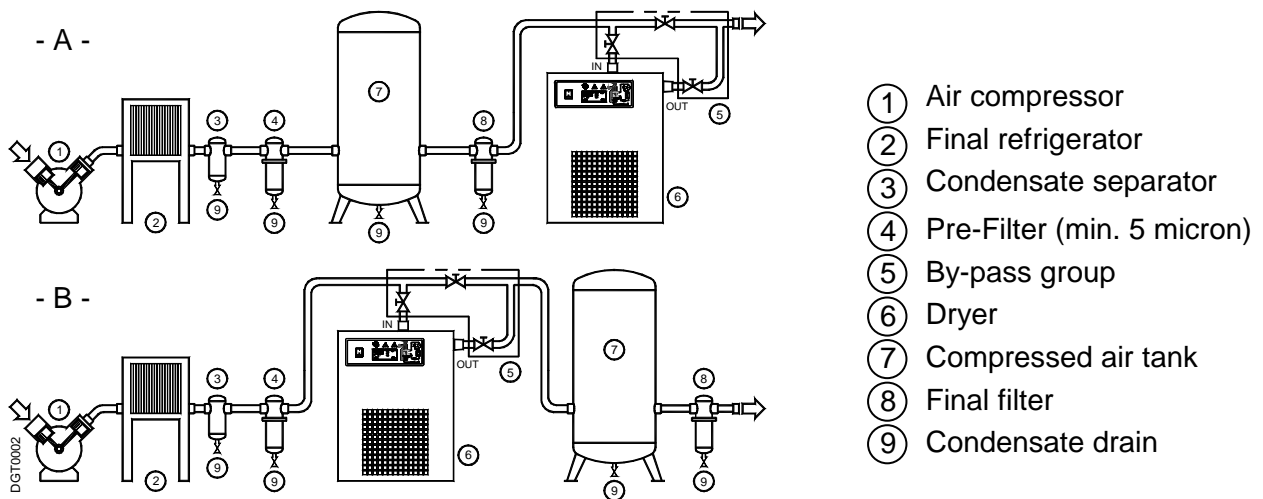
Minimal installation requirements :

- Select a clean room dry, 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.
- Leave at least 1 meter of free space on every side of the drier for ventilation purposes and maintenance operations.

The dryer doesn't require to be fixed to the supporting surface. The dryer needs to be fixed to the supporting surface only with particular installation procedures (dryer on brakets, hanging units, etc.)



2.4 INSTALLATION LAYOUT



It is mandatory to install a filter (with filtration grade at least 5 micron) on the dryer inlet side to prevent that rust, scale or other pollutants clog the Alu-Dry Module and the condensate drain.

Type A installation is suggested when the compressor operates at reduced intermittence and the total consumption equals the compressor flow rate.

Type B installation is suggested when the air consumption can consistently change with peak values highly exceeding the flow rate of the compressors. The capacity of the tank must be sized in order to compensate eventual instantaneous demanding conditions (peak air consumption).

2.5 CORRECTION FACTORS

Correction factor for operating pressure changes :									
Inlet air pressure	barg	4	5	6	7	8	10	12	14
Factor (F1)		0.77	0.86	0.93	1.00	1.05	1.14	1.21	1.27

Correction factor for ambient temperature changes :						
Ambient temperature	°C	≤ 25	30	35	40	45
Factor (F2)		≤ 1.00	0.98	0.95	0.88	0.80

Correction factor for inlet air temperature changes:							
Air temperature	°C	≤ 30	35	40	45	50	55
Factor (F3)		≤ 1.15	1.00	0.84	0.71	0.59	0.50

Correction factor for DewPoint changes:					
DewPoint	°C	3	5	7	10
Factor (F4)		0.91	1.00	1.10	1.26

How to find the air flow capacity:

$$\boxed{\text{Air flow capacity}} = \boxed{\text{Nominal duty}} \times \boxed{\text{Factor (F1)}} \times \boxed{\text{Factor (F2)}} \times \boxed{\text{Factor (F3)}} \times \boxed{\text{Factor (F4)}}$$

Example:

An **RD 18** has a nominal duty of **1800 l/min**. What is the maximum allowable flow through the dryer under the following operating conditions:

- Inlet air pressure = 7 barg
- Ambient temperature = 35°C
- Inlet air temperature = 40°C
- Pressure DewPoint = 3°C

Each item of data has a corresponding numerical factor as follows:

$$\boxed{\text{Air flow capacity}} = \boxed{1800} \times \boxed{1.00} \times \boxed{0.95} \times \boxed{0.84} \times \boxed{0.91}$$

= **1307 l/min** → This is the maximum flow rate that the dryer can accept under these operating conditions.

How to select a suitable dryer for a given duty:

$$\boxed{\text{Minimum Std. air flow rate}} = \boxed{\text{Design air flow}} \div \boxed{\text{Factor (F1)}} \div \boxed{\text{Factor (F2)}} \div \boxed{\text{Factor (F3)}} \div \boxed{\text{Factor (F4)}}$$

Example:

The procedure here is to list the operating conditions and then to locate the corresponding numerical factors:

- Design air flow = 1100 l/min
- Inlet air pressure = 7 barg
- Ambient temperature = 35°C
- Inlet air temperature = 40°C
- Pressure DewPoint = 3°C

In order to select the correct dryer model the required flow rate is to be divided by the correction factors relating to above mentioned parameters:

$$\boxed{\text{Minimum Std. Air flow rate}} = \boxed{1100} \div \boxed{1.00} \div \boxed{0.95} \div \boxed{0.84} \div \boxed{0.91}$$

= **1515 l/min** → Therefore the model suitable for the conditions above is **RD 18 (1800 l/min - nominal duty)**.

2.6 CONNECTION TO THE COMPRESSED AIR SYSTEM

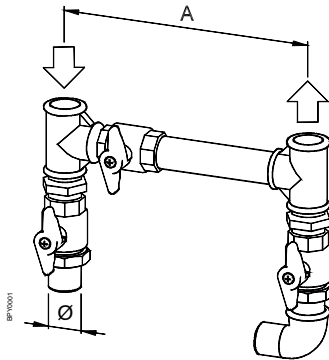


Operations to be performed by qualified personnel. Never operate with plants under pressure. The user is responsible to ensure that the dryer will never be operated with pressure exceeding the nominal values.

Eventual over-pressure could be dangerous both for the operator and the machine.

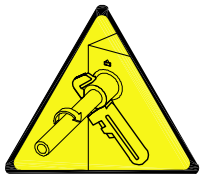
The temperature and the amount of air entering the dryer must comply with the limits reported on the data plate. In case of treatment of air at particularly high temperatures, the installation of a final refrigerator could result necessary. The cross section of the connecting piping, which must be free from dust, rust, chips and other impurities, must be consistent with the flow-rate of the dryer.

In order to facilitate the maintenance operations, a by-pass group has been installed, as shown in the following illustration.



