



## ***NON-CYCLING REFRIGERATED DRYER***

# **Installation & Operation Maintenance Manual**

### **Models**

**Model:** \_\_\_\_\_

**Serial Number:** \_\_\_\_\_

**PLS25 PLS210  
PLS40 PLS275  
PLS60 PLS300  
PLS85 PLS400  
PLS105 PLS500  
PLS140 PLS600  
PLS175 PLS700  
PLS800**



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## **STATEMENT OF WARRANTY TERMS & CONDITIONS**

BelAir's refrigerated air dryers are warranted to be free of defects in materials and workmanship under proper use, installation, and application. Warranty covers parts and labor at fair market value and according to warranty labor replacement guidelines. This warranty shall be for a period of 15 months from date of shipment from our factory or other stocking facilities or 12 months from date of installation. Proof of installation date will be required. All dryers outside the U.S. and Canada carry a parts only warranty.

**ALL FREIGHT DAMAGE CLAIMS ARE NOT THE RESPONSIBILITY OF THE MANUFACTURER AND ARE NOT COVERED UNDER WARRANTY AS ALL PRODUCTS ARE SHIPPED F.O.B. SHIPPER.**

**PLEASE DIRECT ALL FREIGHT CLAIMS TO THE SHIPPER IN QUESTION.**

### **MAINTENANCE AND ADJUSTMENTS**

**ADJUSTMENTS TO THE HOT GAS AND MAINTENANCE OF FLOAT AND AUTOMATIC DRAINS AND CONDENSER COILS ARE CONSIDERED TO BE ROUTINE MAINTENANCE AND THEREFORE NON-WARRANTABLE ITEMS AND ARE THE SOLE RESPONSIBILITY OF THE END USER. CONSULT THE INSTALLATION, OPERATION AND MAINTENANCE MANUAL FOR THE ADJUSTMENT AND MAINTENANCE PROCEDURES.**

**THIS WARRANTY DOES NOT APPLY TO ANY UNIT DAMAGED BY ACCIDENT, MODIFICATION, MISUSE, NEGLIGENCE, OR MISAPPLICATION. DAMAGE TO HEAT EXCHANGERS BY EXPOSURE TO AMMONIA, ANY OTHER CORROSIVE SUBSTANCE OR SUB-FREEZING ENVIRONMENT WILL BE CONSIDERED MISUSE.**

Any refrigerated dryer part or material found defective will be repaired, replaced or refunded, at the sellers option free of charge, provided that BelAir is notified within the above stated warranty period. **All returns of allegedly defective equipment must have prior written authorization.** Said authorization may be obtained through our refrigerated dryer service department. All refrigerated dryers, parts, materials must be returned **freight prepaid** to the Manufacturer's factory for inspection within 30 days of return authorization date. Any shipment returned to the factory collect will be refused.

After inspection, if an item is found to be warrantable, the repaired item or replacement will be returned normal ground freight prepaid within the continental United States and Canada. In the event an item is deemed non-warranty due to improper usage, maintenance, improper installation, abuse, alteration or operator error the customer is responsible for all charges (including parts, labor or replacement costs) incurred resolving the warranty claim. Expedited shipment costs are the responsibility of the requestor.

Any replacement part or material is warranted only to the extent of the remaining warranty period of the dryer or to the extent as provided by the supplier, whichever is longer.

### **IDENTIFICATION PLATE**

The identification plate 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 identification plate. This data should always be referred to when calling the manufacturer or distributor.

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

### **DISCLAIMER**

The warranty does not cover any responsibility or liability for direct or indirect damages to persons, or equipment caused by improper usage or maintenance, and is limited to manufacturing defects only. Refer to BelAir Warranty policy manual for travel, mileage and special charge considerations. The warranty will be immediately voided if there are changes or alterations to the dryer.

### **FILTERS AND DRAINS**

Filters and drains are warranted to be free from defects in material and workmanship, under proper use, installation, application and maintenance in accordance with written specifications for a period of one year from date of purchase. Elements, o-rings and float drains are considered consumable items and are warranted at installation only.

## **WHO TO CONTACT IF YOU HAVE A WARRANTY CLAIM:**

BelAir Technologies, LLC

Phone (302) 832-5800

Fax (302) 832-5900

**All freight damage claims should be filed within 15 working days and should be directed to the carrier.**

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### **1.1 DEFINITION OF THE SAFETY SYMBOLS USED**



Before attempting any Maintenance or service on the dryer, carefully read the instructions reported in this maintenance manual.



General warning sign, Risk of danger or possibility of damage to the machine. Carefully read the text related to this sign.



Electrical hazard. The text outlines conditions which could result in death or injury. The related instructions must be strictly respected.



Danger hazard. Part or system under pressure.



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



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 fires 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 <sup>1</sup>.



Compressed air inlet connection point.



Compressed air outlet connection point.



Condensate drain connection point.



Cooling water inlet connection point (water-cooled).



Cooling water outlet connection point (water-cooled).



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

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 parts under pressure.

Never point the compressed air or the condensate drain lines 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 to 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 the power to the machine is de-energized and locked out before servicing.
- Ensure that any part of the dryer is not under pressure and that it cannot be connected to the compressed air system



These refrigeration air dryers contain R134A & R404A HFC type refrigerant fluid, not considered potential ozone depleting. Maintenance on refrigeration systems must be carried out only by refrigeration engineers according to local rules. R134A & R404A may be dangerous only if it is present in bulk concentrations. In case of leaks the room is to be aired before any intervention.



Any change to the machine or to the relevant operating parameters, if not previously verified and authorized by the manufacturer, in addition to creating the possibility of dangerous conditions it will also void the warranty.



Do not use water to extinguish fires on the dryer or in the surrounding area.

### **1.3 PROPER USE OF THE DRYER**

This dryer has been designed, manufactured and tested to be used to separate 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 be in any case responsible for any resulting damage.

Moreover, the correct use requires the proper installation conditions, in particular :

- Voltage and frequency of the mains.
- Pressure, temperature and flow-rate of the incoming air.
- Pressure, temperature and cooling water capacity (water-cooled).
- Ambient temperature.

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

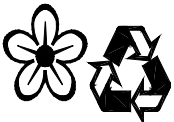


The purpose of the machine is the separation of water and eventual oil particles present in compressed air. The dried air cannot be used for respiration purposes or for operations leading to direct contact with foodstuff. This dryer is not suitable for the treatment of dirty air or of air containing solid particles.

### **2.1 TRANSPORTATION**

Once the packaging has been verified for damage, place the unit near to the installation point and unpack the contents.

- To move the packaged unit we suggest to use a suitable trolley or forklift. Transportation by hand 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.
- Even when packaged, keep the machine protected from severity of the weather.



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.

### **2.2 INSTALLATION SITE**



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

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

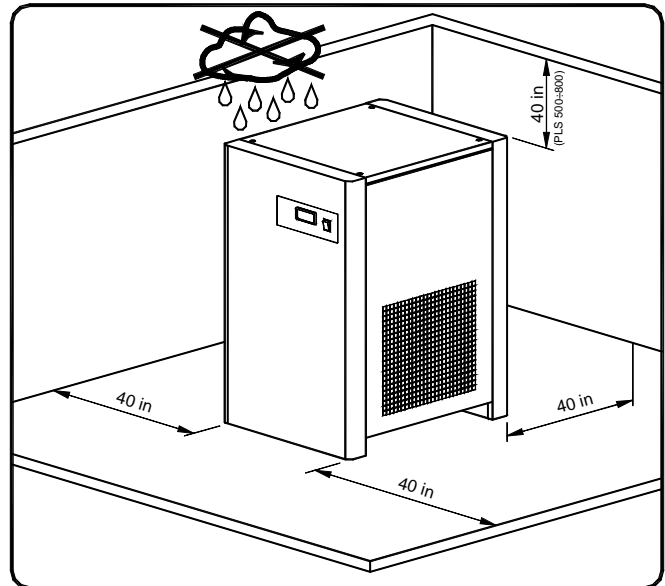


Don't use water to extinguish fires on the dryer or in the surrounding area.

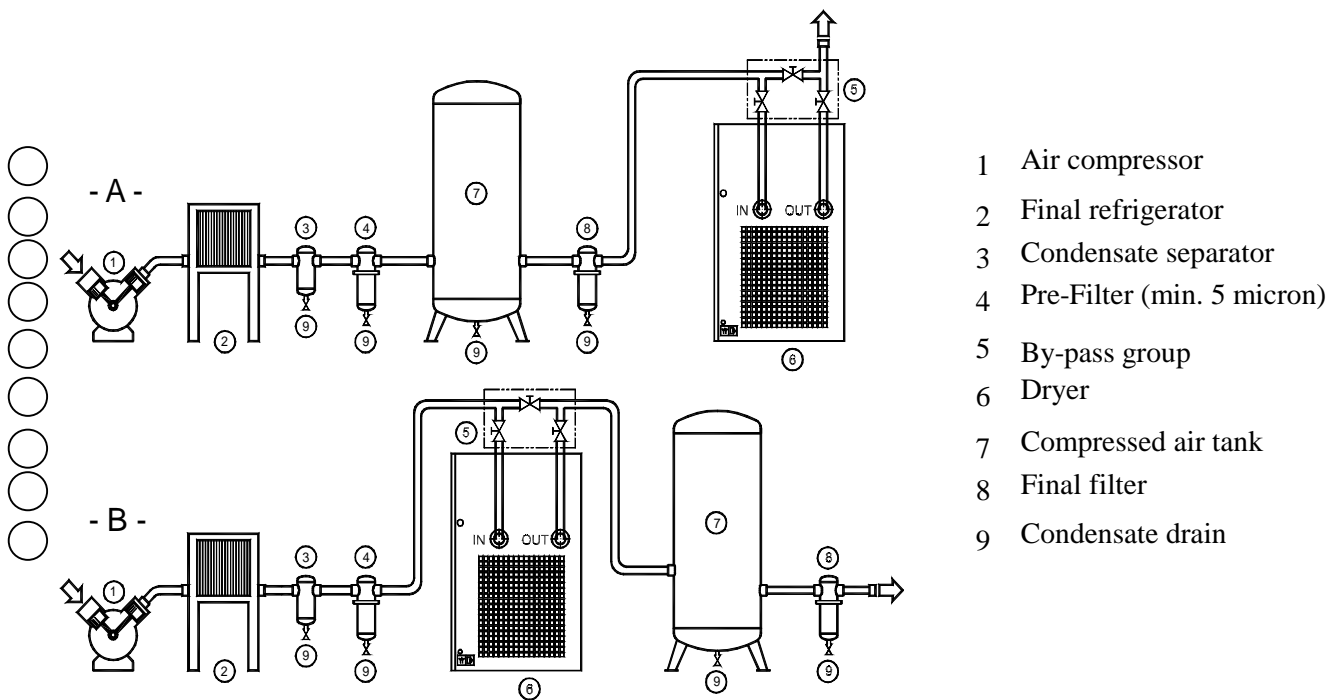
**Minimal installation requirements :**

- Select a clean dry room, 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 +34 °F.
- Maximum ambient temperature +110°F.
- Allow at list a clearance of 40 inches on each side of the dryer for proper ventilation and to facilitate eventual maintenance operations.

The dryer doesn't require to be fixed to the supporting surface.



**2.3 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 could clog the Comby-Heat-Exchanger 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).

## 2.4 CORRECTION FACTORS

Correction factor for operating pressure changes :

Inlet air pressure	psig	60	80	100	120	140	160	190	220
Factor		0.77	0.88	1.00	1.08	1.12	1.18	1.23	1.28

Correction factor for ambient temperature changes (air-cooled):

Ambient temperature	°F	80	90	100	105	110
Factor		1.10	1.06	1.00	0.89	0.84

Correction factor for inlet air temperature changes:

Air temperature	°F	90	100	105	110	120	130
Factor		1.20	1.00	0.85	0.75	0.62	0.49

Correction factor for DewPoint changes:

DewPoint	°F	33÷39	40÷44	45÷49	50÷54
Factor		1.00	1.09	1.22	1.40

**Example:** Select the right Dryer for the following conditions: 160 scfm, 120 psig inlet air pressure, 105 °F ambient temperature, 110 °F inlet air temperature, 42 °F pressure DewPoint, Air-Cooled. Determine dryer model:  $160 / 1.08 / 0.89 / 0.75 / 1.09 = 204$  scfm = capacity dryer required. **Selection PLS 210** .

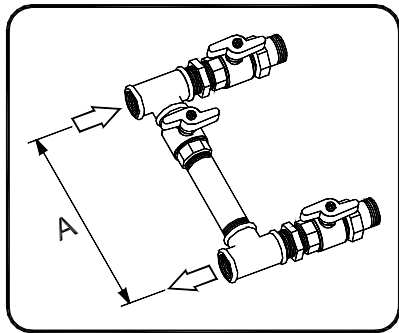
## 2.5 CONNECTION TO THE COMPRESSED AIR SYSTEM



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 temperature, 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, We recommend the installation of bypass piping as shown in the following illustration.



Dryer	Ø [NPT-F]	A [in]	Code By-Pass
PLS 25÷60	3/4"	7.7/8	2240GBP330
PLS 85÷140	1.1/4"	11.7/8	2240GBP331
PLS 175÷275	2"	11.7/8	2240GBP332
PLS 300-400	2"	5.7/16	2240GBP333
PLS 500÷800	3"	5.7/16	2240GBP334

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

## 2.6 CONNECTION TO THE COOLING WATER NETWORK (Water-Cooled)



Operations to be performed by qualified personnel. Never operate with dryer under pressure. The user is responsible to ensure that the dryer will never be operated with pressure exceeding the nominal values. Over-pressure could be dangerous for both the operator and the machine.

The temperature and the amount of cooling water must comply with the limits indicated on the technical characteristics chart.

The cross section of the connection pipes, preferably flexible, must be free from rust, chips and other impurities. We recommend the use of connecting pipes able to insulate the dryer from possible vibrations originating from the line (flexible hoses, vibration damping fittings, etc.).



## 2.7 ELECTRICAL CONNECTION



The electrical connection should be carried out by a qualified technician and the safety systems must comply with local rules and regulations.

Before connecting the unit to the electric power, verify that the voltage and the frequency available on the main corresponds to the data reported on the data plate of the dryer. In terms of voltage, a  $\pm 5\%$  tolerance is allowed. The dryer which is supplied at 115/60/1 comes with a electrical cable installed and ending with a North American standard plug (2 poles & ground).

The dryers supplied at 230/60/1 up to model PLS275 comes with 80 in. length cable for the connection to the main. Dryers from model PLS300 and up comes with a box for the connection to the main.

The plug 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 company.



It's mandatory 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 line towards anybody.

The dryer comes already fitted with plastic flexible tubing (1/4in or 3/8in diameter and 60 in 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 filtered, than discharged. The solenoid valve coil is operated by DMC11 or DMC20 Air Dryer Controller.

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

The drain 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 a water-oil separator be installed where all the condensate drains coming from compressors, dryers, tanks, filters, etc.

## 3.1 PRELIMINARY OPERATION



Verify that the operating parameters matches 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 you 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 will 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 their 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, respect the instructions given below.

The start-up must be performed by qualified personnel.

### **3.2.1 FIRST START-UP OF DRYERS SERIES PLS 25-400**

**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.
- Ensure the cooling water flow and temperature is adequate (water-cooled).
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Switch on the dryer by closing the main switch on the control panel (pos. 1).
- Ensure the DMC11 Air Dryer Controller is ON.
- Ensure the consumption matches with the values of the data plate.
- **Ensure the fan work properly - wait for its first interventions (air-cooled).**
- Allow the dryer temperature to stabilize 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 leaks.
- Ensure the drain is cycling regularly.

### **3.2.2 FIRST START-UP OF DRYERS SERIES PLS 500-800**

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

#### **DMC11 Air Dryer Controller**

- 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 lines are 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 main switch.
- Close the main switch - pos. 1 on the control panel.
- Check that the mains detection light of the ON/OFF button - pos. 3 of the control panel - is ON.

#### **DMC20 Air Dryer Controller**

- 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 lines are 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 main switch.
- Close the main switch - pos. 1 on the control panel.
- Check that "crankcase heater" and "Stand-by" LED's on DMC20 are ON.


- Wait at least two hours before starting the dryer (compressor crankcase heater must heat the oil of the compressor).
  - Ensure the cooling water flow and temperature is adequate (water-cooled).
  - Switch ON the dryer the button "I - ON" of the ON/OFF switch - pos. 3 of the control panel.
  - Ensure the DMC11 Air Dryer Controller is ON.
  - Ensure the consumption matches with the values of the data plate.
  - **Check the direction of the fan for proper rotation Arrows on the condenser indicates the correct rotation. (Air-cooled).**
  - Allow the dryer temperature to stabilize 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 leaks.
  - Ensure the drains are cycling regularly.
- Wait at least two hours before starting the dryer (compressor crankcase heater must heat the oil of the compressor).
  - Ensure the cooling water flow and temperature is adequate (water-cooled).
  - Switch ON the dryer keeping the “Dryer Start-up” button on DMC20 pressed for at least 2 seconds.
  - Check that “compressor ON” led on DMC20 is ON.
  - Ensure the consumption matches with the values of the data plate.
  - **Check that the rotation direction of the fan corresponds with the arrows on the condenser (air-cooled).**
  - Allow the dryer temperature to stabilize 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 leaks.
  - Ensure the drains are cycling regularly.

### **3.3 OPERATION AND SWITCHING OFF**

#### **3.3.1 OPERATION AND SWITCHING-OFF OF DRYERS SERIES PLS 25÷400**



##### **Operation (refer to paragraph 5.1 Control Panel) :**

- Check the condenser for cleanliness (air-cooled).
- Ensure the cooling water flow and temperature is adequate (water-cooled).
- Verify that the system is powered.
- Activate the main switch on the control panel (pos. 1).
- Check that both the main switch - pos. 1 - and the LED  on the DMC11 are glowing.
- Wait a few minutes, verify that the DewPoint displayed on the DMC11 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 displayed on the DMC11 is correct.
- Switch off the air compressor.
- After few minutes, switch off the main switch on the control panel of the dryer (pos. 1).

**NOTE :** A DewPoint in the green operating area of the DMC11 is correct according to the possible working conditions (flow-rate, temperature of the incoming air, ambient temperature, etc.).

During the operation, the refrigeration 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.

### **3.3.2 OPERATION AND SWITCHING-OFF OF DRYERS SERIES PLS 500÷800**

**NOTE:** For short periods of inactivity, (max 2÷3 days) we recommend that power be maintained to the dryer and the control panel. This ensures the dryer is available for instant re-start without waiting for the compressor crankcase heater to heat the oil of the compressor.



#### **Operation (refer to paragraph 5.1 Control Panel) :**

##### **DMC11 Air Dryer Controller**

- Check the condenser for cleanliness (air-cooled).
- Ensure the cooling water flow and temperature is adequate (water-cooled).
- Check that the mains detection light of the ON/OFF button - pos. 1 of the control panel - is ON.
- Press the button "I - ON" of the ON/OFF switch - pos. 3 of the control panel.
- Check that the display of the DMC11 Air Dryer Controller is ON.
- Wait a few minutes, then check that the DMC11 is indicating a correct DewPoint temperature and the condensate drain is cycling.
- Switch ON the air compressor.

##### **DMC20 Air Dryer Controller**

- Check the condenser for cleanliness (air-cooled).
- Ensure the cooling water flow and temperature is adequate (water-cooled).
- Check that "crankcase heater" and "Stand-by" LED's on DMC20 are ON.
- Switch ON the dryer keeping the "Dryer Start-up" button on DMC20 pressed for at least 2 seconds.
- Check that "compressor ON" led on DMC20 is ON.
- Wait a few minutes, then check that the DMC20 is indicating a correct DewPoint temperature and the condensate drain is regularly cycling.
- Switch ON the air compressor.



