AIR DRYERS

MD 6-810 Series

USER'S AND MAINTENANCE INSTRUCTION MANUAL

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Cod. TDA0BW-208

Dear Customer,

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

To avoid incorrect operation of the equipment and possible physical risk to the operator, please read and strictly follow the instructions contained in this manual. Note, these instructions are in addition to the safety rules that apply in the country where the dryer is installed.

Before packing for shipment each **MD** series refrigerated air dryer undergoes a rigorous test to ensure the absence of any manufacturing faults and to demonstrate that the device can perform all the functions for which it has been designed.

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

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

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

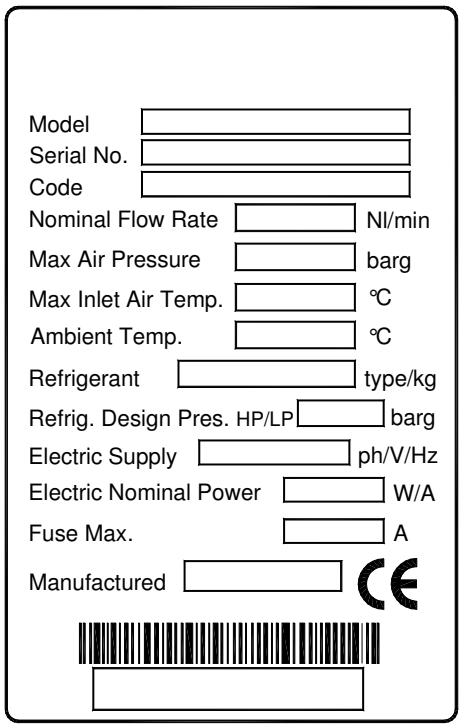
Should you experience any trouble, or for further information, please do not hesitate to contact us.

DATA NAMEPLATE

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

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

Model ⇨
Serial No. ⇨
Code ⇨
Nominal Flow Rate ⇨
Max Air Pressure ⇨
Max Inlet Air Temp. ⇨
Ambient Temp. ⇨
Refrigerant (Type and qty) ⇨
Refrig. Design Pres. HP/LP ⇨
Electric Supply ⇨
Electric Nominal Power ⇨
Fuse Max. ⇨
Manufactured ⇨



WARRANTY CONDITIONS

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

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

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

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

1.1 DEFINITION OF THE CONVENTIONAL SIGNS USED IN THIS MANUAL


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


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


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


Danger hazard. Part or system under pressure.


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


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


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

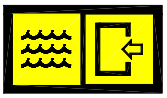

Danger hazard. Do not operate equipment with panels removed.

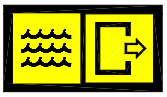

Maintenance or control operation to be performed by qualified personnel only [1].

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


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

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

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

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

1.2 WARNINGS

Compressed air is a highly hazardous energy source.
Never work on the dryer with pressure in the system.
Never point the compressed air or the condensate drain outlet hoses towards anybody.
The user is responsible for the proper installation of the dryer. Failure to follow instructions given in the "Installation" chapter will void the warranty. Improper installation can create dangerous situations for personnel and/or damages to the machine could occur.

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

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

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

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

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

1.3 PROPER USE OF THE DRYER

This dryer has been designed, manufactured and tested for the purpose of separating the humidity normally contained in compressed air. Any other use has to be considered improper.
The Manufacturer will not be responsible for any problem arising from improper use; the user will bear responsibility for any resulting damage.
Moreover, the correct use requires the adherence to the installation instructions, specifically:

- Voltage and frequency of the main power.
- Pressure, temperature and flow-rate of the inlet air.
- Pressure, temperature and cooling water capacity (Water-Cooled).
- Ambient temperature.

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

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

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

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

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

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

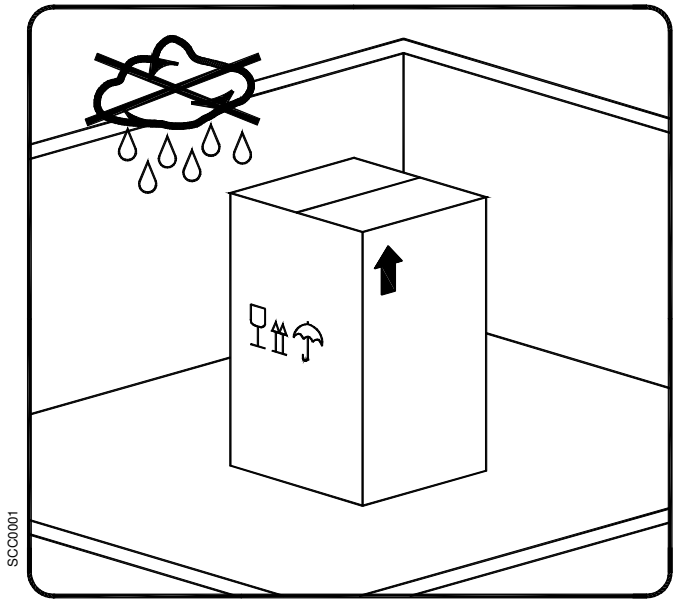
TAMPERING, MODIFICATION AND IMPROPER USE OF THE PRESSURE EQUIPMENT ARE FORBIDDEN. Users of the equipment must comply with all local and national pressure equipment legislation in the country of installation.

2.1 TRANSPORT

Check for visible loss or damage, if no visible damage is found place the unit near to the installation point and unpack the contents.

- Always keep the dryer in the upright vertical position. Damage to components could result if unit is laid on its side or if placed upside down.
- Store machine in a clean, dry environment, do not expose to severe weather environments.
- Handle with care. Heavy blows could cause irreparable damage.

2.2 STORAGE



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

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

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

The packaging materials are recyclable. Dispose of material in compliance with the rules and regulations in force in the destination country.

2.3 INSTALLATION SITE

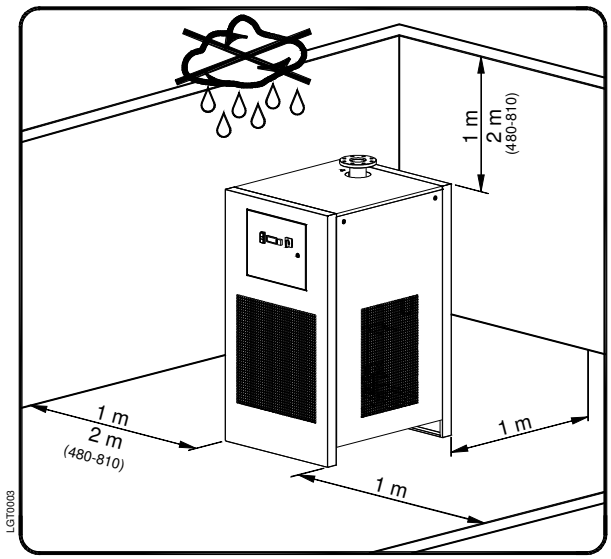
Failure to install dryer in the proper ambient conditions will affect the dryer's ability to condense refrigerant gas. This can cause higher loads on the compressor, loss of dryer efficiency and performance, overheated condenser fan motors, electrical component failure and dryer failure due to the following: compressor loss, fan motor failure and electrical component failure. Failures of this type will affect warranty considerations.
Do not install dryer in an environment of corrosive chemicals, explosive gasses, poisonous gasses; steam heat, areas of high ambient conditions or extreme dust and dirt.

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

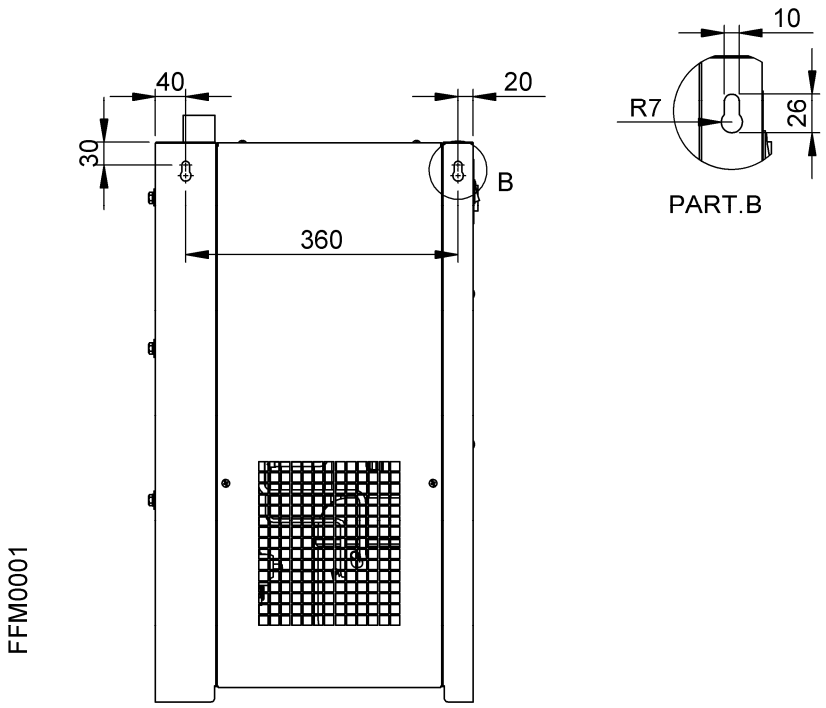
Minimum installation requirements:

- Select a clean dry area, free from dust, and protected from atmospheric disturbances.
- The supporting area must be smooth, horizontal and able to hold the weight of the dryer.
- Minimum ambient temperature +1°C.
- Maximum ambient temperature 45°C.
- Allow at least 1 meter of clearance on each side of the dryer (2m MD 480-810 Air Cooled) for proper ventilation and circulation through the condenser. The space is also necessary to facilitate maintenance operations.

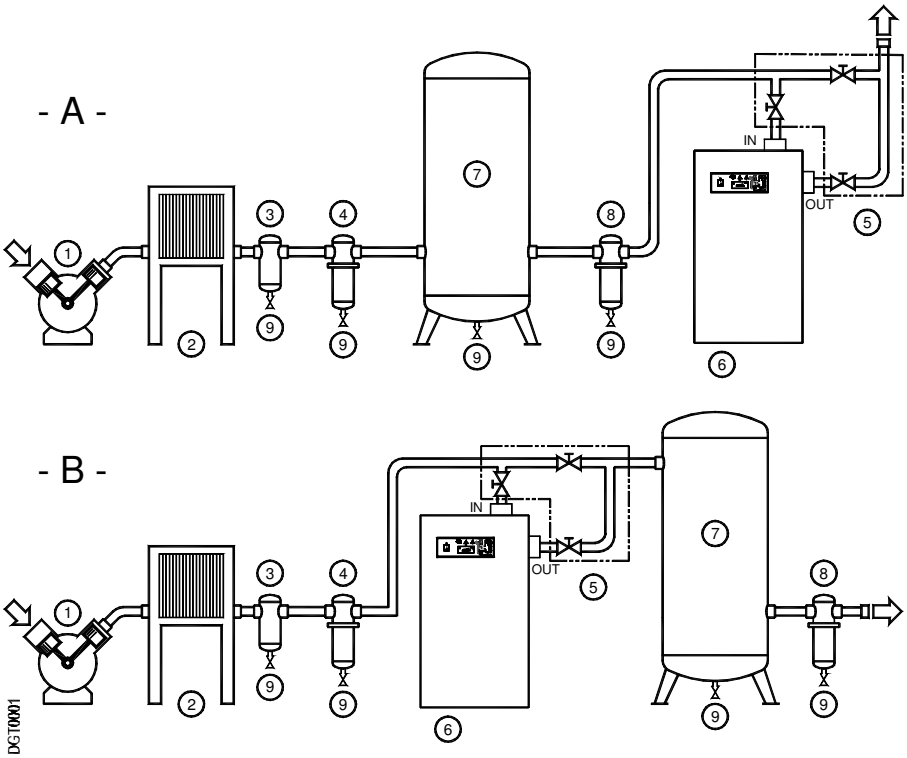
The dryer does not require attachment to the floor surface; however installations where the unit is suspended require an attachment to the hanging apparatus.



Dryer MD 6-25 hanging:



2.4 INSTALLATION LAYOUT



1. Air compressor
2. Final refrigerator
3. Condensate separator
4. Pre-Filter (min. 5 micron)
5. By-pass group
6. Dryer
7. Compressed air tank
8. Final filter
9. Condensate drain

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

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

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

2.5 CORRECTION FACTORS

Correction factor for operating pressure changes :							
Inlet air pressure barg	4	5	7	8	10	12	14
Factor (F1)	0.77	0.85	1.00	1.06	1.15	1.21	1.25

Correction factor for ambient temperature changes (Air-Cooled):					
Ambient temperature ºC	≤ 25	30	35	40	45
Factor (F2)	1.00	0.98	0.95	0.90	0.80

Correction factor for inlet air temperature changes:						
Air temperature ºC	≤ 30	35	40	45	50	55
Factor (F3)	1.20	1.00	0.85	0.75	0.61	0.49

Correction factor for DewPoint changes:				
DewPoint ºC	3	5	7	10
Factor (F4)	1.00	1.09	1.18	1.38

How to find the air flow capacity:

Air flow capacity = Nominal duty X Factor (F1) X Factor (F2) X Factor (F3) X Factor (F4)

Example:

An **MD 49** has a nominal duty of **4900 l/min**. What is the maximum allowable flow through the dryer under the following operating conditions:

- Inlet air pressure = 8 barg
- Ambient temperature = 45°C
- Inlet air temperature = 50°C
- Pressure DewPoint = 10°C

Each item of data has a corresponding numerical factor which multiplied by the design air flow is as follows:

Air flow capacity = 4900 x 1.06 x 0.80 x 0.61 x 1.38

= **3498 l/min** → This is the maximum flow rate that the dryer can accept under these operating conditions.

How to select a suitable dryer for a given duty:

Minimum Std. air flow rate = Design air flow ÷ Factor (F1) ÷ Factor (F2) ÷ Factor (F3) ÷ Factor (F4)

Example:

With the following operating parameters:

- Design air flow = 2800 l/min
- Inlet air pressure = 8 barg
- Ambient temperature = 45°C
- Inlet air temperature = 50°C
- Pressure DewPoint = 10°C

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

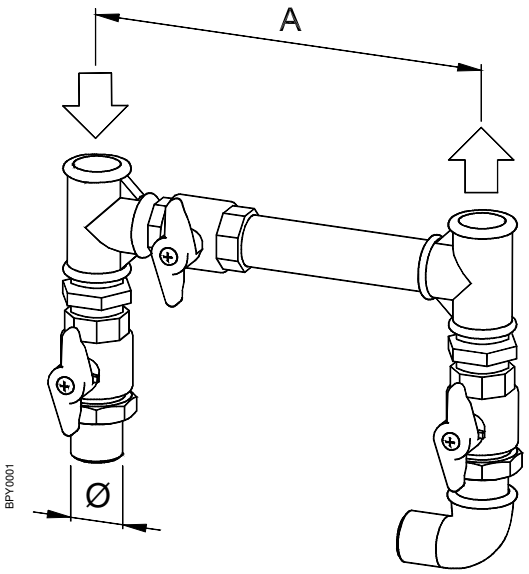
Minimum Std. air flow rate = 2800 ÷ 1.06 ÷ 0.80 ÷ 0.61 ÷ 1.38

= **3920 l/min** → Therefore the model suitable for the conditions above is **MD 49** (**4900 l/min -** nominal duty).

2.6 CONNECTION TO THE COMPRESSED AIR SYSTEM

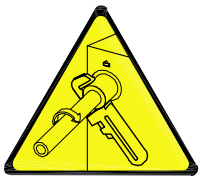
Operations to be performed by qualified personnel.
Never operate with plants under pressure.
The user is responsible to ensure that the dryer will never be operated with pressure exceeding the nominal values.
Eventual over-pressure could be dangerous both for the operator and the machine.

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



Dryer	Ø [BSP-F]	A [mm]	By-Pass Code
MD 6-15	1/2”	210	2240GBP021
MD 20-25	1”	205	2240GBP022
MD 38-49	1.1/4”	205	2240GBP023
MD 68-83	1.1/2”	235	2240GBP024
MD 110	2"	345	2240GBP025
MD 150-170	2.1/2"	410	2240GBP026

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



CAUTION:

PIPING THE DRYER, INLET/OUTLET CONNECTIONS MUST BE SUPPORTED AS SHOW IN THE DIAGRAM.
FAILING WILL RESULT IN DAMAGE

2.7 CONNECTION TO THE COOLING WATER NETWORK (Water-Cooled)

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 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, must be consistent with the flow-rate of the dryer.

2.8 ELECTRICAL CONNECTIONS

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

Before connecting the unit to the electric power, verify that the voltage and the frequency available on the mains correspond to the data reported on the data plate of the dryer. In terms of voltage, a ±5% tolerance is allowed.
The dryers MD 6-83 come with a mains connecting cable already installed and ending with a VDE 16A - Shucko plug; while the dryers MD 110-810 come with an electric box for the connection to the mains.
The mains socket must be provided with a **mains magneto-thermal differential breaker** (IΔn=0.03A), adjusted on the basis of the consumption of the dryer (see the nominal values on the data plate of the dryer).
The cross section of the power supply cables must comply with the consumption of the dryer, while keeping into account also the ambient temperature, the conditions of the mains installation, the length of the cables, and the requirements enforced by the local Power Provider.

It is mandatory to ensure the connection to the ground terminal.
Don't use adapters on the mains socket.
If necessary, have the plug replaced by qualified personnel.

2.9 CONDENSATE DRAIN

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

The dryer comes already fitted with tubing in flexible plastics (6 mm or 10 mm diameter and 1500 mm long) for the connection to the collection plant.
The condensate drain occurs through a solenoid valve protected with a mechanical strainer. In order to avoid clogging of the solenoid valve, the condensate coming from the separator is previously filtered, then discharged. The solenoid valve coil is operated by electronic instrument (dryer controller).
If an electric strainer is installed, the intervention times are determined by the internal capacitive sensor (see specific paragraph).
Connect and properly fasten the condensate drain to a collecting plant or container.
The drain cannot be connected to pressurised systems.

Don't dispose the condensate in the environment.
The condensate collected in the dryer contains oil particles released in the air by the compressor.
Dispose the condensate in compliance with the local rules.
We suggest to install a water-oil separator where to convey all the condensate drain coming from compressors, dryers, tanks, filters, etc.

3.1 PRELIMINARY OPERATION

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

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

Qualified personnel must perform the first start-up.
When installing and operating this equipment, comply with all National Electrical Code and any applicable federal, state and local codes.

Who is operating the unit is responsible for the proper and safe operation of the dryer.
Never operate equipment with panels removed.

3.2 FIRST START-UP

This procedure should be followed on initial start-up, after periods of extended shutdown or following maintenance procedures.
Qualified personnel must perform the start-up.

3.2.1 FIRST START-UP OF DRYERS SERIES MD 6-170

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.
- Turn on the main switch - pos. 1 on the control panel.
- Ensure that DMC14 electronic instrument is ON.
- Ensure the consumption matches with the values of the data plate.
- **Ensure the fan works properly - wait for its first interventions (Air-Cooled).**
- Allow the dryer temperature to stabilise at the pre-set value.
- Slowly open the air inlet valve.
- Slowly open the air outlet valve.
- Slowly close the central by-pass valve of the system (if installed).
- Check the piping for air leakage.
- Ensure the drain is regularly cycling - wait for its first interventions.

3.2.2 FIRST START-UP OF DRYERS SERIES MD 185-810

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 closed and the dryer is isolated.
- Ensure that the manual valve of the condensate drain circuit is open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Turn on the main switch - pos. 1 on the control panel.
- Check that the mains detection light of the ON/OFF button - pos. 6 of the control panel - is ON.
- Wait at least two hours before starting the dryer (compressor crankcase heater must heat the oil of the compressor) - only models MD 185-810.
- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Switch ON the dryer button "I - ON" of the ON/OFF switch - pos. 6 on the control panel.
- Ensure that DMC14 electronic instrument 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 stabilise at the pre-set value.
- Slowly open the air inlet valve.
- Slowly open the air outlet valve.
- Slowly close the central by-pass valve of the system (if installed).
- Check the piping for air leakage.
- Ensure the drain is regularly cycling - wait for its first interventions.

3.3 START-UP AND SHUT DOWN

3.3.1 START-UP AND SHUT DOWN OF DRYERS SERIES MD 6-170

Start-up (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 - pos. 1 on the control panel.
- Ensure that electronic controller DMC14 is ON.
- Wait a few minutes; verify that the DewPoint temperature displayed on electronic instrument DMC14 is correct and that the condensate is regularly drained.
- Switch on the air compressor.

Shut down (refer to paragraph 5.1 Control Panel) :

- Verify that the DewPoint temperature displayed on electronic controller DMC14 is correct.
- Switch OFF the air compressor.
- After a few minutes, switch off the main switch on the control panel of the dryer (pos. 1).

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

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

The number of starts must be no more than 6 per hour. The dryer must stop running for at least 5 minutes before being started up again.
The user is responsible for compliance with these rules. Frequent starts may cause irreparable damage.

3.3.2 START-UP AND SHUT DOWN OF DRYERS SERIES MD 185-810

For short periods of inactivity, (max 2-3 days) we recommend that power is maintained to the dryer and the control panel. Otherwise, before re-starting the dryer, it is necessary to wait at least 2 hours for the compressor crankcase heater to heat the oil of the compressor.

Start-up (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 - pos. 1 on the control panel.
- Ensure that electronic controller DMC14 is ON.
- Wait a few minutes; verify that the DewPoint temperature displayed on electronic instrument DMC14 is correct and that the condensate is regularly drained.
- Switch on the air compressor.

Shut down (refer to paragraph 5.1 Control Panel) :

- Verify that the DewPoint temperature displayed on electronic controller DMC14 is correct.
- Switch OFF the air compressor.
- After a few minutes, switch off the main switch on the control panel of the dryer (pos. 1).