Dryer	Ø [BSP-F]	A [mm]	By-Pass Code
RD 6-18	1/2"	210	2240GBP021
RD 25	1"	205	2240GBP022
RD 32	1.1/4"	205	2240GBP023

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

2.7 CONNECTION TO THE MAINS



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 RD 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** ($I_{\Delta n}=0.3A$), 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.



It is mandatory to ensure the connection to the ground terminal.

Don't use adapters on the mains socket.

If necessary, have the plug replaced by qualified personnel.

2.8 CONDENSATE DRAIN



The condensate is discharged at the same pressure of the air entering the dryer.
Never point the condensate drain jet towards anybody.

The dryer comes already fitted with tubing in flexible plastics (6 mm diameter and 1500 mm long) for the connection to the collection plant.

The condensate drain occurs through a solenoid valve protected with a mechanical strainer. In order to avoid clogging of the solenoid valve, the condensate coming from the separator is previously filtered, then discharged. The solenoid valve coil is operated by electronic instrument (dryer controller).

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

Connect and properly fasten the condensate drain to a collecting plant or container.

The drain cannot be connected to pressurised 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.

3.1 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.).

Before delivery, each dryer is submitted to accurate tests simulating real operating conditions. Nevertheless, the unit could be damaged during transportation. We therefore suggest to check the integrity of the dryer upon arrival and to keep it under control during the first hours of operation.



The start-up must be performed by qualified personnel.

It's mandatory that the engineer in charge adopt safety operational conditions complying with the local safety and accident prevention requirements.



The same engineer will be responsible for the proper and safe operation of the dryer.

Never operate the dryer if the panels are not in place.

3.2 FIRST START-UP



At the first start-up, or in case of start-up after a long inactivity period or following to maintenance operations, follow the instructions given below. The start-up must be performed by qualified personnel.

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 OPERATION AND SWITCHING OFF



Operation (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.



Switching OFF (refer to paragraph 5.1 Control Panel) :

- Verify that the DewPoint temperature displayed on DMC15 electronic instrument is correct.
- Switch OFF 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.

4.1 TECHNICAL FEATURES OF DRYERS SERIES RD / 230V

MODEL	RD 6	RD 12	RD 18	RD 25	RD 32	RD 32 -E
Air flow rate at nominal condition ¹						
[l/min]	600	1200	1800	2500	3200	3200
[m ³ /h]	36	72	108	150	192	192
[scfm]	21	42	64	88	113	113
Pressure DewPoint at nominal condition ¹	+5 equal to 0.85 g/m ³ of H ₂ O					
Nominal ambient temperature (max.)	+25 (+45)					
Min. ambient temperature	+1					
Nominal inlet air temperature (max.)	+35 (+55)					
Nominal inlet air pressure	7					
Max. inlet air pressure	16		14			
Air pressure drop - Δp	0.04	0.14	0.32	0.24	0.16	0.16
Inlet - Outlet connections	G 1/2" BSP-F		G 1" BSP-F		G 1.1/4" BSP-F	
Refrigerant type	R134.a					
Refrigerant quantity ²	0.20	0.25	0.30	0.33	0.44	0.44
Cooling air flow	200	300		350		
Standard Power Supply ²	1/230-240/50, 1/230/60		1/230-240/50		1/230/60	
Nominal electric absorption	160	210	290	390	480	630
[W]						
[A]	1.1	1.4	1.9	2.4	2.9	3.8
Max. electric absorption	200	280	390	610	700	720
[W]						
[A]	1.2	1.7	2.2	3.3	3.8	4.3
Max. level noise at 1 m	< 70					
[dbA]						
Weight	28	31	34	35	40	40
[kg]						

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

² Check the data shown on the identification plate.

4.2 TECHNICAL FEATURES OF DRYERS SERIES RD / 115V

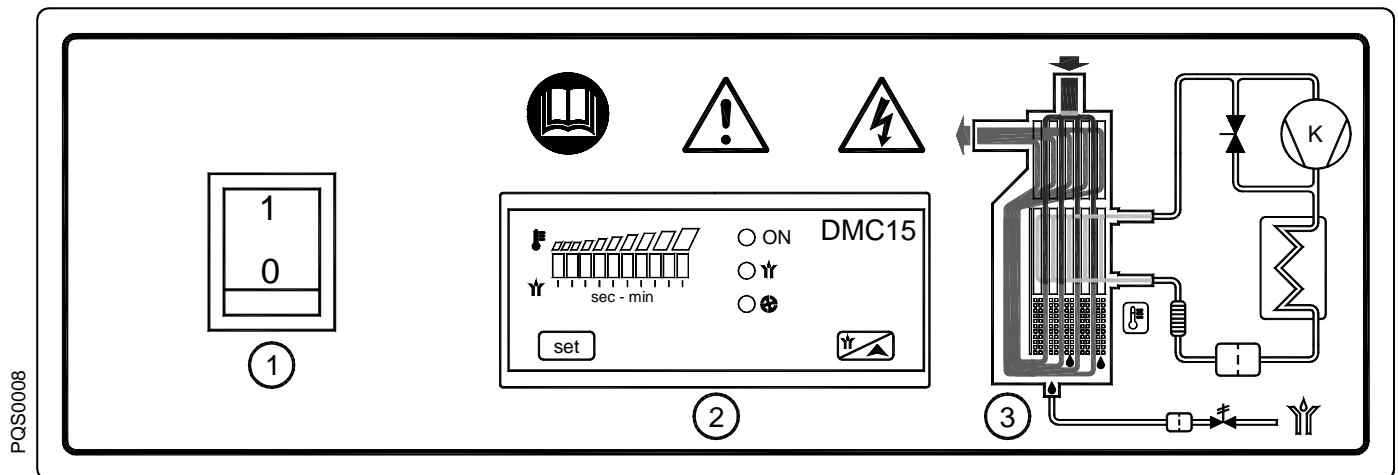
MODEL	RD 6 -P	RD 12 -P	RD 18 -P	RD 25 -P	RD 32 -P
Air flow rate at nominal condition ¹					
[l/min]	600	1200	1800	2500	3200
[m ³ /h]	36	72	108	150	192
[scfm]	21	42	64	88	113
Pressure DewPoint at nominal condition ¹	+5 equal to 0.85 g/m ³ of H ₂ O				
Nominal ambient temperature (max.)	+25 (+45)				
Min. ambient temperature	+1				
Nominal inlet air temperature (max.)	+35 (+55)				
Nominal inlet air pressure	7				
Max. inlet air pressure	16			14	
Air pressure drop - Δp	0.04	0.14	0.32	0.24	0.16
Inlet - Outlet connections	G 1/2" BSP-F		G 1" BSP-F		
Refrigerant type	R134.a				
Refrigerant quantity ²	0.21	0.25	0.30	0.33	0.44
Cooling air flow	200		300		
Standard Power Supply ²	1/115/60				
Nominal electric absorption	190	280	420	490	630
[A]	2.4	3.0	3.5	5.1	6.5
Max. electric absorption	240	320	460	650	720
[A]	2.8	3.5	3.9	6.0	7.6
Max. level noise at 1 m	< 70				
Weight	28	31	34	35	40

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

² Check the data shown on the identification plate.