#### **Switching OFF (refer to paragraph 5.1 Control Panel) :**

##### **DMC11 Air Dryer Controller**

- Check that the DewPoint indicated on the DMC11 is within range.
- Switch OFF the air compressor.
- After few minutes, switch OFF the dryer pressing the "O - OFF" button of the ON/OFF switch - pos. 3 of the control panel.

##### **DMC20 Air Dryer Controller**

- Check that the DewPoint indicated on the DMC20 is within range.
- Switch OFF the air compressor.
- After few minutes, switch OFF the dryer keeping the "Dryer Stop" button on DMC20 pressed for at least 2 seconds.

**NOTE:** A DewPoint in the green operating area of the DMC11 is correct according to the possible working conditions (flow-rate, temperature of the incoming air, ambient temperature, etc.).

**NOTE :** A DewPoint within 0°C and +10°C (32 to 50°F) displayed on DMC20 is correct according to the possible working conditions (flow-rate, temperature of the incoming air, ambient temperature, etc.).

During the operation, the refrigeration compressor will run continuously.

The dryer must remain ON when ever compressed air is being used, even if the air compressor only loads intermittently.

4.1 TECHNICAL FEATURES OF DRYERS SERIES PLS 25-210 (1/115/60)

PLS MODEL	Air-Cooled								Water-Cooled		
	25	40	60	85	105	140	175	210	175	210	
Air flow rate at nominal [scfm]	25	40	60	85	105	140	175	210	175	210	
[Nm <sup>3</sup> /h]	42	68	102	144	178	238	297	357	297	357	
Pressure DewPoint at [°F]	+38 equal to 0.73 g/Nm <sup>3</sup> of H <sub>2</sub> O										
Nominal (max.) ambient [°F]	+100 (+110)										
Min. ambient temperature [°F]	+34										
Nominal (max.) inlet air [°F]	+100 (+130)										
Nominal inlet air pressure [psig]	100										
Max. inlet air pressure [psig]	220										
Air pressure drop - Δp [psi]	2.9	4.0	3.6	3.9	4.2	4.0	3.4	3.8	3.4	3.8	
Inlet - Outlet connections [NPT-F]	3/4"			1.1/4"			2"				
Refrigerant type	R134.a			R404A							
Refrigerant quantity [oz]	10.	14	16	19.5	25	35	53	62	49	58	
Cooling air flow [cfm]	175		235	350		530	1490		-		
Cooling water flow (in US[gpm])	-								1.2	1.7	
Control of cooling water	-								Automatic		
Maximum water [°F]									86		
Maximum (min.) water [psig]									145(30)		
Cooling water connections [NPT-F]									1/2"		
Standard Power Supply <sup>3</sup> [Ph/V/Hz]	1/115/60										
Nominal electric [W]	310	350	540	780	830	970	1180	1500	1030	1380	
[A]	3.9	4.1	6.8	7.9	8.6	10.0	11.5	15.8	10.2	14.5	
Max. electric absorption [W]	350	400	610	950	980	1180	1380	1900	1240	1750	
[A]	4.5	4.6	7.4	9.8	10.2	12.2	13.8	17.8	12.5	16.5	
Compressor power [HP]	1/5	1/4	1/3+	1/2	1/2	1/2+	5/8	1.1/8	5/8	1.1/8	
Heat Load [Btu/h]	280	3500	5800	8400	8500	10300	11900	17600	11900	17600	
Max. level noise at 40 in [dbA]	< 70										
Weight [lbs]	75	79	81	121	134	139	185	216	180	210	

<sup>1</sup> The nominal condition refers to an ambient temperature of +100°F with inlet air at 100 psig and +100°F.

<sup>2</sup> Other temperature on request.

<sup>3</sup> Check the data shown on the identification plate.

PLS MODEL	Air-Cooled									Water-Cooled		
	25	40	60	85	105	140	175	210	275	175	210	275
Air flow rate at [scfm]	25	40	60	85	105	140	175	210	275	175	210	275
[Nm <sup>3</sup> /h]	42	68	102	144	178	238	297	357	467	297	357	467
Pressure DewPoint at [°F]	+38 equal to 0.73 g/Nm <sup>3</sup> of H <sub>2</sub> O											
Nominal (max.) [°F]	+100 (+110)											
Min. ambient [°F]	+34											
Nominal (max.) inlet [°F]	+100 (+130)											
Nominal inlet air [psig]	100											
Max. inlet air pressure [psig]	220											
Air pressure drop - [psi]	2.9	4.0	3.6	3.9	4.2	4.0	3.4	3.8	3.4	3.4	3.8	3.4
Inlet - Outlet [NPT-F]	3/4"			1.1/4"			2"					
Refrigerant type	R134.a			R404A								
Refrigerant quantity [oz]	10.5	14	16	19.5	25	35	53	62	60	49	58	56
Cooling air flow [cfm]	175		235	350		530	1490		1500	-		
Cooling water flow US[gpm]	-									1.2	1.7	1.9
Control of cooling	-									Automatic		
Maximum water [°F]	-									86		
Maximum (min.) [psig]	-									145(30)		
Cooling water [NPT-F]	-									1/2"		
Standard Power [Ph/V/Hz]	1/230/60											
Nominal electric [W]	310	350	540	790	840	970	1150	1500	1800	1030	1380	1570
[A]	1.8	1.9	3.1	4.2	4.4	4.9	5.6	7.6	9.5	5.1	7.1	8.5
Max. electric [W]	360	410	630	960	990	1180	1360	1870	2200	1240	1750	1950
[A]	2.0	2.1	3.4	5.0	5.2	5.8	6.8	9.5	11.3	6.3	9.0	10.3
Compressor power [HP]	1/5	1/4	1/3+	1/2	1/2	1/2+	5/8	1.1/8	1.1/4	5/8	1.1/8	1.1/4
Heat Load [Btu/h]	2800	3500	5800	8400	8500	10300	11900	17600	20300	11900	17600	20300
Max. level noise at 40 [dbA]	< 70											
Weight [lbs]	75	79	81	121	134	139	185	216	244	180	210	238

<sup>1</sup> The nominal condition refers to an ambient temperature of +100°F with inlet air at 100 psig and +100°F.

<sup>2</sup> Other temperature on request.

<sup>3</sup> Check the data shown on the identification plate.

PLS MODEL	Air-Cooled		Water-Cooled		Air-Cooled				Water-Cooled			
	300	400	300	400	500	600	700	800	500	600	700	800
Air flow rate at [scfm]	300	400	300	400	500	600	700	800	500	600	700	800
[Nm <sup>3</sup> /h]	510	680	510	680	850	1019	1189	1359	850	1019	1189	1359
Pressure DewPoint at [°F]	+38 equal to 0.73 g/Nm <sup>3</sup> of H <sub>2</sub> O											
Nominal (max.) [°F]	+100 (+110)											
Min. ambient [°F]	+34											
Nominal (max.) [°F]	+100 (+130)											
Nominal inlet air [psig]	100											
Max. inlet air [psig]	220											
Air pressure drop - [psi]	3.3	3.4	3.3	3.4	3.3	3.6	3.2	3.3	3.3	3.6	3.2	3.3
Inlet - Outlet [NPT-F]	2"				3"							
Refrigerant type	R404A											
Refrigerant quantity [oz]	76	81	70.5	76	123	140	160	255	113	130	150	240
Cooling air flow [cfm]	2200		-		4800				-			
Cooling water flow US[gpm]	-		2.1	2.7	-				3.5	3.9	4.5	5.6
Control of cooling	-		Automatic		-				Automatic			
Maximum water [°F]	-		86		-				86			
Maximum (min.) [psig]	-		145(29)		-				145(30)			
Cooling water [NPT-F]	-		3/4"		-				3/4"			
Standard Power [Ph/V/Hz]	1/230/60				3/460/60							
Nominal electric [W]	2100	2700	1600	2200	4000	4300	4700	5600	2950	3250	3700	4600
[A]	10.5	13.2	8.5	11.2	6.0	6.6	7.1	8.5	4.5	5.1	5.6	7.0
Max. electric [W]	2450	3100	2050	2680	4600	5000	5600	6500	3550	4000	4600	5500
[A]	12.3	15.5	10.3	13.5	6.8	7.5	8.3	9.7	5.3	6.0	6.8	8.2
Compressor power [HP]	1.1/4	1.1/2	1.1/4	1.1/2	2.1/3	2.5/8	3	3.5/8	2.1/3	2.5/8	3	3.5/8
Heat Load [Btu/h]	20500	27200	20500	27200	35500	39500	45200	56300	35500	39500	45200	56300
Max. level noise at [dba]	< 70											
Weight [lbs]	275	293	272	289	504	541	563	629	498	536	556	622

<sup>1</sup> The nominal condition refers to an ambient temperature of +100°F with inlet air at 100 psig and +100°F.

<sup>2</sup> Other temperature on request.

<sup>3</sup> Check the data shown on the identification plate.

PLS MODEL	Air-Cooled				Water-Cooled			
	500	600	700	800	500	600	700	800
Air flow rate at [scfm]	500	600	700	800	500	600	700	800
[Nm <sup>3</sup> /h]	850	1019	1189	1359	850	1019	1189	1359
Pressure DewPoint at [°F]	+38 equal to 0.73 g/Nm <sup>3</sup> of H <sub>2</sub> O							
Nominal (max.) [°F]	+100 (+110)							
Min. ambient [°F]	+34							
Nominal (max.) inlet [°F]	+100 (+130)							
Nominal inlet air [psig]	100							
Max. inlet air [psig]	220							
Air pressure drop - [psi]	3.3	3.6	3.2	3.3	3.3	3.6	3.2	3.3
Inlet - Outlet [NPT-F]	3"							
Refrigerant type	R404A							
Refrigerant quantity [oz]	123	140	160	255	113	130	150	240
Cooling air flow [cfm]	4800				-			
Cooling water flow US[gpm]	-				3.5	3.9	4.5	5.6
Control of cooling	-				Automatic			
Maximum water [°F]	-				86			
Maximum (min.) [psig]	-				145(30)			
Cooling water [NPT-F]	-				3/4"			
Standard Power [Ph/V/Hz]	3/230/60							
Nominal electric [W]	3900	4200	4600	5500	2950	3250	3700	4600
[A]	13.4	14.7	15.6	19.8	9.5	10.8	11.7	16.2
Max. electric [W]	4500	4900	5500	6400	3550	4000	4600	5500
[A]	15.1	16.5	17.9	22.6	11.2	12.6	14.0	18.7
Compressor power [HP]	2.1/3	2.5/8	3	3.5/8	2.1/3	2.5/8	3	3.5/8
Heat Load [Btu/h]	35500	39500	45200	56300	35500	39500	45200	56300
Max. level noise at 40 [dbA]	< 70							
Weight [lbs]	504	541	563	629	498	536	556	622

<sup>1</sup> The nominal condition refers to an ambient temperature of +100°F with inlet air at 100 psig and +100°F.

<sup>2</sup> Other temperature on request.

<sup>3</sup> Check the data shown on the identification plate.

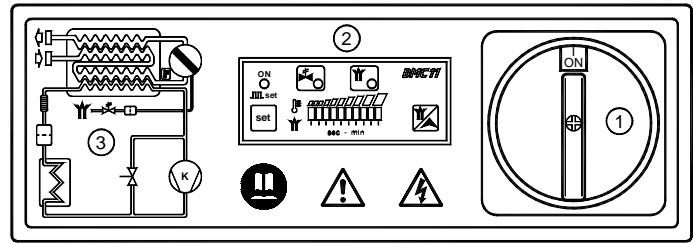
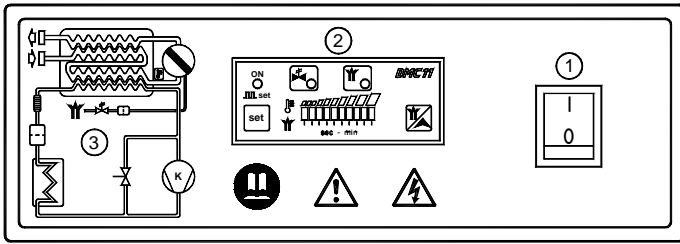


## 5.1 CONTROL PANEL

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

**PLS 25-140**

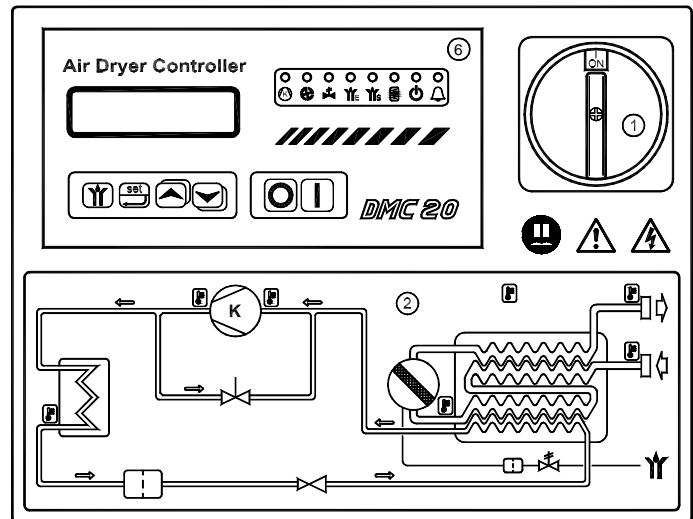
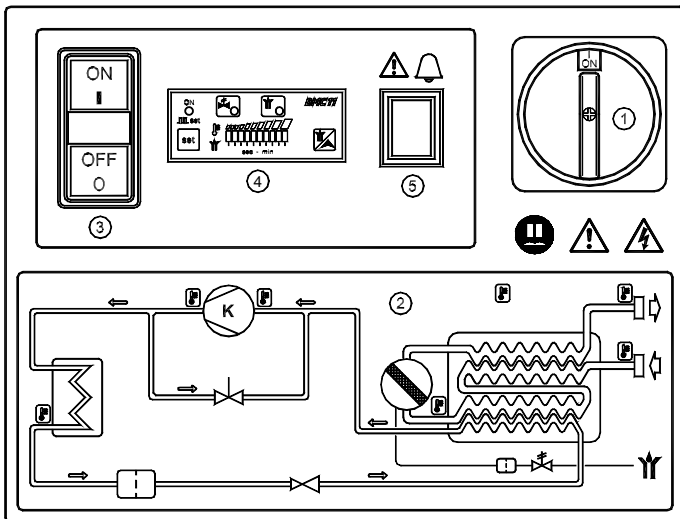
**PLS 175-400**



- 1 Main switch
- 2 DMC11 Air Dryer Controller
- 3 Air and refrigerating gas flow diagram

**PLS 500-800 - DMC11**

**PLS 500-800 - DMC20 Optional**



- 1 Main switch
- 2 Air and refrigerating gas flow diagram
- 3 ON/OFF switch with mains detecting light
- 4 DMC11 Air Dryer Controller
- 5 Alarm light
- 6 DMC20 Air Dryer Controller

## 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.

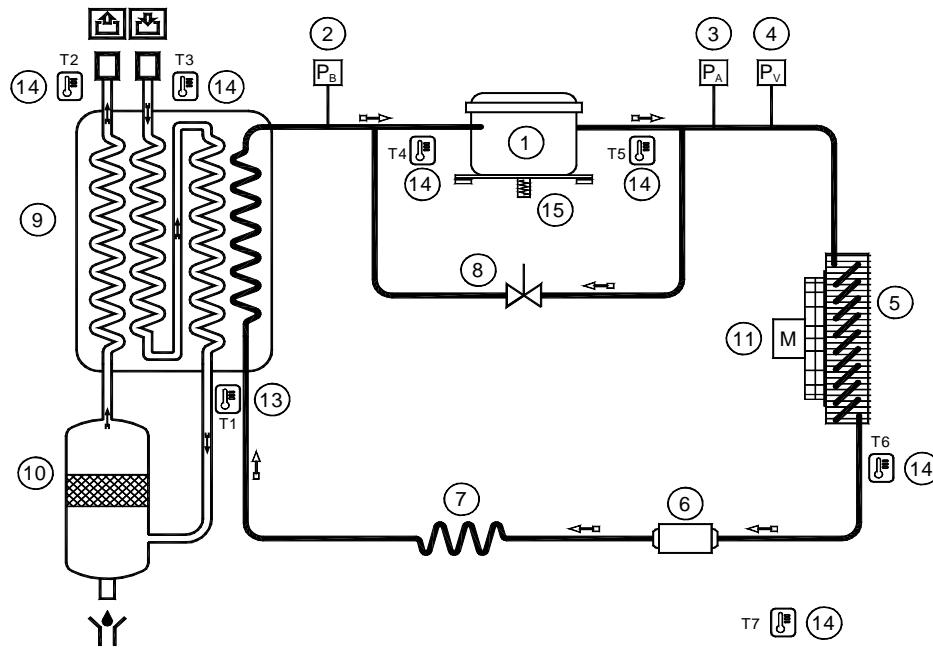
The warm and humid entering air goes through an air-to-air exchanger before entering the evaporator (air-to-refrigerant exchanger) where, due to the contact with the refrigeration circuit, it cools down to allow the condensation of the humidity it contains.

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

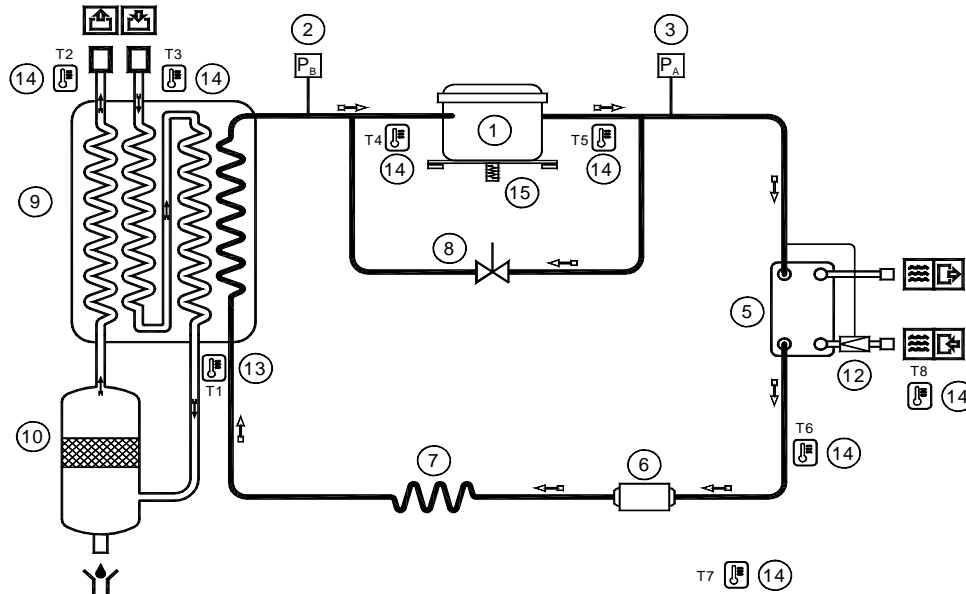
The cooled air goes through the air-to-air exchanger, where it partially warms up in cooling down the entering warm air (pre-refrigeration).

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 (Air-Cooled)



### 5.4 FLOW DIAGRAM (Water-Cooled)



- |   |  |
|---|--|
| ① Refrigerating compressor                        | 9 Comby-Heat-Exchanger                       |
| ② Refrigerant pressure-switch $P_B$ (PLS300÷800U) | 10 Condensate separator                      |
| ③ Refrigerant pressure-switch $P_A$ (PLS300÷800U) | 11 Condenser fan                             |
| ④ Refrigerant pressure-switch (fan control) $P_V$ | 12 Condenser water regulating valve          |
| ⑤ Condenser                                       | 13 T1 DewPoint Probe                         |
| ⑥ Dehydration filter                              | 14 T2÷T8 DMC20 Probes (if installed)         |
| ⑦ Capillary tube                                  | 15 Compressor crankcase heater (PLS500÷800U) |
| ⑧ Hot gas by-pass valve                           |  |

→ Air flow direction

→ Refrigerating gas flow direction

### **5.5 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 gas tight, so ensuring high-energy efficiency and long 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 over heating and over currents. The protection is automatically restored as soon as the nominal temperature conditions are reached.