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

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

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		Air-Cooled								
MD MODEL		**6**	**9**	**15**	**20**	**25**	**38**	**49**	**68**	**83**
Air flow rate at nominal condition [1]	[l/min]	600	900	1500	2000	2500	3800	4900	6800	8300
	[m^3/h]	36	54	90	120	150	228	294	408	498
	[scfm]	21	32	53	71	88	134	173	240	293
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O								
Nom. ambient temperature. (max.)	[°C]	+25 (+45)								
Min. ambient temperature	[°C]	+1								
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)								
Nominal inlet air pressure	[barg]	7								
Max. inlet air pressure	[barg]	14								
Air pressure drop - Δp	[bar]	0.04	0.07	0.12	0.12	0.16	0.17	0.23	0.17	0.27
Inlet - Outlet connections	[BSP-F]	G 1/2"			G 1”		G 1.1/4”		G 1.1/2”	
Refrigerant type		R134.a					R404A			
Refrigerant quantity [3]	[kg]	0.21	0.21	0.27	0.30	0.35	0.42	0.48	0.70	0.80
Cooling air flow	[m^3/h]	200	200	300	300	300	380	380	450	450
Cooling water flow at 15°C (out 30°C)	[m^3/h]	-								
Cooling water flow at 30°C (out 40°C)	[m^3/h]	-								
Control of cooling water flow		-								
Maximum water temperature [2]	[°C]	-								
Maximum (min.) water pressure	[barg]	-								
Cooling water connections	[BSP-F]	-								
Standard Power Supply [3]	[Ph/V/Hz]	1/230-240/50, 1/230-240/60				1/230-240/50				
Nominal electric absorption	[W]	150	180	300	430	460	690	790	820	920
	[A]	1.0	1.1	1.9	2.4	2.6	3.7	3.9	4.0	4.4
Max. electric absorption	[W]	200	220	350	540	670	950	1100	1150	1400
	[A]	1.2	1.3	2.1	3.1	3.5	5.1	5.3	5.6	6.4
Max. level noise at 1 m	[dbA]	< 70								
Weight	[kg]	28	29	35	36	37	46	50	55	63

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

		Air-Cooled									
MD MODEL		**110**	**150**	**170**	**185**	**250**	**350**	**410**	**480**	**620**	**810**
Air flow rate at nominal condition [1]	[l/min]	11000	15000	17000	18500	25000	35000	41000	48000	62000	81000
	[m^3/h]	660	900	1020	1110	1500	2100	2460	2880	3720	4860
	[scfm]	389	530	601	654	883	1237	1449	1696	2191	2862
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O									
Nom. ambient temperature. (max.)	[°C]	+25 (+45)									
Min. ambient temperature	[°C]	+1									
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)									
Nominal inlet air pressure	[barg]	7									
Max. inlet air pressure	[barg]	14									
Air pressure drop - Δp	[bar]	0.10	0.12	0.19	0.18	0.23	0.24	0.30	0.23	0.20	0.30
Inlet - Outlet connections	[BSP-F]	G 2”	G 2.1/2”		DN80-PN16				DN100-PN16		DN125-PN16
Refrigerant type		R404A									
Refrigerant quantity [3]	[kg]	1.30	1.85	2.30	2.50	2.60	4.00	4.60	9.00	9.80	11.0
Cooling air flow	[m^3/h]	1900	2500	3300	5300	5300	6500	6500	15500	15500	15500
Cooling water flow at 15°C (out 30°C)	[m^3/h]	-									
Cooling water flow at 30°C (out 40°C)	[m^3/h]	-									
Control of cooling water flow		-									
Maximum water temperature [2]	[°C]	-									
Maximum (min.) water pressure	[barg]	-									
Cooling water connections	[BSP-F]	-									
Standard Power Supply [3]	[Ph/V/H	1/230-240/50			3/400-415/50						
Nominal electric absorption	[W]	1150	1380	1530	3350	3500	4400	5000	6500	6700	8500
	[A]	5.2	6.2	7.0	5.6	6.3	8.7	9.0	11.1	11.5	14.6
Max. electric absorption	[W]	1700	2400	2900	4700	5400	5700	6500	8600	8900	11000
	[A]	8.0	13.8	15.8	7.4	8.9	11.2	11.7	14.6	15.0	17.9
Max. level noise at 1 m	[dbA]	< 70			< 75				< 80		
Weight	[kg]	95	141	161	232	242	267	302	530	580	700

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

		Air-Cooled							
MD MODEL		**6P**	**9P**	**15P**	**20P**	**25P**	**38P**	**49P**	**68P**
Air flow rate at nominal condition [1]	[l/min]	600	900	1500	2000	2500	3800	4900	6800
	[m^3/h]	36	54	90	120	150	228	294	408
	[scfm]	21	32	53	71	88	134	173	240
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O							
Nom. ambient temperature. (max.)	[°C]	+25 (+45)							
Min. ambient temperature	[°C]	+1							
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)							
Nominal inlet air pressure	[barg]	7							
Max. inlet air pressure	[barg]	14							
Air pressure drop - Δp	[bar]	0.04	0.07	0.12	0.12	0.16	0.17	0.23	0.17
Inlet - Outlet connections	[BSP-F]	G 1/2"			G 1"		G 1.1/4"		G 1.1/2"
Refrigerant type		R134.a					R404A		
Refrigerant quantity [3]	[kg]	0.18	0.18	0.29	0.35	0.40	0.63	0.67	0.95
Cooling air flow	[m^3/h]	300			400		600		900
Cooling water flow at 15°C (out 30°C)	[m^3/h]	-							
Cooling water flow at 30°C (out 40°C)	[m^3/h]	-							
Control of cooling water flow		-							
Maximum water temperature [2]	[°C]	-							
Maximum (min.) water pressure	[barg]	-							
Cooling water connections	[BSP-F]	-							
Standard Power Supply [3]	[Ph/V/Hz]	1/115/60							
Nominal electric absorption	[W]	190	260	390	480	480	1100	1200	1380
	[A]	2.4	2.8	4.2	5.2	6.7	9.8	10.2	11.8
Max. electric absorption	[W]	240	370	470	630	800	1270	1310	1580
	[A]	2.8	4.0	5.1	6.9	8.4	11.2	11.8	14.5
Max. level noise at 1 m	[dbA]	< 70							
Weight	[kg]	28	29	35	36	37	46	50	55

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

MD MODEL		Air-Cooled							
		25E	**38E**	**49E**	**68E**	**83E**	**110E**	**150E**	**170E**
Air flow rate at nominal condition [1]	[l/min]	2500	3800	4900	6800	8300	11000	15000	17000
	[m^3/h]	150	228	294	408	498	660	900	1020
	[scfm]	88	134	173	240	293	389	530	601
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O							
Nom. ambient temperature. (max.)	[°C]	+25 (+45)							
Min. ambient temperature	[°C]	+1							
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)							
Nominal inlet air pressure	[barg]	7							
Max. inlet air pressure	[barg]	14							
Air pressure drop - Δp	[bar]	0.16	0.17	0.23	0.17	0.27	0.10	0.12	0.19
Inlet - Outlet connections	[BSP-F]	G 1”	G 1.1/4”		G 1.1/2”		G 2”	G 2.1/2”	
Refrigerant type		R134.a	R404A						
Refrigerant quantity [3]	[kg]	0.40	0.63	0.67	0.95	1.00	1.22	1.45	2.10
Cooling air flow	[m^3/h]	600			900	2400	2400	2600	3750
Cooling water flow at 15°C (out 30°C)	[m^3/h]	-							
Cooling water flow at 30°C (out 40°C)	[m^3/h]	-							
Control of cooling water flow		-							
Maximum water temperature [2]	[°C]	-							
Maximum (min.) water pressure	[barg]	-							
Cooling water connections	[BSP-F]	-							
Standard Power Supply [3]	[Ph/V/Hz]	1/230/60							
Nominal electric absorption	[W]	580	1100	1200	1380	1620	2240	2330	2380
	[A]	3.8	4.9	5.1	5.9	7.4	10.4	10.9	11.2
Max. electric absorption	[W]	800	1270	1310	1580	2050	2730	2800	2900
	[A]	4.2	5.6	5.9	7.2	10.1	12.6	13.0	13.5
Max. level noise at 1 m	[dbA]	< 70							
Weight	[kg]	37	46	50	55	63	95	141	161

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

4.5 TECHNICAL SPECIFICATIONS MD 185R-810R /AC

MD MODEL		Air-Cooled						
		185R	**250R**	**350R**	**410R**	**480R**	**620R**	**810R**
Air flow rate at nominal condition [1]	[l/min]	18500	25000	35000	41000	48000	62000	81000
	[m^3/h]	1110	1500	2100	2460	2880	3720	4860
	[scfm]	654	883	1237	1449	1696	2191	2862
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O						
Nom. ambient temperature. (max.)	[°C]	+25 (+45)						
Min. ambient temperature	[°C]	+1						
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)						
Nominal inlet air pressure	[barg]	7						
Max. inlet air pressure	[barg]	14						
Air pressure drop - Δp	[bar]	0.18	0.23	0.24	0.30	0.23	0.20	0.30
Inlet - Outlet connections	[BSP-F]	DN80-PN16				DN100-PN16		DN125-PN16
Refrigerant type		R404A						
Refrigerant quantity [3]	[kg]	2.50	2.70	4.50	4.60	9.00	9.70	13.0
Cooling air flow	[m^3/h]	5500	6600	6600	6600	19000	19000	19000
Cooling water flow at 15°C (out 30°C)	[m^3/h]	-						
Cooling water flow at 30°C (out 40°C)	[m^3/h]	-						
Control of cooling water flow		-						
Maximum water temperature [2]	[°C]	-						
Maximum (min.) water pressure	[barg]	-						
Cooling water connections	[BSP-F]	-						
Standard Power Supply [3]	[Ph/V/Hz]	3/440-460/60						
Nominal electric absorption	[W]	3200	5000	5800	6500	8700	10500	12200
	[A]	4.8	7.7	9.0	9.5	12.7	15.0	17.6
Max. electric absorption	[W]	3700	5800	6700	7500	10000	12000	14000
	[A]	5.5	8.7	10.0	10.8	14.5	17.0	20.0
Max. level noise at 1 m	[dbA]	< 75				< 80		
Weight	[kg]	232	242	267	302	530	580	700

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

		Air-Cooled						
MD MODEL		**185F**	**250F**	**350F**	**410F**	**480F**	**620F**	**810F**
Air flow rate at nominal condition [1]	[l/min]	18500	25000	35000	41000	48000	62000	81000
	[m^3/h]	1110	1500	2100	2460	2880	3720	4860
	[scfm]	654	883	1237	1449	1696	2191	2862
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O						
Nom. ambient temperature. (max.)	[°C]	+25 (+45)						
Min. ambient temperature	[°C]	+1						
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)						
Nominal inlet air pressure	[barg]	7						
Max. inlet air pressure	[barg]	14						
Air pressure drop - Δp	[bar]	0.18	0.23	0.24	0.30	0.23	0.20	0.30
Inlet - Outlet connections	[BSP-F]	DN80-PN16				DN100-PN16		DN125-PN16
Refrigerant type		R404A						
Refrigerant quantity [3]	[kg]	2.50	2.70	4.50	4.60	9.00	9.70	13.0
Cooling air flow	[m^3/h]	5500	6600	6600	6600	19000	19000	19000
Cooling water flow at 15°C (out 30°C)	[m^3/h]	-						
Cooling water flow at 30°C (out 40°C)	[m^3/h]	-						
Control of cooling water flow		-						
Maximum water temperature [2]	[°C]	-						
Maximum (min.) water pressure	[barg]	-						
Cooling water connections	[BSP-F]	-						
Standard Power Supply [3]	[Ph/V/Hz]	3/380-400/60						
Nominal electric absorption	[W]	3200	5000	5800	6500	8700	10500	12200
	[A]	5.8	9.3	10.9	11.5	15.4	18.2	21.3
Max. electric absorption	[W]	3700	5800	6700	7500	10000	12000	14000
	[A]	6.7	10.5	12.1	13.1	17.6	20.6	24.2
Max. level noise at 1 m	[dbA]	< 75				< 80		
Weight	[kg]	232	242	267	302	530	580	700

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

		Water-Cooled				
MD MODEL		**68**	**83**	**110**	**150**	**170**
Air flow rate at nominal condition [1]	[l/min]	6800	8300	11000	15000	17000
	[m^3/h]	408	498	660	900	1020
	[scfm]	240	293	389	530	601
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O				
Nom. ambient temperature. (max.)	[°C]	+25 (+45)				
Min. ambient temperature	[°C]	+1				
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)				
Nominal inlet air pressure	[barg]	7				
Max. inlet air pressure	[barg]	14				
Air pressure drop - Δp	[bar]	0.17	0.27	0.10	0.12	0.19
Inlet - Outlet connections	[BSP-F]	G 1.1/2”		G 2”	G 2.1/2”	
Refrigerant type		R404A				
Refrigerant quantity [3]	[kg]	0.70	0.80	1.00	1.30	1.70
Cooling air flow	[m^3/h]	-				
Cooling water flow at 15°C (out 30°C)	[m^3/h]	0.16	0.21	0.25	0.26	0.32
Cooling water flow at 30°C (out 40°C)	[m^3/h]	0.24	0.31	0.38	0.39	0.48
Control of cooling water flow		Automatic by valve				
Maximum water temperature [2]	[°C]	30				
Maximum (min.) water pressure	[barg]	3 (10)				
Cooling water connections	[BSP-F]	G 1/2"			G 3/4"	
Standard Power Supply [3]	[Ph/V/Hz]	1/230-240/50				
Nominal electric absorption	[W]	750	850	1020	1250	1350
	[A]	3.7	4.1	4.6	5.6	6.1
Max. electric absorption	[W]	1080	1300	1570	2270	2700
	[A]	5.3	6.1	7.4	13.2	14.9
Max. level noise at 1 m	[dbA]	< 70				
Weight	[kg]	54	62	99	146	166

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

		Water-Cooled						
MD MODEL		**185**	**250**	**350**	**410**	**480**	**620**	**810**
Air flow rate at nominal condition [1]	[l/min]	18500	25000	35000	41000	48000	62000	81000
	[m^3/h]	1110	1500	2100	2460	2880	3720	4860
	[scfm]	654	883	1237	1449	1696	2191	2862
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O						
Nom. ambient temperature. (max.)	[°C]	+25 (+45)						
Min. ambient temperature	[°C]	+1						
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)						
Nominal inlet air pressure	[barg]	7						
Max. inlet air pressure	[barg]	14						
Air pressure drop - Δp	[bar]	0.18	0.23	0.24	0.30	0.23	0.20	0.30
Inlet - Outlet connections	[BSP-F]	DN80-PN16			DN100-PN16			DN125-PN16
Refrigerant type		R404A						
Refrigerant quantity [3]	[kg]	1.35	1.45	1.80	2.40	4.00	4.70	8.80
Cooling air flow	[m^3/h]	-						
Cooling water flow at 15°C (out 30°C)	[m^3/h]	0.54	0.62	0.75	0.87	1.25	1.27	1.69
Cooling water flow at 30°C (out 40°C)	[m^3/h]	0.82	0.94	1.13	1.32	1.80	1.90	2.53
Control of cooling water flow		Automatic by valve						
Maximum water temperature [2]	[°C]	30						
Maximum (min.) water pressure	[barg]	3 (10)						
Cooling water connections	[BSP-F]	G 3/4"				G 1"		
Standard Power Supply [3]	[Ph/V/Hz]	3/400-415/50						
Nominal electric absorption	[W]	2900	3050	3650	4250	5800	6000	7800
	[A]	4.8	5.6	6.9	7.2	9.9	10.3	13.4
Max. electric absorption	[W]	4200	4600	5000	5800	7900	8200	10300
	[A]	6.6	8.1	9.5	9.9	13.4	13.8	16.7
Max. level noise at 1 m	[dbA]	< 70				< 75		
Weight	[kg]	227	237	272	297	520	570	690

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

		Water-Cooled					
MD MODEL		**68P**	**68E**	**83E**	**110E**	**150E**	**170E**
Air flow rate at nominal condition [1]	[l/min]	6800	6800	8300	11000	15000	17000
	[m^3/h]	408	408	498	660	900	1020
	[scfm]	240	240	293	389	530	601
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O					
Nom. ambient temperature. (max.)	[°C]	+25 (+45)					
Min. ambient temperature	[°C]	+1					
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)					
Nominal inlet air pressure	[barg]	7					
Max. inlet air pressure	[barg]	14					
Air pressure drop - Δp	[bar]	0.17	0.17	0.27	0.10	0.12	0.19
Inlet - Outlet connections	[BSP-F]	G 1.1/2”			G 2”	G 2.1/2”	
Refrigerant type		R404A					
Refrigerant quantity [3]	[kg]	0.85	0.85	0.88	1.02	1.25	2.10
Cooling air flow	[m^3/h]	900	900	2400	2400	2600	3750
Cooling water flow at 15°C (out 30°C)	[m^3/h]	0.16	0.16	0.25	0.26	0.29	0.36
Cooling water flow at 30°C (out 40°C)	[m^3/h]	0.24	0.24	0.37	0.39	0.43	0.54
Control of cooling water flow		Automatic by valve					
Maximum water temperature [2]	[°C]	30					
Maximum (min.) water pressure	[barg]	3 (10)					
Cooling water connections	[BSP-F]	G 1/2"				G 3/4"	
Standard Power Supply [3]	[Ph/V/Hz]	1/115/60	1/230/60				
Nominal electric absorption	[W]	1290	1290	1500	2080	2100	1900
	[A]	11.0	5.6	6.9	9.6	9.9	10.0
Max. electric absorption	[W]	1480	1490	1930	2500	2550	2450
	[A]	13.6	6.9	9.6	11.5	11.8	12.2
Max. level noise at 1 m	[dbA]	< 70					
Weight	[kg]	54	54	62	99	146	166

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

MD MODEL		Water-Cooled						
		185R	**250R**	**350R**	**410R**	**480R**	**620R**	**810R**
Air flow rate at nominal condition [1]	[l/min]	18500	25000	35000	41000	48000	62000	81000
	[m^3/h]	1110	1500	2100	2460	2880	3720	4860
	[scfm]	654	883	1237	1449	1696	2191	2862
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O						
Nom. ambient temperature. (max.)	[°C]	+25 (+45)						
Min. ambient temperature	[°C]	+1						
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)						
Nominal inlet air pressure	[barg]	7						
Max. inlet air pressure	[barg]	14						
Air pressure drop - Δp	[bar]	0.18	0.23	0.24	0.30	0.23	0.20	0.30
Inlet - Outlet connections	[BSP-F]	DN80-PN16				DN100-PN16		DN125-PN16
Refrigerant type		R404A						
Refrigerant quantity [3]	[kg]	2.00	2.20	3.60	3.70	5.80	6.50	7.60
Cooling air flow	[m^3/h]	5500	6600	6600	6600	19000	19000	19000
Cooling water flow at 15°C (out 30°C)	[m^3/h]	0.45	0.71	0.90	1.03	1.21	1.48	1.89
Cooling water flow at 30°C (out 40°C)	[m^3/h]	0.68	1.08	1.35	1.57	1.75	2.21	2.83
Control of cooling water flow		Automatic by valve						
Maximum water temperature [2]	[°C]	30						
Maximum (min.) water pressure	[barg]	3 (10)						
Cooling water connections	[BSP-F]	G 3/4"				G 1"		
Standard Power Supply [3]	[Ph/V/Hz]	3/440-460/60						
Nominal electric absorption	[W]	2400	3850	4650	5350	6000	7800	9500
	[A]	3.8	5.8	7.1	7.6	18.5	10.8	13.4
Max. electric absorption	[W]	2900	4600	5500	6400	7300	9300	11300
	[A]	4.2	6.8	8.1	8.9	10.3	12.8	15.8
Max. level noise at 1 m	[dbA]	< 70				< 75		
Weight	[kg]	227	237	272	297	520	570	690

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

[2] Other temperature on request.

[3] Check the data shown on the identification plate.

MD MODEL		Water-Cooled						
		185F	**250F**	**350F**	**410F**	**480F**	**620F**	**810F**
Air flow rate at nominal condition [1]	[l/min]	18500	25000	35000	41000	48000	62000	81000
	[m^3/h]	1110	1500	2100	2460	2880	3720	4860
	[scfm]	654	883	1237	1449	1696	2191	2862
Pressure DewPoint at nominal condition [1]	[°C]	+3 equal to 0.73 g/m3 of H2O						
Nom. ambient temperature. (max.)	[°C]	+25 (+45)						
Min. ambient temperature	[°C]	+1						
Nominal inlet air temperature. (max.)	[°C]	+35 (+55)						
Nominal inlet air pressure	[barg]	7						
Max. inlet air pressure	[barg]	14						
Air pressure drop - Δp	[bar]	0.18	0.23	0.24	0.30	0.23	0.20	0.30
Inlet - Outlet connections	[BSP-F]	DN80-PN16				DN100-PN16		DN125-PN16
Refrigerant type		R404A						
Refrigerant quantity [3]	[kg]	2.00	2.20	3.60	3.70	5.80	6.50	7.60
Cooling air flow	[m^3/h]	5500	6600	6600	6600	19000	19000	19000
Cooling water flow at 15°C (out 30°C)	[m^3/h]	0.45	0.71	0.90	1.03	1.21	1.48	1.89
Cooling water flow at 30°C (out 40°C)	[m^3/h]	0.68	1.08	1.35	1.57	1.75	2.21	2.83
Control of cooling water flow		Automatic by valve						
Maximum water temperature [2]	[°C]	30						
Maximum (min.) water pressure	[barg]	3 (10)						
Cooling water connections	[BSP-F]	G 3/4"				G 1"		
Standard Power Supply [3]	[Ph/V/Hz]	3/380-400/60						
Nominal electric absorption	[W]	2400	3850	4650	5350	6000	7800	9500
	[A]	4.6	7.0	8.6	9.2	10.3	13.1	16.2
Max. electric absorption	[W]	2900	4600	5500	6400	7300	9300	11300
	[A]	5.1	8.2	9.8	10.8	12.5	15.5	19.1
Max. level noise at 1 m	[dbA]	< 70				< 75		
Weight	[kg]	227	237	272	297	520	570	690

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

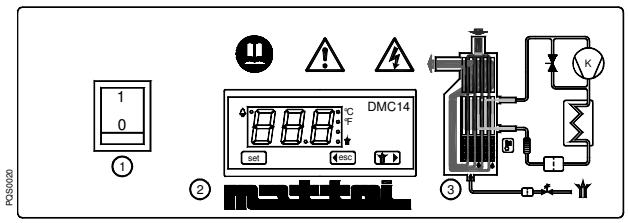
[2] Other temperature on request.