5.1 CONTROL PANEL

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



PQS0008

- ① Main switch
- ② DMC15 Electronic control instrument
- ③ Air and refrigerating gas flow diagram

5.2 OPERATION

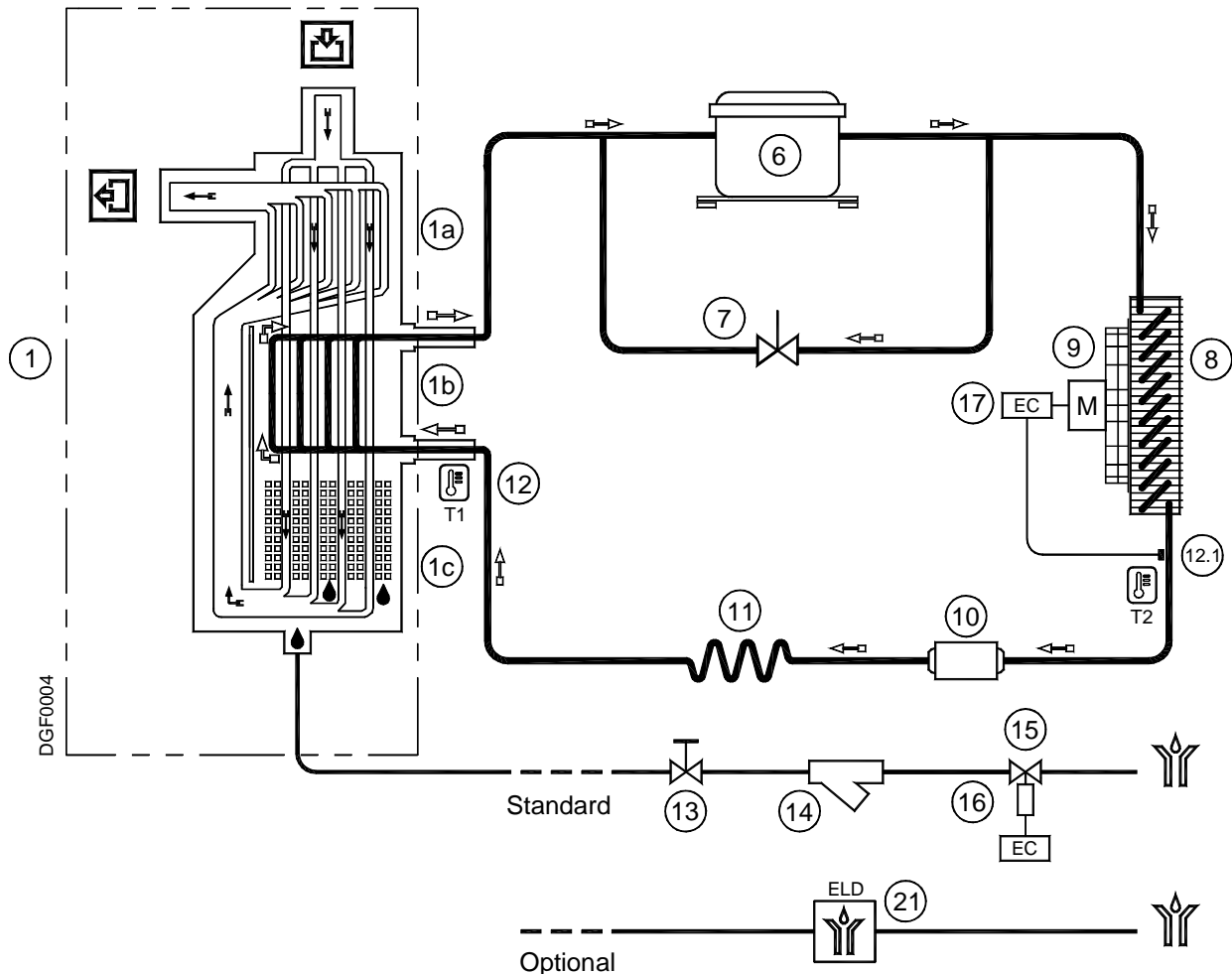
The dryer described in this manual basically consists of two separated circuits: a compressed air circuit, divided into two heat exchangers, and a refrigeration circuit.

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 exchanger.

5.3 FLOW DIAGRAM



- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> ① Alu-Dry Module <li style="padding-left: 20px;">a - Air-to-air heat exchanger <li style="padding-left: 20px;">b - Air-to-refrigerant exchanger <li style="padding-left: 20px;">c - Condensate separator ... ⑥ Refrigerating compressor ⑦ Hot gas by-pass valve ⑧ Condenser ⑨ Condenser fan ⑩ Dehydration filter | <ul style="list-style-type: none"> ⑪ Capillary tube ⑫ T1 Temperature probe (DewPoint) ⑫.1 T2 Temperature probe (fan control) ⑬ Condensate drain service valve ⑭ Y-shaped condensate drain strainer ⑮ Condensate drain solenoid valve ⑯ Coil for condensate drain solenoid valve ⑰ EC = Electronic control instrument ... ⑰.1 Electronic level drain |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
- ➡ Compressed air flow direction ➡ Refrigerating gas flow direction

5.4 REFRIGERATING COMPRESSOR

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 overcurrents. The protection is automatically restored as soon as the nominal temperature conditions are reached.

5.5 CONDENSER

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 aluminium 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 important **TO KEEP THE UNIT FREE FROM DUST AND OTHER IMPURITIES**.

5.6 DEHYDRATION FILTER

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.

5.7 CAPILLARY TUBE

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 lower the capillary tube outlet pressure, the lower 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.

5.8 ALU-DRY MODULE

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 air-to-refrigerant exchanger, with counter-current flows, assure excellent performances. 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. The generous collection volume assure the correct operation of the dryer even with extremely damp inlet air.

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



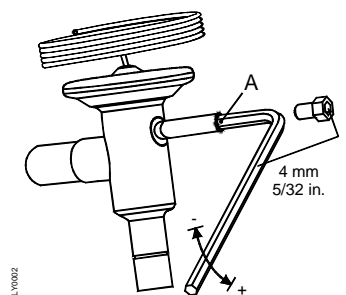
ADJUSTMENT

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 refrigeration engineer.