### **5.6 CONDENSER (Air-Cooled)**

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 as well important **TO KEEP THE UNIT FREE FORM DUST AND OTHER IMPURITIES.**

### **5.7 CONDENSER (Water-Cooled)**

The condenser is the element in which the gas coming from the compressor is cooled down and condensed thus becoming a liquid. Basically it is a water/refrigerating gas exchanger where the cooling water lowers the temperature of the refrigerating gas. The temperature of the inlet water must not exceed the nominal values. It must also guarantee an adequate flow and **THAT THE WATER ENTERING THE EXCHANGER IS FREE FROM DUST AND OTHER IMPURITIES.**

### **5.8 CONDENSER WATER REGULATING VALVE (Water-Cooled)**

The condenser water regulating valve is used to keep the condensing pressure/temperature constant when the Water-Cooled is being used. Thanks to the capillary tube, the valve detects the pressure in the condenser and consequently adjusts the water flow.

When the dryer stops the valve automatically closes the cooling water flow.



The condenser water regulating valve is an operating control device.

The closure of the water circuit from the pressure condenser water regulating valve cannot be used as a safety closure during service operations on the system.



#### **ADJUSTMENT**

The condenser water regulating valve is adjusted during the testing phase to a pre-set value that covers 90% of the applications. However, sometimes the extreme operating conditions of the dryer may require a more accurate calibration. During start-up, a qualified technician should check the condensing pressure/temperature and if necessary adjust the valve by using the screws on the valve itself. To increase the condensing temperature, turn the adjusting screws counter-clockwise; to lower it turns the screws clock-wise.

Adjust the valve in order to guarantee a condensing temperature of 108÷113 °F.

### **5.9 DEHYDRATION FILTER**

Traces of humidity and slag 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 expansion valve. The function of the dehydration filter is to stop the impurities, and avoiding their circulation within the system. The filter is located before the capillary tubing,

### **5.10 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 less is the capillary tube outlet pressure, the less is the evaporation temperature.

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

### 5.11 COMBY-HEAT-EXCHANGER

Comby-heat-exchanger consists of both air-to-air and air-to-refrigerant heat exchanger, all in one. The heating surface is obtained by means of thin corrugated stainless steel plates stacked on top of each other and fixed by copper brazing. Channels are formed between the plates and corner ports are arranged so that the total counter-current flow is ensured. The purpose of air-to-air heat exchanger is the transmission of the heat of the incoming air to the exiting cold air. The benefits of this solution are basically two: the incoming air is partially cooled down, therefore the chilling system can be sized for a lower thermal drop, thus allowing a 40÷50% energy saving; moreover, as cool air will never reach the compressed air circuit, no condensate will form on the external surface of the piping. In the air-to-refrigerant heat exchanger the liquid refrigerant formed in the condenser is evaporated. During the evaporation phase the refrigerant tends to absorb the heat from the compressed air present in the other side of the exchanger, so at the air-to-refrigerant outlet the air is chilled at the DewPoint temperature.

### 5.12 CONDENSATE SEPARATOR

The cold air exiting the evaporator goes through the hi-efficiency condensate separator featuring a stainless steel mesh. As the condensate transported by the air gets in contact with the mesh net it is separated and expelled by means of the draining device. The resulting cold and dry air is then conveyed into the air-to-air heat exchanger.

The mesh type mist separator offers the benefit to be highly efficient even with variable flow rates.

### 5.13 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.



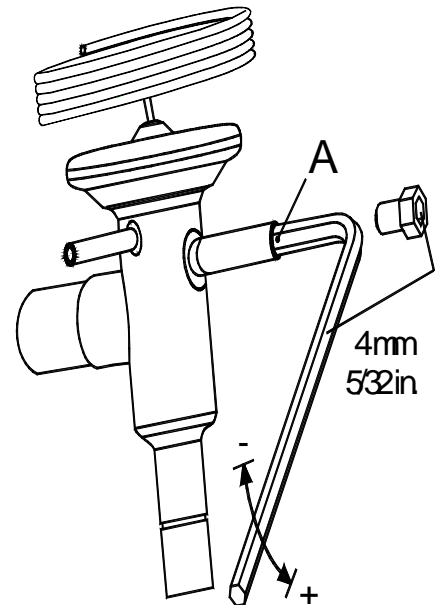
#### ADJUSTMENT

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 1/4" 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)
Hot gas setting (R404A) :	temperature 0.5 °C (+0.5 / -0 °K) pressure 5.2 barg (+0.1 / -0 bar)



### 5.14 REFRIGERANT PRESSURE SWITCH PA - PB - PV

As operation safety and protection of the dryer a series of pressure switches are installed in gas circuit.

**PB :** Low-pressure controller device on the pushing side (Carter) of the compressor is enabled only if the pressure drops below the pre-set value. The values are automatically reset when the nominal conditions are restored.

**Calibrated pressure :** R 404 A Stop 1.0 barg - Restart 5.0 barg

**PA :** This high-pressure controller device, located on the pushing side on the compressor, is activated when the pressure exceeds the pre-set value. It features a manual-resetting button mounted on the controller itself.

**Calibrated pressure :** R 404 A Stop 28 barg - Manual Reset

**PV :** Fan control pressure switch is placed at the discharge side of refrigeration compressor. It keeps the condensation temperature/pressure constant within preset limits.

**Calibrated pressure :** R 134.A Start 11 barg (47°C) – Stop 8 barg (36°C) – Tolerance  $\pm 1$  bar

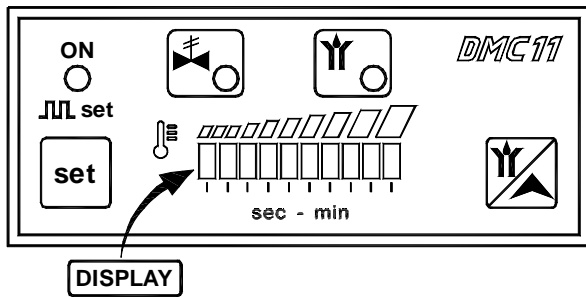
**Calibrated pressure :** R 404 A Start 20 barg (45°C) – Stop 16 barg (36°C) – Tolerance  $\pm 1$  bar







### 5.15 COMPRESSOR CRANKCASE HEATER (PLS 500÷800)

At low temperatures, when the compressor starts, oil can be drawn into the refrigeration circuit and liquid hammering could occur. To prevent this, an electrical resistance heater is installed in the suction side of the compressor. When the system is powered and the compressor is not running, this heater keeps the oil at the correct temperature. This heater is controlled by a thermostat which prevents overheating the oil.


**NOTE :** The heater must be powered at least a couple of hours before the start up of the refrigeration compressor.

### 5.16 DMC11 AIR DRYER CONTROLLER




-  Button - access the set-up.
-  Button - condensate drain test / value increment.
-  LED - glowing = power on.
-  LED - flashing = set-up condition.
-  LED - not used.
-  LED - condensate drain solenoid valve on.


The DMC11 device controls the whole operation of the dryer, and allows the calibration of some operating parameters. The digital thermometer (10 LED's Display) show the DewPoint temperature detected by a probe located in the evaporator, while a electronic timer drives the condensate drain solenoid valve at regular intervals.

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

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

- Blue section - the operative DewPoint of the dryer is too low: freeze risk;
- Green section - operating conditions ensuring an optimal DewPoint;
- Red section - DewPoint of the dryer too high, the treatment of the compressed air may be improper.

The condensate drain solenoid valve is activated for 2 seconds ( $T_{ON}$ ) -  LED on - each minute ( $T_{OFF}$ ).



To perform the manual test for the condensate drain, press the  button.


The "out of scale" conditions are indicated by the intermittent flashing of the first and the last LED of the display, respectively showing the exceeding of the lower or the upper range.



**SET-UP** - The DMC11 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 :


- Set-point - not used.
- $T_{ON}$  - 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 pressed the  button for at least 2 seconds;  LED flashing confirms the command.

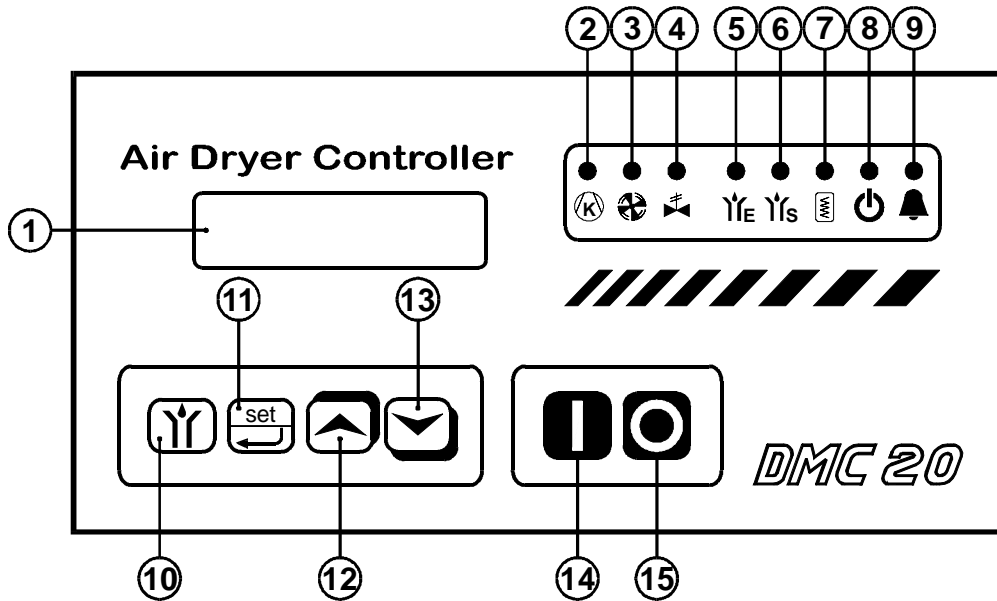
First appears the Set-Point parameter; to access the other parameters, press sequentially the  button.

To change the value of the selected parameter, keep pressed the  button 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
Set-point	Not used	Synchronous flashing LED  + LED 	N. A.	N. A.	N. A.
$T_{ON}$	Activation time of the condensate drain solenoid valve	Synchronous flashing LED  + LED 	1 - 10 sec	1 sec	2 sec
$T_{OFF}$	Pause time of the condensate drain solenoid valve	Non-synchronous flashing LED  + LED 	1 - 10 min	1 min	1 min

To exit the set-up condition at any time, press the  button. If no value changes are made in 2 minutes the controller exits the set-up mode automatically.

## 5.17 DMC20 AIR DRYER CONTROLLER



- |   |                                  |
|---|----------------------------------|
| 1. Back-lighted LCD display                         | 9. Led alarm ON                  |
| 2. Led compressor ON                                | 10. Condensate drain test button |
| 3. Led condenser fan(s) ON                          | 11. Set-up access button         |
| 4. Not Used   | 12. Incremental button           |
| 5. Not Used   | 13. Decrement button             |
| 6. Led condensate separator drain solenoid valve ON | 14. Dryer start-up button        |
| 7. Led crankcase heater ON                          | 15. Dryer stop button            |
| 8. Led dryer in Stand-by                            |                                  |

The DMC20 controls all the operations, the alarms and the operational setting of the dryer. By means of a 32 characters display it shows all the operating conditions. In case of abnormalities, a set of messages in the selected language allows a fast detection of the fault and the relevant solution.

### 5.17.1 DISPLAY MESSAGES

When the main switch is turned ON, all the characters of the DMC20 display are activated for 2 seconds. Afterwards, appears the software release, and finally the two lines of the display are ready for their normal functions.

When the dryer is in stand-by condition, the display shows "Stand-by", and the "crankcase heater" and "Stand-by" LED's are ON. If the remote command is in use, the display shows "Stand-by Remote".

To switch ON the dryer, keep the button [14] "Dryer Start-up" pressed for at least 2 seconds. **NOTE: DMC20 has an internal timer that cannot allow to restart the compressor before 2 minutes after the switch off.**

The upper line of the display will show the DewPoint. The following parameters can be selected and displayed on the lower line:

- |           |  |
|-----------|--|
| Air →O    | - temperature of the incoming air in °C                              |
| Air ←O    | - temperature of the outgoing air in °C                              |
| Compr. LP | - suction temperature of the compressor (low pressure side) in °C    |
| Compr. HP | - discharge temperature of the compressor (high pressure side) in °C |
| Condens.  | - condensing temperature in °C                                       |
| Ambient   | - ambient temperature in °C  |
| Water →O  | - inlet temperature of the cooling water (water-cooled) in °C        |
| Working   | - operating time of the dryer in hours                               |

The parameter to be displayed on the lower line is selected pressing the [12] or [13] keys.

In alarm condition, the list of the parameter to be displayed will include the DewPoint.

To switch OFF the dryer, keep the [15] button "Dryer Stop" pressed for at least 2 seconds.



### **5.17.2 ALARMS**

Any alarm condition is indicated by the flashing of the [9] led "Alarm" and the DMC20 activates a buzzer tone in order to alert the operator. The operator can stop the buzzer by pressing any key.

The cause of the alarm will be displayed on the upper line of the LCD display

<b>Alarm Message</b>	<b>Cause</b>	<b>Intervention Point</b>	<b>Intervention Delay</b>	<b>Remarks</b>
Protection Comp.	Thermal/electrical protection of the compressor	-	No delay	The dryer is stopped
Protection Fan (air-cooled)	Thermal/electrical protection of the fan	-	No delay	The dryer is stopped
STOP Compr. LP	Refrigerant low pressure switch (PB)	R404A = 14.5 psig	No delay	The dryer is stopped
STOP Compr. HP	Refrigerant high pressure switch (PA)	R404A = 406 psig	No delay	The dryer is stopped
Condens. HIGH	Condensation temperature too high (probe T6)	50 ÷ 70 °C (60 to 70 °F)	0.5 ÷ 20 min adjustable	The dryer is stopped
DewPoint LOW	DewPoint low (probe T1)	-10 ÷ 0 °C (14 to 32 °F)	0.5 ÷ 20 min adjustable	The operator can select if stop the dryer
DewPoint HIGH	DewPoint high (probe T1)	10 ÷ 20 °C (50 to 68 °F)	0.5 ÷ 30 min adjustable	The operator can select if stop the dryer
Probe Fault	One of the probes is faulty	-	No delay	The dryer does not stop

### **ALARMS MEMORY**

When the “**Start at Power Up**” and “**Recovery After !**” functions are deactivated (Note, this is the standard factory setting, set at “**NO**”) any alarm causing the dryer to stop and any anomaly with one or more probes (Probe Fault) is stored in the memory of DMC20. To reset the alarm memory the dryer is to be switched OFF (keep the button [15] "Dryer Stop" pressed for at least 2 seconds). The dryer is then to be switched ON again (keep the button [14] "Dryer Start-up" pressed for at least 2 seconds). If the alarm is no longer in effect the dryer will run correctly, otherwise the alarm message will appear again.

When “**Start at Power Up**” and “**Recovery After !**” functions are activated (customer selected setting “**yes**”) any alarm which has caused the stop of the dryer and any anomaly with one or more probes (Probe Fault) is automatically reset once nominal conditions return and the dryer will run again automatically.

Any alarm, which is not causing the stop of the dryer, is reset automatically when nominal working conditions return.

### **5.17.3 SET-UP**

The DMC20 is adjusted during the final test of the dryer. Where particular requirements concerning the operation or the alarm management exist, the user can change the setting of the programmed parameters.

Set-up parameters are divided in two levels: anybody can access the level 1, while the access to level 2 is reserved to authorised personnel provided with the password. The password is specified in the last page of this manual.

To access to Set-up mode the [11] "Set-up access" button must be depressed for at least 2 seconds. Then it will be possible to display the desired parameter using the [12] and [13] keys. To modify the displayed parameter, use the [12] and [13] keys, while keeping the [11] key depressed.

During Set-up, the upper line of the display will display the selected parameter, while the lower line will show the current value of the same parameter.

To exit Set-up mode, press simultaneously the [12] and [13] keys, or wait 20 seconds.

**NOTE : The character “!” means “Alarm”**

### **DESCRIPTION OF SET-UP PARAMETERS**

#### **LEVEL 1**

- **Pass Code?** : The system asks for the password to access the level 2 of the programming parameters. If the password is not modified or wrong, only the parameters of level 1 will be accessible. **NOTE:** The password can be modified only when the dryer is in stand-by; therefore during operation, only the level 1 will be accessible.

- **Language** : It is possible to select the language for the alarm and dialogue messages.
- **DewPoint Set** : Not Used.
- **DewPoint Diff.** : Not Used.
- **E Drain Time** : Not Used.
- **E Drain Pause** : Not Used.
- **S Drain Time** : Setting of the condensate drainage time of the solenoid valve located on the condensate separator
- **S Drain Pause** : Setting of the pause time between two successive condensate drain cycles of the valve located on the condensate separator.
- **Display Contrast** : Adjustment of the contrast of the LCD display, depending on the observation angle, the illumination, the ambient temperature, etc.

## LEVEL 2

- **Min DewPoint** : Not Used.
- **Max DewPoint** : Not Used.
- **Low DewPoint !** : Setting of the threshold activating the alarm for the low DewPoint.
- **Low DP ! Diff.** : This is the differential temperature to deactivate the low DewPoint alarm.
- **Low DP ! Delay** : Setting in minutes of the delay for the low DewPoint alarm. For example, setting the "Low DewPoint !" value on -5, the "Low DP ! Diff." value on 6, and the "Low DP ! Delay" value on 10, the alarm is activated when the DewPoint remains below -5°C (23°F) for at least 10 minutes and goes off as soon as the DewPoint goes over +1°C (33.8°F).
- **Low DP ! Stop** : Selecting "YES", it is possible to enable the low DewPoint alarm to switch OFF the dryer, otherwise a simple alarm signal is displayed.
- **High DewPoint !** : Setting of the activation threshold for the high DewPoint.
- **High DP ! Diff.** : This is the differential temperature to deactivate the high DewPoint alarm.
- **High DP ! Delay** : Setting in minutes of the delay for the high DewPoint alarm. For example, setting the "High DewPoint !" value on 15, the "High DP ! Diff." value on -5, and the "High DP ! Delay" value on 10, the alarm is activated when the DewPoint remains over 15°C (59°F) for at least 10 minutes and goes off as soon as the DewPoint goes below +10°C (50°F).
- **High DP ! Stop** : Selecting "YES", it is possible to enable the high DewPoint alarm to switch OFF the dryer, otherwise a simple alarm signal is displayed.
- **Condensation !** : Setting of the activation threshold for the condensing temperature too high.
- **Condens.! Diff.** : This is the differential temperature to deactivate the high condensing temperature alarm.
- **Condens.! Delay** : Setting in minutes of the delay for the alarm when the condensing temperature is too high. For example, setting the "Condensation !" value on 60, the "Condens.! Diff." value on -5, and the "Condens.! Delay" value on 10, the alarm is activated when the condensing temperature remains over +60°C (140°F) for at least 10 minutes and goes off as soon as it falls, below +55°C (131°F). **NOTE:** the condensing temperature, "too high alarm" will switch OFF the dryer.
- **Start at Power Up** : At factory setting of "NO", each time the dryer is powered ON it will always enter the Stand-by condition; Selecting "YES", the dryer will continue the function it was performing at the moment of the power cut off (Stand-by if it was in Stand-by conditions, ON if it was ON).



**SELECTING "YES" THE USER WILL BE RESPONSIBLE FOR THE INSTALLATION OF PROPER PROTECTION FOR POSSIBLE SUDDEN POWER RESTORATION TO THE DRYER.**

- **Recovery After !** : Automatic alarms recovery. Selecting "NO", in case of the activation of an alarm that stopped the dryer, the operator will have to stop the alarm switching the dryer to stand-by condition (pressing the [15] button for at least 2 seconds). If "YES" is selected, the dryer will revert to its previous its operational condition as soon as the nominal conditions will be restored.