[3] Check the data shown on the identification plate.

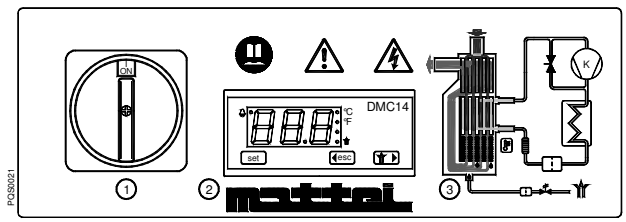
5.1 CONTROL PANEL

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

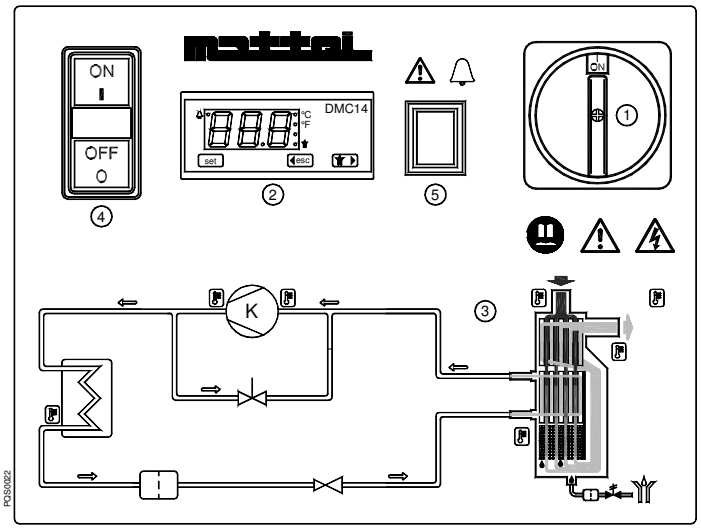
MD 6-49



MD 68-170



MD 185-810



① Main switch

② Electronic control instrument DMC14

③ Air and refrigerating gas flow diagram

④ ON/OFF switch with mains detecting light

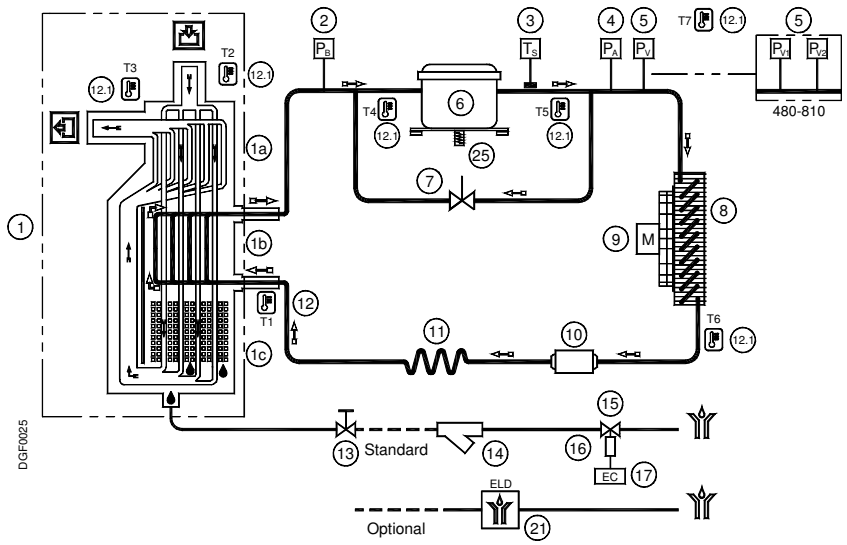
⑤ Alarm light

5.2 OPERATION

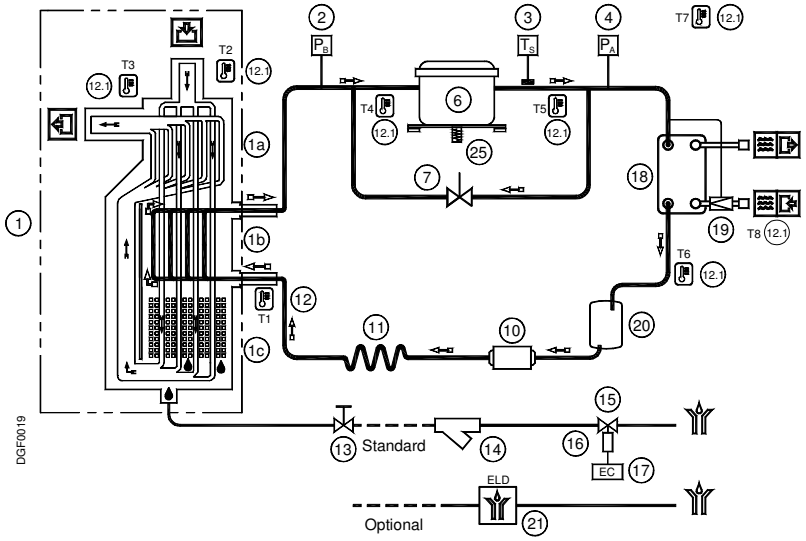
Operating principal - The dryer models described in this manual operate all on the same principal. The hot moisture laden air enters an air to air heat exchanger. The air then goes through the evaporator, also known as the air to refrigerant heat exchanger. The temperature of the air is reduced to approximately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

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

5.3 FLOW DIAGRAM (Air-Cooled)



5.4 FLOW DIAGRAM (Water-Cooled)



① Alu-Dry Module
a - Air-to-air heat exchanger
b - Air-to-refrigerant exchanger
c - Condensate separator
② Refrigerant pressure-switch P_B (MD 110-810)
③ safety thermo-switch T_S (MD 68-810)
④ Refrigerant pressure-switch P_A (MD 110-810)
⑤ Refrigerant pressure-switch (fan) P_V
P_{V1} - P_{V2} (MD 480-810)
⑥ Refrigerating compressor
⑦ Hot gas by-pass valve
⑧ Condenser (Air-Cooled)
⑨ Condenser fan
⑩ Filter Drier
⑪ Capillary tube
⑫ T1 Temperature probe (DewPoint)
⑫.1 Temp. Probes T2-T8 → DMC20 (if installed)
⑬ Condensate drain service valve
⑭ Y-shaped condensate drain strainer
⑮ Condensate drain solenoid valve
⑯ Coil for cond. drain solenoid valve
⑰ Electronic control instrument
⑱ Condenser (Water-Cooled)
⑲ Condenser water regulating valve (water-Cooled)
⑳ Liquid receiver (water-cooled)
㉑ Electronic level drain
...
㉕ Compressor crankcase heater (MD 185-810)

→ Compressed air flow direction
⇨ Refrigerating gas flow direction

5.5 REFRIGERATING COMPRESSOR

The refrigerating compressor is the pump in the system, gas coming from the evaporator (low pressure side) is compressed up to the condensation pressure (high pressure side). The compressors utilized are manufactured by leading manufacturers and are designed for applications where high compression ratios and wide temperature changes are present.
The hermetically sealed construction is perfectly gas tight, ensuring high-energy efficiency and long, useful life. Dumping springs support the pumping unit in order to reduce the acoustic emission and the vibration diffusion. The aspirated refrigerating gas, flowing through the coils before reaching the compression cylinders cools the electric motor. The thermal protection protects the compressor from over heating and over currents. The protection is automatically restored as soon as the nominal temperature conditions are reached.

5.6 CONDENSER (Air-Cooled)

The condenser is the component in which the gas coming from the compressor is cooled down and condensed becoming a liquid. Mechanically, a serpentine copper tubing circuit (with the gas flowing inside) is encapsulated in an aluminum fin package.
The cooling operation occurs via a high efficiency fan, creating airflow within the dryer, moving air through the fin package. It's mandatory that the ambient air temperature does not exceed the nominal values. It is also important **TO KEEP THE CONDENSER UNIT FREE FROM DUST AND OTHER IMPURITIES**

5.7 CONDENSER (Water-Cooled)

The condenser is the component in which the gas coming from the compressor is cooled down and condensed 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 turn the screws clock-wise. Adjust the valve in order to guarantee a condensing temperature of 42-45 °C.

5.9 FILTER DRIER

Traces of humidity and slag which could accumulate inside the chilling plant, or smudge which could occur after a long use of the dryer, could limit the lubrication of the compressor and clog the capillary tube. The function of the dehydration filter, located before the capillary tubing, is to stop the impurities, so avoiding their circulation within the system.

5.10 CAPILLARY TUBE

It consists of a piece of reduced cross section copper tubing located between the condenser and the evaporator to form a throttling against the flow of the refrigerating fluid. This throttling creates a pressure drop, which is a function of the temperature to be reached within the evaporator: the lower the capillary tube outlet pressure, the lower the evaporation temperature. The length and the diameter of the capillary tubing are accurately sized with the performance to be reached by the dryer; no maintenance/adjustment operations are necessary.

5.11 ALU-DRY MODULE

The air-to-air and the air-to-refrigerant heat exchangers plus the demister type condensate separator are housed in a unique module.
The counter-flows of compressed air in the air-to-air heat exchanger ensure maximum heat transfer. The large cross section of flow channels within the heat exchanger module leads to low velocities and reduced power requirements. The air-to-refrigerant exchanger, with counter-current flows, assure excellent performances. The generous dimensions of the exchange surface determines the correct and complete evaporation of the refrigerant (preventing liquid returning to the compressor). The high efficiency condensate separator is located within the drying module. No maintenance is required and it offers the additional advantage of creating a cold coalescing effect for excellent air drying results. The generous collection volume assures the correct operation of the dryer even with extremely damp inlet air.

5.12 HOT GAS BY-PASS VALVE

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

ADJUSTMENT

The hot gas by-pass valve is adjusted during the manufacturing testing phase. As a rule no adjustment is required; anyway if it is necessary the operation must be carried out by an experienced refrigeration engineer.

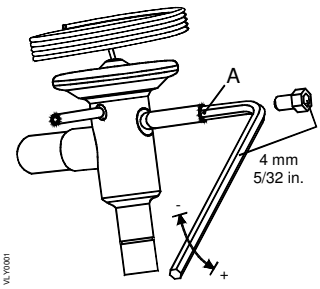
WARNING : the use of ¼" Schrader service valves must be justified by a real malfunction of the refrigeration system. Each time a pressure gauge is connected, a part of refrigerant is exhausted.

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

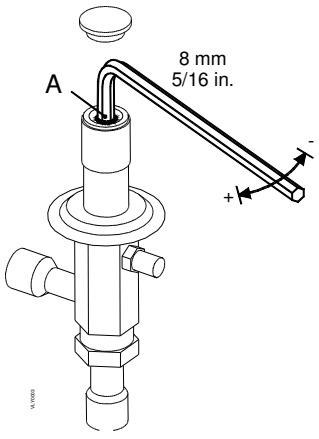
Hot gas setting (R134.a) : temperature 0.5 °C (+0.5 / -0 °K)
pressure 2.0 barg (+0.1 / -0 bar)

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

MD 6-410



MD 480-810



5.13 REFRIGERANT PRESSURE SWITCH P_A - P_B - P_V

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

P_B : Low-pressure controller device on the suction 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

P_A : This high-pressure controller device is located at the pushing side of refrigeration compressor, and it 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 32 barg - Manual reset

P_V : Fan control pressure switch located on the pushing side on the compressor. It keeps the condensation temperature/pressure constant within preset limits (Air-Cooled).

Calibrated pressure :

MD 6-25	R 134.a	Start 11 barg (47°C) - Stop 8 barg (36°C) - Tolerance ± 1 bar
MD 38-170	R 404 A	Start 20 barg (45°C) - Stop 16 barg (36°C) - Tolerance ± 1 bar
MD 185-410	R 404 A	Start 20 barg (45°C) - Stop 18 barg (40°C) - Tolerance ± 1 bar

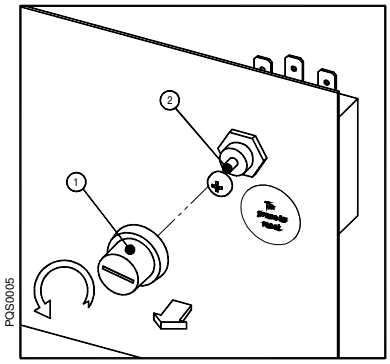
PV1 : **MD 480-810** - Fan control pressure switch located on the pushing side on the compressor. It keeps the condensation temperature/pressure constant within preset limits (Air-Cooled) – Low Speed.

Calibrated pressure : R 404 A Start 21 barg (47°C) - Stop 18 barg (41°C) - Tolerance ± 1 bar

PV2 : **MD 480-810** Fan control pressure switch located on the pushing side on the compressor. It keeps the condensation temperature/pressure constant within preset limits (Air-Cooled) – High Speed.

Calibrated pressure : R 404 A Start 23 barg (51°C) - Stop 20.5 barg (46°C) - Tolerance ± 1 bar

5.14 SAFETY THERMO-SWITCH T_S



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

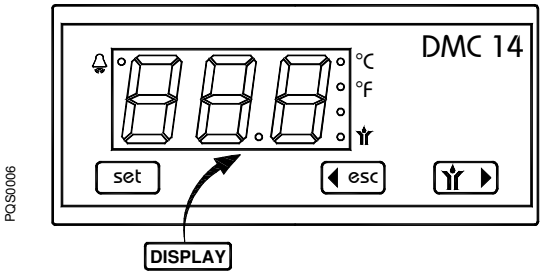
T_S : Manually reset the thermo-switch only after the nominal operating conditions have been restored. Unscrew the relative cap (see pos.1 in the figure) and press the reset button (see pos.2 in the figure).

5.15 COMPRESSOR CRANKCASE HEATER (MD 185-810)

At low temperatures oil can more easily be mixed with the refrigerant gas. So, 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 thermo-switch 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 DMC14 ELECTRONIC INSTRUMENT (AIR DRYER CONTROLLER)



set Button - access the set-up.
esc Button - Exit programming / decrease value.
Button - condensate drain test / value increment.
LED - Dryer in allarm status.
● °C LED - Display the set temperature scale (°C).
● °F LED - Display the set temperature scale (°F).
● LED - condensate drain solenoid valve on.

The DMC14 controller performs a double function : it shows the current operating DewPoint temperature through the alphanumeric display, that is measured by a probe located at the end of the evaporator; it also controls the functioning of condensate drain solenoid valve through the cyclic electronic timer.

The ● LED shows any alarm condition, it can happen when :
- pressure DewPoint is too high;
- pressure DewPoint is too low;
- the probe is faulty.

If the probe is faulty, the instrument also shows “PF” message (Probe Failure), and alarm activation is immediate. In case of “DewPoint too low” condition (ASL parameter, that is fix and equal to 28.5°F or -2°C), the alarm signal is delayed of a fix time (AdL parameter) equal to 30 sec, while for “DewPoint too high” condition the value (ASH parameter) is set by the user and the signal is activated with AdH delay time, that can be also set up by the operator (the instrument is already adjusted during final test of the dryer, please see following values). When DewPoint returns into operating temperature (set range), the alarm condition is deactivated.

DMC14 allows also remote annunciation of the alarm condition of the dryer; this through a volt free contact on terminals 8 & 9 - please also see electric drawings into the attachments (max 250V 1A, min 5VDC 10mA)
- with dryer off or in alarm conditions contact is open
- with dryer on and correct operating DewPoint, contact is closed.

OPERATION - After dryer starting, the electronic controller displays current operating DewPoint : it shows the measured temperature in Celsius degrees (● °C) with a 0.5°C resolution, or in Fahrenheit degrees (● °F) with a 1°F resolution.

The condensate drain solenoid valve is activated for 2 seconds (Ton) - LED (●) on - each minute (ToF), if standard setting. To perform the manual test for the condensate drain, press the button.

SET-UP (PROGRAMMING)

To access the set-up, keep pressed simultaneously both set and button for at least 5 seconds. In this way **programming operation will be activated** and the controller display shows the first parameter that can be set (Ton). After that, by pressing set buttom the display shows the value set for that parameter. If the value is correct press set button to conferm it and to give access on following parameters. To change the value of selected parameter, must be used esc and button, respectively to decrease or increase the value. All parameters that can be modified are indicated in following table :

Display	Description	Value range	Set value	Equal to
Ton	Activation time of the condensate drain solenoid valve.	01 … 20	02	2 sec
ToF	Pause time of the condensate drain solenoid valve.	01 … 20	01	1 min
ASH	Alarm threshold for a high DewPoint .	0.0 … 20.0	15	15°C
AdH	ASH alarm time before signal	00 … 20	20	20 min
SCL	Temperature scale	°C … °F	°C	°Celsius
Fixed parameters :	ASL (low DewPoint alarm) = -2°C	AdL (signal delay) = 30 sec		

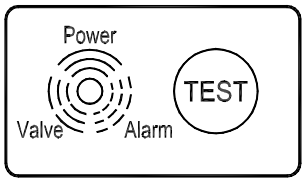
It is possibile to exit from set-up conditon in any moment, by pressing simultaneously both esc and button. If any operations are not made during 30 seconds, the controller exits automatically from programming operation.

5.17 ELECTRONIC LEVEL DRAIN

Instead of the usual drain system (a solenoid valve controlled by means of electronic instrument); an electronic level controlled drain can be installed as option. This drain 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. No condensate strainers are installed. No adjusting is required. A service valve is installed before the electronic drain in order to make check and maintenance easily.

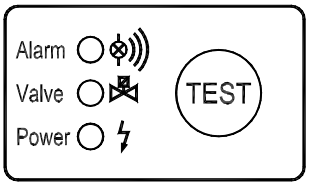
AT DRYER START-UP VERIFY THAT THIS VALVE IS OPEN.

CONTROL PANEL FOR DRYERS MD 6-110



The control panel here illustrated allows checking of drain working.
Power : LED - drain ready to work / supplied
Valve : slow blinking led - membrane solenoid valve open / discharging
Alarm : fast blinking led - drain in alarm condition
Test : button - discharge test (keep pushed for 2 seconds)

CONTROL PANEL FOR DRYERS MD 150-810



The control panel here illustrated allows checking of drain working.
Power : LED ON - drain ready to work / supplied
Valve : LED ON - membrane solenoid valve open / discharging
Alarm : LED ON - drain in alarm condition
Test : button - discharge test (keep pushed for 2 seconds)

TROUBLE SHOOTING

Only qualified personnel should perform troubleshooting and or maintenance operations.
Prior to performing any maintenance or service, be sure that:
- **no part of the machine is powered and that it cannot be connected to the mains supply.**
- **no part of the machine is under pressure and that it cannot be connected to the compressed air system.**
- **Maintenance personnel have read and understand the safety and operation instructions in this manual.**

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆No led lighting up.	⇨ Verify that the system is powered. ⇨ Verify the electric wiring (internal and/or external). ⇨ Check internal printed circuit board for possible damage.
◆Pressing of Test button, but no condensate discharge.	⇨ The service valve located before the drain is closed - open it. ⇨ The dryer is not under pressure - restore nominal condition. ⇨ Solenoid valve defective - replace the drain. ⇨ The internal printed circuit board is damaged - replace the drain.
◆Condensate discharge only when Test button is pressed.	⇨ The capacitive sensor is too dirty - open the drain and clean the sensor plastic tube.
◆Drain keeps blowing off air.	⇨ The diaphragm valve is dirty - open the drain and clean it. ⇨ The capacitive sensor is too dirty - open the drain and clean the sensor plastic tube.
◆Drain in alarm condition.	⇨ The capacitive sensor is too dirty - open the drain and clean the sensor plastic tube. ⇨ The service valve located before the drain is closed - open it. ⇨ The dryer is not under pressure - restore nominal condition. ⇨ Solenoid valve defective - replace the drain.

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

6.1 CONTROLS AND MAINTENANCE

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

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

Before attempting any maintenance operation on the dryer, shut it down and wait at least 30 minutes.
Some components can reach high temperature during operation. Avoid contact until system or component has dissipated heat.

DAILY

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

EVERY 200 HOURS OR MONTHLY

- With an air jet (max. 2 bar / 30 psig) blowing from inside towards outside clean the condenser; repeat this operation blowing in the opposite way; be careful not to damage the aluminium fins of the cooling package.
- Close the manual condensate drain valve, unscrew the mechanical strainer and clean it with compressed air and 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, inspect unit for broken, cracked or bare wires.
- Inspect refrigerating circuit for signs of oil and refrigerant leakage.
- Measure and record amperage. Verify that readings are within acceptable parameters as listed in specification table.
- Inspect condensate drain flexible hoses, and replace if necessary.
- At the end, check the operation of the machine.

6.2 TROUBLESHOOTING

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

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

Before attempting any maintenance operation on the dryer, shut it down and wait at least 30 minutes.
Some components can reach high temperature during operation. Avoid contact until system or component has dissipated heat.