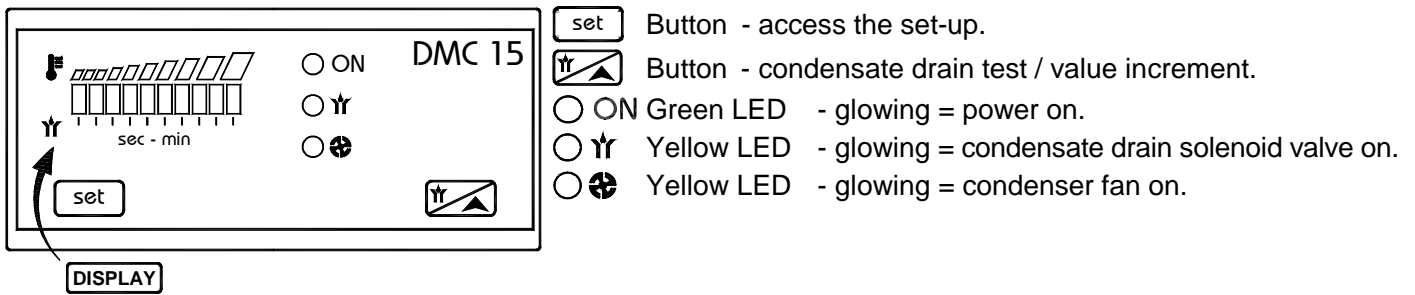
WARNING : the use of ¼" Schrader service valves must be justified by a real malfunction of the refrigeration system. Each time a pressure gauge is connected, a part of refrigerant is exhausted.

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)



5.10 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; 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 - The fan condenser is activated when the condensate temperature reaches or exceeds 35°C (FAN_{ON}) - LED ON - and it is deactivated when the temperature goes down to 30°C (FAN_{ON} - Hys) - LED ON off. In case of (T2) probe failure, the fan will run continuously and the ON LED will intermittent flash.

Timer - The condensate drain solenoid valve is activated for 2 seconds (T_{ON}) - ON LED on - each minute (T_{OFF}), 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_{ON} - 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_{ON} - activation time of the condensate drain solenoid valve.
- T_{OFF} - 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_{ON}) 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 _{ON}	Activation temperature of condenser fan	Synchronous flashing LED ON + LED ON	31 - 40 °C	1°K	35°C
T _{ON}	Activation time of the condensate drain solenoid valve	Synchronous flashing LED ON + LED ON	1 - 10 sec	1 sec	2 sec
T _{OFF}	Pause time of the condensate drain solenoid valve	Non-Synchronous flashing LED ON + LED ON	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.

6.1 CONTROLS AND MAINTENANCE SCHEDULE



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.	<ul style="list-style-type: none"> ⇒ Verify that the system is powered. ⇒ Verify the electric wiring.
◆ The compressor doesn't work.	<ul style="list-style-type: none"> ⇒ Activation of the compressor internal thermal protection - wait for 30 minutes, then retry. ⇒ Verify the electric wiring. ⇒ Where installed- Replace the internal thermal protection and/or the start-up relay and/or the start-up capacitor and/or the working capacitor. ⇒ If the compressor still doesn't work, replace it.
◆ The fan of the condenser doesn't work.	<ul style="list-style-type: none"> ⇒ Verify the electric wiring. ⇒ The DMC15 electronic controller is faulty - replace it. ⇒ If the fan still doesn't work, replace it.
◆ DewPoint too low.	<ul style="list-style-type: none"> ⇒ The fan is always ON - the  yellow LED of DMC15 controller is glowing continuously - see specific point. ⇒ Ambient temperature is too low - restore de nominal condition. ⇒ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore the nominal setting.
◆ DewPoint too high.	<ul style="list-style-type: none"> ⇒ The dryer doesn't start - see specific point. ⇒ The T1 DewPoint probe doesn't correctly detect the temperature - ensure the sensor is pushed into the bottom of copper tube immersion well. ⇒ The refrigerating compressor doesn't work - see specific point. ⇒ The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation. ⇒ The inlet air is too hot - restore the nominal conditions. ⇒ The inlet air pressure is too low - restore the nominal conditions. ⇒ The inlet air flow rate is higher than the rate of the dryer - reduce the flow rate - restore the normal conditions. ⇒ The condenser is dirty - clean it. ⇒ The condenser fan doesn't work - see specific point. ⇒ The dryer doesn't drain the condensate - see specific point. ⇒ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore the nominal setting. ⇒ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer.
◆ Excessive pressure drop within the dryer.	<ul style="list-style-type: none"> ⇒ The dryer doesn't drain the condensate - see specific point. ⇒ The DewPoint is too low - the condensate is frost and blocks the air - see specific point. ⇒ Check for throttling the flexible connection hoses.

-
- ◆ The dryer doesn't drain the condensate.
- ⇒ The condensate drain service valve is closed - open it.
 - ⇒ The condensate drain strainer is clogged - remove and clean it.
 - ⇒ The drain solenoid valve is jammed - remove and clean it.
 - ⇒ Verify the electric wiring.
 - ⇒ The coil of the condensate drain solenoid valve burned out - replace it.
 - ⇒ The DewPoint is too low - the condensate is frozen - see specific point.
-
- ◆ The dryer continuously drains condensate.
- ⇒ The drain solenoid valve is jammed - remove and clean it.
 - ⇒ 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.
 - ⇒ **Where installed** - Untreated air flows through the by-pass unit - close the by-pass.
 - ⇒ The dryer doesn't drain the condensate - see specific point.
 - ⇒ DewPoint too high - see specific point.
-
- ◆ **DMC15**- The first and the last LED of the display of electronic instrument blink simultaneously.
- ⇒ Verify the electric wiring of (T1) DewPoint probe.
 - ⇒ The (T1) DewPoint probe is faulty - replace it.
 - ⇒ The DMC15 electronic controller is faulty - replace it.
-
- ◆ **DMC15**- The  yellow LED of the electronic controller is flashing continuously.
- ⇒ Verify the electric wiring of (T2) fan control probe.
 - ⇒ The (T2) fan control probe is faulty - replace it.
 - ⇒ The DMC15 electronic controller is faulty - replace it.
-
- ◆ **DMC15**- The first LED of the display of electronic instrument is flashing continuously.
- ⇒ DewPoint too low - see specific point.
 - ⇒ The (T1) DewPoint probe is faulty - replace it.
 - ⇒ The DMC15 electronic controller is faulty - replace it.
-
- ◆ **DMC15**- The last LED of the display of electronic instrument is flashing continuously.
- ⇒ DewPoint too high - see specific point.
 - ⇒ The (T1) DewPoint probe is faulty - replace it.
 - ⇒ 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 ₂ FCF ₃	1000 ppm	1300
R404A - HFC	CH ₂ FCF ₃ /C ₂ HF ₅ /C ₂ H ₃ F ₃	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. Is 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.