**SELECTING "YES" THE USER WILL BE RESPONSIBLE FOR THE INSTALLATION OF PROPER PROTECTIONS FOR POSSIBLE SUDDEN POWER RESTORATION TO THE DRYER.**

- **Peripheral No:** Assignment of a physical address for the DMC20, in case this is connected to a data transmission network via a serial port.

## SET-UP PARAMETERS TABLE

Parameter	Description	Adjustment Range	Std Value
Pass Code ?	Password to access level 2	0 ÷ 255	0
Language	Selection of the language for dialogue and alarm messages	Italian - English German - French	
DewPoint Set	Not Used	N.A.	-5 °C (23°F)
DewPoint Diff.	Not Used	N.A.	0.2 °K (32.7°F)
E Drain Time	Not Used	0 ÷ 50 sec	3 sec
E Drain Pause	Not Used	0.5 ÷ 10 min	4.0 min
S Drain Time	Discharge time of the condensate separator	0 ÷ 50 sec	4 sec
S Drain Pause	Pause between two condensate separator discharges	0.5 ÷ 10 min	1.0 min
Display Contrast.	Adjustment of the Display contrast	0 ÷ 100	50
Min DewPoint	Not Used	N.A.	-10 °C (14°F)
Max DewPoint	Not Used	N.A.	0 °C (32°F)
Low ! DewPoint	Temperature of interv. for the too low DewPoint alarm	-10.0 ÷ 0.0 °C (14 to 32 °F)	-5 °C (23°F)
Low DP ! Diff.	Differential temperature for the too low DewPoint alarm	1.0 ÷ 10.0 °K (33.8 to 50 °F)	6 °K (43°F)
Low DP ! Delay	Delay time for the too low DewPoint alarm	0.5 ÷ 20 min	10 min
Low DP ! Stop	STOP enabled in case the DewPoint of the dryer is too low	YES/NO	NO
High DewPoint !	Temperature of interv. for the too high DewPoint alarm	10.0 ÷ 20.0 °C (50 to 68 °F)	15 °C (43°F)
High DP ! Diff.	Differential temperature for the too high DewPoint alarm	-1.0 ÷ -10.0 °K (14 to 30 °F)	-5 °K (23°F)
High DP ! Delay	Delay time for the too high DewPoint alarm	0.5 ÷ 30 min	20 min
High DP ! Stop	STOP enabled in case the DewPoint of the dryer is too high	YES/NO	NO
Condensation !	Temp. of intervention for the too high condensation temperature alarm	50.0 ÷ 70.0 °C (122 to 158 °F)	60.0 °C (140°F)
Condens ! Diff.	Differential temp. for the too high condensation temperature alarm	-1.0 ÷ -10.0 °K (14 to 30 °F)	-5 °K (23°F)
Condens. ! Delay	Delay time for the too high condensation temp. alarm	0.5 ÷ 20 min	10 min
Start at Power Up	Machine enabled to restore its operation after a power black out	YES/NO	NO
Recovery After !	Automatic alarms reset	YES/NO	NO
Peripheral No.	Unit address for serial communication	01 ÷ 255	01

### 5.17.4 REMOTE COMMAND

It is possible to remotely switch the dryer ON and OFF by means of a simple switch connected with two wires to the DMC20 (see terminal 12 and 13 on the electric diagram). Closing the contact of the command switch, on the display appears the message "Stand-by Remote", and no functions will be selectable on the local panel; as soon as the contact is opened, the dryer returns to the previous condition (Stand-by if it was in Stand-by condition, ON if it was ON).



**IF INSTALLED, THE REMOTE CONTROL HAS PRIORITY ON THE FRONTAL COMMANDS OF THE DMC20. THE USER WILL BE RESPONSIBLE FOR THE INSTALLATION OF PROPER PROTECTIONS FOR POSSIBLE SUDDEN POWER RESTORATION TO THE DRYER.**

### 5.17.5 REMOTE ALARM SIGNAL

A voltage free contact is provided for remote annunciation of any alarm condition of the dryer (see terminal 14, 15 and 16 on the electric diagram).

### 5.17.6 ACCESS CODE

A serviceman's code is required to access level 2.



The manufacturer accepts no responsibility for damages due to the alteration of the operating parameters.



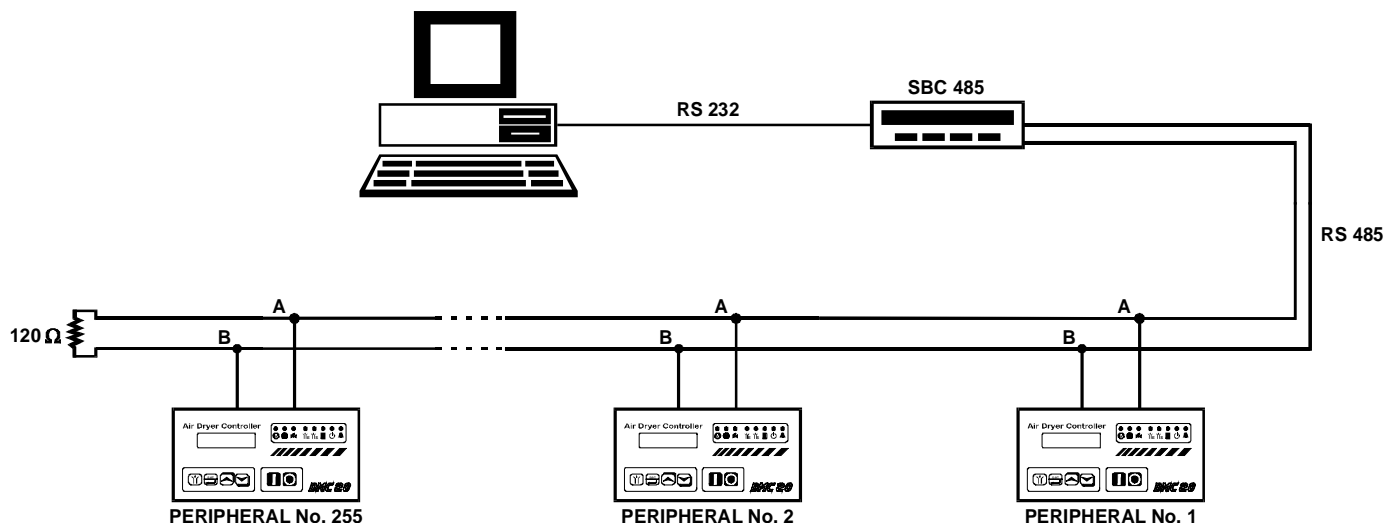
The password is specified in the last page of this manual.

The password must be kept by qualified personnel.

### 5.17.7 SERIAL COMMUNICATION

The DMC20 features a RS485 serial port (see terminal A and B on DMC20 back side) allowing the connection to a network managed by a PC or PLC controller. A maximum of 255 DMC20 units can be connected to the same network. If a PC is used, the connection between the PC and one or more DMC20 requires usage of an SBC485 interface adapter (can be purchased as accessory - see spare parts list) to be interposed between RS232 serial port and the RS485 bus consisting of two polarized wires. The line can cover 2180yd (2000 m) maximum; for long distance (exceeding 109yd - 100m), it is advisable to use a shielded twisted pair polyethylene cable.

For good data transmission, it is imperative that at the cable end a 120 ohm resistor is placed in order to adapt line impedance, as shown in figure.



CONNECTIONS	COM # PC	SBC485	SBC485	DMC20
	25 pin RS232	25 pin RS232	9 pin RS485	DATA connector
	Shield - pin 1	n.c.	A - pin 1	A terminal
	Tx - pin 2	Pin 2	B - pin 2	B terminal
	Rx - pin 3	Pin 3	Shield - pin 4	n.c.
	RTS - pin 4	Pin 4		
	CTS - pin 5	Pin 5		
	GND - pin 7	Pin 7		

### PROTOCOL

The data flow between PC and SBC485 is controlled by RTS signal. The protocol used for communication is a subset of MODICON MODBUS 1 (MB1), functions 03 and 06 only are supported. Data are exchanged in ASCII mode with the following format :

Baud rate : 9600

Data bit : 7

Stop bit : 1

Parity : even

**DATABASE HERE BELOW ARE LISTED PARAMETER DESCRIPTION, TYPE AND ADDRESS OF DATES ON DMC20 :**

<b>Data</b>	<b>Description</b>	<b>Type</b>	<b>Register Address</b>
DewPoint	DewPoint temperature - T1 probe	Signed Integer	0000 - R
Air →O	Temperature of the incoming air - T2 probe	Signed Integer	0001 - R
Air ←O	Temperature of the outgoing air - T3 probe	Signed Integer	0002 - R
Compr.LP	Suction temperature of the compressor (low pressure side) - T4 probe	Signed Integer	0003 - R
Compr.HP	Outlet temperature of the compressor (high pressure side) - T5 probe	Signed Integer	0004 - R
Condens.	Condensing temperature - T6 probe	Signed Integer	0005 - R
Water →O	Inlet temperature of the cooling water (Water-Cooled) - T8 probe	Signed Integer	0006 - R
Ambient	Ambient temperature - T7 probe	Signed Integer	0007 - R
Language <sup>1)</sup>	Selection of the language for dialogue and alarm messages	Signed Integer	0200 - R/W
DewPoint Set	Not Used	Signed Integer	0201 - R/W
DewPoint Diff.	Not Used	Signed Integer	0202 - R/W
E Drain Time	Not Used	Signed Integer	0203 - R/W
E Drain Pause	Not Used	Signed Integer	0204 - R/W
S Drain Time	Discharge time of the Condensate Separator	Signed Integer	0205 - R/W
S Drain Pause	Pause between two Condensate Separator discharges	Signed Integer	0206 - R/W
Display Contrast	Adjustment of the Display contrast	Signed Integer	0207 - R/W
Min DewPoint	Not Used	Signed Integer	0208 - R/W
Max DewPoint	Not Used	Signed Integer	0209 - R/W
Low DewPoint !	Temperature of intervention for the too low DewPoint alarm	Signed Integer	0210 - R/W
Low DP ! Diff.	Differential temperature for the too low DewPoint alarm	Signed Integer	0211 - R/W
Low DP ! Delay	Delay time for the too low DewPoint alarm	Signed Integer	0212 - R/W
High DewPoint !	Temperature of intervention for the too high DewPoint alarm	Signed Integer	0213 - R/W
High DP ! Diff.	Differential temp. for the too high DewPoint alarm	Signed Integer	0214 - R/W
High DP ! Delay	Delay time for the too high DewPoint alarm	Signed Integer	0215 - R/W
Condensation !	Intervention temperature for too high condensation temperature alarm	Signed Integer	0216 - R/W
Condens.! Diff.	Differential temperature for the too high condensation	Signed Integer	0217 - R/W
Condens.! Delay	Delay time for the too high condensation temperature alarm	Signed Integer	0218 - R/W
Peripheral No.	Unit address for serial communication	Signed Integer	0219 - R/W
Working	Operating time of the dryer	Signed Integer	0246 - R/W
Alarm STOP	Presence of an alarm that has stopped the dryer	bit - 1=Yes	0100.0 - R
Alarm Status	Presence of an alarm	bit - 1=Yes	0100.1 - R
Cond. Fan Switch	Status of the condenser fan control pressure switch	bit - 1=ON	0101.3 - R
Remote ON/OFF Switch	Status of the Remote ON/OFF switch	bit - 0=Local 1=Remote	0101.6 - R
DewPoint LOW	Low DewPoint alarm ON	bit - 1=Yes	0102.0 - R
DewPoint HIGH	High DewPoint alarm ON	bit - 1=Yes	0102.1 - R
Condens. HIGH	High Condensation temperature alarm ON	bit - 1=Yes	0102.2 - R
STOP Compr.LP	Cooler low pressure switch (PB) alarm ON	bit - 1=Yes	0102.4 - R
STOP Compr.HP	Cooler high pressure switch (PA) alarm ON	bit - 1=Yes	0102.5 - R
Fan Protection	Fan thermal/electrical protections alarm ON (Air-Cooled)	bit - 1=Yes	0102.6 - R
Protection Comp.	Compressor thermal/electrical protections alarm ON	bit - 1=Yes	0102.7 - R
Probe Fault	Probe faulty alarm ON	bit - 1=Yes	0102.8 - R
Low DP ! Stop	STOP enabled in case the DewPoint of the dryer is too low	bit - 1=Yes	0220.0 - R/W
High DP ! Stop	STOP enabled in case the DewPoint of the dryer is too high	bit - 1=Yes	0220.1 - R/W
Start at Power Up	Machine enabled to restore its operation after a power black out	bit - 1=Yes	0220.2 - R/W
Recovery After !	Automatic alarms reset	bit - 1=Yes	0220.3 - R/W
ON/OFF DMC20	Status of DMC20 - ON or OFF (Stand-by)	bit - 1=Stand-by	0220.15 - R/W

**5.18 ELECTRONIC LEVEL DRAINER - (OPTIONAL)**

Instead of the usual drain system (a solenoid valve controlled by means of DMC11 or DMC20 Air Dryer Controller), an electronic level controlled drain can be installed as option.

This drainer consists of a condensate accumulator where a capacitive sensor continuously checking liquid level is placed: as soon as the accumulator is filled, the sensor passes a signal to the electronic control and a diaphragm solenoid valve will open to discharge the condensate.

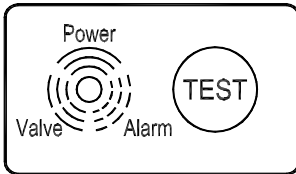
For a complete condensate discharge the valve opening time will be adjusted exactly for each single drain operation. Right in time the discharge line will be closed again without wasting compressed air.

No condensate strainers are installed. No adjusting is required.

A service valve is installed before electronic drainer in order to make check and maintenance easily.

**AT DRYER START-UP VERIFY THAT THIS VALVE IS OPEN.**

### CONTROL PANEL for Dryers PLS 25-275



The control panel here illustrated allows checking of drainer working.

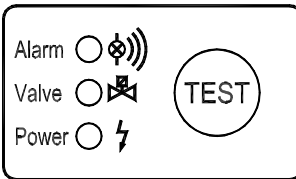
**Power** : led ON - drainer ready to work / supplied

**Valve** : slow blinking led - membrane solenoid valve open / discharging

**Alarm** : fast blinking led - drainer in alarm condition

**Test** : button - discharge test (keep pushed for 2 seconds)

### CONTROL PANEL for Dryers PLS 300-800



The control panel here illustrated allows checking of drainer working.

**Power** : led - drainer ready to work / supplied

**Valve** : led - membrane solenoid valve open / discharging

**Alarm** : blinking led - drainer in alarm condition

**Test** : button - discharge test (keep pushed for 2 seconds)

### TROUBLE SHOOTING



The troubleshooting and resultant service work should be carried out by qualified personnel.

**Before any intervention, Ensure 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.



#### SYMPTOM

#### POSSIBLE CAUSE - SUGGESTED ACTION

- |  |  |
|--|--|
| ◆ No led lighting up.                                    | <ul style="list-style-type: none"> <li>— Check for mains failure.</li> <li>— Verify the electric wiring (internal and/or external).</li> <li>— Check internal printed circuit board for possible damage.</li> </ul>  |
| ◆ Pressing of Test button, but no condensate discharge.  | <ul style="list-style-type: none"> <li>— The service valve located before the drainer is closed - open it.</li> <li>— The dryer is not under pressure - restore nominal condition.</li> <li>— Solenoid valve defective - replace the drainer.</li> <li>— The internal printed circuit board is damaged - replace the drainer.</li> </ul>                     |
| ◆ Condensate discharge only when Test button is pressed. | <ul style="list-style-type: none"> <li>— The capacitive sensor is too dirty - open the drainer and clean the sensor plastic tube.</li> </ul>   |
| ◆ Drainer keeps blowing off air.                         | <ul style="list-style-type: none"> <li>— The diaphragm valve is dirty - open the drainer and clean it.</li> <li>— The capacitive sensor is too dirty - open the drainer and clean the sensor plastic tube.</li> </ul>  |
| ◆ Drainer in alarm condition.                            | <ul style="list-style-type: none"> <li>— The capacitive sensor is too dirty - open the drainer and clean the sensor plastic tube.</li> <li>— The service valve located before the drainer is closed - open it.</li> <li>— The dryer is not under pressure - restore nominal condition.</li> <li>— Solenoid valve defective - replace the drainer.</li> </ul> |

**NOTE : When the drainer is in alarm condition, the diaphragm solenoid valve will open 7.5 sec every 4 min.**



The maintenance operations must be worked out by qualified personnel.

**Before any intervention, Ensure that:**

- **No part of the machine is powered** and that it cannot be connected to the main supply.
- **no part of the machine is under pressure** and that it cannot be connected to the compressed air system.



Before attempting any maintenance operation on the dryer, switch it off and wait at least 30 minutes. During operation the copper piping connecting the compressor to the condenser can reach dangerous temperature able to burn the skin.



**DAILY**

- Verify that the DewPoint displayed on the DMC is correct.
- Check the proper operation of the condensate drains systems.
- Verify the condenser for cleanliness.



**EVERY 200 HOURS OR MONTHLY**

- With an air jet (Max. 29 psig) blowing from inside towards outside (from outside towards inside on models PLS 500-800) clean the condenser; repeat this operation blowing in the opposite way; be careful not to damage the aluminium blades of the cooling package.
- Close the manual condensate drain valve, unscrew the mechanical strainer and clean it with compressed air and a brush. Reinstall the strainer properly tight, and then open the manual 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.
- Check the conditions of the condensate drain flexible hoses, and replace if necessary.
- At the end, check the operation of the machine.

**6.2 TROUBLESHOOTING**



The troubleshooting and the eventual checks have to be worked out by qualified personnel. Pay particular attention in case of interventions on the refrigerating circuit. The refrigerating fluid, if under pressure, while expanding could cause congelation burns and serious damage to the eyes, should it get in contact with them.



**SYMPTOM**

**POSSIBLE CAUSE - SUGGESTED ACTION**

◆ The dryer doesn't start.	_ Check for mains failure. _ Verify the electric wiring. _ <b>PLS 500-600-</b> intervention of the electric protection (see Q3 on the electric diagram) of the auxiliary circuit - restore it and check the proper operation of the dryer. _ <b>DMC20-</b> The led “alarm” is ON - see specific point.
◆ The compressor doesn't work.	_ Activation of the compressor internal thermal protection - wait for 30 minutes, then retry. _ Verify the electric wiring. _ <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. _ <b>Where installed-</b> The pressure switch PA has been activated - see specific point. _ <b>Where installed-</b> The pressure switch PB has been activated - see specific point. _ <b>DMC20-</b> Internal delay timer - wait at least 2 min from the last switching off. _ <b>DMC20-</b> The led “alarm” is ON - see specific point. _ If the compressor still doesn't work, replace it.
◆ The fan(s) of the condenser	_ Verify the electric wiring.

doesn't work (air-cooled).  
\_ Pv pressure switch is faulty - replace it.  
\_ **PLS 500-600 U-** The fan(s) power contactor (see V on the electric diagram) is faulty - replace it.  
\_ **DMC20-** The led "alarm" is ON - see specific point.  
\_ If the fan(s) still doesn't work, replace it.

◆ DewPoint too high.  
\_ The dryer is OFF - switch it ON.  
\_ The DewPoint sensor 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 (air-cooled).  
\_ 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 (air-cooled).  
\_ The condenser fan(s) doesn't work - see specific point (air-cooled).  
\_ The cooling water is too hot - restore the nominal condition (water-cooled).  
\_ The cooling water flow is insufficient - restore the nominal condition (water-cooled).  
\_ 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.

◆ DewPoint too low.  
\_ The fan is always ON - Pv pressure switch is faulty - replace it (air-cooled).  
\_ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore the nominal setting.  
\_ The DewPoint probe doesn't correctly detect the temperature. Ensure the probe is pushed into the bottom of the copper tube immersion well.

◆ Excessive pressure drop within the dryer.  
\_ 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 - see specific point.