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ The dryer doesn't start.	⇨ Verify that the system is powered. ⇨ Verify the electric wiring. ⇨ 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. ⇨ **MD 185-810-** The back panel of the dryer is open (SD door interlock safety-switch has been activated) - make sure the back panel is correctly closed and the SD switch restored. ⇨ **MD 480-810-** The “alarm” led is ON - see specific point. ⇨ **MD 185-810-** The “alarm” led 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. ⇨ **Where installed**- Replace the internal thermal protection ⇨ **MD 110-810**The high pressure switch P_A has been activated - see specific point. ⇨ **MD 110-810-**The low pressure switch P_B has been activated - see specific point. ⇨ **MD 68-810-**The safety thermo-switch T_S has been activated - see specific point. ⇨ **MD 185-810-**The "alarm" led is ON - see specific point. ⇨ If the compressor still doesn't work, replace it.
◆ The fan of the condenser doesn't work (Air-Cooled).	⇨ Verify the electric wiring. ⇨ **MD 6-410-** P_V pressure switch is faulty - contact a refrigeration engineer. ⇨ **MD 480-810-** P_{V1}-P_{V2} pressure switches are faulty - contact a refrigeration engineer. ⇨ **MD 185-810-**The fan power contactor (see V) is faulty - replace it. ⇨ **MD 185-810-** The "alarm" led is ON - see specific point. ⇨ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer. ⇨ If the fan still doesn't work, replace it.
◆ DewPoint too high.	⇨ The dryer doesn't start - see specific point. ⇨ The T1 DewPoint probe doesn't correctly detect the temperature - ensure the sensor is pushed into the bottom of copper tube immersion well. ⇨ The 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 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 - P_V 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. ⇨ Ambient temperature is too low - restore de nominal condition.
◆ Excessive pressure drop within the dryer.	⇨ The dryer doesn't drain the condensate - see specific point. ⇨ The DewPoint is too low - the condensate is frost and blocks the air - see specific point. ⇨ Check for throttling the flexible connection hoses.
◆ The dryer doesn't drain the condensate.	⇨ The Condensate drain isolation valve is closed - open it. ⇨ The condensate drain strainer is clogged - remove and clean it. ⇨ The drain solenoid valve is jammed - remove and clean it. ⇨ Verify the electric wiring. ⇨ The coil of the condensate drain solenoid valve burned out - replace it. ⇨ The DewPoint is too low - the condensate is frozen - see specific point. ⇨ The coil of the condensate drain solenoid valve burned out - 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 stops verify the electric wiring or the electronic instrument is faulty - replace it.
◆ Water within the line.	⇨ The dryer doesn't start - see specific point. ⇨ **Where installed -** Untreated air flows through the by-pass unit - close the by-pass. ⇨ The dryer doesn't drain the condensate - see specific point. ⇨ DewPoint too high - see specific point.

◆ **Where installed -** The safety thermo-switch T_S tripped.	⇨ Check which of the following has caused the activation : 1. Excessive thermal load – restore the standard operating conditions. 2. The inlet air is too hot - restore the nominal conditions. 3. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation. 4. The condenser unit is dirty - clean it. 5. The fan doesn't work - see specific point. 6. There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer. ⇨ Reset the thermo-switch by pressing the button on the thermo-switch itself – verify the correct operation of the dryer. ⇨ The T_S thermo-switch is faulty - replace it.
◆ **Where installed -** The P_A 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 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 P_A pressure switch is faulty - contact a refrigeration engineer to replace it.
◆ **Where installed -** The P_B low-pressure switch has been activated.	⇨ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer. ⇨ The pressure switch restores automatically when normal conditions are restored - check the proper operation of the dryer.
◆ **MD 185-810-** The "alarm" led is ON.	⇨ The P_A high-pressure switch is activated - see specific point. ⇨ The P_B 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). ⇨ The thermal protection (see TK on the electric diagram) inside the fan is activated - wait 30 minutes and retry. ⇨ The safety thermo-switch T_S has been activated - see specific point.
◆ The LED 🔔 ● of the instrument is on or flashes to indicate alarm situations.	⇨ The LED 🔔 ● flashes because the DewPoint is too high – see specific point. ⇨ The LED 🔔 ● flashes because the DewPoint is too low - see specific point. ⇨ The LED 🔔 ● flashes because the probe is faulty or interrupted, the instrument displays the message "PF" (Probe Failure) – replace the probe.

6.3 SPARE PARTS

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

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

			MD											
No.	**DESCRIPTION OF THE SPARE PARTS**	**CODE**	**6**	**9**	**15**	**20**	**25**	**38**	**49**	**68**	**83**	**110**	**150**	**170**
2	Refrigerant pressure switch P_B	5655NNN085										1	1	1
3	Safety thermo-switch T_S	56141NN005								1	1	1	1	1
4	Refrigerant gas pressure switch P_A	5655NNN087										1	1	1
4	Refrigerant gas pressure switch P_V	5655NNN160	1	1	1	1	1	1	1	1	1			
4	Refrigerant gas pressure switch P_V	5655NNN170										1	1	1
6	Refrigerating compressor	5015110101	1											
6	Refrigerating compressor	501511104		1										
6	Refrigerating compressor	5015110113			1									
6	Refrigerating compressor	5015110115				1								
6	Refrigerating compressor	5015110016					1							
6	Refrigerating compressor	5025116105						1						
6	Refrigerating compressor	5025116010							1					
6	Refrigerating compressor	5030116010								1				
6	Refrigerating compressor	5030116015									1			
6	Refrigerating compressor	5030116020										1		
6	Refrigerating compressor	5030116025											1	
6	Refrigerating compressor	5030116035												1
7	Hot gas by-pass valve	64140SS150	1	1	1	1	1							
7	Hot gas by-pass valve	64140SS155						1	1	1	1	1	1	1
9	Complete fan	5250110071										1	1	
9	Complete fan	5250110080												1
9.1	Fan motor	5210110005	1	1										
9.1	Fan motor	5210110011			1	1	1							
9.1	Fan motor	5210110018						1	1					
9.1	Fan motor	5210110022								1	1			
9.2	Fan blade	5215000010	1	1										
9.2	Fan blade	5215000019			1	1	1							
9.2	Fan blade	5215000025						1	1					
9.2	Fan blade	5215000033								1				
9.2	Fan blade	5215000034									1			
9.3	Fan grid	5225000010			1	1	1							
9.3	Fan grid	5225000027						1	1	1				
9.3	Fan grid	5225000030									1			
10	Filter Drier	6650SSS007	1	1	1	1	1							
10	Filter Drier	6650SSN150						1	1					
10	Filter Drier	6650SSN160								1	1	1	1	1
12	Temp. probe DMC14 (T1)	5625NNN035	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
13+14	Condensate drain valve/strainer	64355MN012	1	1	1	1	1							
14	Y-type condensate drain strainer	64355FF011						1	1	1	1	1	1	1
15	Condensate drain solenoid valve	64320FF006	1♦	1♦	1♦	1♦	1♦	1♦	1♦					
15	Condensate drain solenoid valve	64320FF012								1♦	1♦	1♦	1♦	1♦
16	Coil for cond. drain solenoid valve	64N22MM020	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
17	DMC14 Electronic Instrument	5620110103	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
21	Electronic drain	2210BEK001A	1	1	1	1	1	1	1	1	1	1		
21	Electronic drain	2210BEK002A											1	1
22	Main switch 2P 0/1	5450SZN010	1	1	1	1	1	1	1					
22	Main switch 2P 0/1	5450SZN117								1	1	1	1	1

♦ Suggested spare part.

No.	DESCRIPTION OF THE SPARE PARTS	CODE	MD						
			185	250	350	410	480	620	810
2	Refrigerant pressure switch PB	5655NNN085	1	1	1	1	1	1	1
3	Safety thermo-switch TS	56141NN005	1	1	1	1	1	1	1
4	Refrigerant gas pressure switch PV	5655NNN087	1	1	1	1	1	1	1
5	Refrigerant gas pressure switch PV	5655NNN170	1	1	1	1	2	2	2
6	Refrigerating compressor	5015340006	1						
6	Refrigerating compressor	5015340003		1					
6	Refrigerating compressor	5015340007			1				
6	Refrigerating compressor	5015340008				1			
6	Refrigerating compressor	5015340018					1	1	
6	Refrigerating compressor	5015340023							1
7	Hot gas by-pass valve	64140SS102					1	1	
7	Hot gas by-pass valve	64140SS110							1
7	Hot gas by-pass valve	64140SS155	1	1	1				
7	Hot gas by-pass valve	64140SS156				1			
9	Complete fan	5250340090	1	1					
9	Complete fan	5250340100			1	1			
9	Complete fan	5250340105					1	1	1
10	Filter Drier	6650SSN165	1	1	1	1			
10	Filter Drier	6650SSN175					1	1	1
12	Temp. probe . L=1800mm	5625NNN037	1	1	1	1	1♦	1♦	1♦
12.2	Extension for probe L=1200mm	5625NNN030	1♦	1♦	1♦	1♦	1♦	1♦	1♦
14	Y-type condensate drain strainer	64355FF006					1	1	1
14	Y-type condensate drain strainer	64355FF011	1	1	1	1			
15	Condensate drain solenoid valve	64N20FF005	1♦	1♦	1♦	1♦	1♦	1♦	1♦
16	Coil for cond. drain solenoid valve	64N22FF005	1♦	1♦	1♦	1♦	1♦	1♦	1♦
17	DMC14 Electronic Instrument	5620110103	1♦	1♦	1♦	1♦	1♦	1♦	1♦
21	Electronic drain	2210BEK002A	1	1	1	1	1	1	
21	Electronic drain	2210BEK018A							1
22	Main switch	5450SZN100	1	1	1	1			
22	Main switch	5450SZN105					1	1	1
60.1	Q1 - Circuit breaker	54443SM152	1	1	1	1			
60.1	Q1 - Circuit breaker	54443C6026					1	1	1
60.2	Q1 - Circuit breaker	54443SM135	1	1	1	1	1	1	1
60.3	Q1 - Circuit breaker	54443C6010	1	1	1	1			
60.3	Q1 - Circuit breaker	54444C6016					1	1	1
60.4	Q1 - Auxiliary contact x circuit breaker	5490CAX002					1	1	1
60.4	Q2 - Auxiliary contact x circuit breaker	5490CAX060					1	1	1
60.4	Q1-Q2 - Auxiliary contact x circuit breaker	5490CAX060	2	2	2	2			
60.5	K - Power contact	5454TLT116	1	1	1	1			
60.5	K - Power contact	5454TLT125					1	1	1
60.6	A - Auxiliary relay - 2 contacts	5456REL110	1	1	1	1	1	1	1
60.7	A - Relay socket - 2 contacts	5456REL015	1	1	1	1	1	1	1
60.8	P - Double ON/OFF button with light	5452PLS020	1	1	1	1	1	1	1
60.9	P - Neon lamp for the double button	5480NEN010	1	1	1	1	1	1	1
60.10	X - Rectangular red indicator 18x24	5452IND005	1	1	1	1	1	1	1
60.11	X - Neon lamp for red indicator	5480NEN005	1	1	1	1	1	1	1
60.12	TF - Transformer	5440TFM025	1	1	1	1	1	1	1
60.13	K - Power contact	5490CAX010					1	1	1
60.13	K - Power contact	5490CAX011	1	1	1	1	1	1	1
60.14	V1 – V2 Power contact	5454TLT111					2	2	2
60.14	V - Power contact	5454TLT111	1	1	1	1			
60.15	V1-V2 - Interlock for power contact	5490INM010					1	1	1

♦ Suggested spare part.

6.4 MAINTENANCE OPERATION ON THE REFRIGERATION CIRCUIT

Maintenance and service on refrigeration systems must be carried out only by certified refrigeration engineers only, according to local rules.
All the refrigerant of the system must be recovered for its recycling, reclamation or destruction.
DO NOT DISPOSE THE REFRIGERANT FLUID IN THE ENVIROMENT.

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

In case of refrigerant leak contact a certified refrigeration engineers. Room is to be aired before any intervention.
If is required to re-fill the refrigeration circuit, contact a certified refrigeration engineers.
Refer to the dryer nameplate for refrigerant type and quantity.

Characteristics of refrigerants used:

Refrigerant	Chemical formula	TLV	GWP
R134a - HFC	CH2FCF3	1000 ppm	1300
R404A - HFC	CH2FCF3/C2HF5/C2H3F3	1000 ppm	3784

6.5 DISMANTLING OF THE DRYER

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

Part	Material
Refrigerant fluid	R404A, R134a, Oil
Canopy and Supports	Carbon steel, Epoxy paint
Compressor	Steel, Copper, Aluminium, Oil
Alu-Dry Module	Aluminium
Condenser Unit	Aluminium, Copper, Carbon steel
Pipe	Copper
Fan	Aluminium, Copper, Steel
Valve	Brass, Steel
Electronic Level Drain (optional)	PVC, Aluminium, Steel
Insulation Material	Synthetic rubber without CFC, Polystyrene, Polyurethane
Electric cable	Copper, PVC
Electric Parts	PVC, Copper, Brass

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

7.1 DRYERS DIMENSIONS

7.2 EXPLODED VIEW

Exploded view table of components - Dryers MD 6-810

(1) Alu-Dry Module
1.1 Insulation Material
(2) Refrigerant pressure-switch P_B (MD 110-810)
(3) T_S safety thermo-switch (MD 68-810)
(4) Refrigerant pressure-switch P_A (MD 110-810)
(5) Refrigerant pressure-switch (fan) P_V
(6) Refrigerating compressor
(7) Hot gas by-pass valve
(8) Condenser (Air-Cooled)
(9) Condenser fan
9.1 Motor
9.2 Blade
9.3 Grid
(10) Filter Drier
(11) Capillary tube
(12) T1 Temperature probe (DewPoint)
(13) Condensate drain service valve
(14) Y-shaped condensate drain strainer
(15) Condensate drain solenoid valve
(16) Coil for cond. drain solenoid valve
(17) Electronic control instrument
...
(20) Liquid receiver
(21) Electronic level drain
(22) Main switch
...
(51) Front panel
(52) Back panel
(53) Right lateral panel
(54) Left lateral panel
(55) Cover
(56) Base plate
(57) Upper plate
(58) Support beam
(59) Support bracket
(60) Control panel
(61) Electric connector
(62) Electric box
(63) SD Door interlock safety-switch

7.3 ELECTRIC DIAGRAMS

Electrical Diagram table of components - Dryers MD 6-810

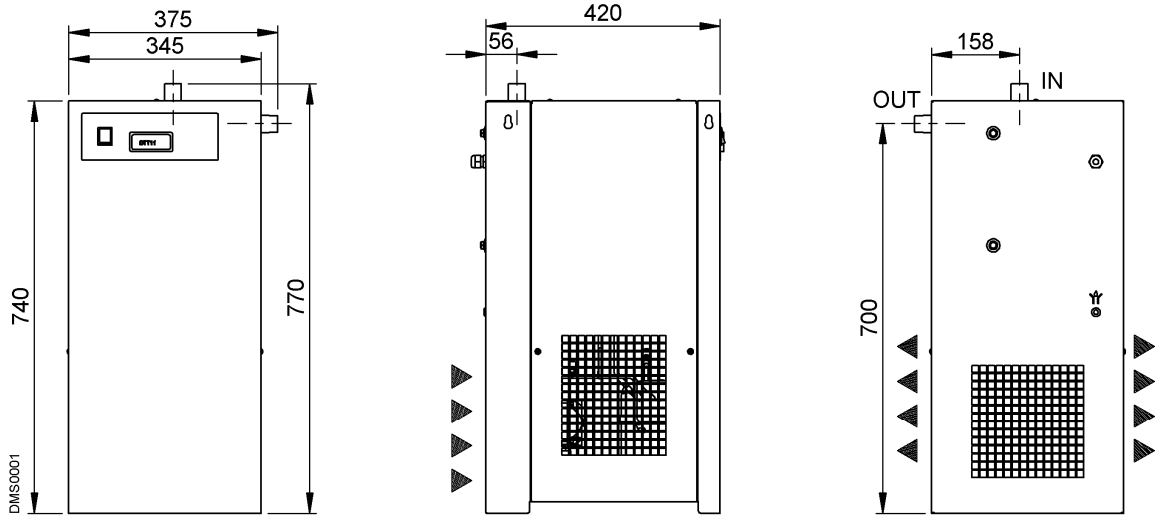
IG : Main switch
K : Refrigerating compressor
- **KT** : Compressor thermal protection
- **KR** : Compressor starting relay (if installed)
- **CS** : Compressor starting capacitor (if installed)
- **CR** : Compressor operating capacitor (if installed)

V : Condenser fan
- **CV** : Fan starting capacitor (if installed)
- **TK** : Fan thermal protection

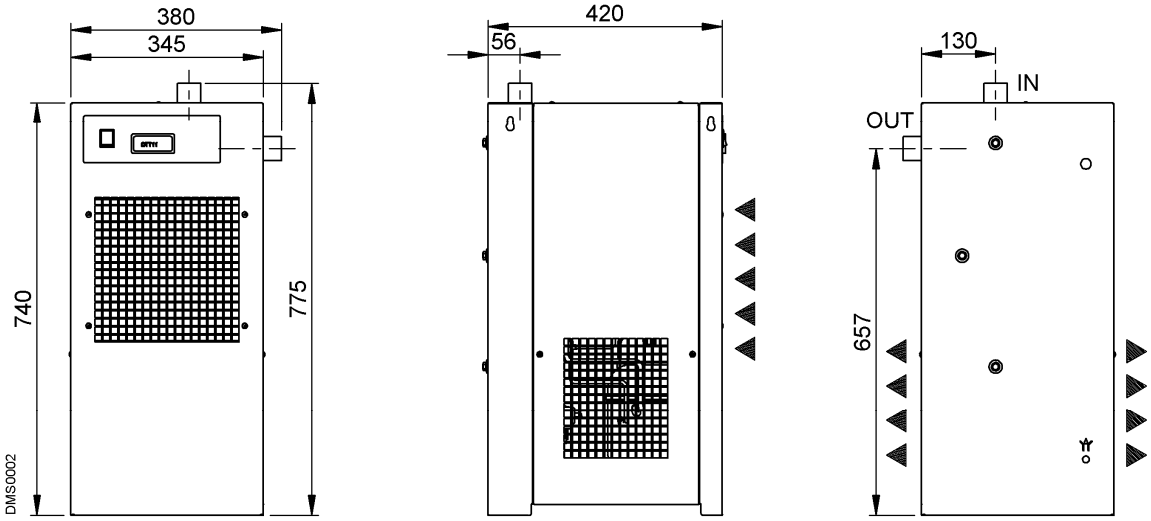
DMC14 : DMC14 Electronic Instrument - Air Dryer Controller
PR : T1 Temperature probe (DewPoint)
PV : Pressure switch - Fan control
PV1 - PV2 : Pressure switch - Fan control
PA : Pressure switch - Compressor discharge side - high-pressure (MD 110-810)
PB : Pressure switch - Compressor suction side - low-pressure (MD 110-810)
TS : Safety thermo-switch (MD 68-810)
BOX : Electric box
EVD : Condensate drain solenoid valve
ELD : Electronic level drain
SEZ : Main switch with door block
P : Start-Stop button - Power on light
X : Alarm on light
R : Compressor crankcase heater
SD : Door interlock safety-switch
CP : Control panel