7.1 DRYERS DIMENSIONS

- 7.1.1 *RD 6 Dryers Dimensions*
- 7.1.2 *RD 12-18 Dryers Dimensions*
- 7.1.3 *RD 25 Dryers Dimensions*
- 7.1.4 *RD 32 Dryers Dimensions*

7.2 ELECTRIC DIAGRAMS

7.2.1 *Electrical Diagram of Dryers RD 6-32*

Electrical Diagram table of components - Dryers RD 6-32

- IG** : Main switch
 - K** : Refrigerating compressor
 - KT** : Compressor thermal protection
 - KR** : Compressor starting relay (if installed)
 - CS** : Compressor starting capacitor (if installed)
 - CR** : Compressor run capacitor (if installed)
 - V** : Condenser fan
 - CV** : Fan starting capacitor (if installed)
 - DMC15** : DMC15 Electronic Instrument - Air Dryer Controller
 - T1** : T1 Temperature probe (DewPoint)
 - T2** : T2 Temperature probe (Fan control)
 - EVD** : Condensate drain solenoid valve
 - ELD** : Electronic level drain
- BN = BROWN BK = BLACK
 BU = BLUE YG = YELLOW/GREEN

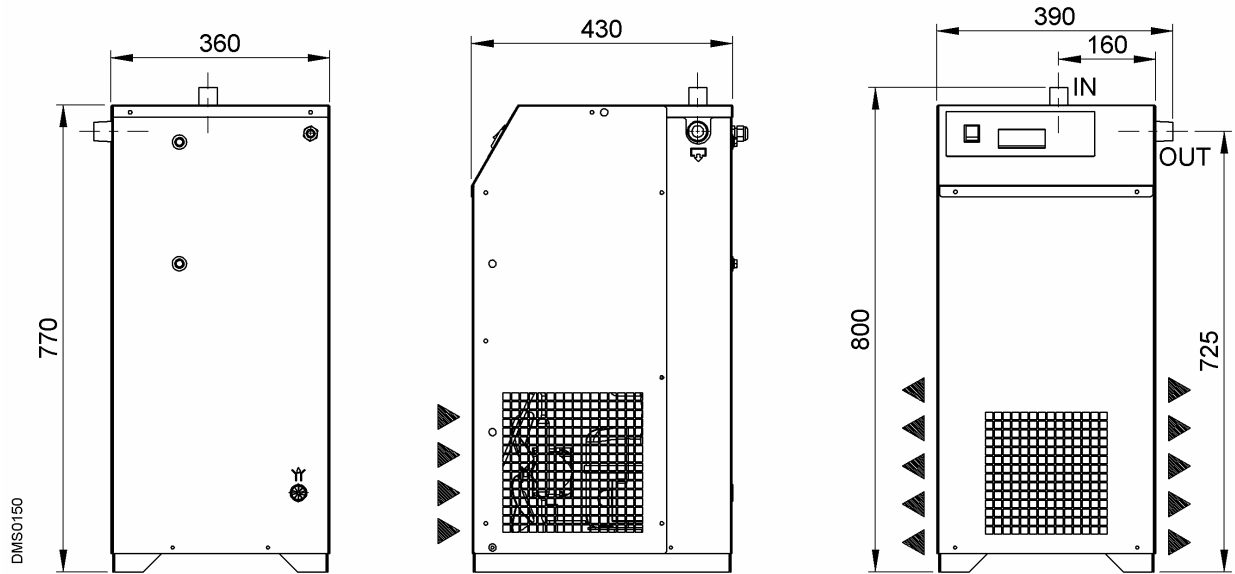
7.3 EXPLODED VIEW

- 7.3.1 *Exploded view of Dryers 6*
- 7.3.2 *Exploded view of Dryers RD 12*
- 7.3.3 *Exploded view of Dryers RD 18-32*

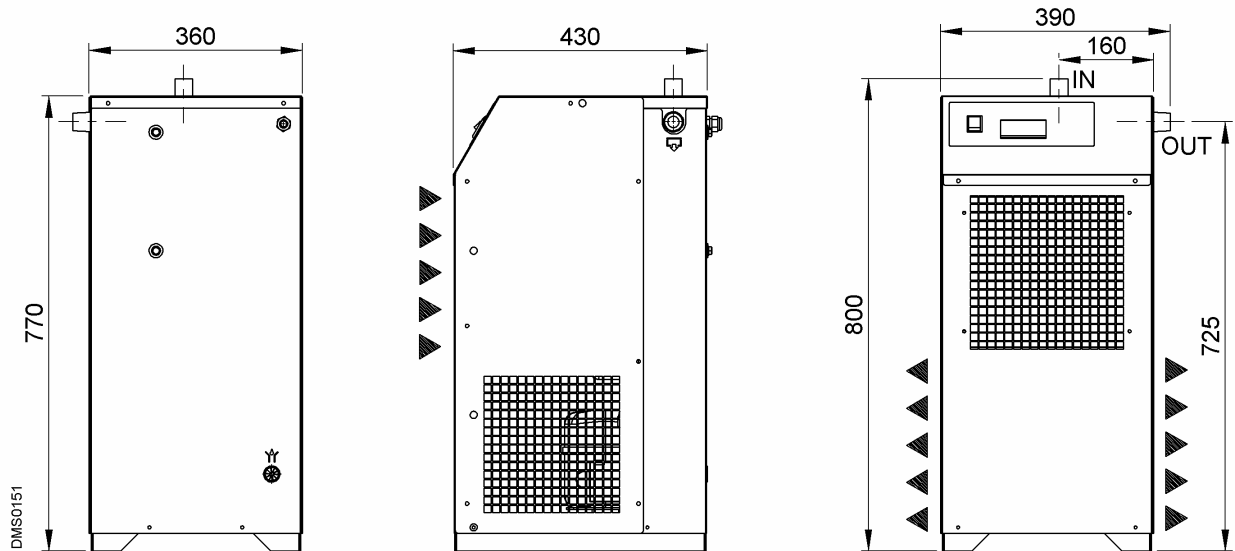
Exploded view table of components – Dryers RD 6-32

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> ① Alu-Dry Module <li style="padding-left: 20px;">1.1 Insulation Material ⑥ Refrigerating compressor ⑦ Hot gas by-pass valve ⑧ Condenser ⑨ Condenser fan <ul style="list-style-type: none"> 9.1 Motor 9.2 Blade 9.3 Grid ⑩ Dehydration filter ⑪ Capillary tube ⑫ T1 Temperature probe (DewPoint) ⑬ Condensate drain service valve ⑭ Y-shaped condensate drain strainer ⑮ Condensate drain solenoid valve | <ul style="list-style-type: none"> ⑯ Coil for cond. drain solenoid valve ⑰ Electronic control instrument ⑳ Electronic level drain ㉑ Main switch ㉒ Front panel ㉓ Back panel ㉔ Right lateral panel ㉕ Left lateral panel ㉖ Base plate ... ㉗ Electric connector ... ㉘ Flow diagram sticker |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