◆ The dryer doesn't drain the condensate.  
\_ The condensate drain service valve is closed - open it.  
\_ Verify the electric wiring.  
\_ The condensate drain mechanical strainer is clogged - remove and clean it.  
\_ The drain solenoid valve is jammed - remove and clean it.  
\_ The coil of the condensate drain solenoid valve burned out - replace it.  
\_ The DewPoint is too low - the condensate is frozen - see specific point.  
\_ **DMC11-** DMC11 doesn't work - replace it.  
\_ **DMC20-** Drain times on DMC20 are set at zero seconds. - See DMC20 "set-up" on.  
\_ **DMC20-** The DMC20 is faulty - replace it.

◆ 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 stop the Air Dryer Controller is faulty - replace it.  
\_ **DMC11-** The DMC11 is faulty - replace it.  
\_ **DMC20-** The DMC20 is faulty - replace it.



- ◆ Water within the line.
  - \_ The dryer is OFF - switch it ON.
  - \_ Untreated air flows through the by-pass unit (if installed) - close the by-pass.
  - \_ The dryer doesn't drain condensate - see specific point.
  - \_ DewPoint too high - see specific point.
  
- ◆ Where installed- The PA high-pressure switch has been activated.
  - Check which of the following has caused the activation :**
  - 1. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation (air-cooled).
  - 2. The condenser unit is dirty - clean it (air-cooled).
  - 3. The condenser fan doesn't work - see specific point (air-cooled).
  - 4. The cooling water is too hot - restore the nominal condition (water-cooled).
  - 5. The cooling water flow is insufficient - restore the nominal condition (water-cooled).
  - \_ Reset the pressure-switch pressing the button on the controller itself - verify the dryer for correct operation.
  - \_ The PA pressure switch is faulty - contact a refrigeration engineer to replace it.
  
- ◆ Where installed- The PB low-pressure switch has been activated.
  - \_ There is a leak in the refrigerant fluid circuit - contact a refrigeration engineer.
  - \_ The pressure switch restores automatically when normal conditions are restored - check the proper operation of the dryer.
  
- ◆ PLS 500-600 -DMC11- The alarm light is ON.
  - \_ The PA high-pressure switch is activated - see specific point.
  - \_ The PB low-pressure switch is activated - see specific point.
  - \_ The electric protection (see Q1 on the electric diagram) of the compressor is activated - restore it and retry.
  - \_ The electric protection (see Q2 on the electric diagram) of the fan(s) is activated - restore it and retry (air cooled).
  
- ◆ DMC20-The led "alarm" is ON.
  - One of the following appears on the upper line of the DMC20 display.**
  - 1. "Protection Comp." : Intervention of the electric protection (see Q1 on the electric diagram) of the compressor - restores it and checks the proper operation of the dryer.
  - 2. "Protection Fan": (air-cooled) Intervention of the electric protection (see Q2 on the electric diagram) of the fan - restore it and check the proper operation of the dryer or Intervention of the thermal protection (see TV on the electric diagram) inside the fan - wait 30 minutes and retry.
  - 3. "STOP Compr. LP" : The PB low pressure-switch is activated - see specific point.
  - 4. "STOP Compr. HP" : The PA high pressure-switch is activated - see specific point.
  - 5. "Condens. HIGH" : condensing temperature is too high - see specific point.
  - 6. "DewPoint LOW" : DewPoint is too low - see specific point.
  - 7. "DewPoint HIGH" : DewPoint is too high - see specific point.
  - 8. "Probe Fault" : one of the probes is faulty - see specific point.
  
- ◆ DMC20-The condensing temperature is too high.
  - Check which of the following has caused the alarm:
  - 1. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation (air-cooled).
  - 2. The condenser unit is dirty - clean it (air-cooled).
  - 3. The condenser fan(s) doesn't work - see specific point (air-cooled).
  - 4. The cooling water is too hot - restore the nominal condition (water-cooled).
  - 5. The cooling water flow is insufficient - restore the nominal condition (water-cooled).

- ◆ **DMC20-** DMC20 display “Probe Fault” message.
  - \_ One of the temperature probes is faulty - display in sequence all the temperatures - the parameter indicated with “?” corresponds to faulty probe.
  - \_ Ensure that the probe-extension connector of faulty probe is correctly inserted in DMC20.
  - \_ Check the probe-extension connection between DMC20 and terminal board.
  - \_ Check connection between probe and terminal board.
  - \_ If the fault persists, replace probe and/or probe-extension.

**NOTE:** If the faulty probe is T1 (DewPoint) the hot gas by-pass solenoid valve is always on. If any other probe is faulty the dryer will run correctly even if there is an alarm condition.

### 6.3 SUGGESTED SPARE PARTS

The suggested spare parts list will enable you to promptly service and maintain normal operation, so to avoid waiting for replacement parts, the following parts list provides part numbers and quantity's required for each model.

		PLS												
DESCRIPTION OF THE SPARE PARTS	CODE	1/115/60			1/230/60			1/115/60			1/230/60			
		25	40	60	25	40	60	85	105	140	85	105	140	
Condensate drain valve/strainer	64355MN012	1	1	1	1	1	1	1	1	1	1	1	1	1
Fan motor	5210135010	1	1	1										
Fan motor	5210110011				1	1	1							
Fan motor	5210135020							1	1	1				
Fan motor	5210110017										1	1	1	
Fan blade	5215000010	1	1	1	1	1	1							
Fan blade	5215000025							1	1	1	1	1	1	1
Fan grid	5225000014	1	1	1	1	1	1							
Fan grid	5225000027							1	1	1	1	1	1	1
DMC11 Air Dryer Controller	5620130100	1♦	1♦	1♦				1♦	1♦	1♦				
DMC11 Air Dryer Controller	5620110100				1♦	1♦	1♦				1♦	1♦	1♦	
Temperature probe L=24in (T1)	5625NNN033	1♦	1♦	1♦	1♦	1♦	1♦							
Temperature probe L=47in (T1)	5625NNN035							1♦	1♦	1♦	1♦	1♦	1♦	1♦
Condensate drain solenoid valve	64320FF005	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Coil for condensate drain solenoid valve	64N22MM035	1♦	1♦	1♦				1♦	1♦	1♦				
Coil for condensate drain solenoid valve	64N22MM005				1♦	1♦	1♦				1♦	1♦	1♦	
Dehydration filter	6650SSS005	1	1	1	1	1	1							
Dehydration filter	6650SSS015							1	1	1	1	1	1	1
Hot gas by-pass valve	64140SS150	1	1	1	1	1	1							
Hot gas by-pass valve	64140SS155							1	1	1	1	1	1	1
Refrigerant pressure switch P <sub>v</sub>	5655NNN162	1	1	1	1	1	1							
Refrigerant pressure switch P <sub>v</sub>	5655NNN165							1	1	1	1	1	1	1
Main switch 2P 0/1	5450SZN010	1	1	1	1	1	1	1	1	1	1	1	1	1
Refrigerating compressor	5015135005	1												
Refrigerating compressor	5015135009		1											
Refrigerating compressor	5015135011			1										
Refrigerating compressor	5015110007				1									
Refrigerating compressor	5015115010					1								
Refrigerating compressor	5015115011						1							
Refrigerating compressor	5025135003							1	1					
Refrigerating compressor	5025135005									1				
Refrigerating compressor	5025115003										1	1		
Refrigerating compressor	5025115005													1
Electronic drainer (optional)	BZL	1	1	1				1	1	1				
Electronic drainer (optional)	BZL				1	1	1				1	1	1	

♦ Suggested spare part.

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

DESCRIPTION OF THE SPARE PARTS	CODE	PLS						
		1/115/60		1/230/60				
		175	210	175	210	275	300	400
Condensate Y – type drain strainer	64355FF011	1	1	1	1	1	1	1
Complete fan	5250130005	1	1					
Complete fan	5250110100			1	1			
Complete fan	5250115005					1		
Complete fan	5250110110						1	1
DMC11 Air Dryer Controller	5620130100	1♦	1♦					
DMC11 Air Dryer Controller	5620110100			1♦	1♦	1♦	1♦	1♦
Temperature probe L=47in (T1)	5625NNN035	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Condensate drain solenoid valve	64320FF011	1♦	1♦	1♦	1♦	1♦	1♦	1♦
Coil for condensate drain solenoid valve	64N22MM018	1♦	1♦					
Coil for condensate drain solenoid valve	64N22MM021			1♦	1♦	1♦	1♦	1♦
Dehydration filter	6650SSN035	1	1	1	1	1	1	1
Hot gas by-pass valve	64140SS155	1	1	1	1	1	1	1
Refrigerant pressure switch P <sub>v</sub>	5655NNN165	1	1	1	1	1	1	1
Refrigerant pressure switch P <sub>A</sub> - P <sub>B</sub>	5655NNN095						1	1
Main switch	5450SZN117	1	1	1	1	1	1	1
Refrigerating compressor	5025135006	1						
Refrigerating compressor	5025135015		1					
Refrigerating compressor	5025115006			1				
Refrigerating compressor	5025115015				1			
Refrigerating compressor	5025115020					1	1	
Refrigerating compressor	5025115025							1
Electronic drainer (optional)	BZL	1	1					
Electronic drainer (optional)	BZL			1	1	1		
Electronic drainer (optional)	BZL						1	1

♦ Suggested spare part.

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

		PLS							
		3/460/60							
		DMC11 - Air Dryer Controller				DMC20 - Air Dryer Controller			
DESCRIPTION OF THE SPARE PARTS	CODE	500	600	700	800	500	600	700	800
Fan	5250120005	2	2	2	2	2	2	2	2
DMC11 Air Dryer Controller	5620110100	1◆	1◆	1◆	1◆				
Display module DMC20	5620100005					1◆	1◆	1◆	1◆
Power module DMC20	5620100006					1◆	1◆	1◆	1◆
Temperature probe L=24in (T7)	5625NNN033					1◆	1◆	1◆	1◆
Temperature probe L=47in (T1-T4)	5625NNN035	1◆	1◆	1◆	1◆	2◆	2◆	2◆	2◆
Temperature probe L=71in (T2-T3-T5-T6-T8)	5625NNN037					5◆	5◆	5◆	5◆
Extension for probe L=47in	5625NNN030	1◆	1◆	1◆	1◆				
Extension for probe L=71in	5625NNN029					8◆	8◆	8◆	8◆
Flat cable 16P L=47in	5625NNN100					1◆	1◆	1◆	1◆
Condensate drain solenoid valve	64320FF020	1	1	1	1	1	1	1	1
Coil for condensate drain solenoid valve	64N22MM021	1	1	1	1				
Coil for condensate drain solenoid valve	64N22MM016					1	1	1	1
Dehydration filter	6650SSN060	1	1	1		1	1	1	
Dehydration filter	6650SSN080				1				1
Hot gas by-pass valve	64140SS155	1	1	1	1	1	1	1	1
Refrigerant pressure switch P <sub>V</sub>	5655NNN090	1	1	1	1	1	1	1	1
Refrigerant pressure switch P <sub>A</sub> - P <sub>B</sub>	5655NNN095	1	1	1	1	1	1	1	1
Main switch	5450SZN100	1	1	1	1	1	1	1	1
Q1 - Circuit breaker	54443SM152	1	1	1	1	1	1	1	1
Q2 - Circuit breaker	54443SM130	1	1	1	1	1	1	1	1
Q3 - Transformer Circuit breaker	54443ST020	1	1	1	1	1	1	1	1
Q4 - Circuit breaker	54441C6005	1	1	1	1				
Q4 - Circuit breaker	54442C6015					1	1	1	1
Q1-Q2 - Auxiliary contact	5490CAX060	2	2	2	2	2	2	2	2
K - Power contactor	5454TLT116	1	1	1	1				
K - Auxiliary contact	5490CAX011	1	1	1	1				
K - Power contactor	5454TLT016					1	1	1	1
V - Power contactor	5454TLT111	1	1	1	1				
V - Power contactor	5454TLT011					1	1	1	1
A - Auxiliary relay coil	5456REL110	1	1	1	1				
A - Relay socket	5456REL015	1	1	1	1				
P - Double ON/OFF button with light	5452PLS020	1	1	1	1				
P - Neon lamp for the double button	5480NEN010	1	1	1	1				
X - Rectangular red indicator 18x24	5452IND005	1	1	1	1				
X - Neon lamp for red indicator	5480NEN005	1	1	1	1				
TF - Transformer	5440TFM021	1	1	1	1	1	1	1	1
Refrigerating compressor	5015340004	1				1			
Refrigerating compressor	5015340006		1				1		
Refrigerating compressor	5015340003			1				1	
Refrigerating compressor	5015340007				1				1
Electronic drainer (optional)	BZL	1	1	1	1				
Electronic drainer (optional)	BZL					1	1	1	1

◆ Suggested spare part.

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

		PLS							
		3/230/60							
		DMC11 - Air Dryer Controller				DMC20 - Air Dryer Controller			
DESCRIPTION OF THE SPARE PARTS	CODE	500	600	700	800	500	600	700	800
Fan	5250110110	2	2	2	2	2	2	2	2
DMC11 Air Dryer Controller	5620110100	1◆	1◆	1◆	1◆				
Display module DMC20	5620100005					1◆	1◆	1◆	1◆
Power module DMC20	5620100006					1◆	1◆	1◆	1◆
Temperature probe L=24in (T7)	5625NNN033					1◆	1◆	1◆	1◆
Temperature probe L=47in (T1-T4)	5625NNN035	1◆	1◆	1◆	1◆	2◆	2◆	2◆	2◆
Temperature probe L=71in (T2-T3-T5-T6-T8)	5625NNN037					5◆	5◆	5◆	5◆
Extension for probe L=47in	5625NNN030	1◆	1◆	1◆	1◆				
Extension for probe L=71in	5625NNN029					8◆	8◆	8◆	8◆
Flat cable 16P L=47in	5625NNN100					1◆	1◆	1◆	1◆
Condensate drain solenoid valve	64320FF020	1	1	1	1	1	1	1	1
Coil for condensate drain solenoid valve	64N22MM021	1	1	1	1				
Coil for condensate drain solenoid valve	64N22MM016					1	1	1	1
Dehydration filter	6650SSN060	1	1	1		1	1	1	
Dehydration filter	6650SSN080				1				1
Hot gas by-pass valve	64140SS155	1	1	1	1	1	1	1	1
Refrigerant pressure switch P <sub>V</sub>	5655NNN090	1	1	1	1	1	1	1	1
Refrigerant pressure switch P <sub>A</sub> - P <sub>B</sub>	5655NNN095	1	1	1	1	1	1	1	1
Main switch	5450SZN100	1	1	1	1	1	1	1	1
Q1 - Circuit breaker	54443SM165	1	1	1	1	1	1	1	1
Q2 - Circuit breaker	54443SM145	1	1	1	1	1	1	1	1
Q4 - Circuit breaker	54441C6005					1	1	1	1
Q1-Q2 - Auxiliary contact	5490CAX060	2	2	2	2	2	2	2	2
K - Power contactor	5454TLT121	1	1	1	1				
K - Power contactor	5454TLT021					1	1	1	1
K - Auxiliary contact	5490CAX011	1	1	1	1				
V - Power contactor	5454TLT116	1	1	1	1				
V - Power contactor	5454TLT016					1	1	1	1
A - Auxiliary relay coil	5456REL110	1	1	1	1				
A - Relay socket	5456REL015	1	1	1	1				
P - Double ON/OFF button with light	5452PLS020	1	1	1	1				
P - Neon lamp for the double button	5480NEN010	1	1	1	1				
X - Rectangular red indicator 18x24	5452IND005	1	1	1	1				
X - Neon lamp for red indicator	5480NEN005	1	1	1	1				
TF - Transformer	5440TFM040					1	1	1	1
Refrigerating compressor	5015310004	1				1			
Refrigerating compressor	5015310006		1				1		
Refrigerating compressor	5015310003			1				1	
Refrigerating compressor	5015310007				1				1
Electronic drainer (optional)	BZL	1	1	1	1				
Electronic drainer (optional)	BZL					1	1	1	1

◆ Suggested spare part.

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

## 6.4 DISMANTELING 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 – HFC, R134.a – HFC, Oil
Canopy and Supports	Carbon steel, Epoxy paint
Refrigeration Compressor	Steel, Copper, Aluminium, Oil
Comby-Heat-Exchanger	Stainless steel AISI 316L, copper
Condensate Separator	Copper or Carbon steel, Stainless steel
Condenser Unit	Aluminium, Copper, Carbon steel
Pipe	Copper
Fan	Aluminium, Copper, Steel
Valve	Brass, Steel
Electronic Level Drainer (optional)	PVC, Aluminium, Steel
Insulation Material	Synthetic gum without CFC
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.

### 7.1 DRYERS DIMENSIONS

- 7.1.1 *PLS 25-60 Dryers Dimensions*
- 7.1.2 *PLS 85-140 Dryers Dimensions*
- 7.1.3 *PLS 175-275 Dryers Dimensions*
- 7.1.4 *PLS 300-400 Dryers Dimensions*
- 7.1.5 *PLS 500-800 Dryers Dimensions*

### 7.2 EXPLODED VIEW

- 7.2.1 *Exploded view of Dryers PLS 25-60*
- 7.2.2 *Exploded view of Dryers PLS 85-140*
- 7.2.3 *Exploded view of Dryers PLS 175-275*
- 7.2.4 *Exploded view of Dryers PLS 300-400*
- 7.2.5 *Exploded view of Dryers PLS 500-800*

#### *Exploded view table of components - Dryers PLS 25-800*

1 Comby-Heat-Exchanger	11 Base plate	21 Nipple
2 Condensate separator	12 Fan blade	22 Condensate drain solenoid valve
3 Rear panel	13 Fan grid	23 Coil for cond. drain solenoid valve
4 Cover	14 Fan motor	24 Service valve
5 Hot gas by-pass valve	15 Dehydration filter	25 Electronic Drainer
6 Lateral panel	16 DewPoint Probe	26 Capillary tube
7 Middle plate	17 Refrigerant pressure switch P <sub>V</sub>	27 Refrigerant pressure switch P <sub>B</sub>
8 Control panel	18 Refrigerating compressor	28 Refrigerant pressure switch P <sub>A</sub>
9 Front panel	19 Service valve / Strainer	29 Fan
10 Condenser	20 Y-type condensate drain strainer	30 Electric box

### 7.3 ELECTRICAL DIAGRAM

- 7.3.1 *Electrical Diagram of Dryers PLS 25-210 - (115/1/60)*
- 7.3.2 *Electrical Diagram of Dryers PLS 25-275 - (230/1/60)*
- 7.3.3 *Electrical Diagram of Dryers PLS 300-400*
- 7.3.4 *Electrical Diagram of Dryers PLS 500-800 - (460/3/60) - DMC11 - POWER*
- 7.3.5 *Electrical Diagram of Dryers PLS 500-800 - (460/3/60) - DMC11 - AUXILIARY*
- 7.3.6 *Electrical Diagram of Dryers PLS 500-800 - (460/3/60) - DMC11 - CONNECTIONS*
- 7.3.7 *Electrical Diagram of Dryers PLS 500-800 - (460/3/60) - DMC20 - POWER*
- 7.3.8 *Electrical Diagram of Dryers PLS 500-800 - (460/3/60) - DMC20 - AUXILIARY*
- 7.3.9 *Electrical Diagram of Dryers PLS 500-800 - (460/3/60) - DMC20 - CONNECTIONS*
- 7.3.10 *Electrical Diagram of Dryers PLS 500-800 - (230/3/60) - DMC11 - POWER*
- 7.3.11 *Electrical Diagram of Dryers PLS 500-800 - (230/3/60) - DMC11 - AUXILIARY*
- 7.3.12 *Electrical Diagram of Dryers PLS 500-800 - (230/3/60) - DMC11 - CONNECTIONS*
- 7.3.13 *Electrical Diagram of Dryers PLS 500-800 - (230/3/60) - DMC20 - POWER*
- 7.3.14 *Electrical Diagram of Dryers PLS 500-800 - (230/3/60) - DMC20 - AUXILIARY*
- 7.3.15 *Electrical Diagram of Dryers PLS 500-800 - (230/3/60) - DMC20 - CONNECTIONS*