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

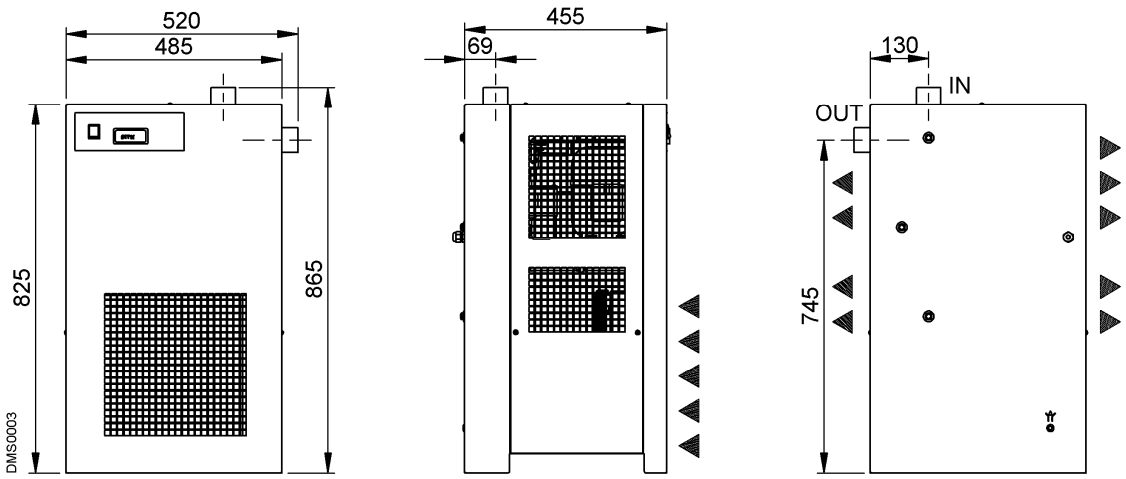
7.1.1 MD 6-15 /AC



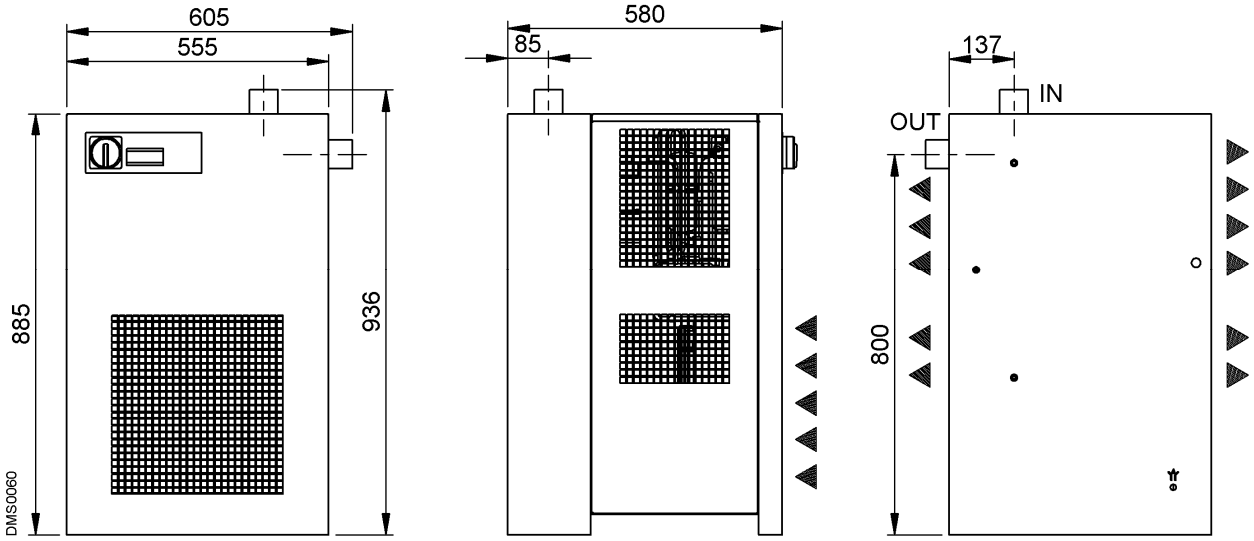
7.1.2 MD 20-25 /AC



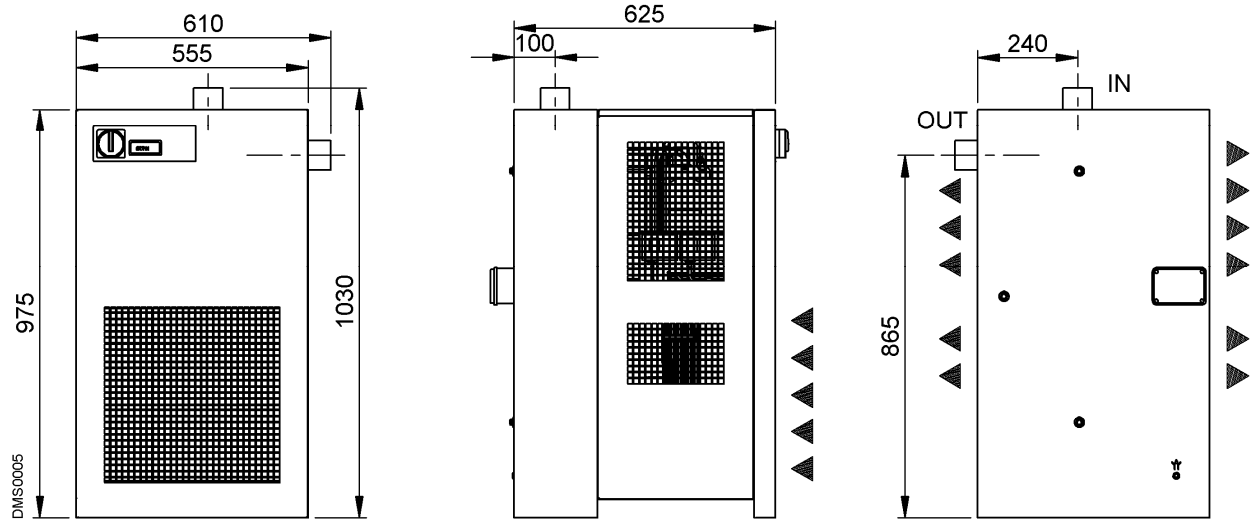
7.1.3 MD 38-49 /AC



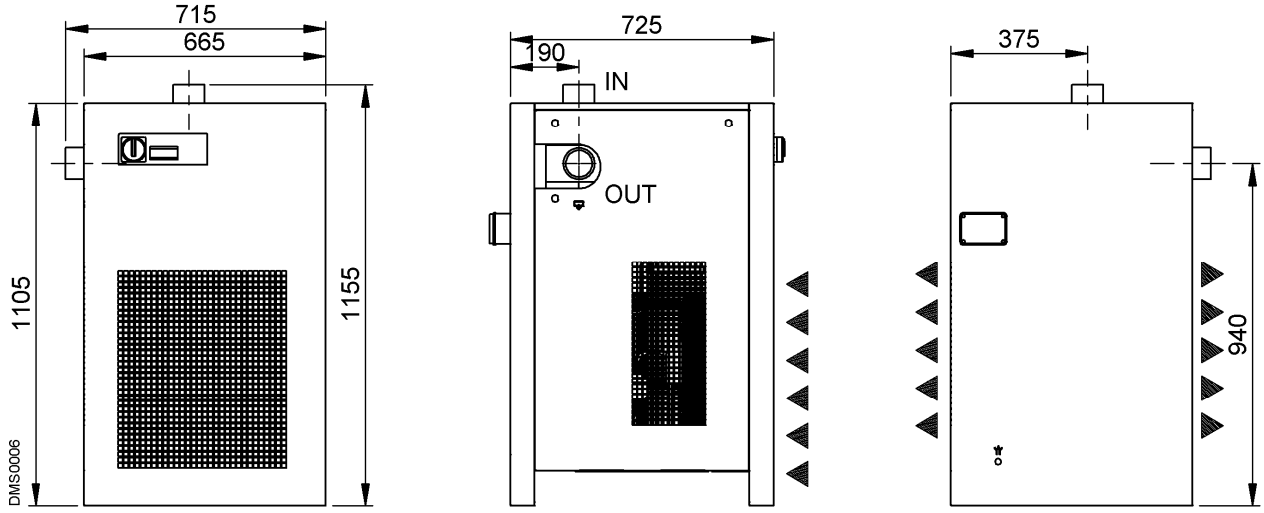
7.1.4 MD 68-83 /AC



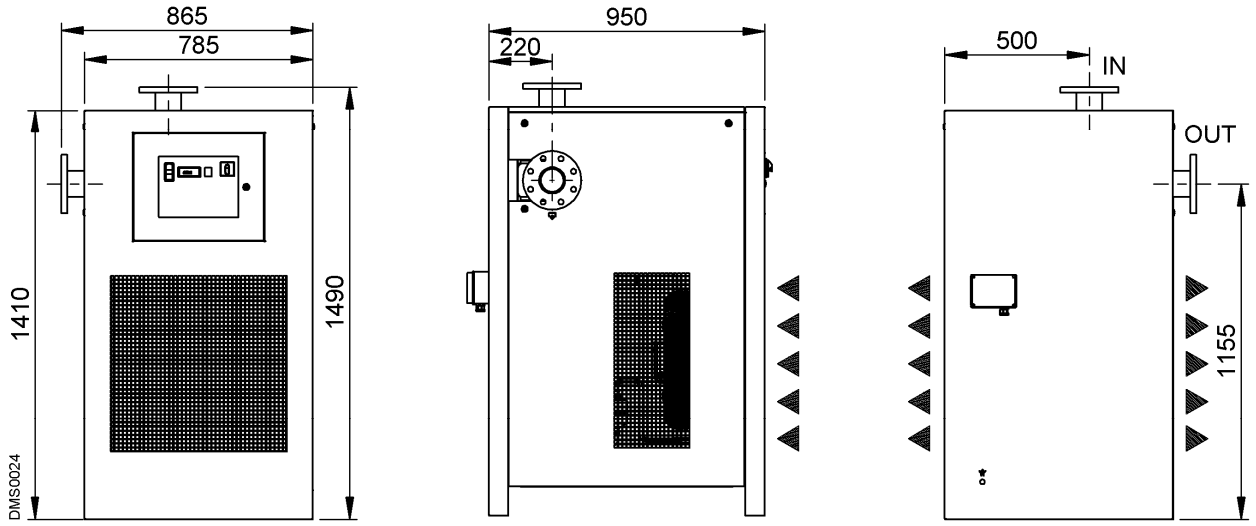
7.1.5 MD 110 /AC



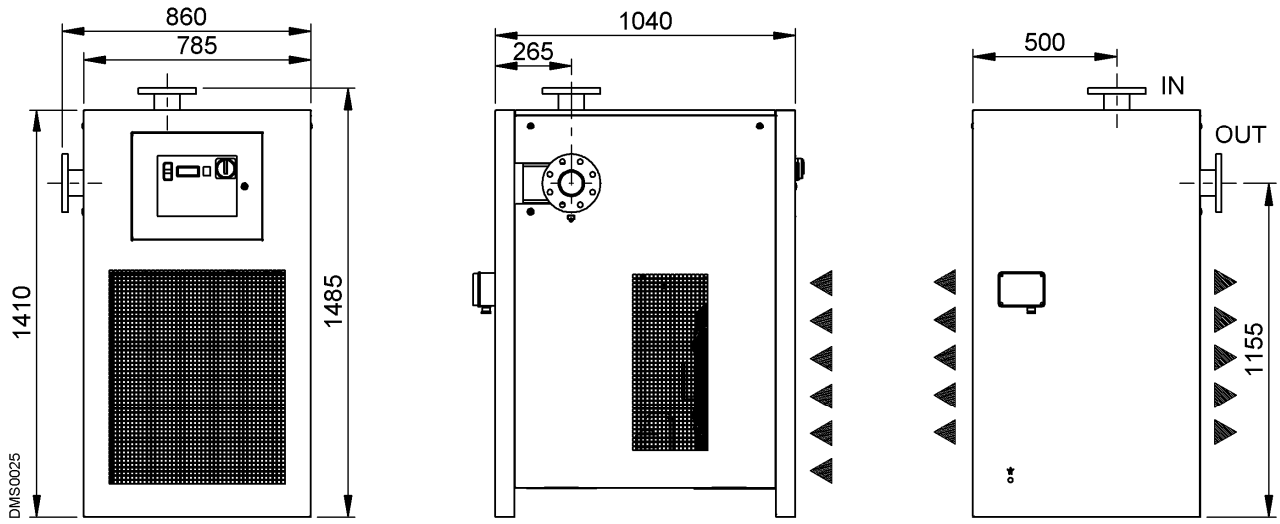
7.1.6 MD 150-170 /AC



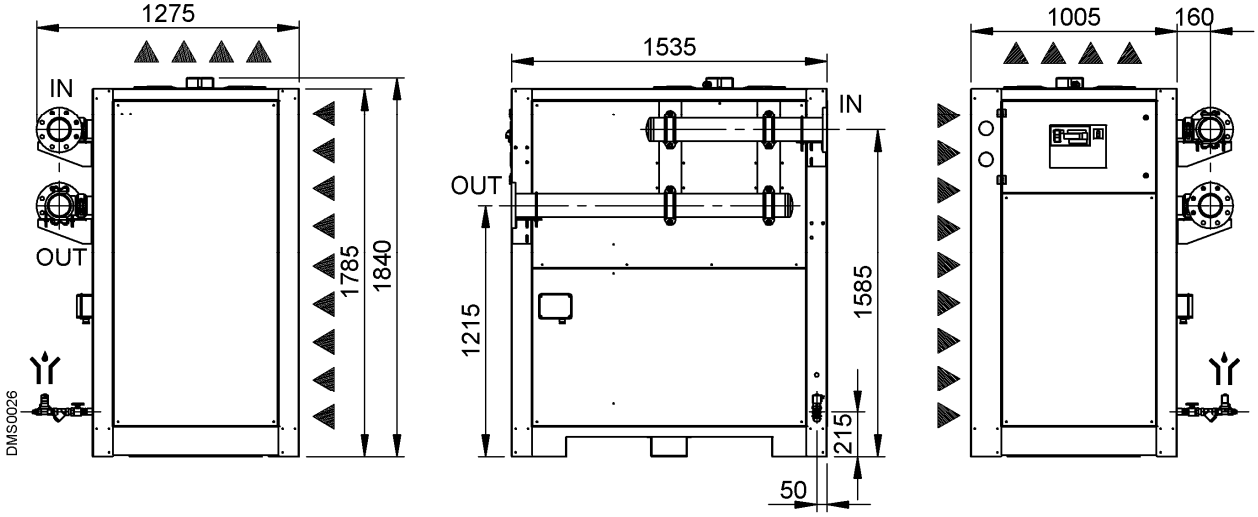
7.1.7 MD 185-350 /AC



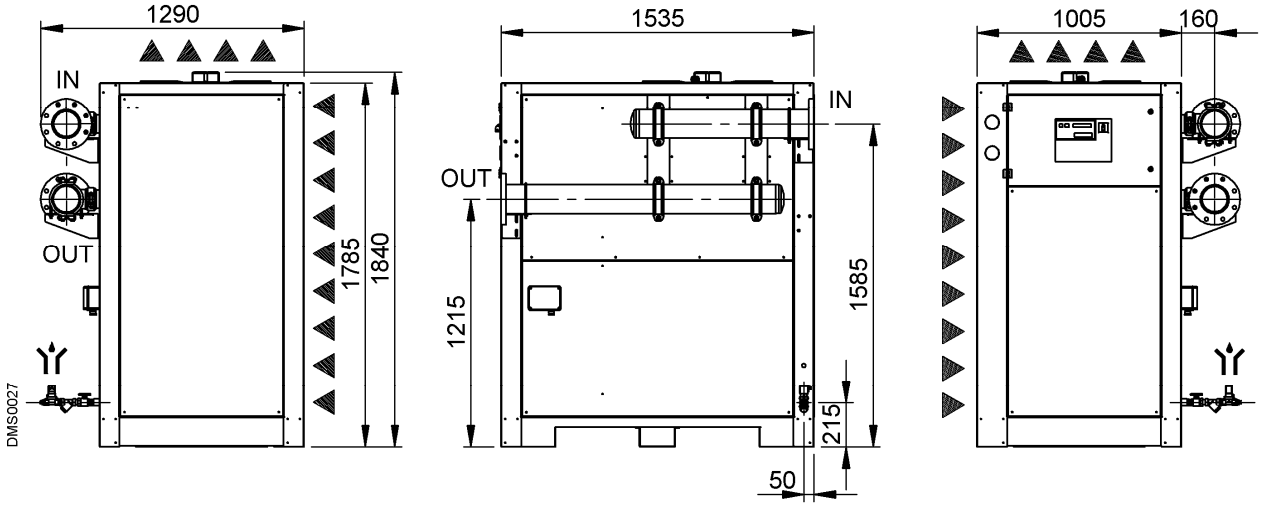
7.1.8 MD 410 /AC



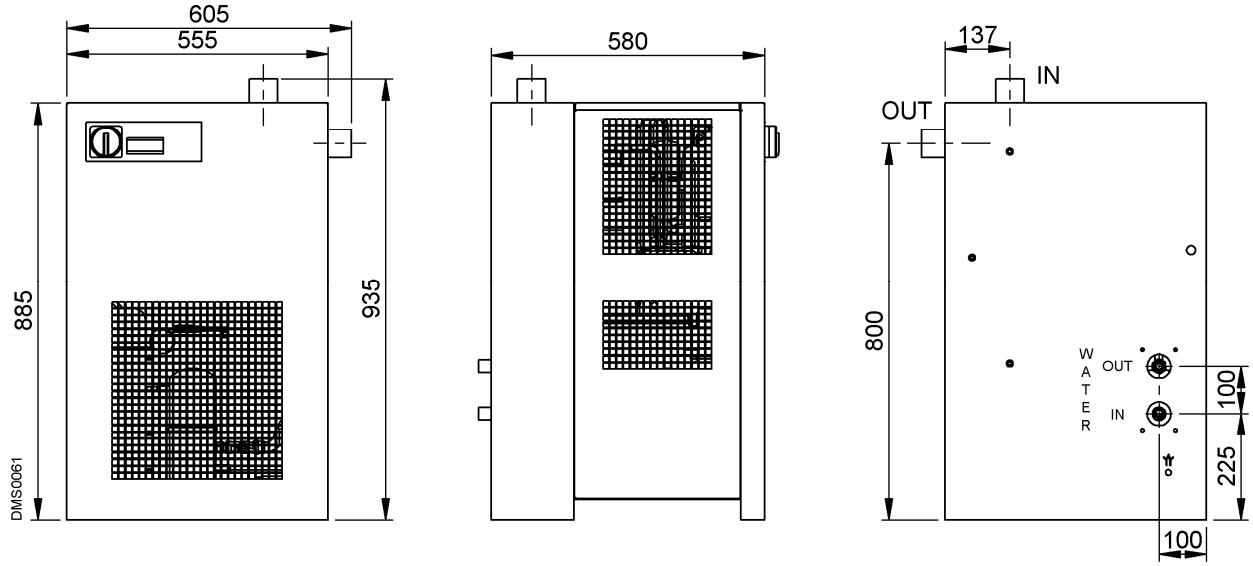
7.1.9 MD 480-620 /AC



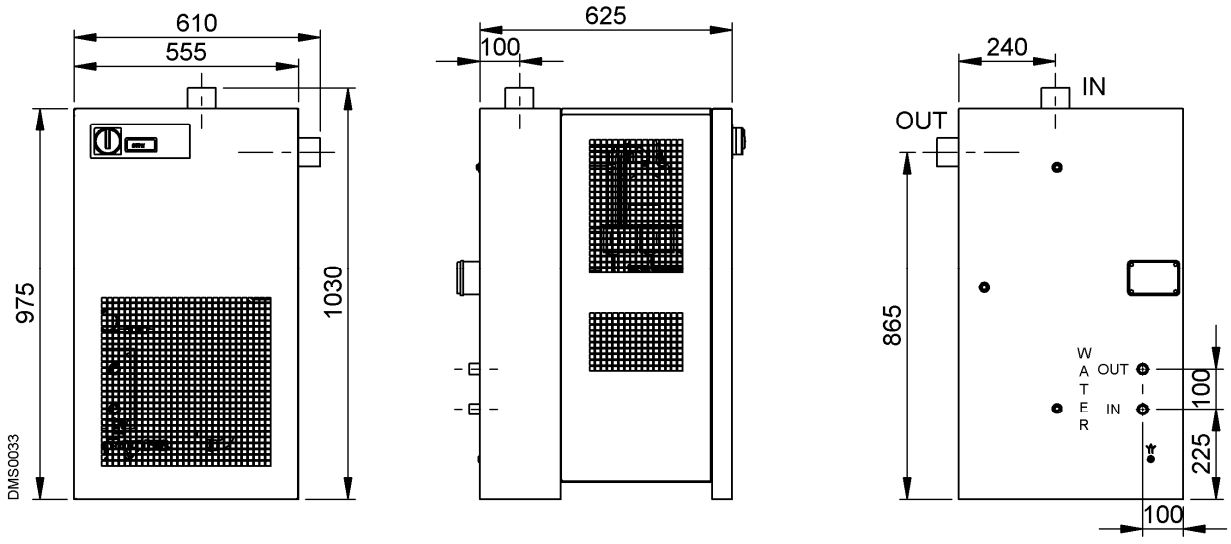
7.1.10 MD 810 /AC



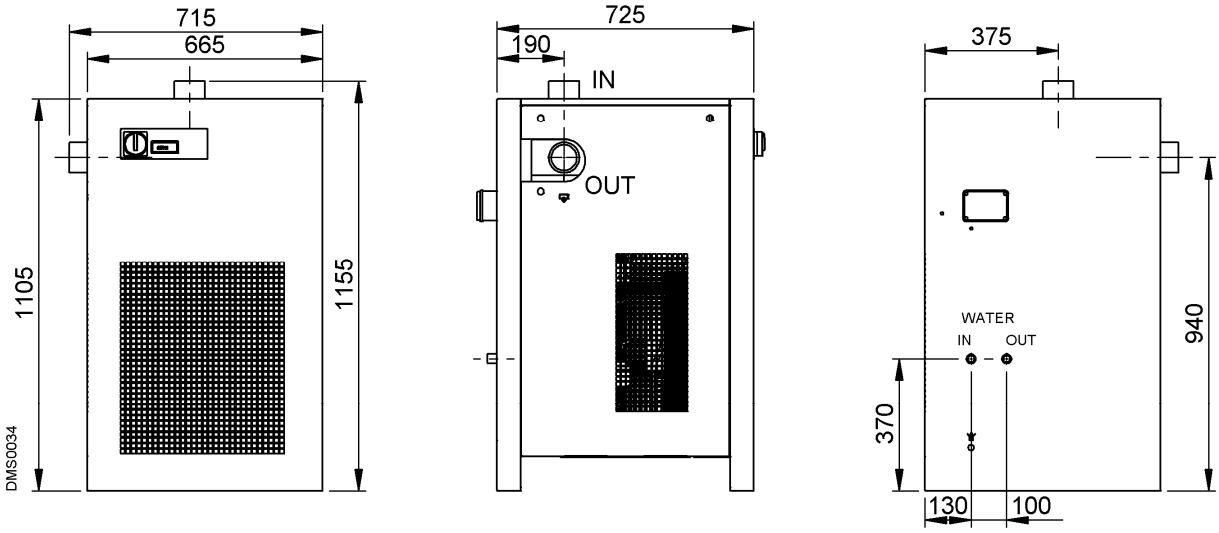
7.1.11 MD 68-83 /WC



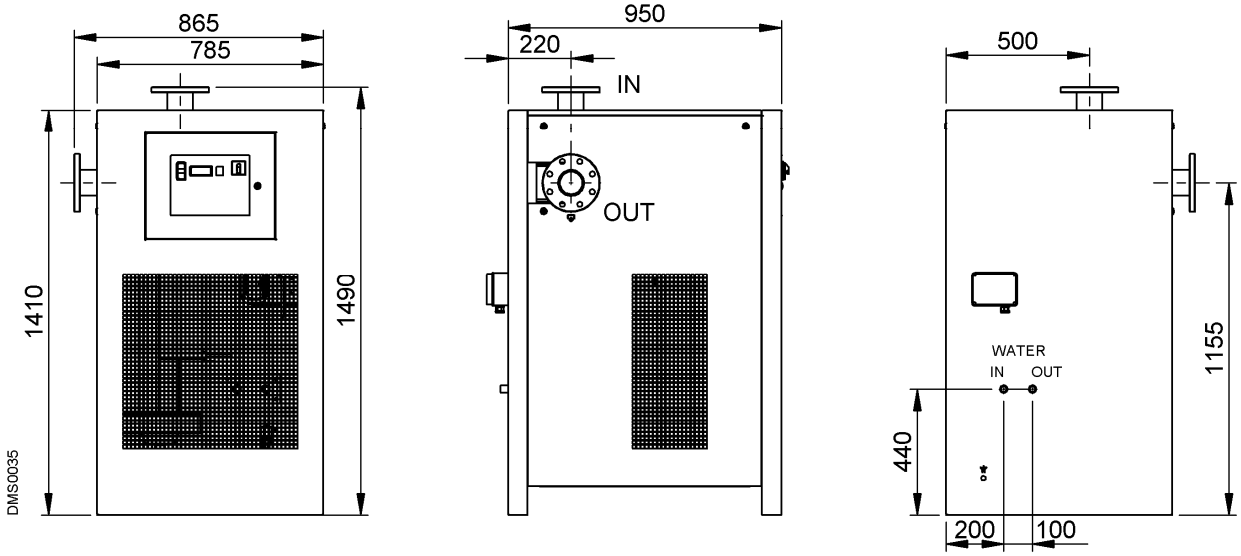
7.1.12 MD 110 /WC



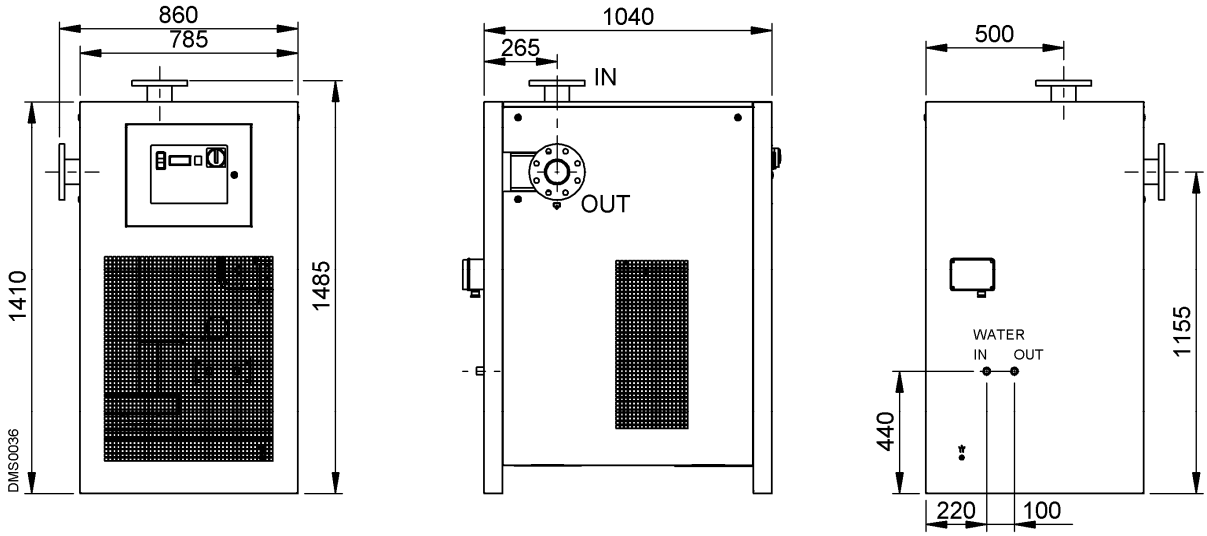
7.1.13 MD 150-170 /WC