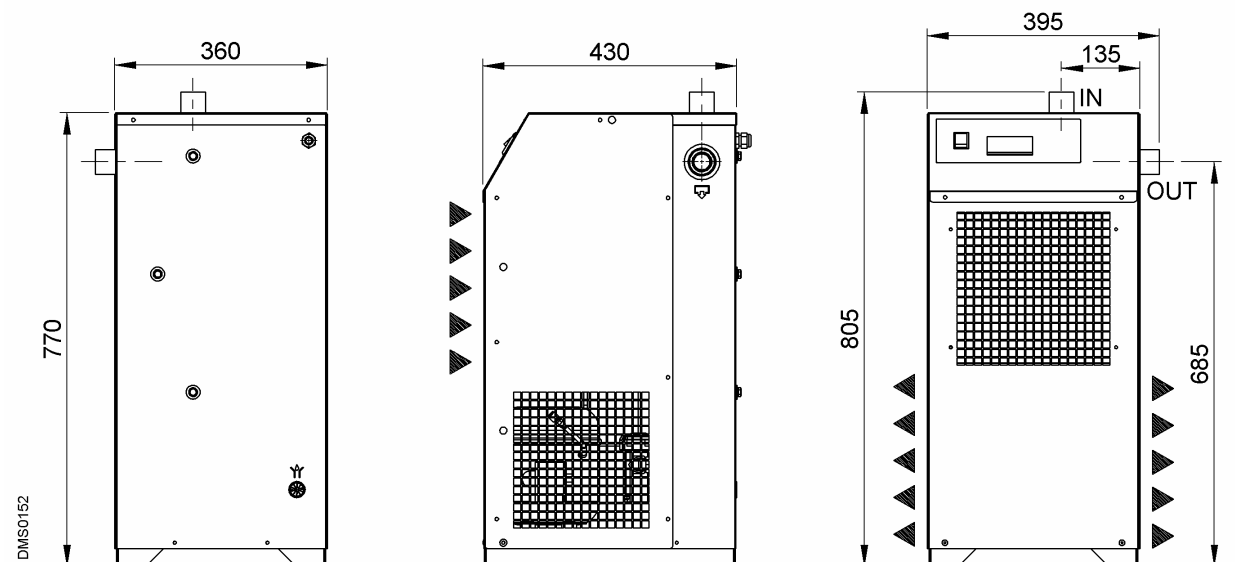
7.1.1 RD 6



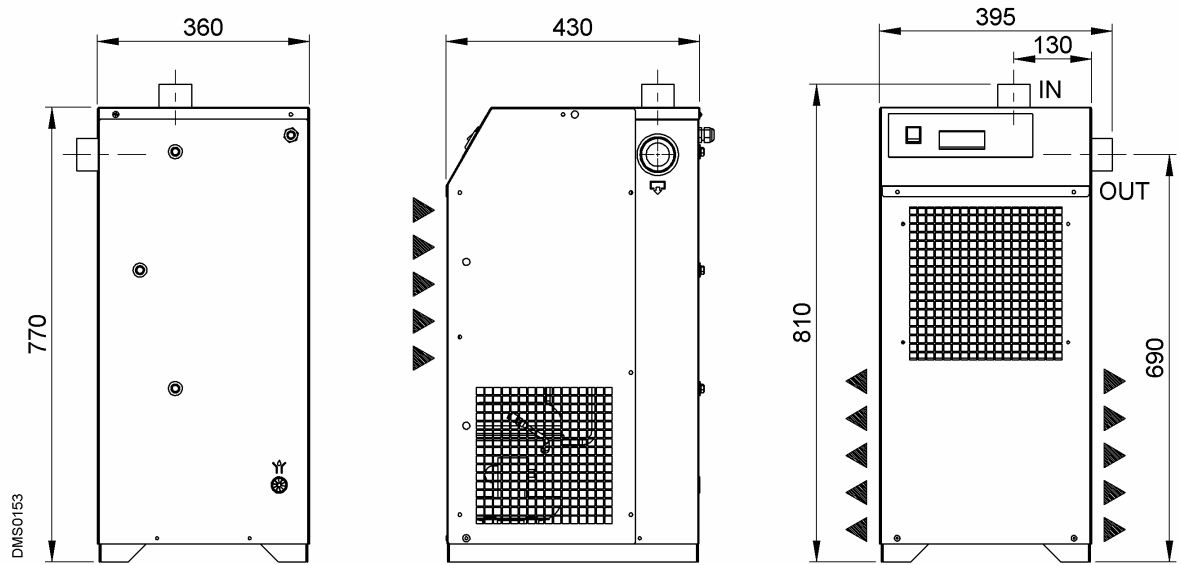
7.1.2 RD 12-18



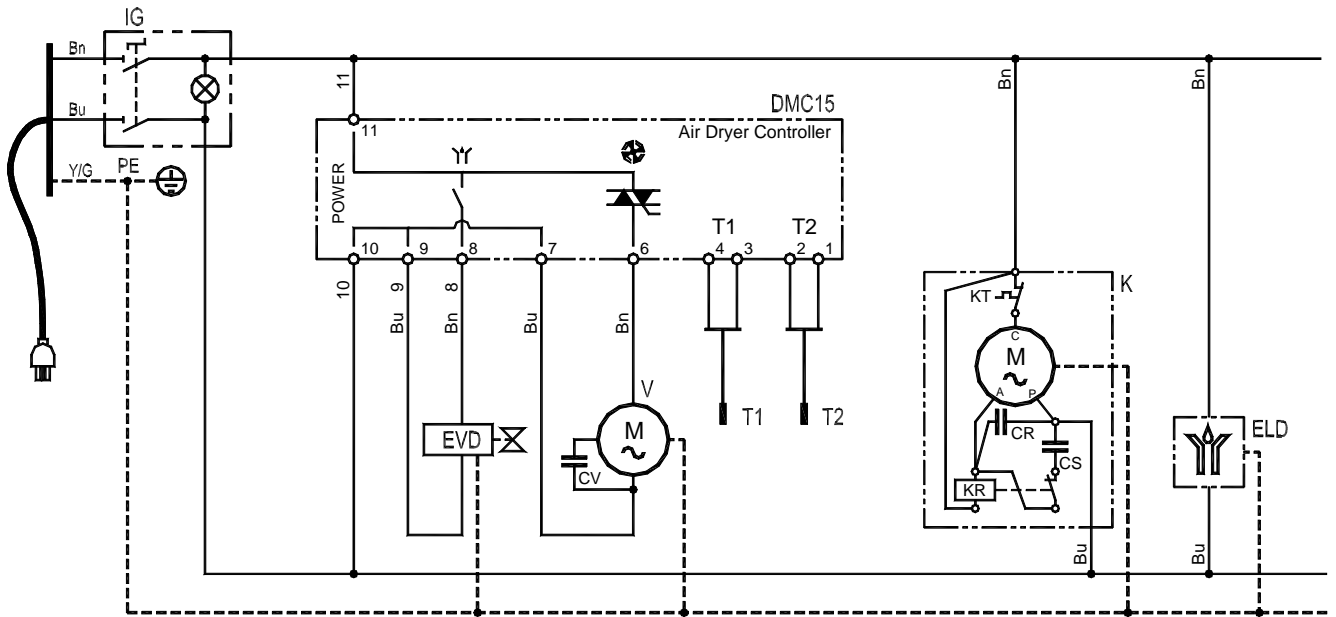
7.1.3 RD 25



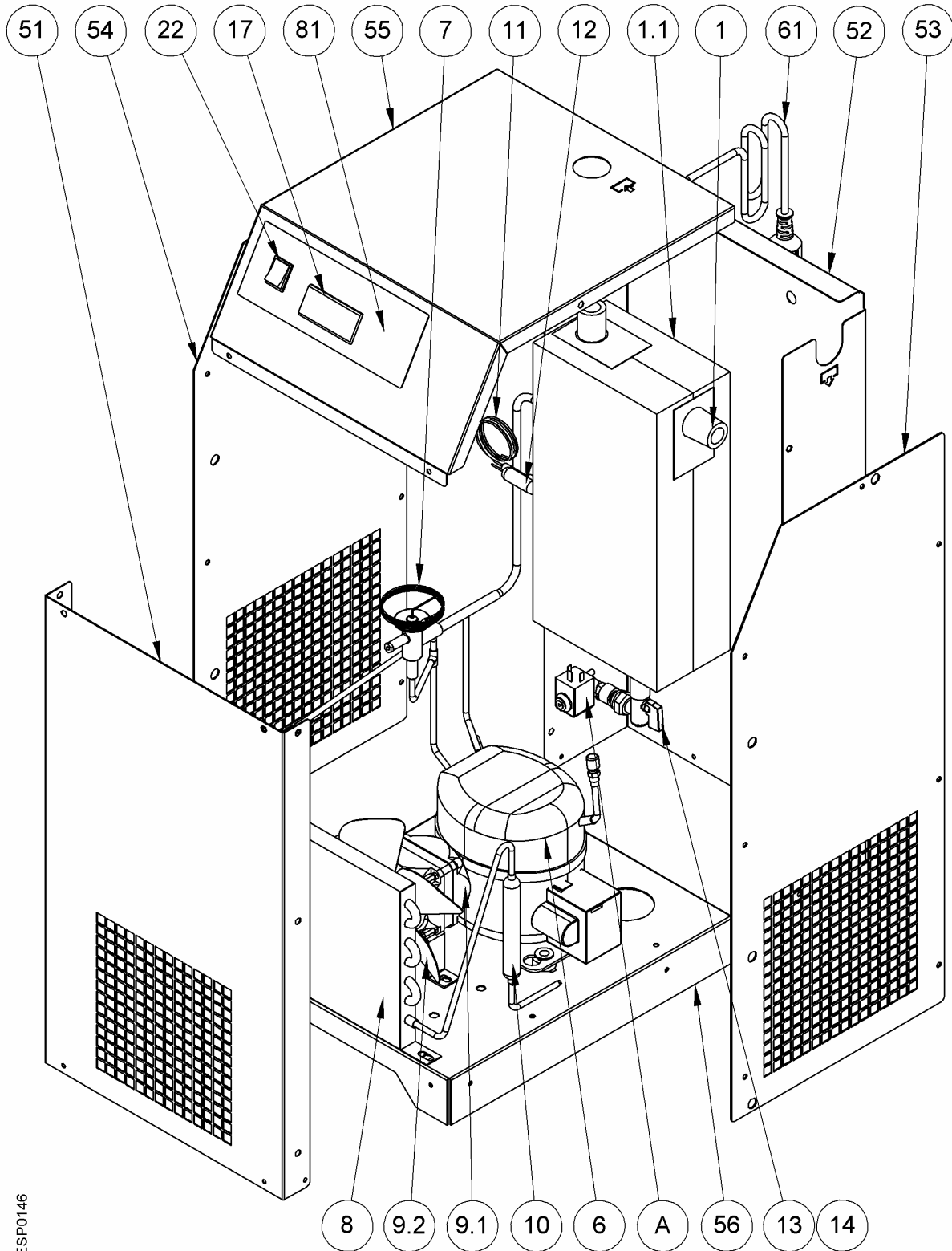
7.1.4 RD 32