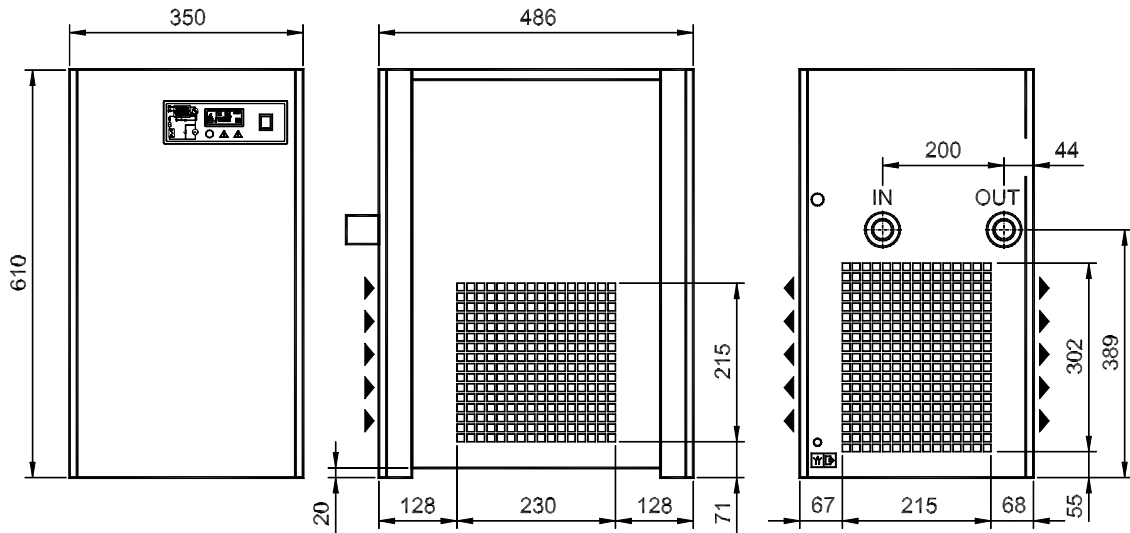
#### *Electrical Diagram table of components - Dryers PLS 25-800*

- 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)
- DMC11** : DMC11 Air Dryer Controller
  - PR** : DMC11 DewPoint sensor
  - PV** : Pressure switch - Fan control
  - PA** : Pressure switch - Compressor discharge (HIGH) side (Optional PLS 25-275 )
  - PB** : Pressure switch - Compressor suction (LOW) side (Optional PLS 25-275 )
- BOX** : Electric supply box
- EVD** : Condensate drain solenoid valve
- ELD** : Electronic level drainer (Optional)
- SEZ** : Main switch with door block
  - P** : Start-Stop button - Power on light
  - X** : Alarm on light
  - R** : Compressor crankcase heater
- CP** : Control Panel
- DMC20** : DMC20 Air Dryer Controller Display Module
- DMC20RI** : DMC20 Air Dryer Controller Power Module

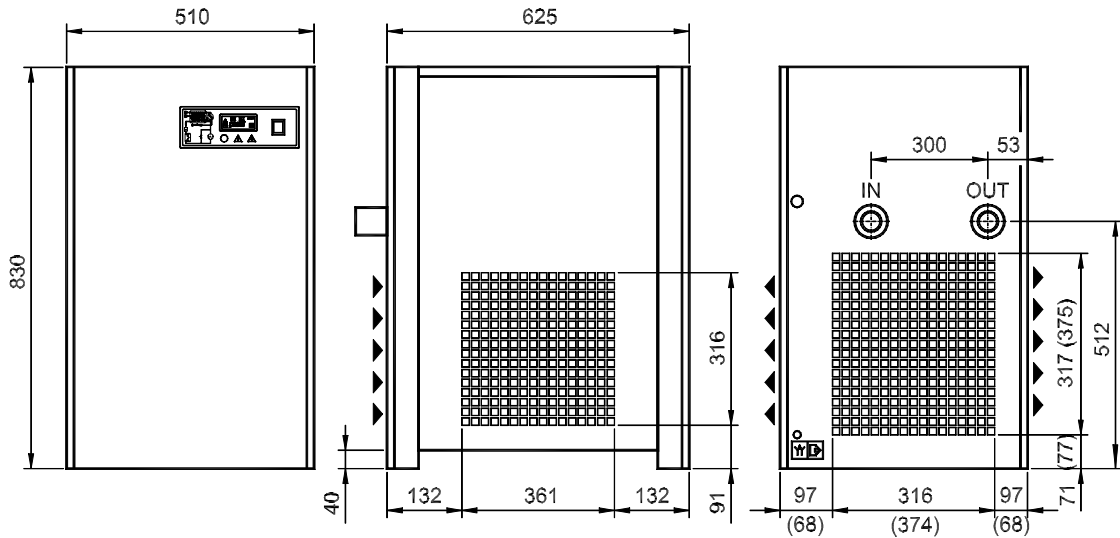
BN = BROWN  
BU = BLUE  
BK = BLACK  
YG = YELLOW/GREEN