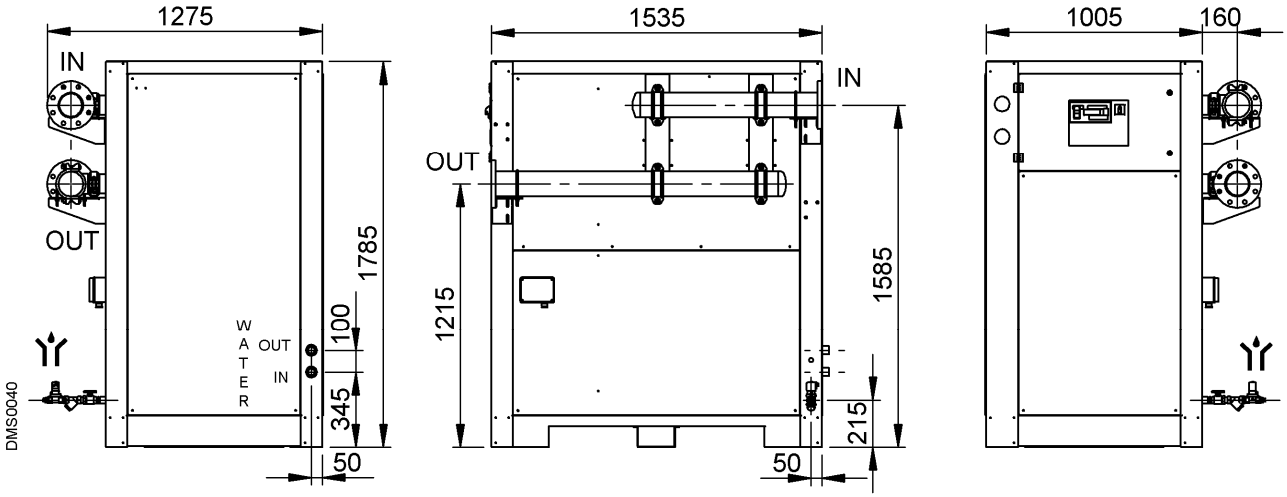
7.1.14 MD 185-350 /WC



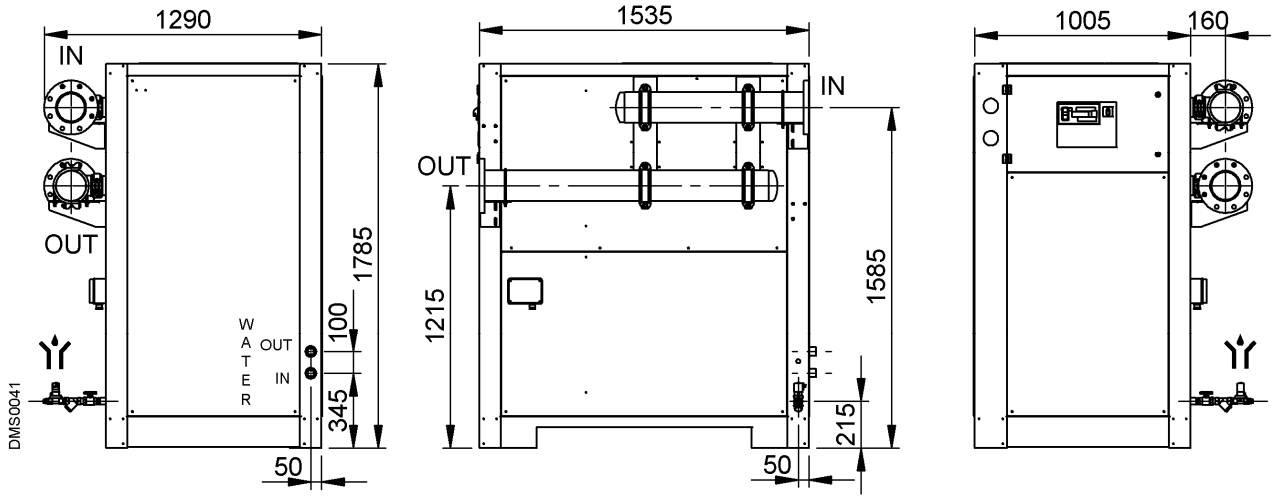
7.1.15 MD 410 /WC



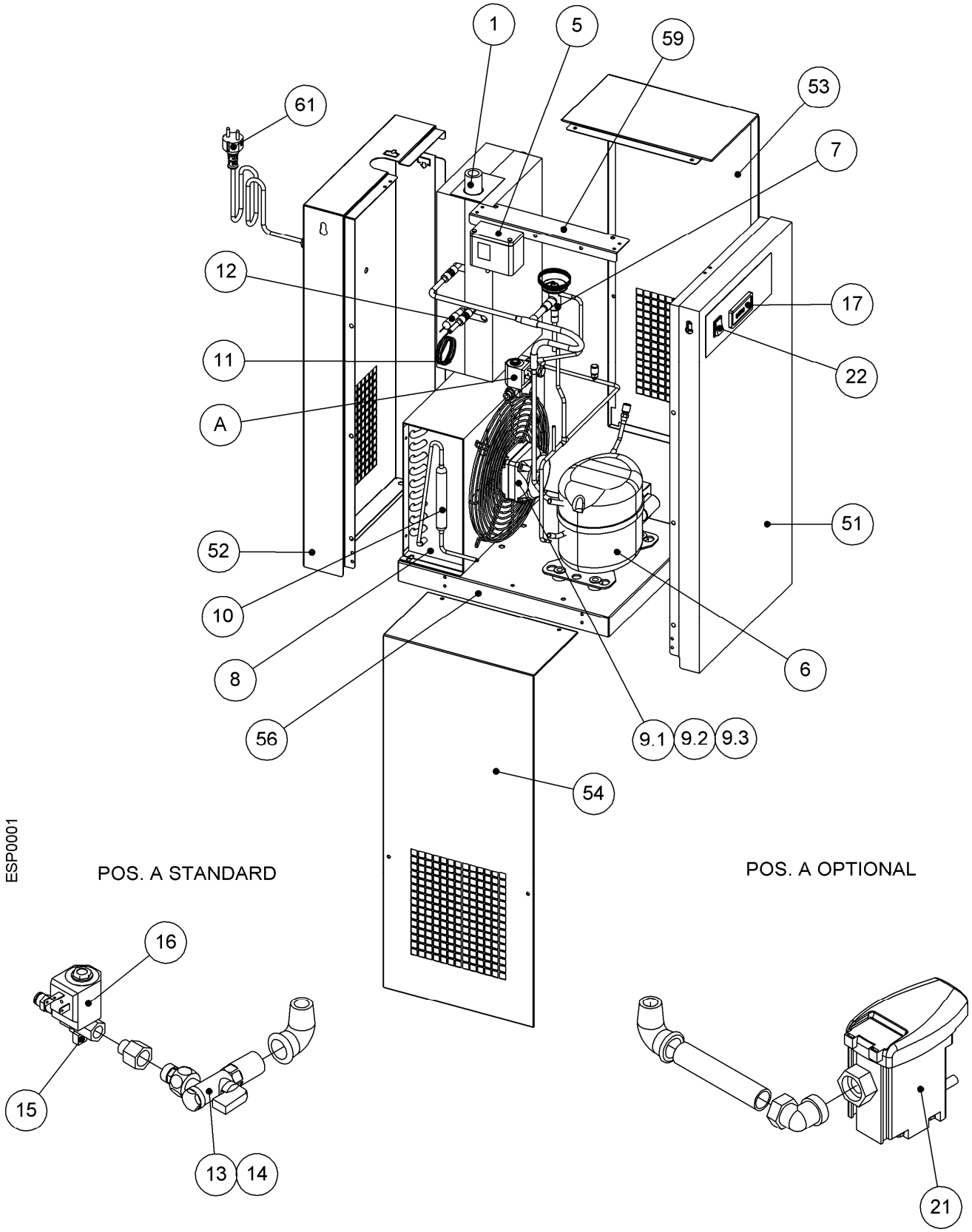
7.1.16 MD 480-620 /WC



7.1.17 MD 810 /WC



7.2.1 MD 6-15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9.1
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54
ESP0001
POS. A STANDARD
POS. A OPTIONAL
16
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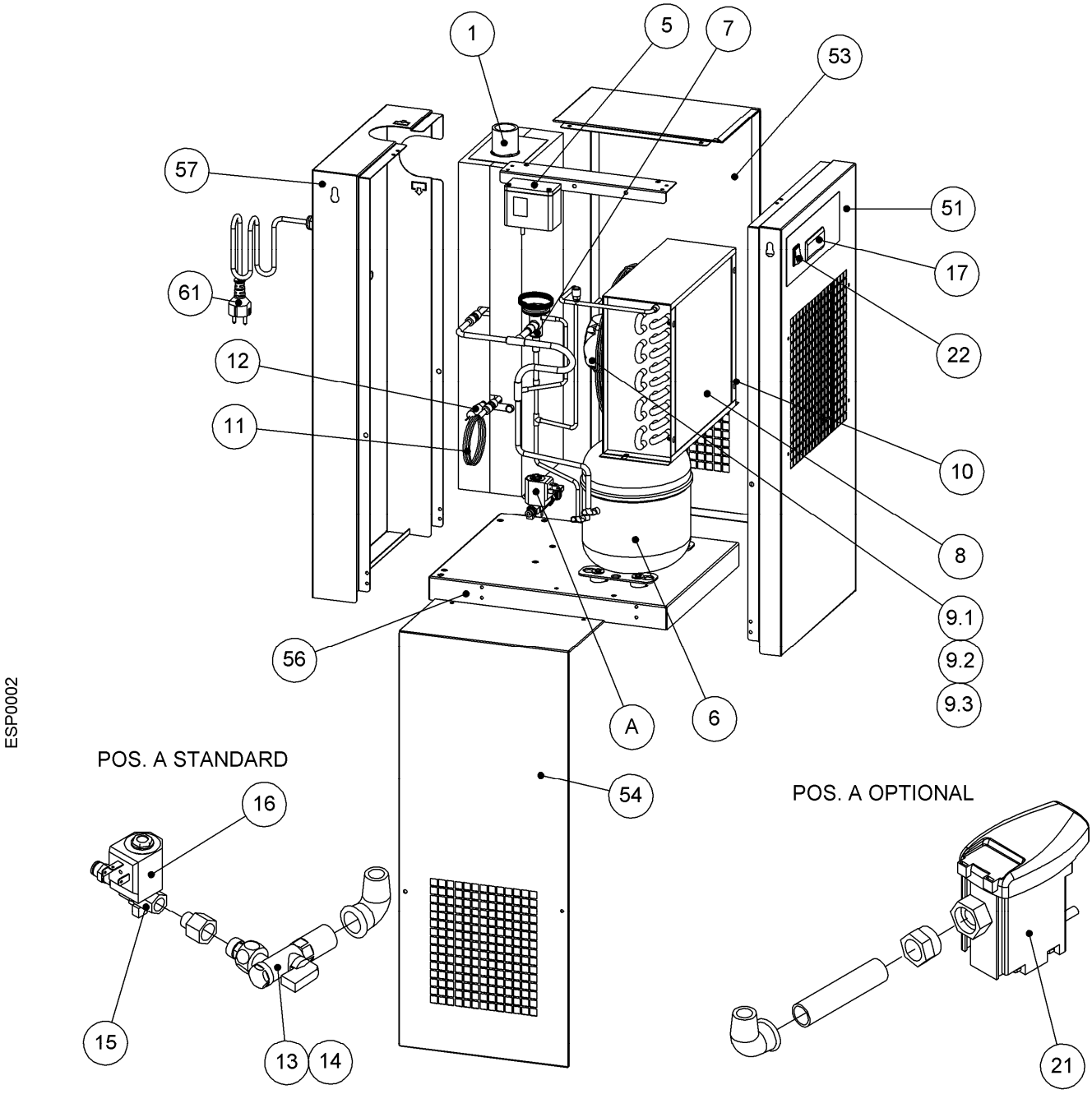
21

7.2.2 MD 20-25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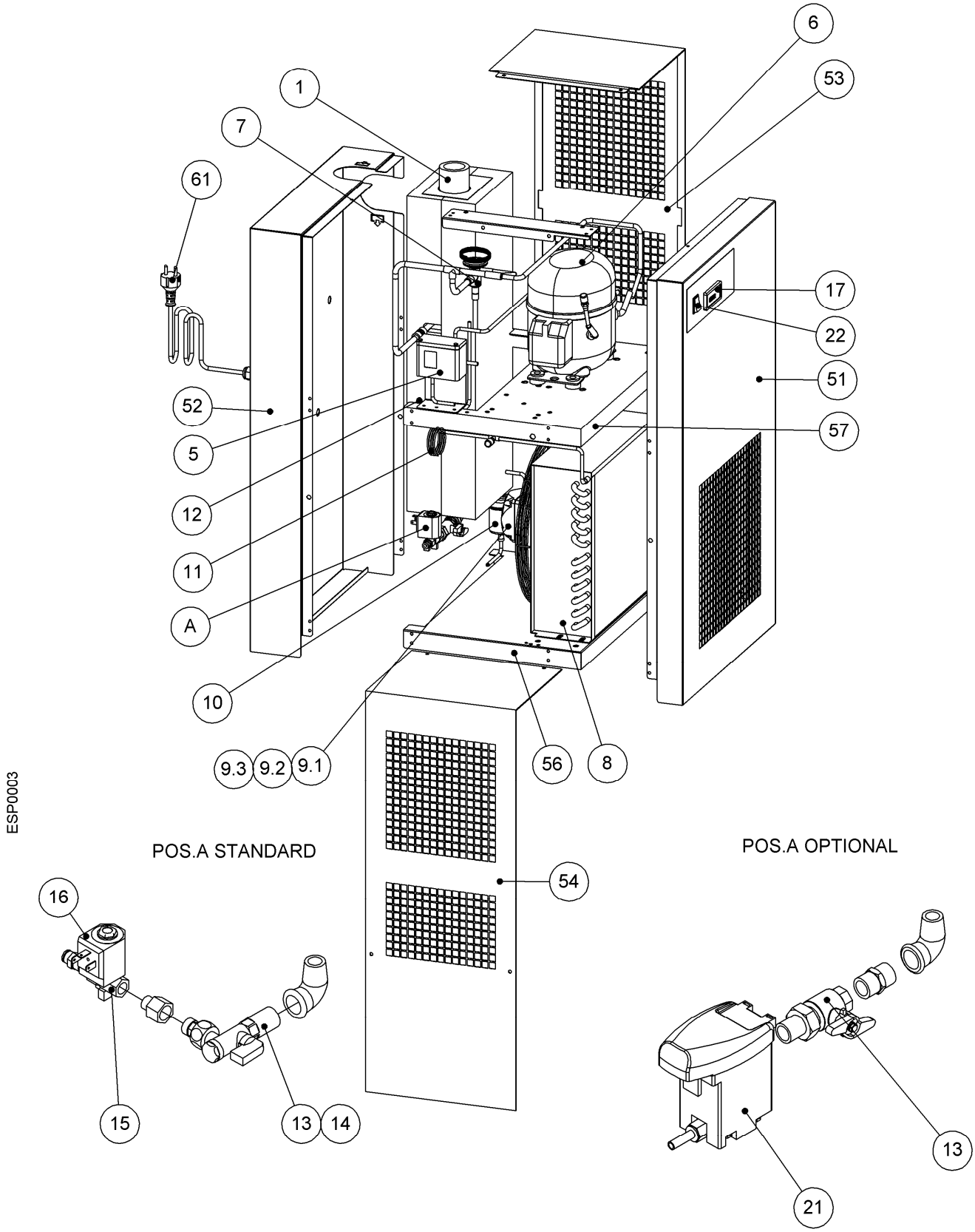
A
6
54
POS. A STANDARD
16
15
13
14
POS. A OPTIONAL
21

7.2.3 MD 38-49


6
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7
61
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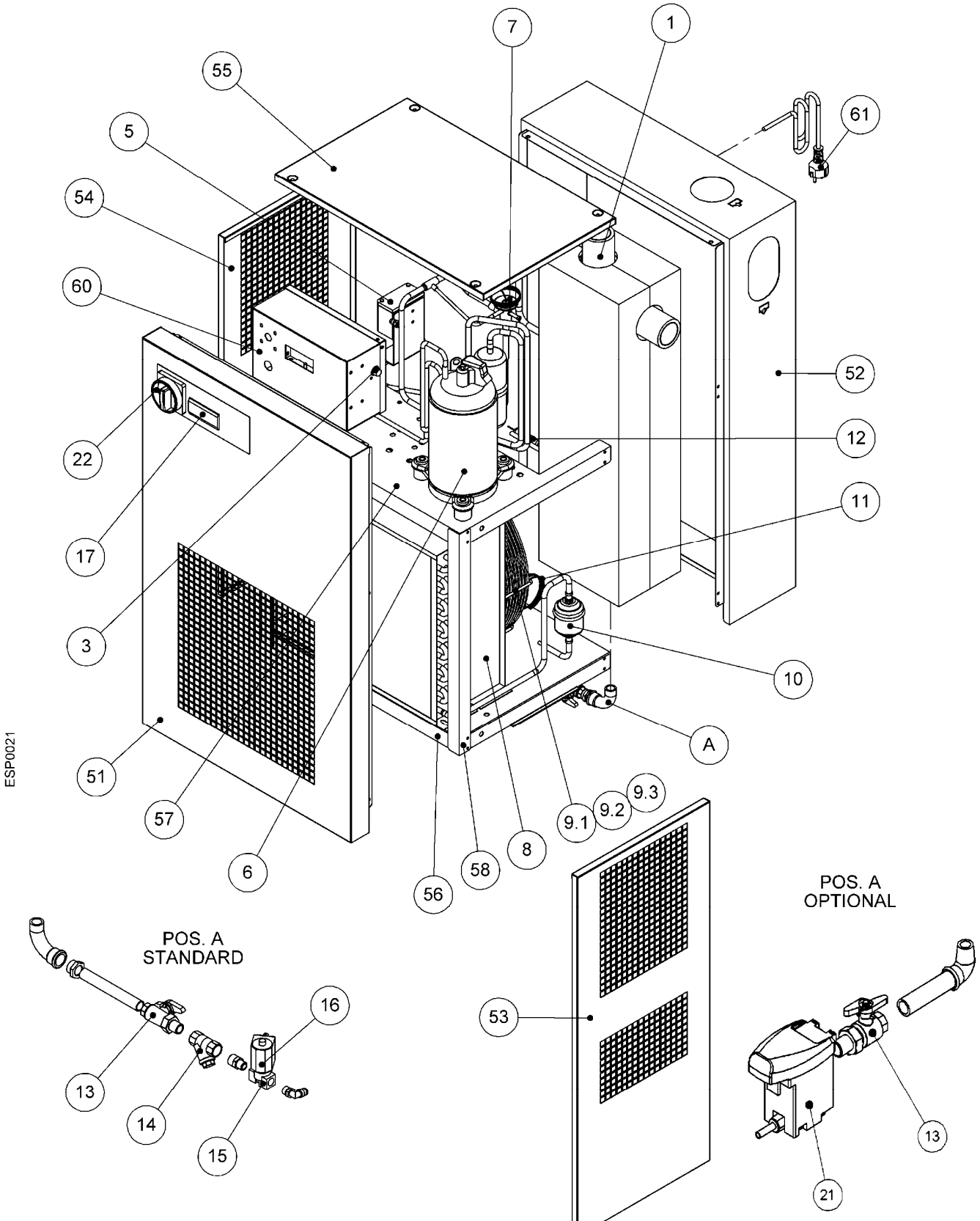
5
12
11
A
10
9.3
9.2
9.1
56
8
ESP0003
POS.A STANDARD
POS.A OPTIONAL
54
16
15
13
14
13
21