7.2.1 RD 6-32

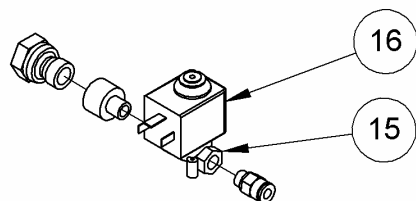


7.3.1 RD 6

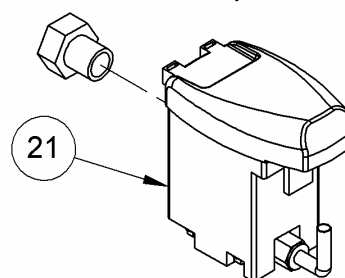


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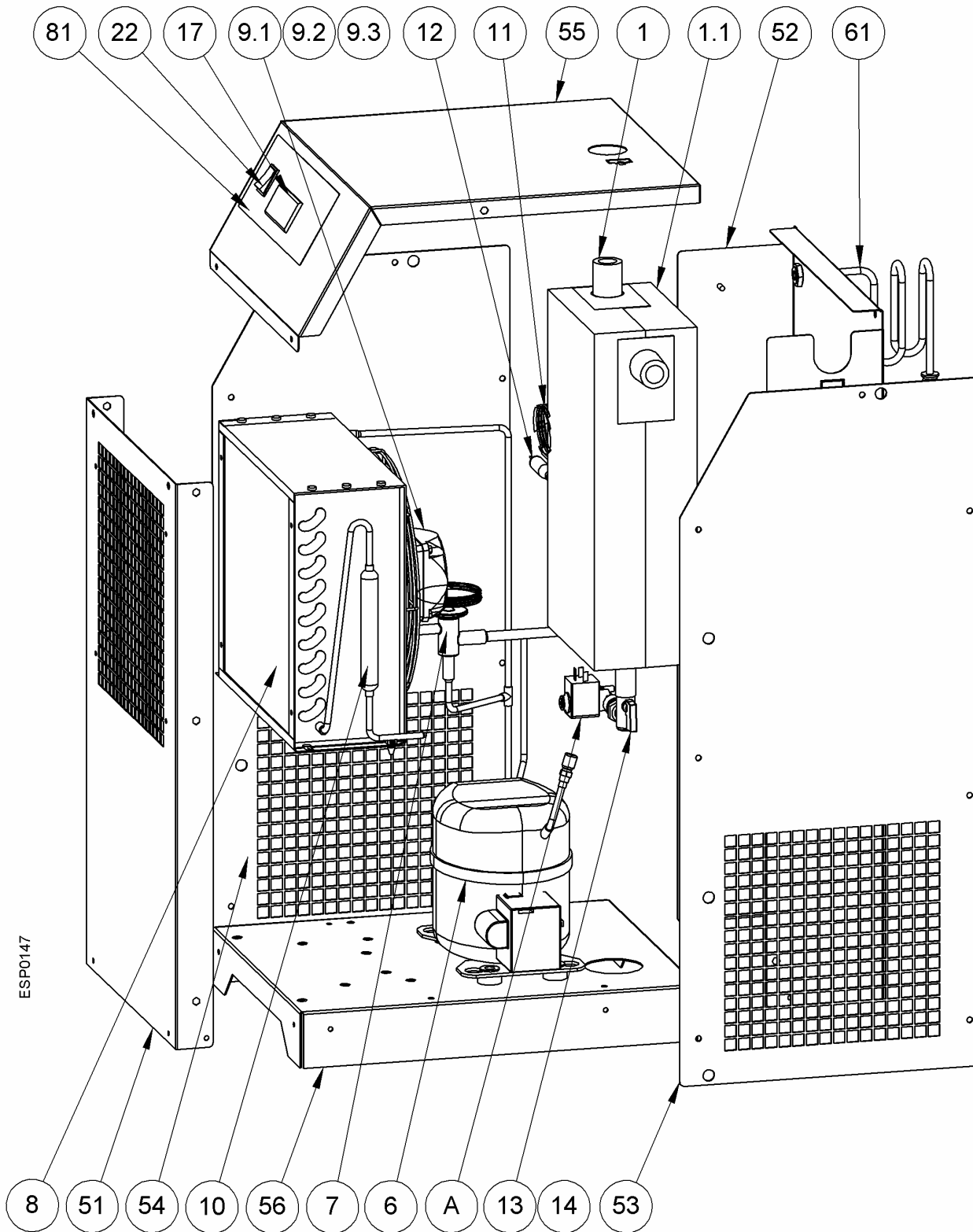
Pos."A" standard