**7.1.1 PLS 8-22**

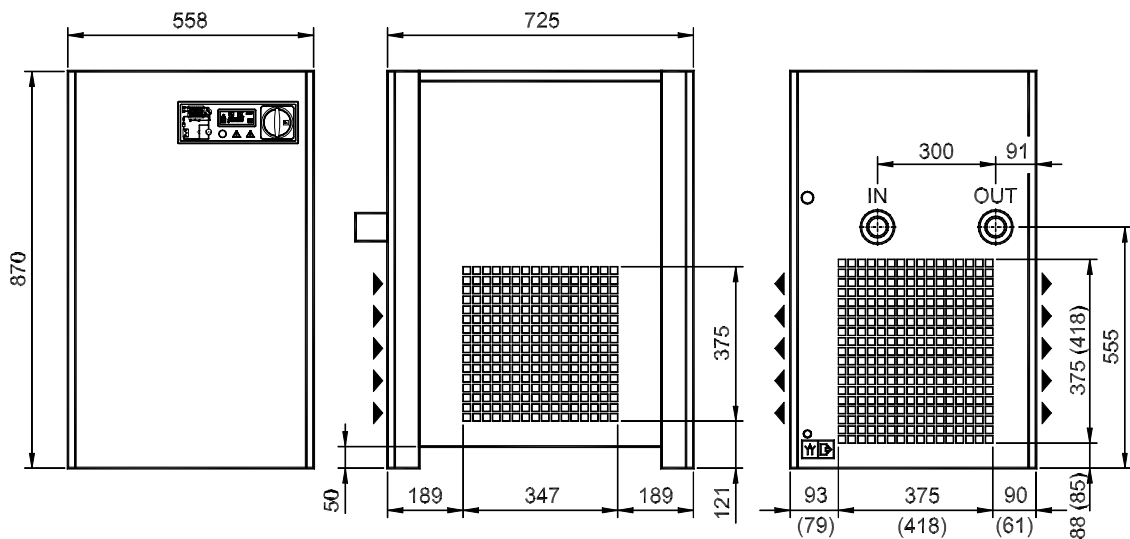


**7.1.2 PLS 30-50**



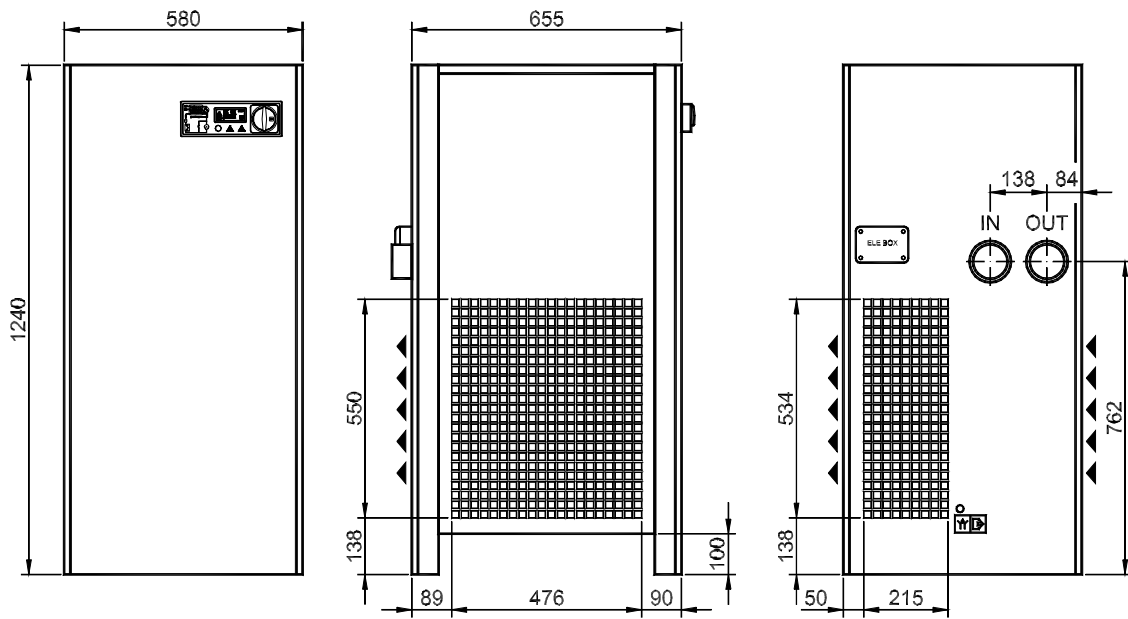
( ) : PLS 50

**7.1.3 PLS 60-80**

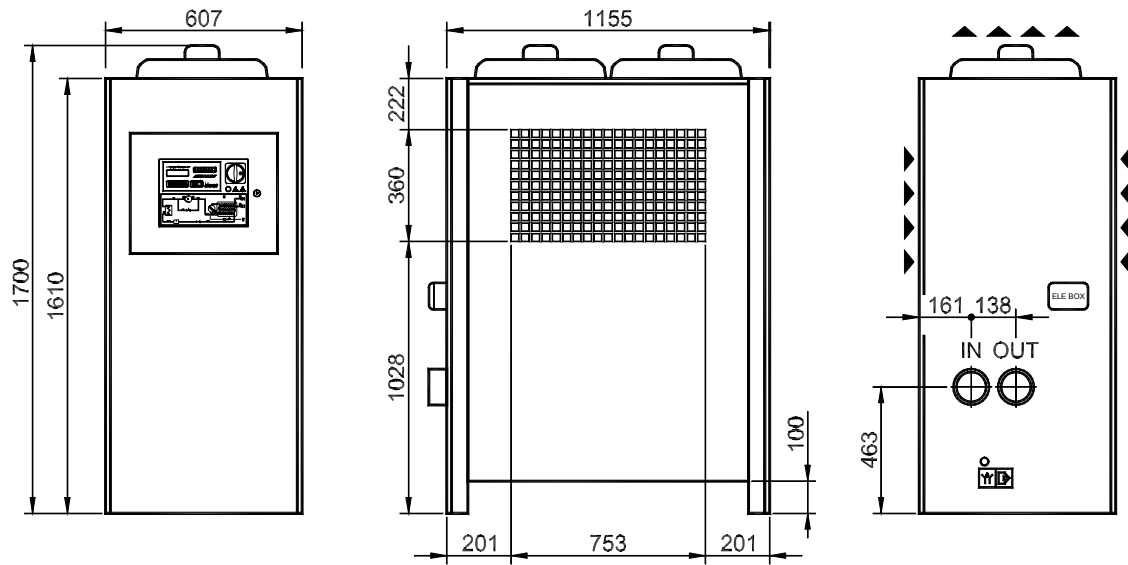


( ) : PLS 80

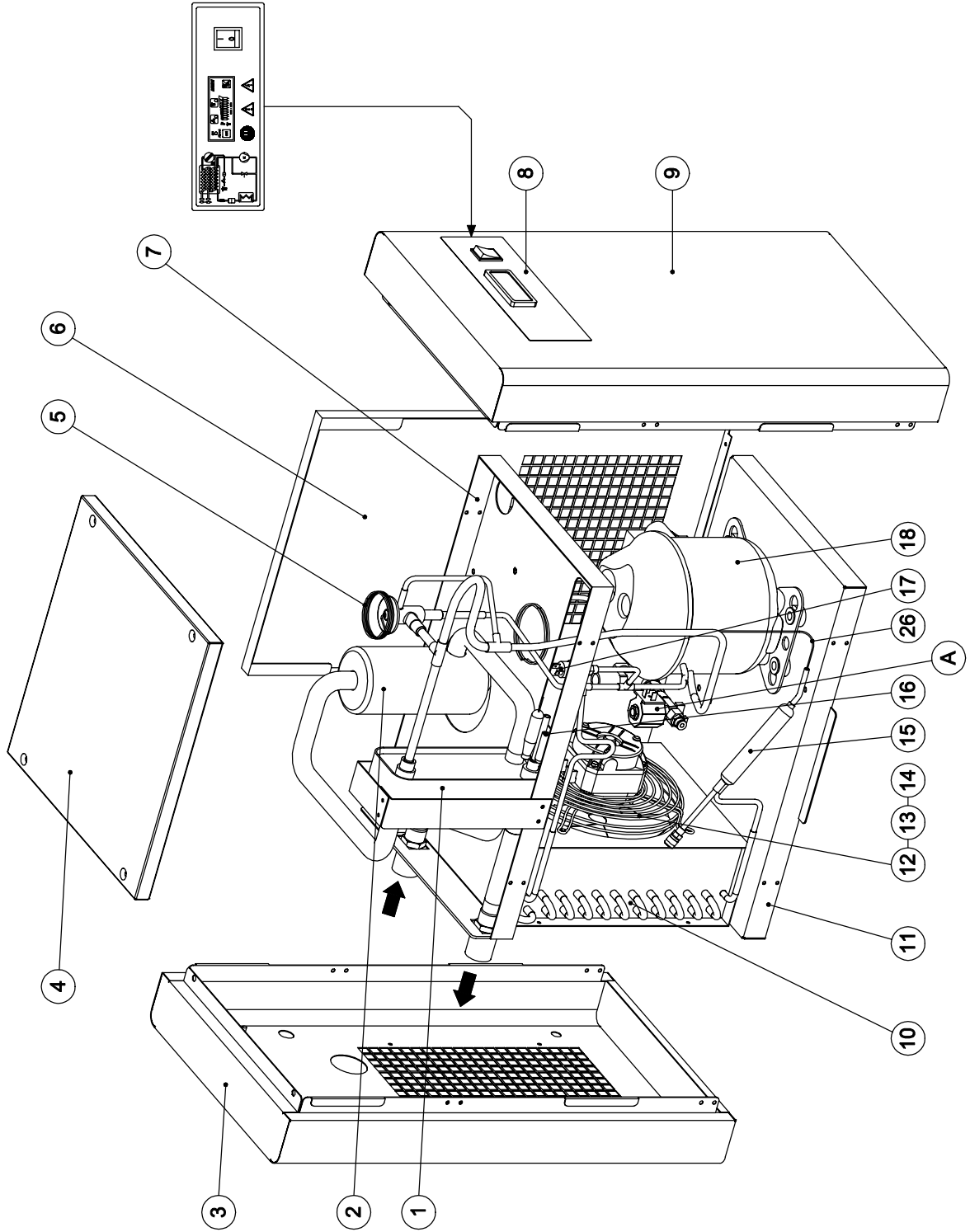
### 7.1.4 PLS 100-130



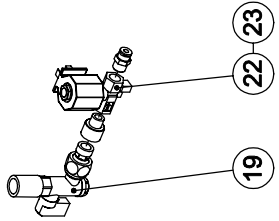
### 7.1.5 PLS 160-250



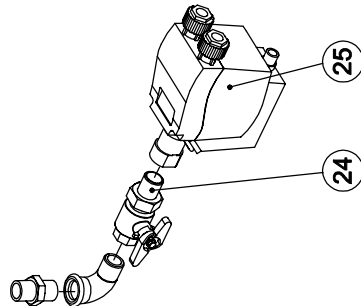
7.2.1 PLS 8-22



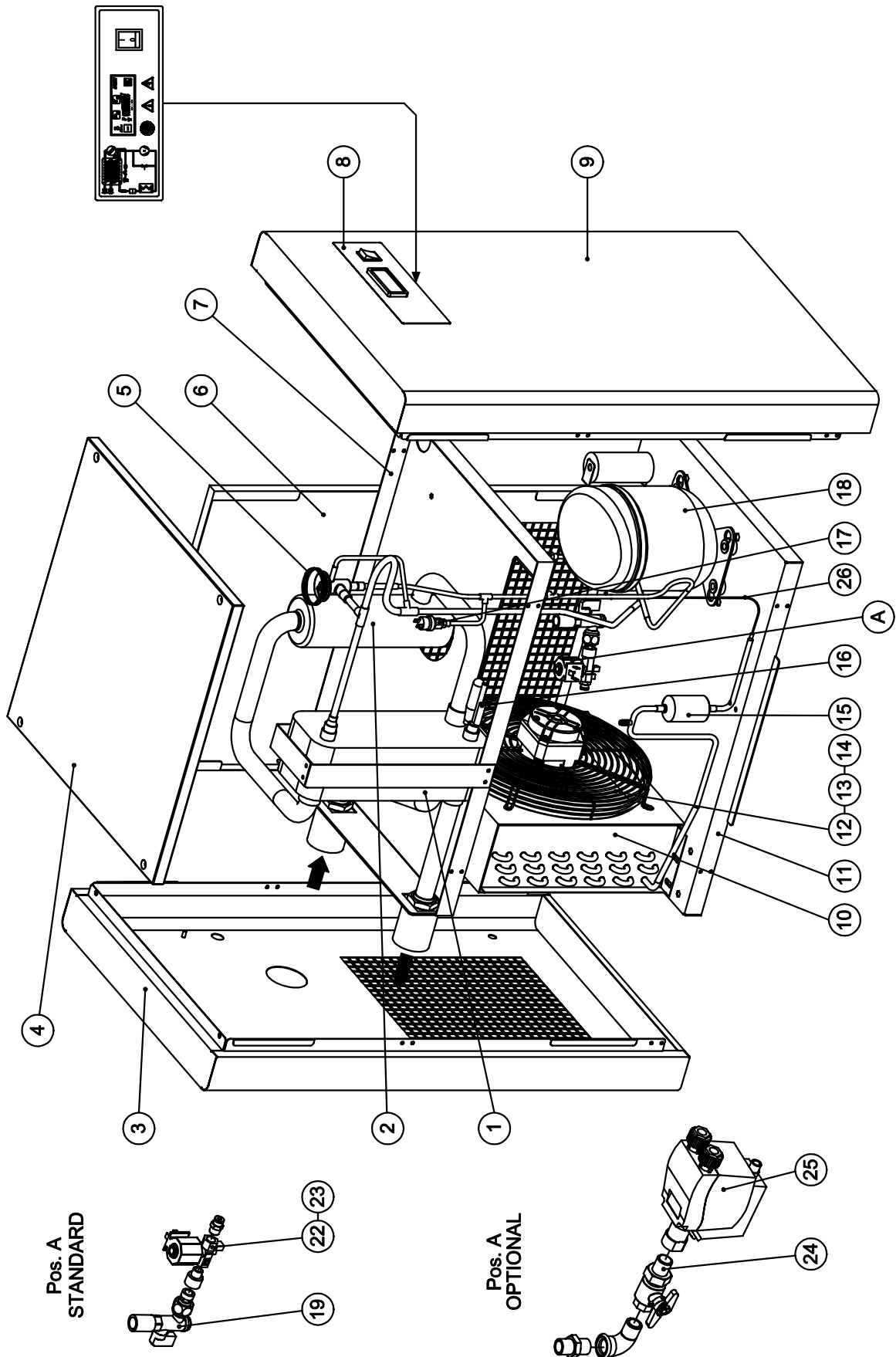
Pos. A  
STANDARD



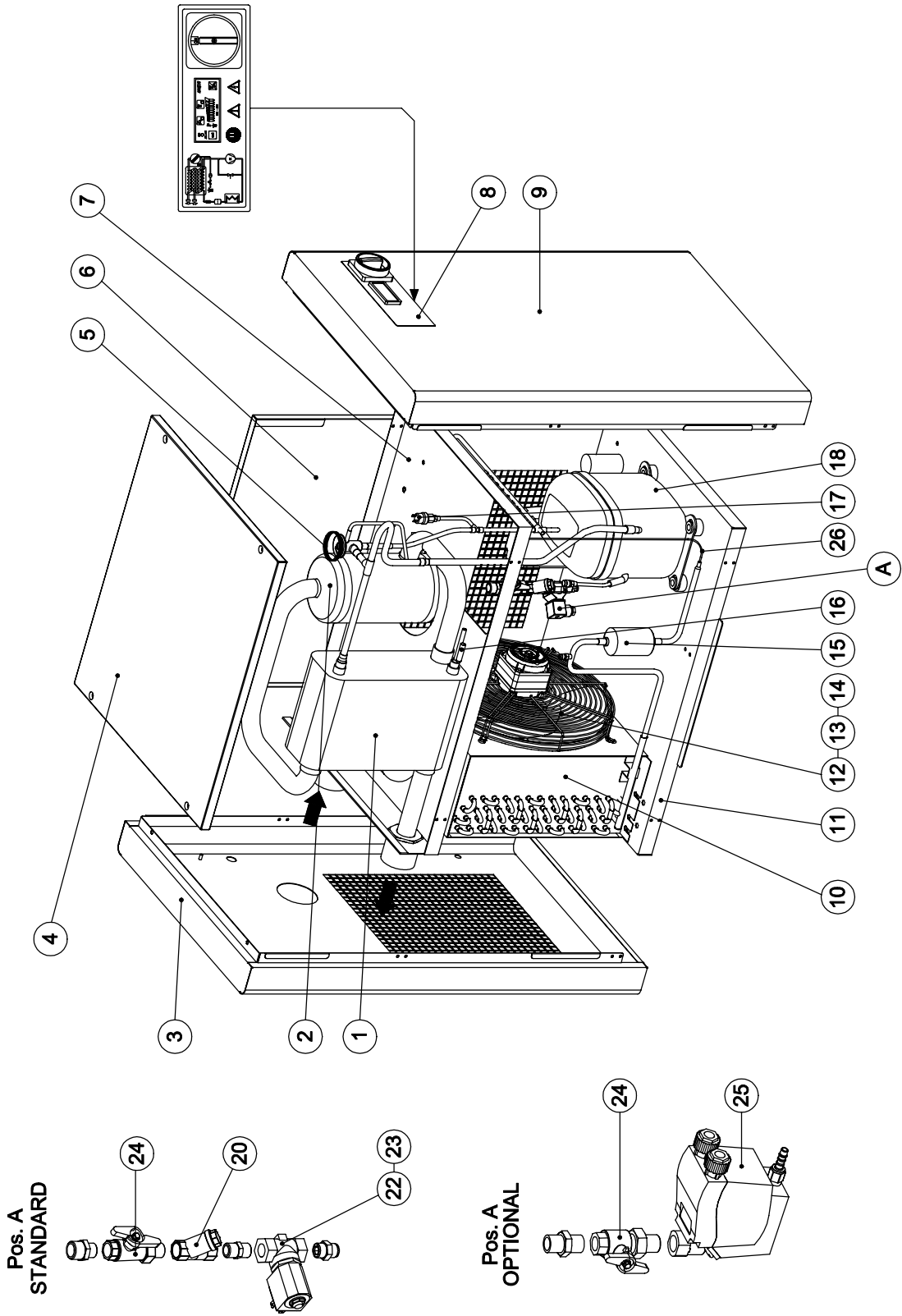
Pos. A  
OPTIONAL



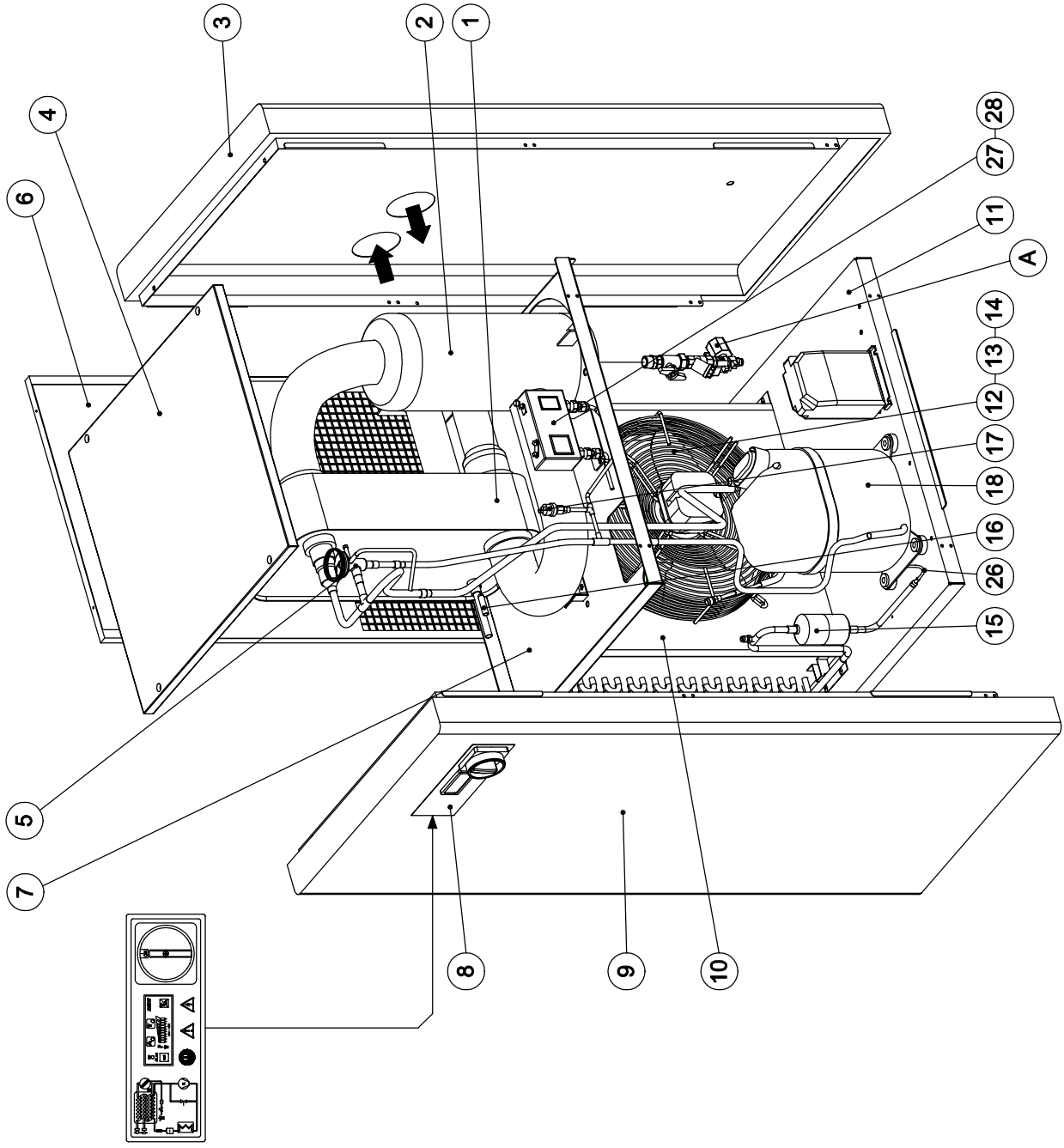
7.2.2 PLS 30-50



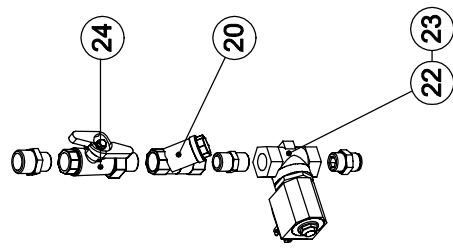
7.2.3 PLS 60-80



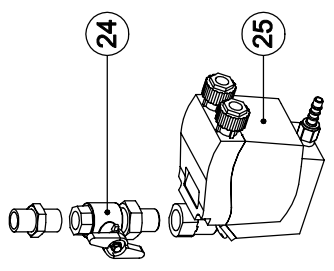
7.2.4 PLS 100-130



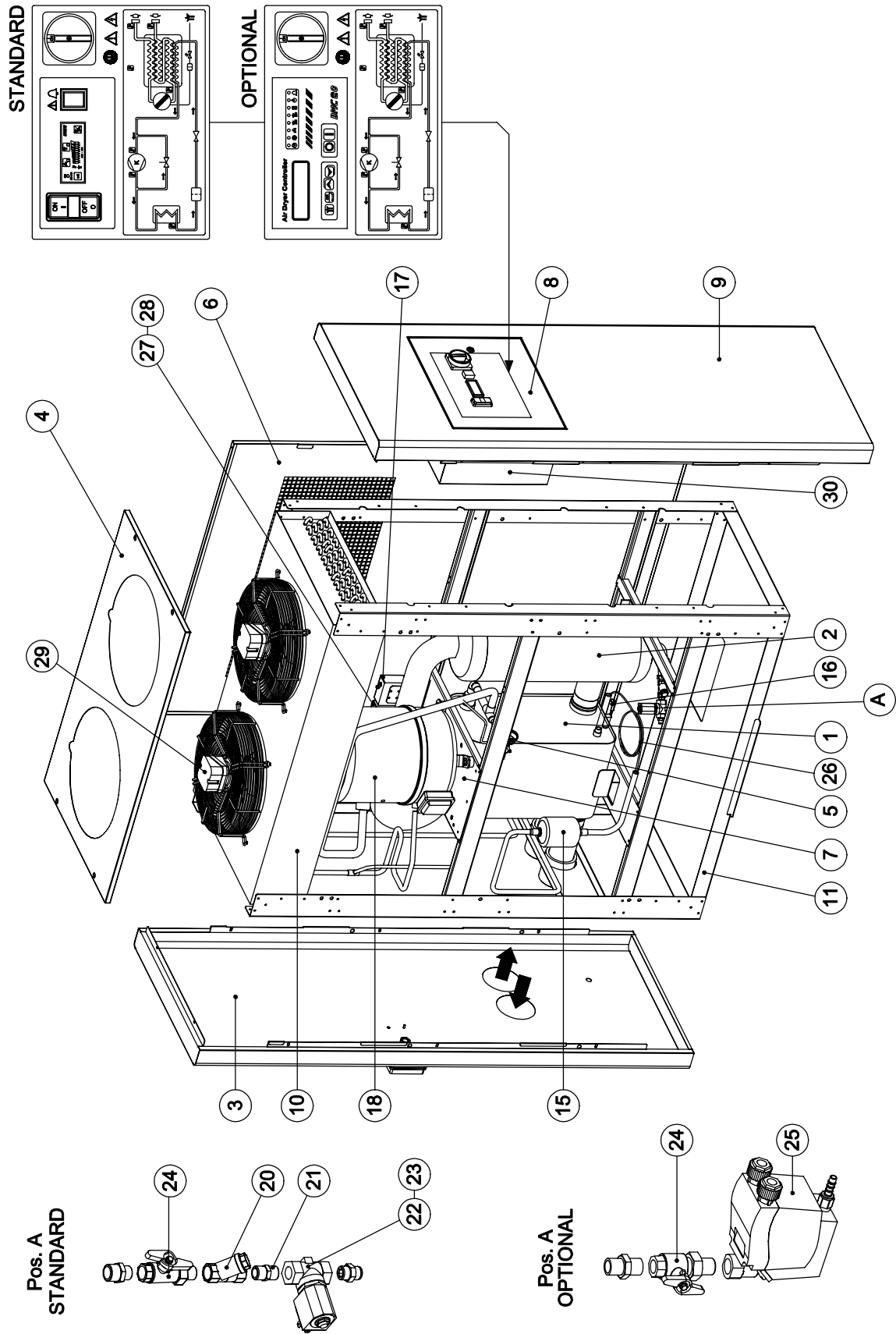
Pos. A  
STANDARD



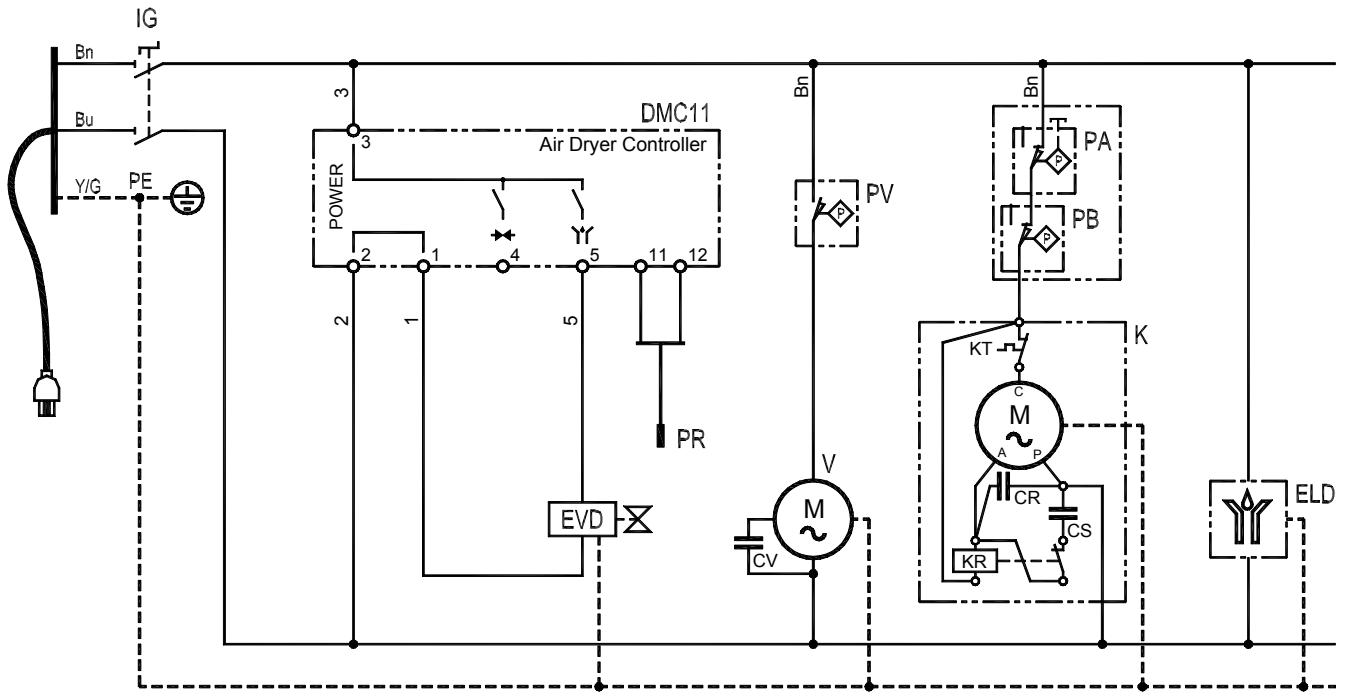
Pos. A  
OPTIONAL



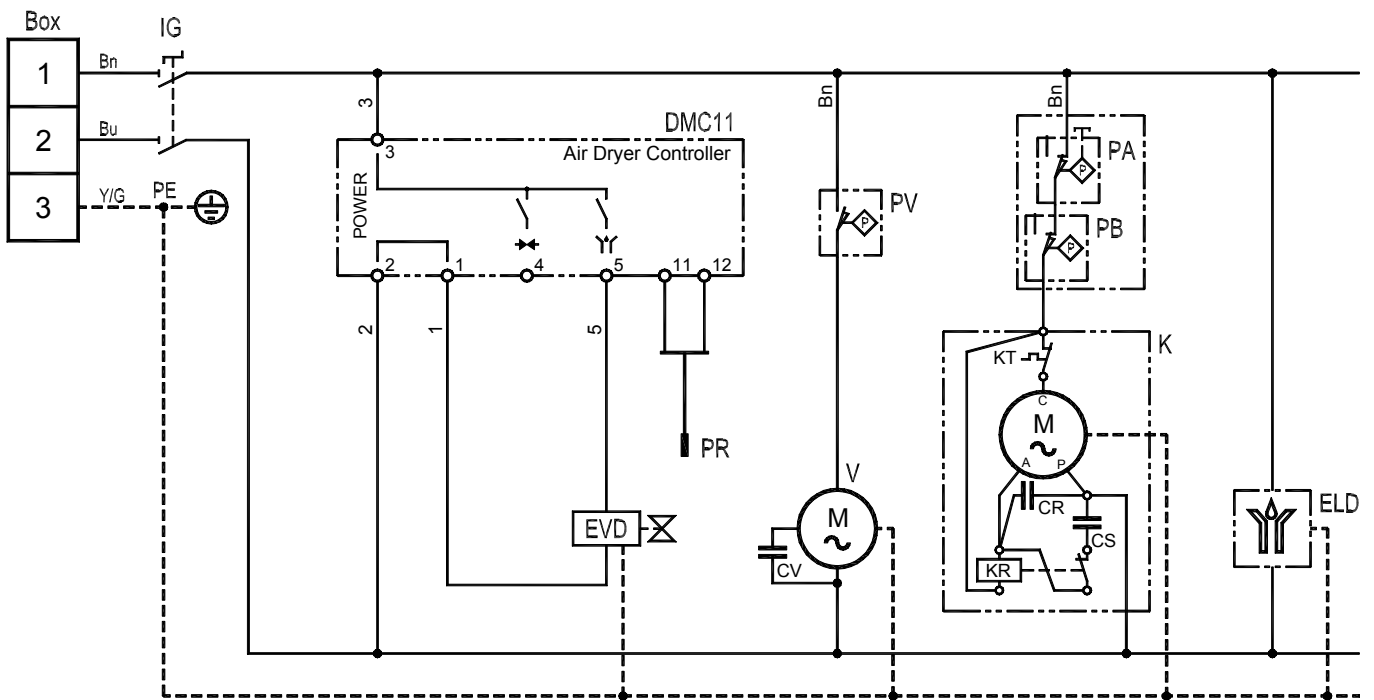