7.2.4 MD 68-83


ESP0021
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A
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58
8
9.1
9.2
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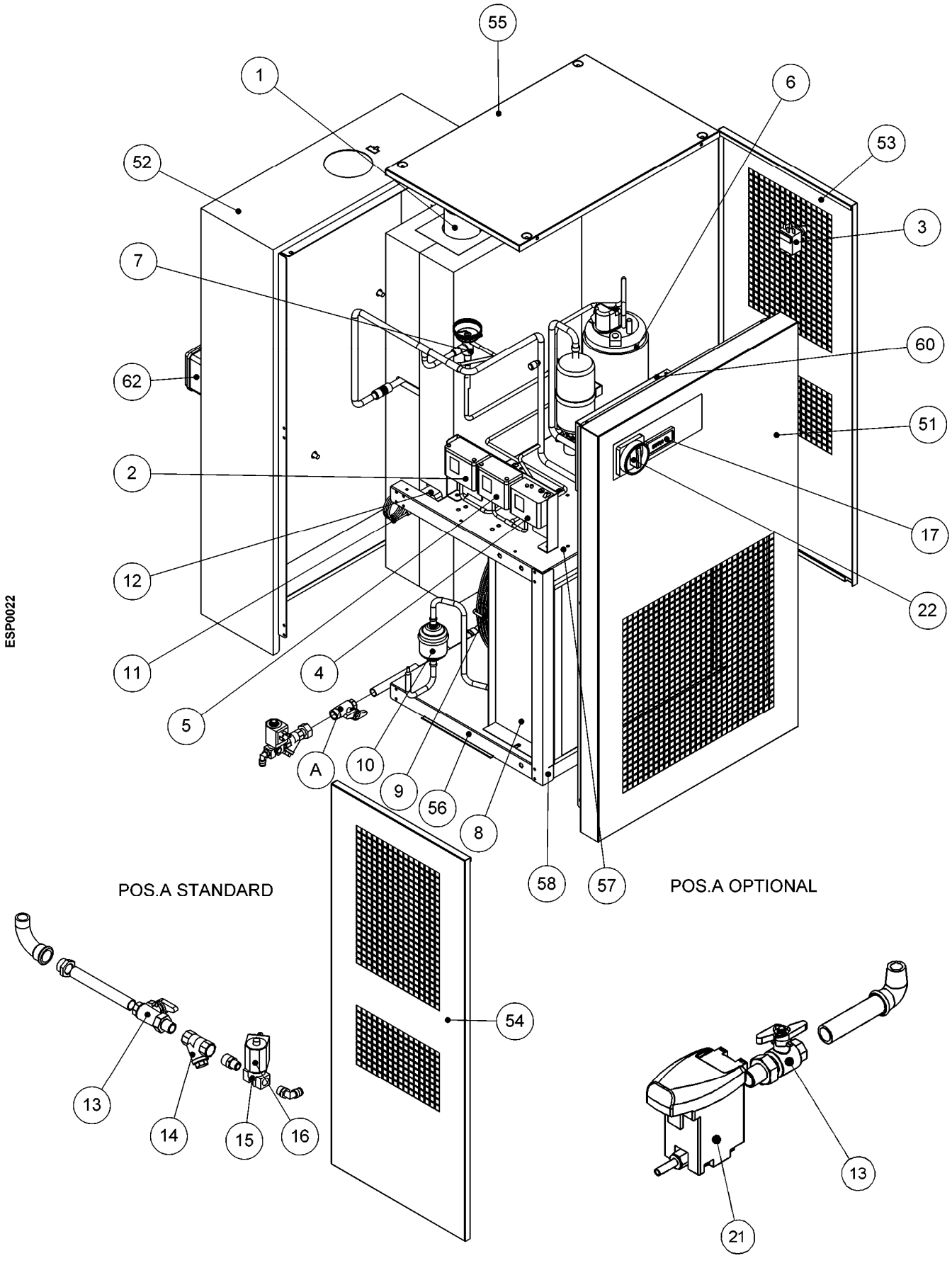
53
POS. A
STANDARD
16
13
14
15
POS. A
OPTIONAL
13
21

7.2.5 MD 110


ESP0022
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62
51
2
17
12
22
11
4
5
A
10
9
56
8
58
57
POS.A STANDARD
POS.A OPTIONAL
54
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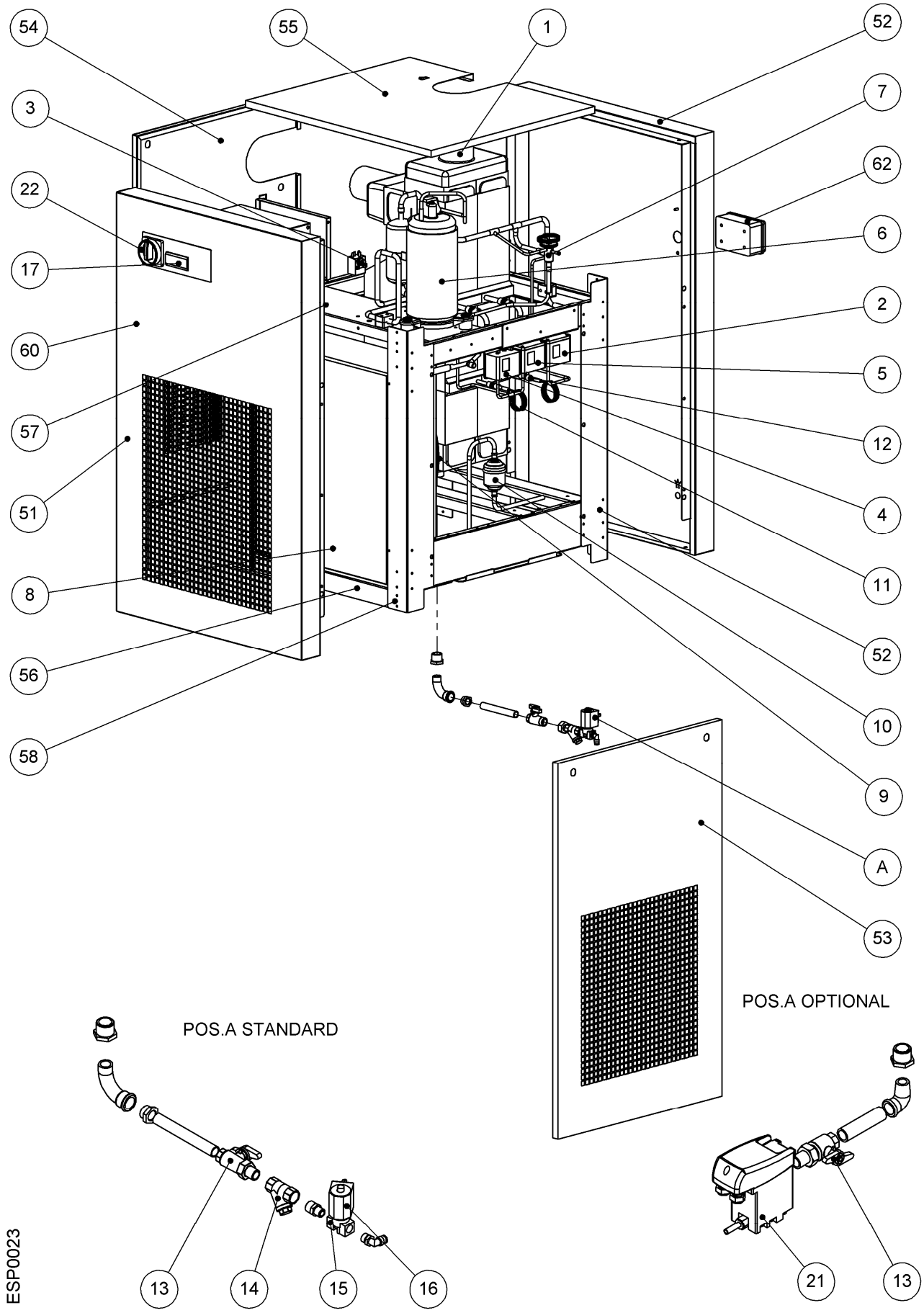
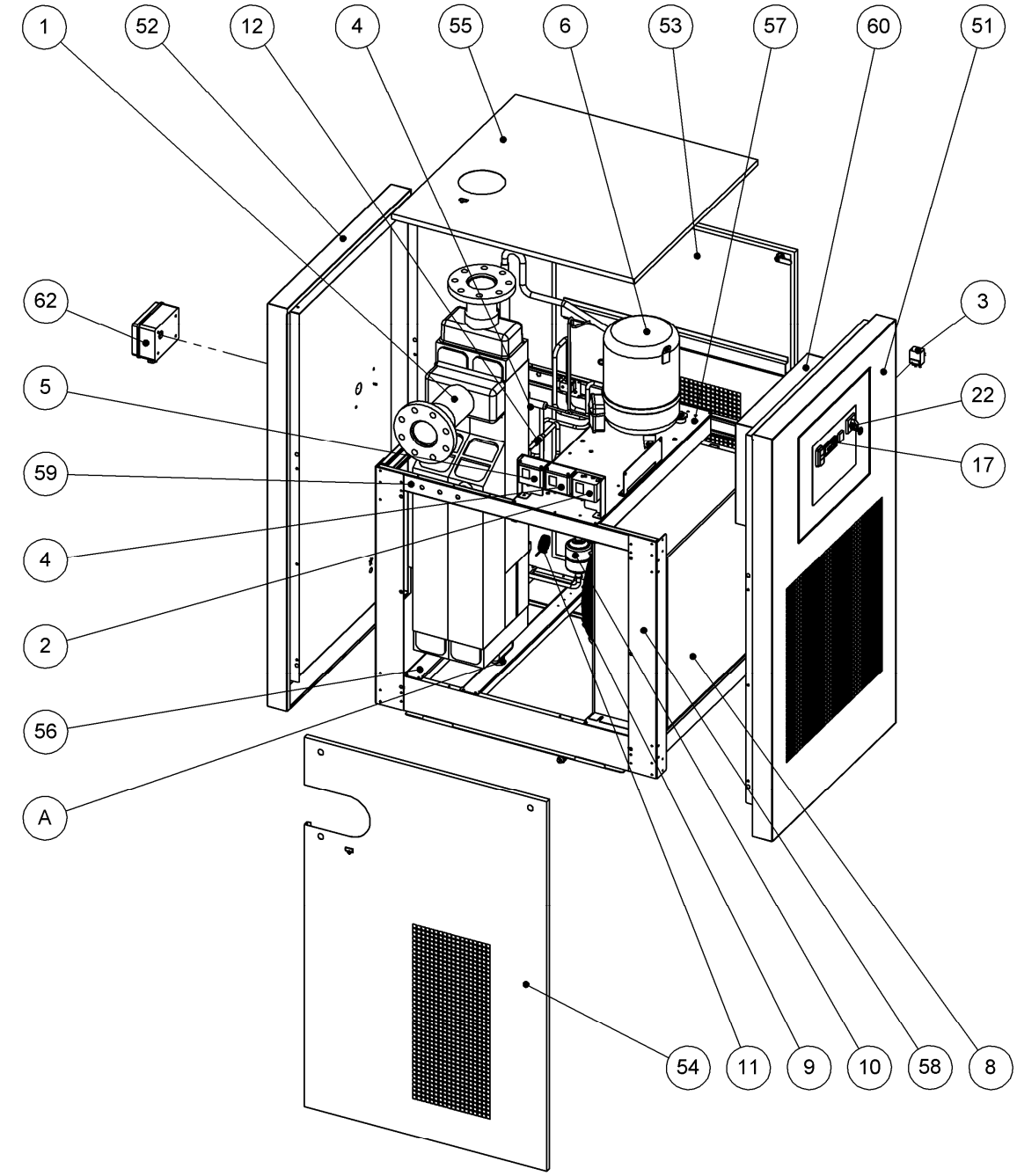
21