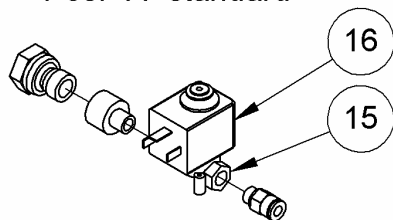
Pos."A" optional



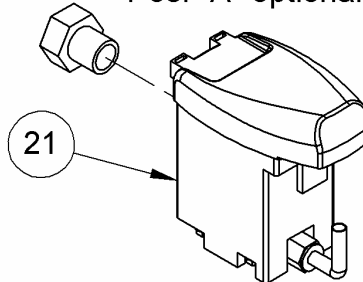
7.3.2 RD 12



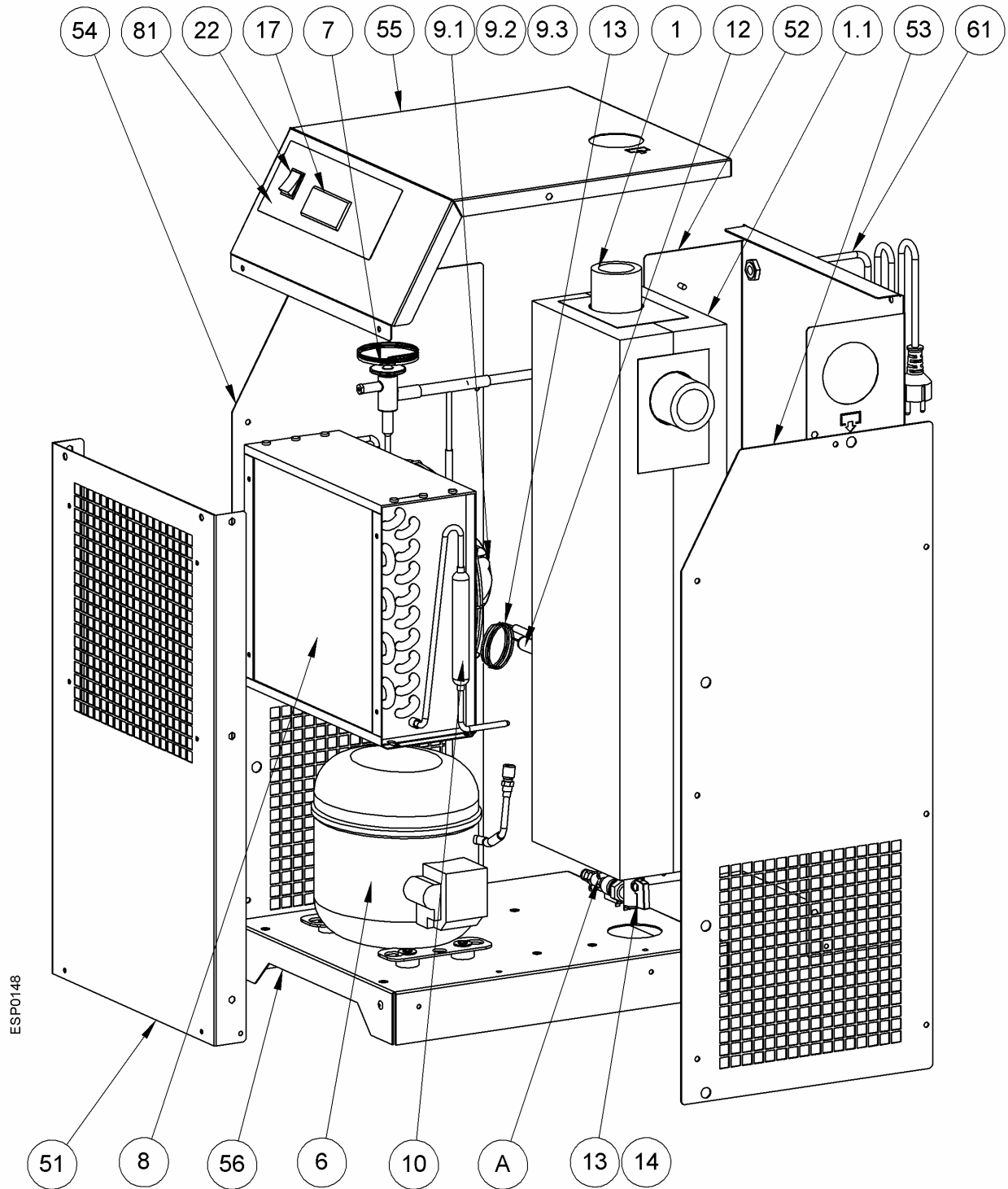
Pos. "A" standard



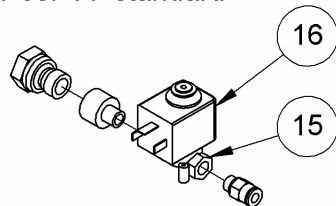
Pos. "A" optional



7.3.3 RD 18-32



Pos. "A" standard



Pos. "A" optional