7.2.5 PLS 160-250



### 7.3.1 PLS 8-80

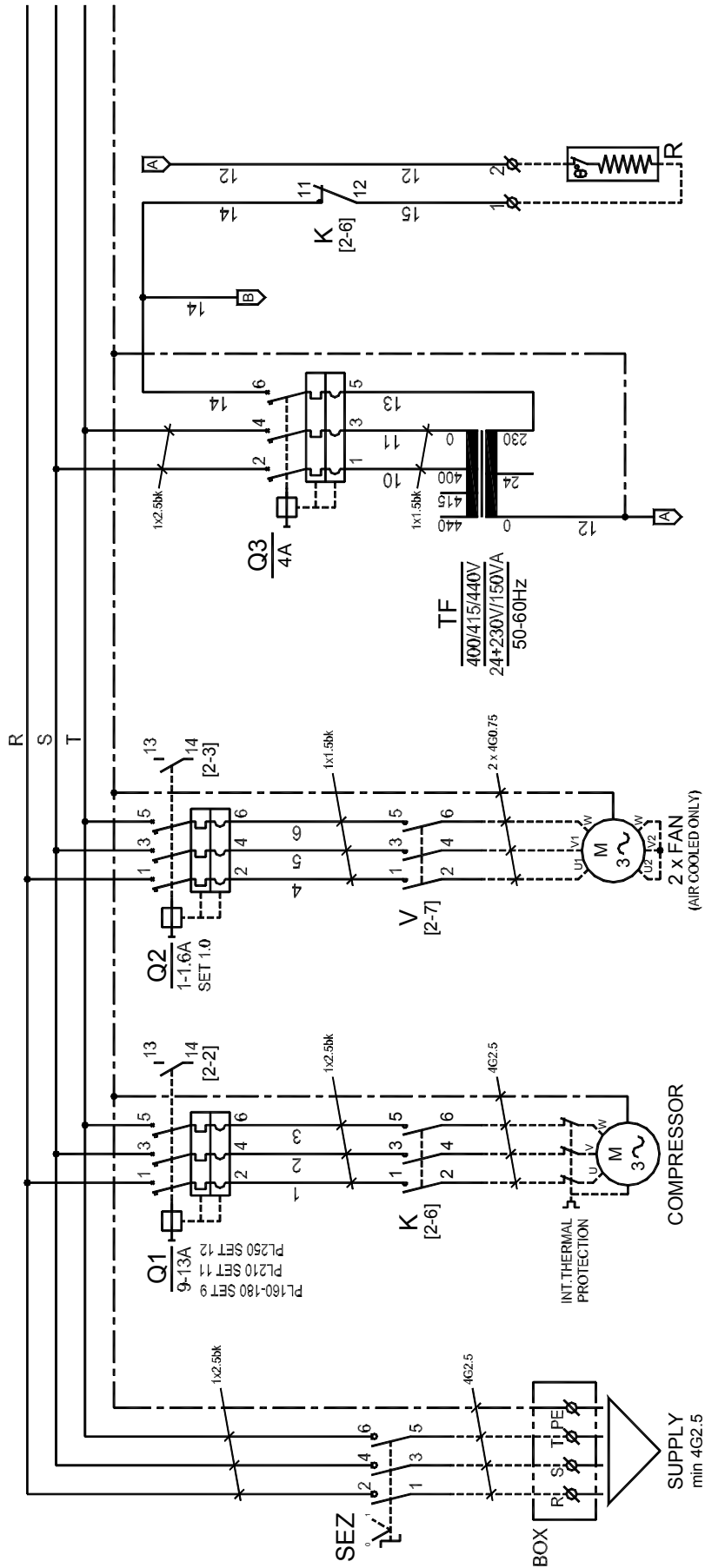


### 7.3.2 PLS 100-130



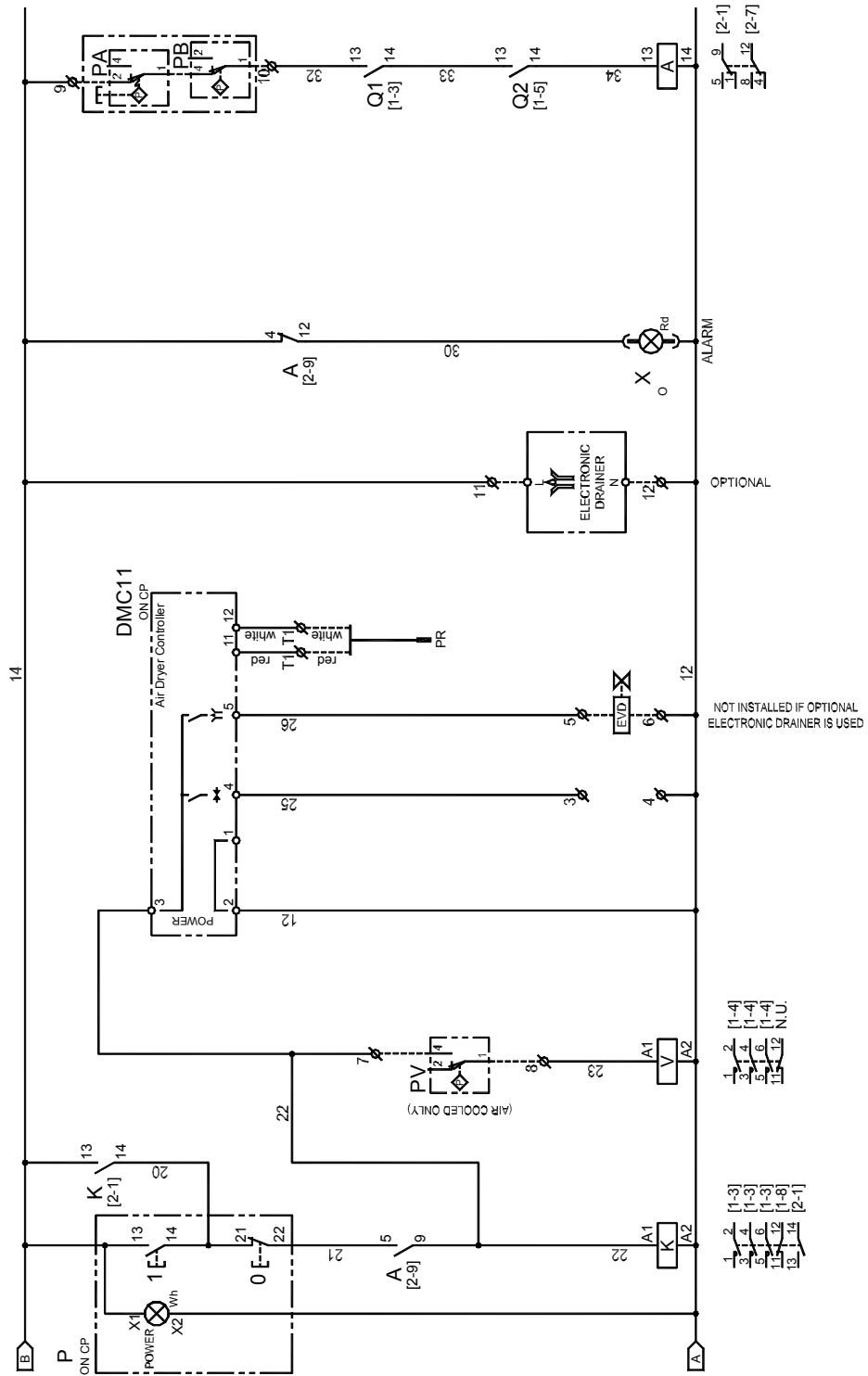


### 7.3.3 PLS 160-250 - DMC11 Air Dryer Controller

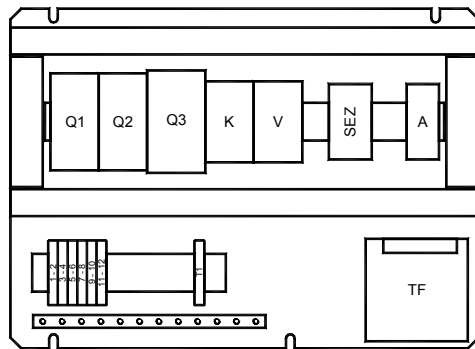
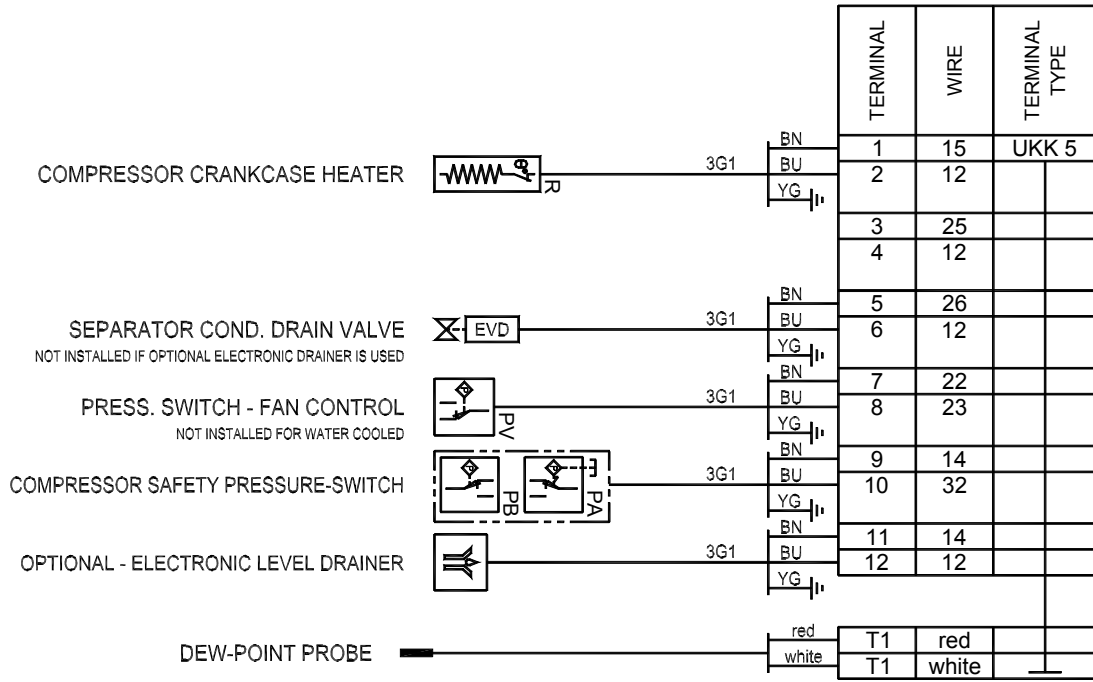


Unless

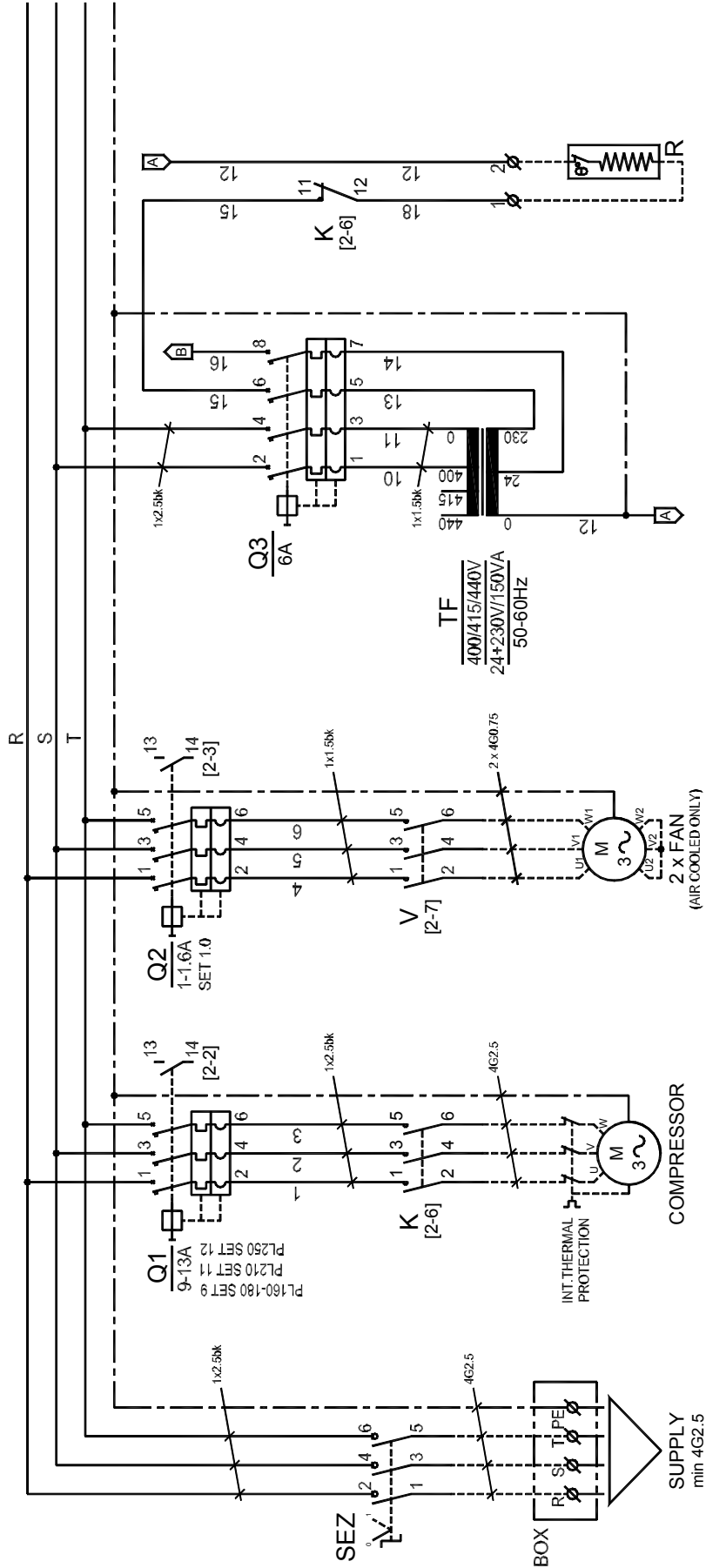
### 7.3.4 PLS 160-250 - DMC11 Air Dryer Controller



### 7.3.5 PLS 160-250 - DMC11 Air Dryer Controller

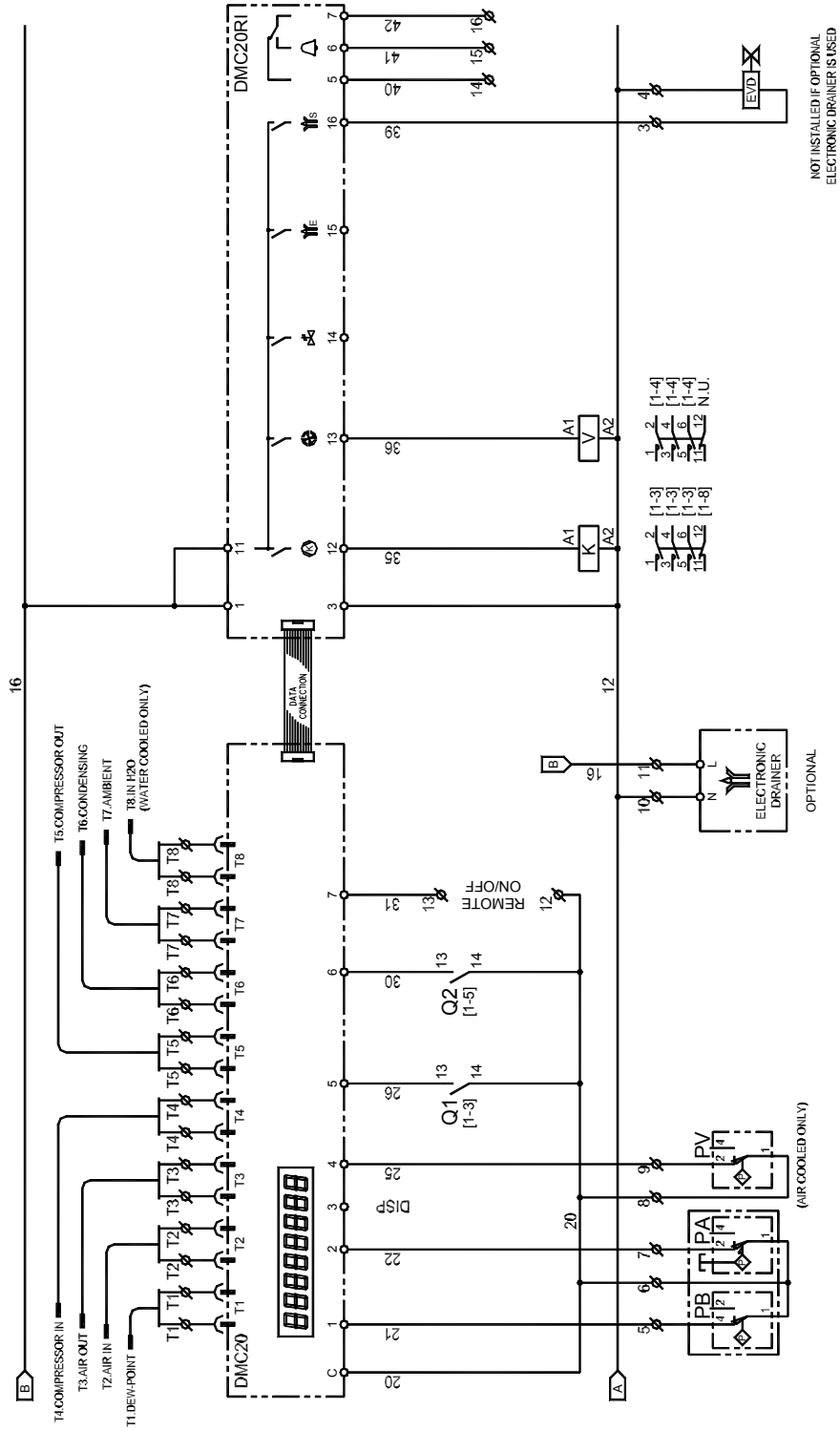


### 7.3.6 PLS 160-250 - DMC20 Air Dryer Controller

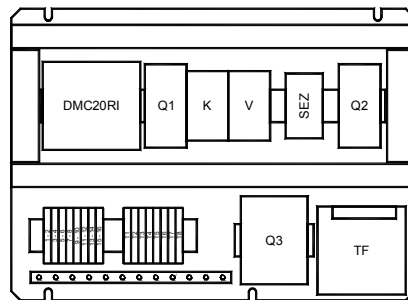
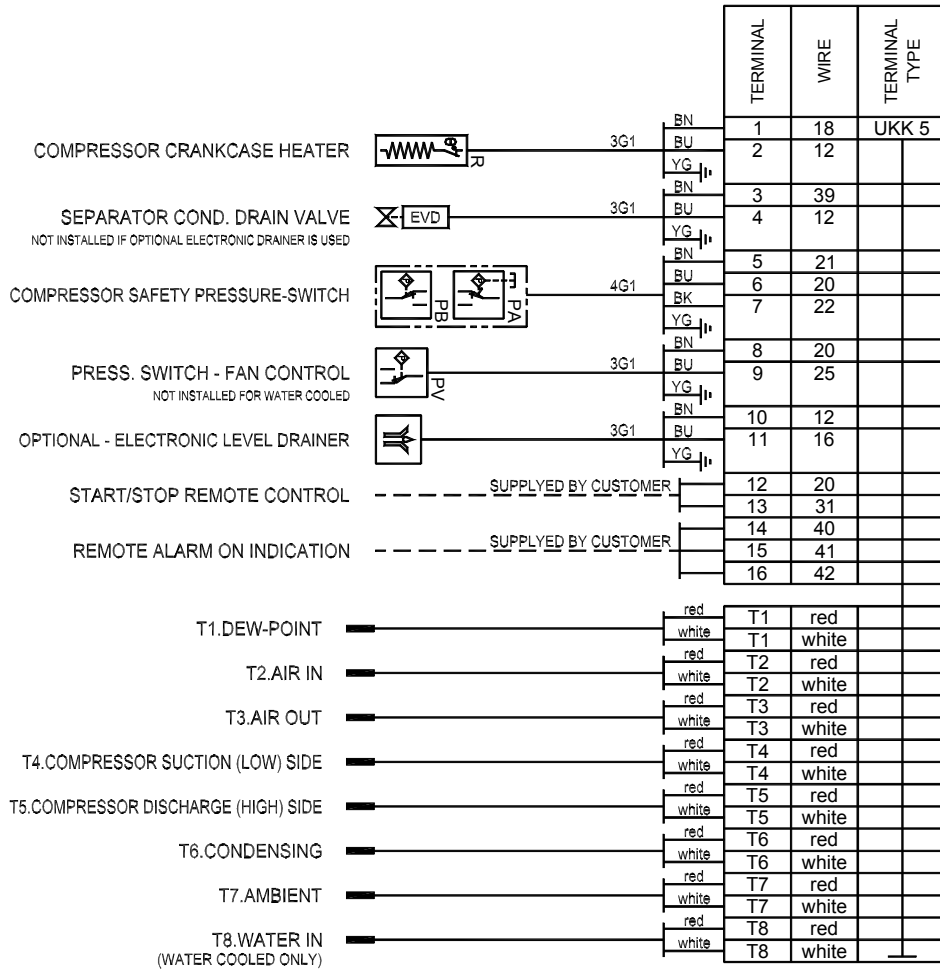


Unless specified 1x1rd

## 7.3.7 PLS 160-250 - DMC20 Air Dryer Controller



## 7.3.8 PLS 160-250 - DMC20 Air Dryer Controller





The access code to the 2 level is :



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