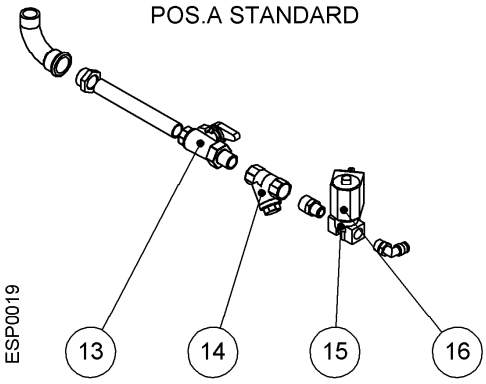
7.2.6 MD 150-170



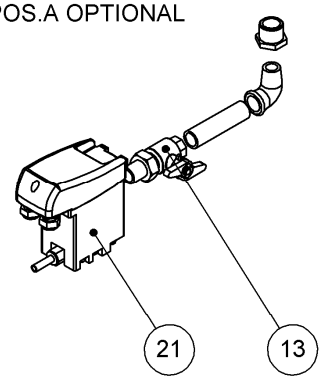
7.2.7 MD 185-410



POS.A STANDARD

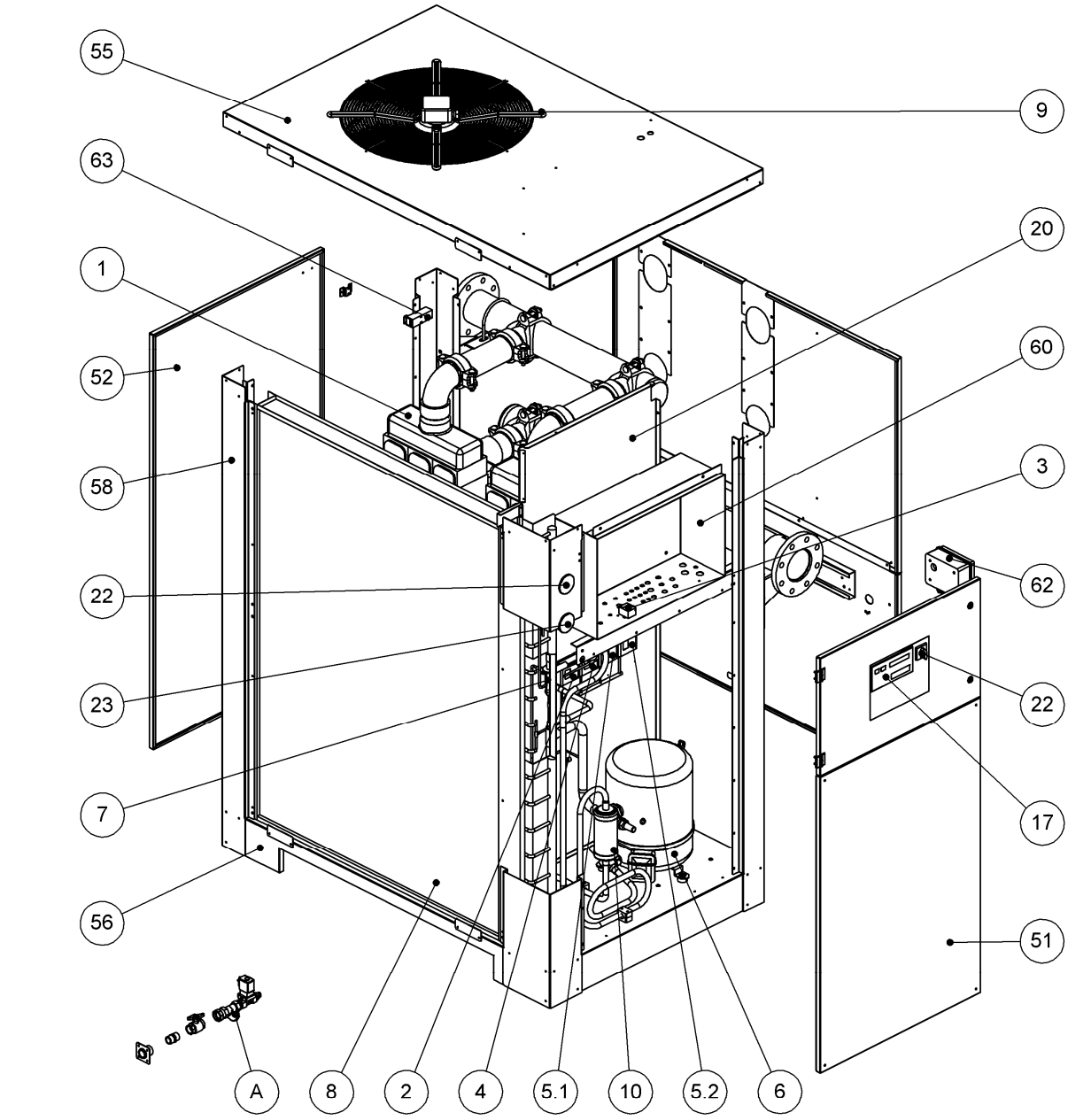


POS.A OPTIONAL

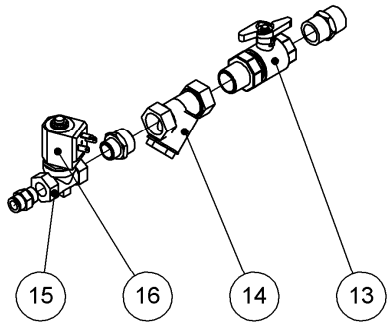


ESP0019

7.2.8 MD 480-810

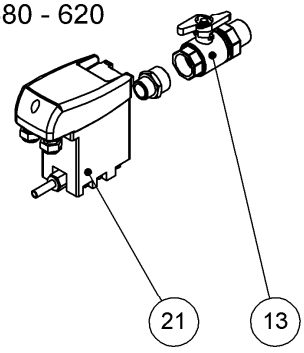


POS.A STANDARD

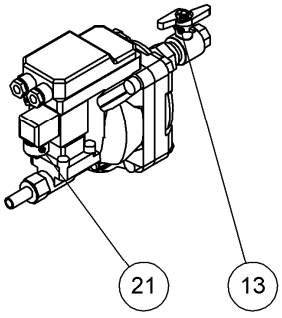


POS.A OPTIONAL

480 - 620

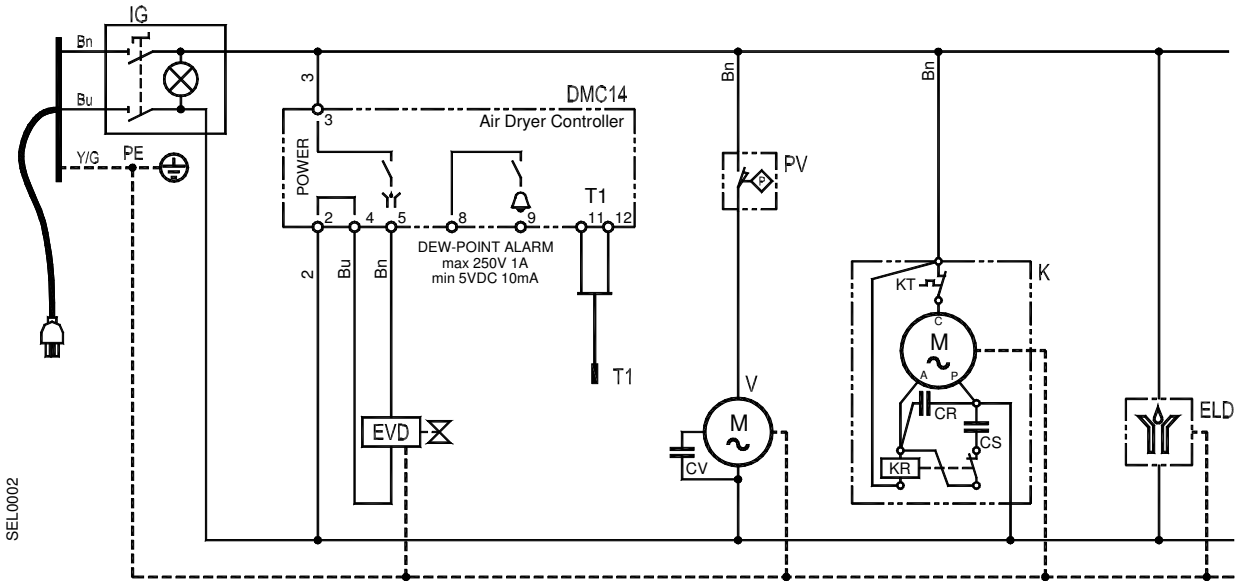


810

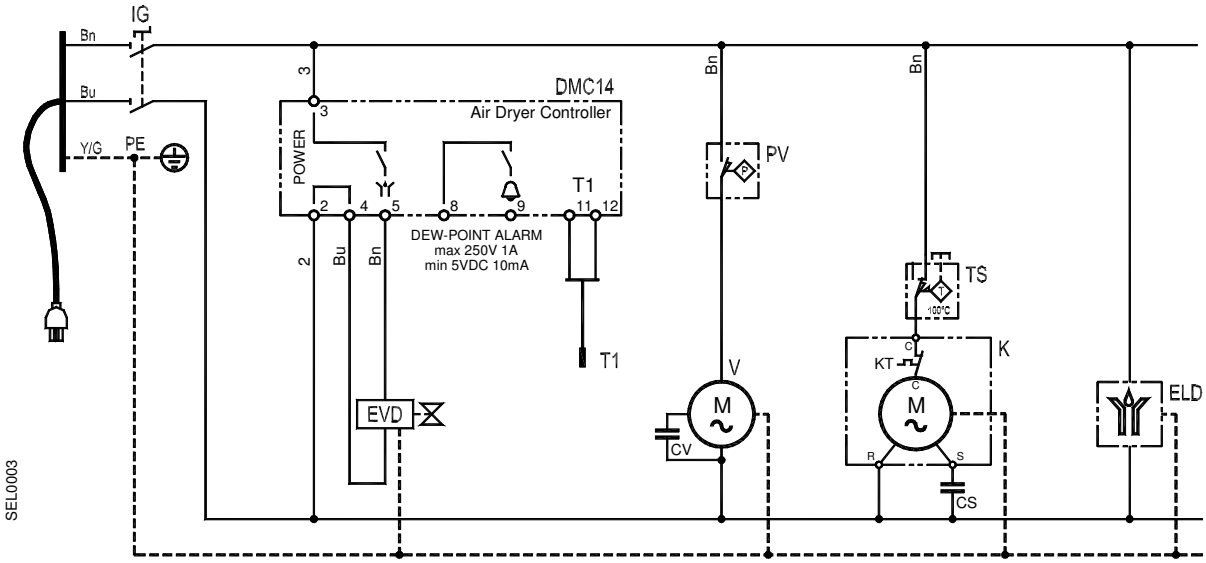


ESP0038

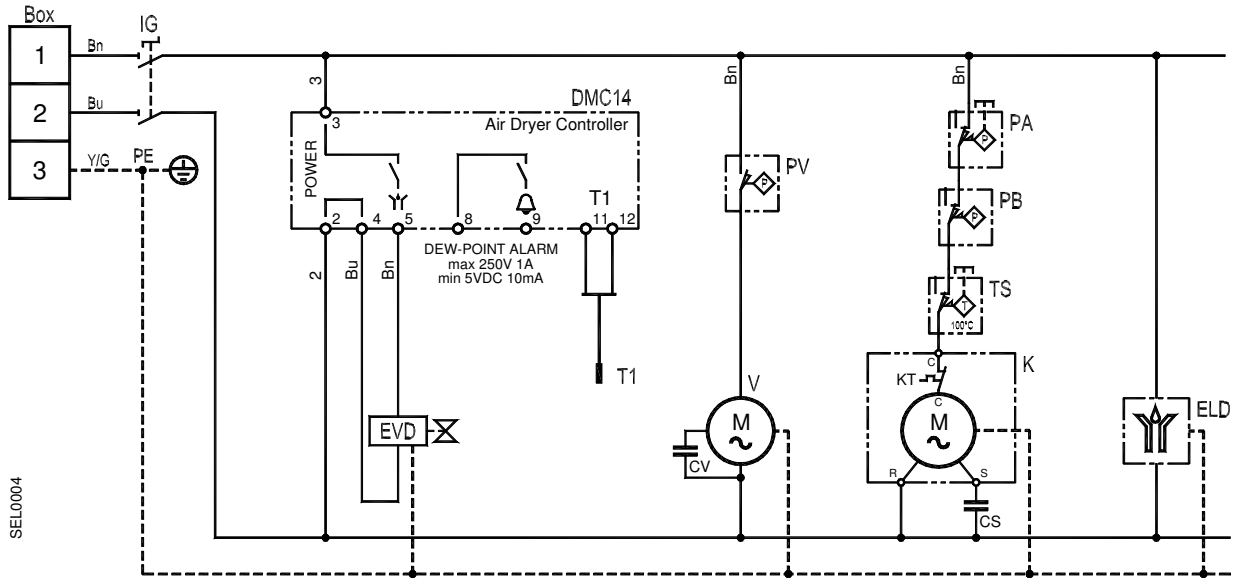
7.3.1 MD 6-49 - DMC14



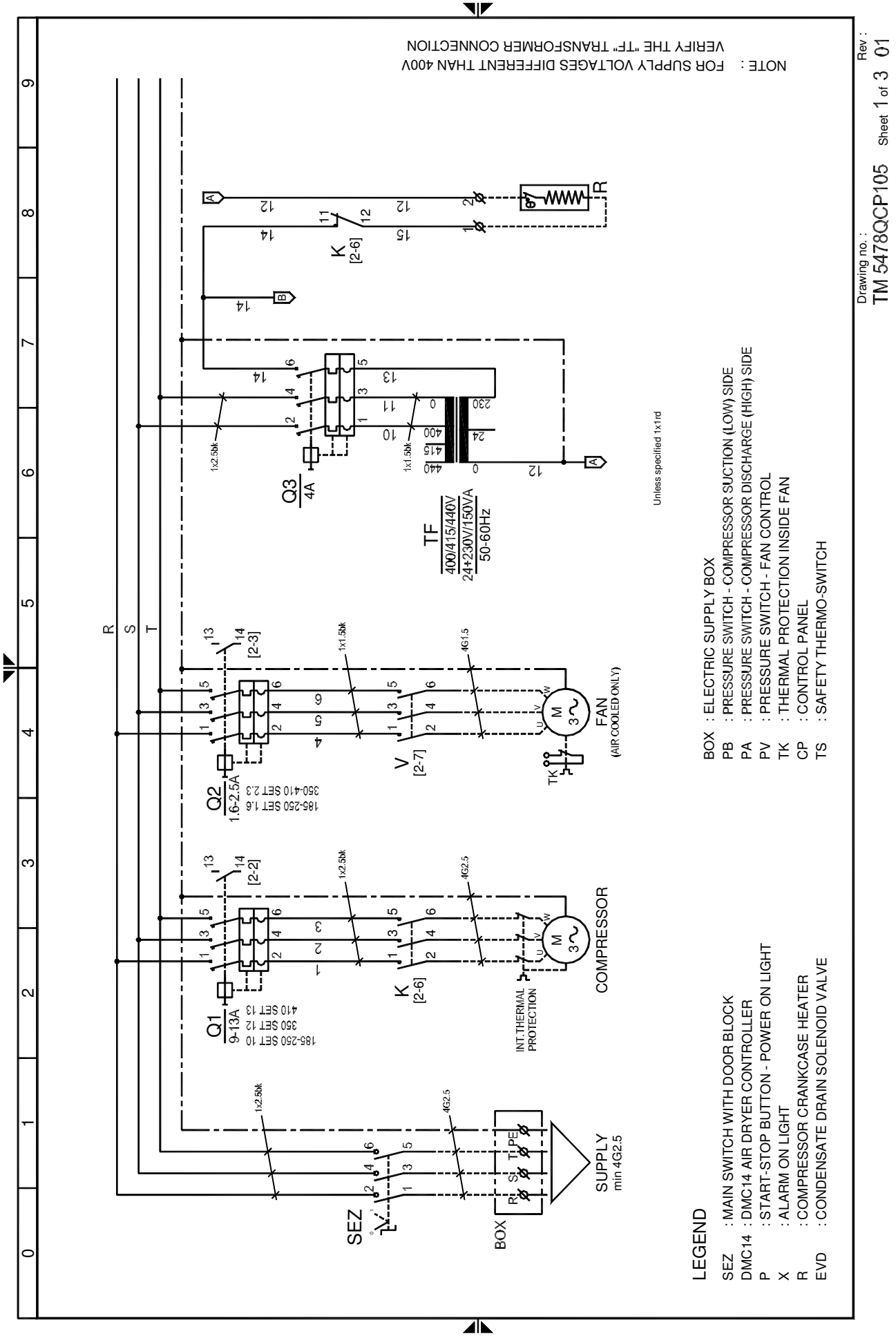
7.3.2 MD 68-83 - DMC14



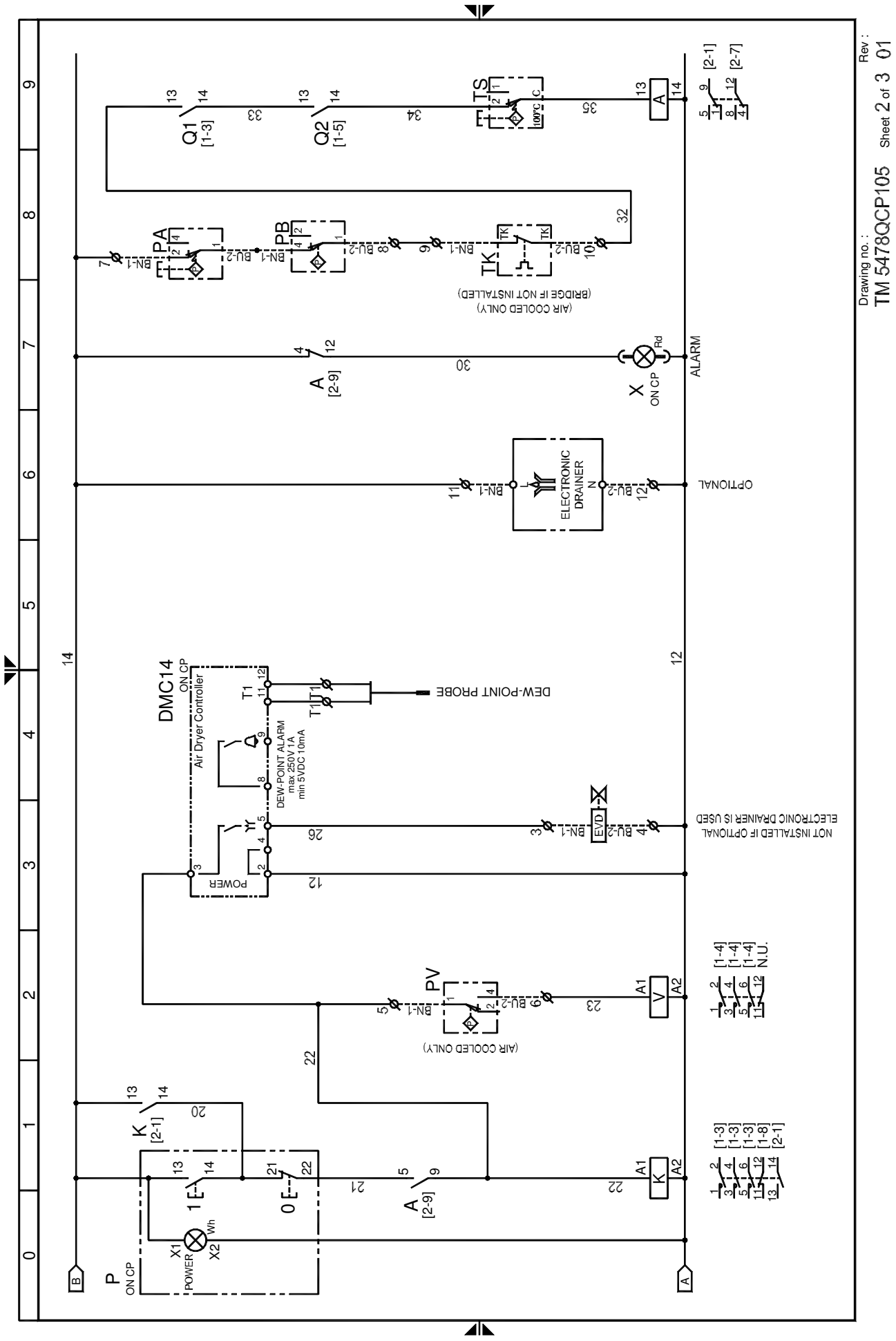
7.3.3 MD 110-170 - DMC14



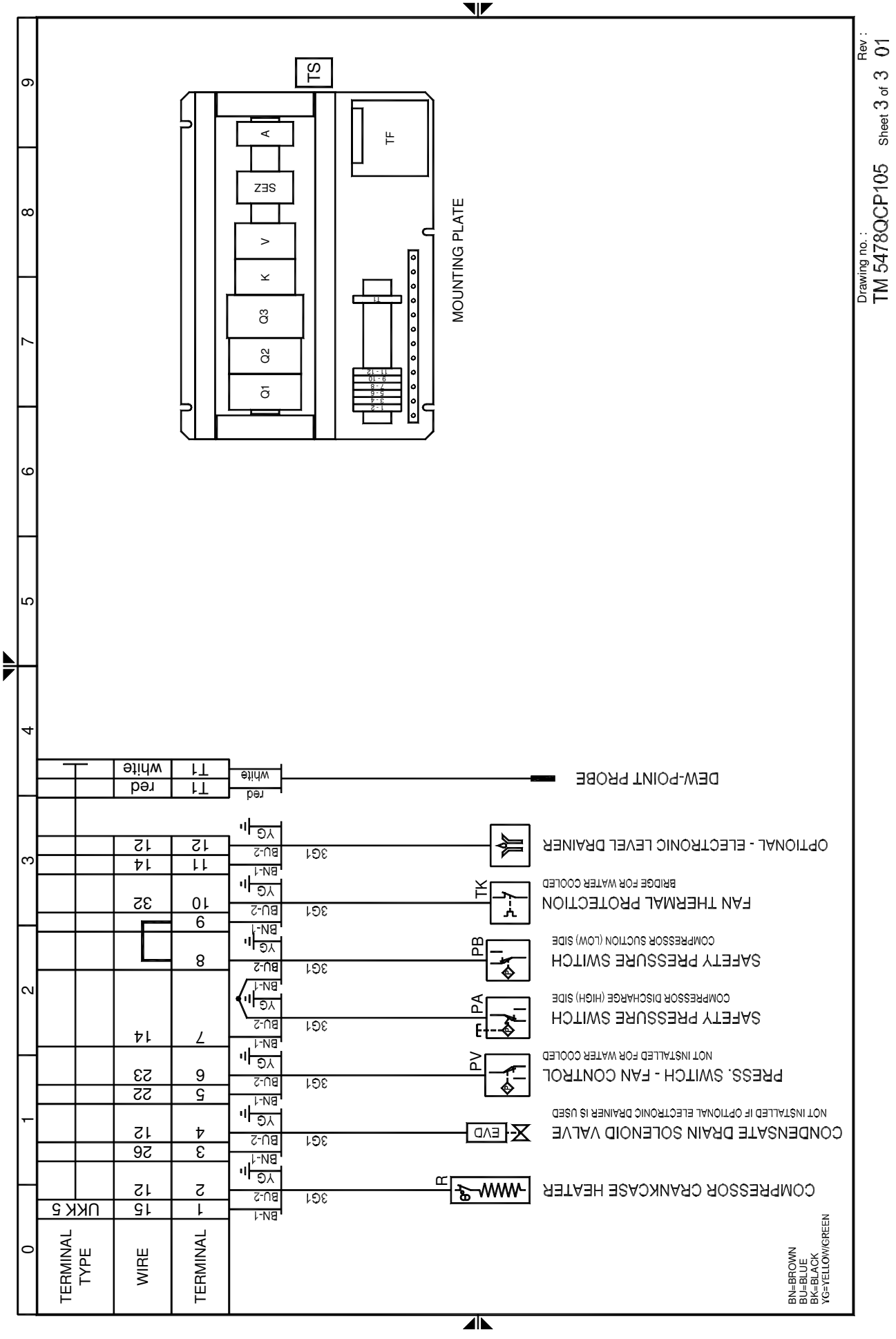
7.3.4 MD 185-410 - DMC14



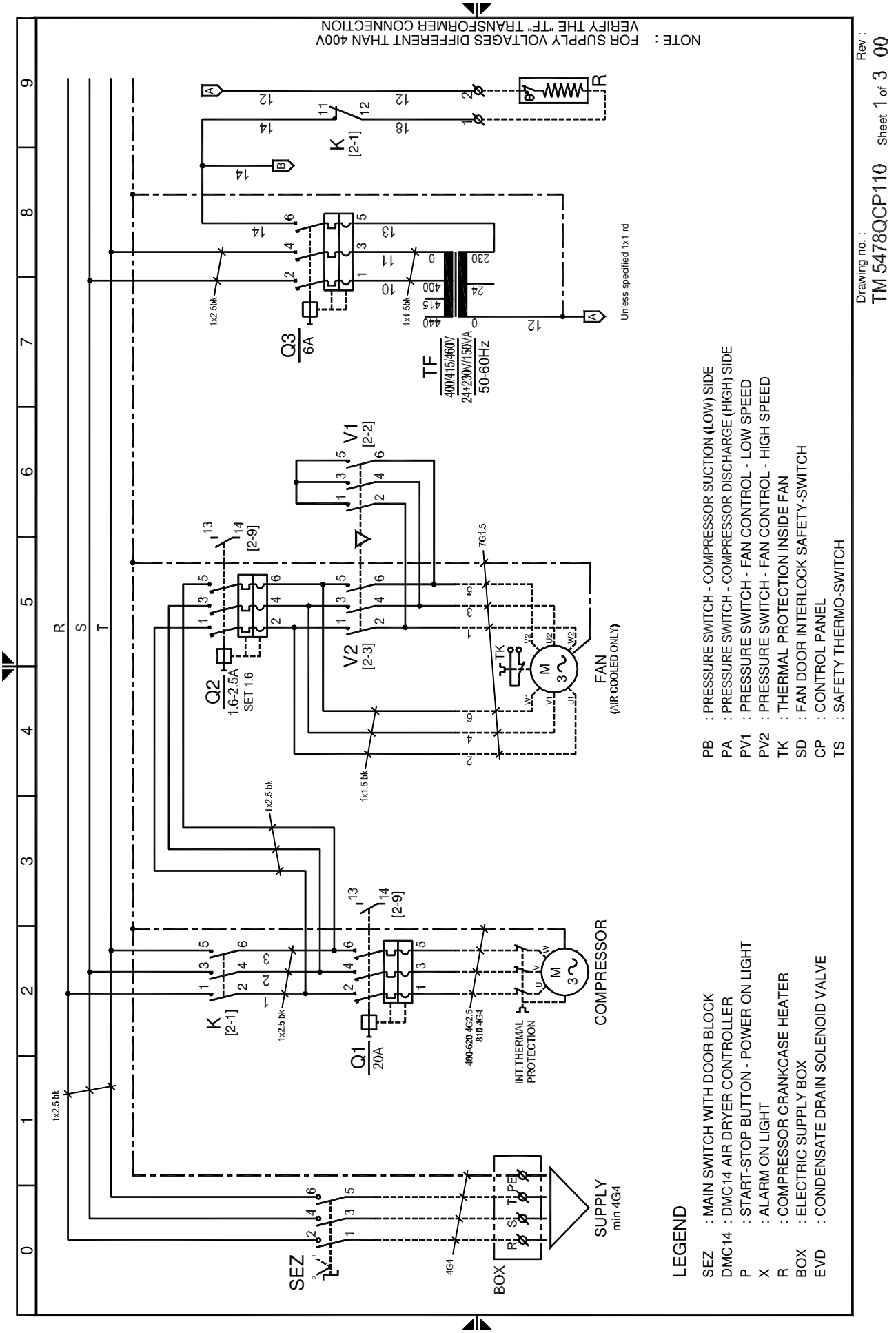
7.3.5 MD 185-410 - DMC14



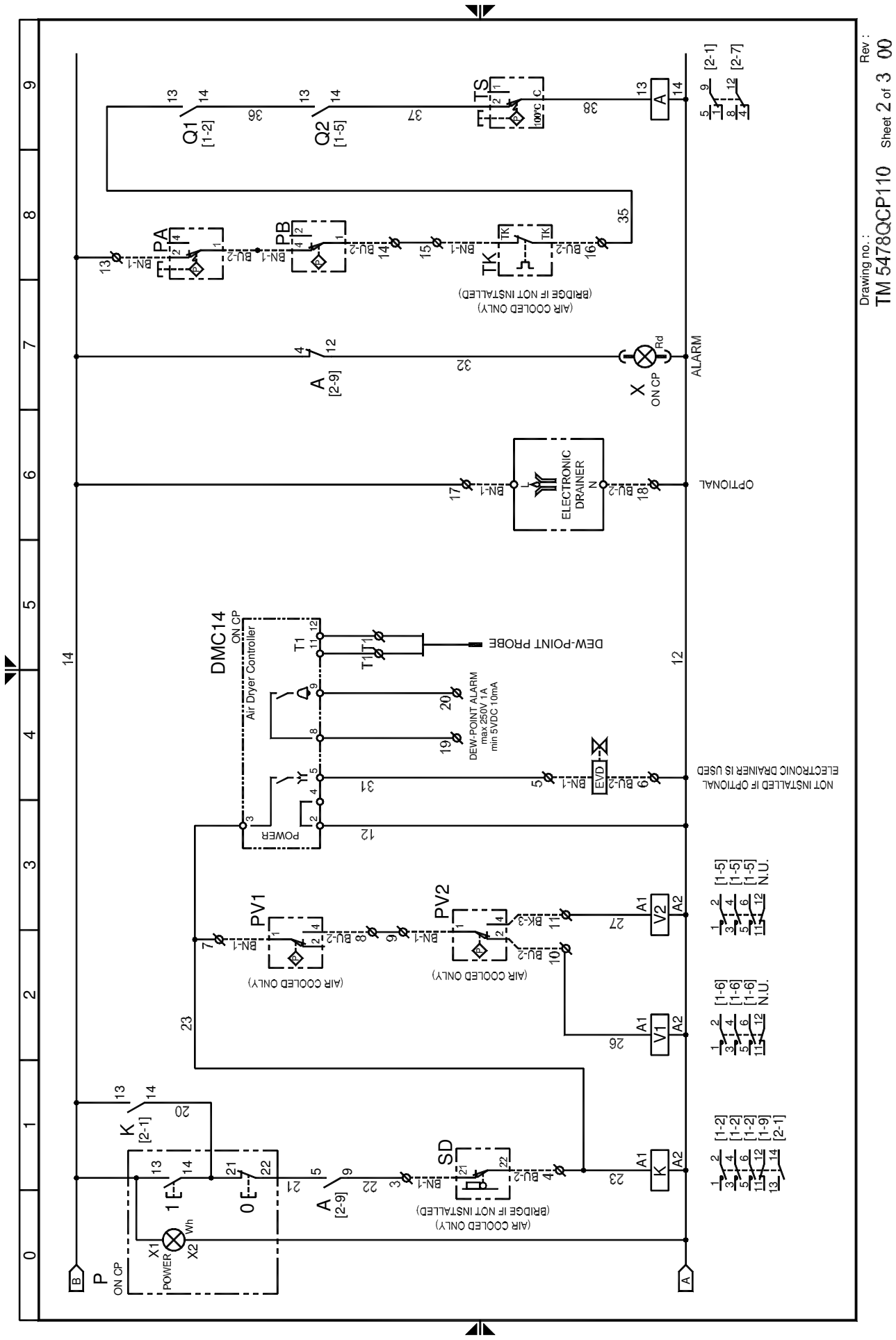
7.3.6 MD 185-410 - DMC14



7.3.7 MD 480-810 - DMC14



7.3.8 MD 480-810 - DMC14



7.3.9 MD 480-810 - DMC14