

Pilot TFD6-220 Refrigerated Compressed Air Treatment System



REFRIGERATED AIR DRYERS



TFD 6-220

User's Maintenance & Spare Parts Manual

Dear Customer,

Thank you for choosing our product. In order to get the best performance 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 TFD xxx 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.

Best Regards,



PILOT AIR COMPRESSORS

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1 Identification plate

The identification plate is located on the back of the dryer and shows all the primary data of the machine. This data should always be referred to when calling the manufacturer or distributor. The removal or alteration of the identification plate will void the warranty rights.

2 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.

3 Safety rules

3.1 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.



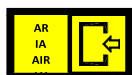
Danger hazard: In case of fire, use an approved fire extinguisher, water is not an acceptable means in cases of fire.



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



Operations which can be performed 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.

3.2 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 R407C 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.

3.3 Proper use of the dryer

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

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

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

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

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



The purpose of the machine is the separation of water and eventual oil particles present in compressed air.



The dried air cannot be used for breathing purposes or for operations leading to direct contact with foodstuff.

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

3.4 Instructions for the use of pressure equipment according to PED directive 2014/68/EU

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 data nameplate.
2. Welding on heat-exchanger is not recommended.
3. The equipment must not be stored in badly ventilated spaces, near a heat source or inflammable substances.
4. Vibration must be eliminated from the equipment to prevent fatigue failure.
5. Automatic condensate drains should be checked for operation every day to prevent a build up of condensate in the pressure equipment.
6. The maximum working pressure stated on the manufacturer's data nameplate 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.

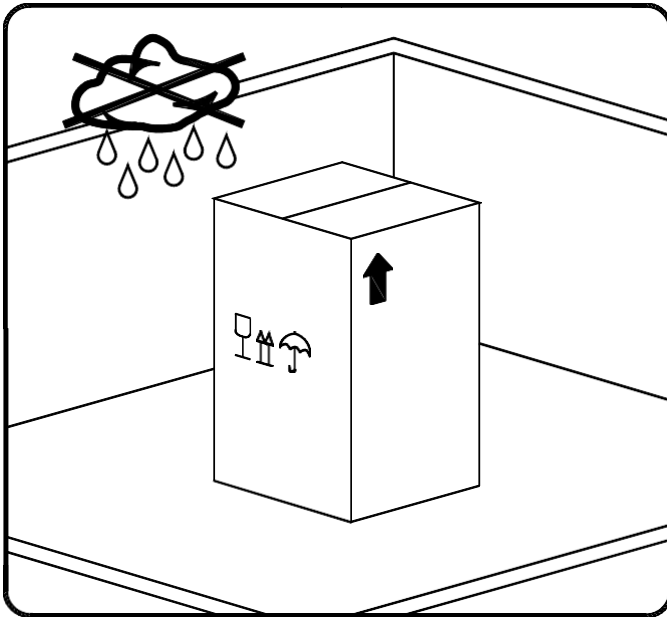
4 Installation

4.1 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.

- To move the packaged unit we recommend using a suitable trolley or forklift truck. Hand carrying is not recommended.
- 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.
- Handle with care. Heavy blows could cause irreparable damage.

4.2 Storage



SCC0001

- 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 temperature of +1°C...+50°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.

4.3 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:

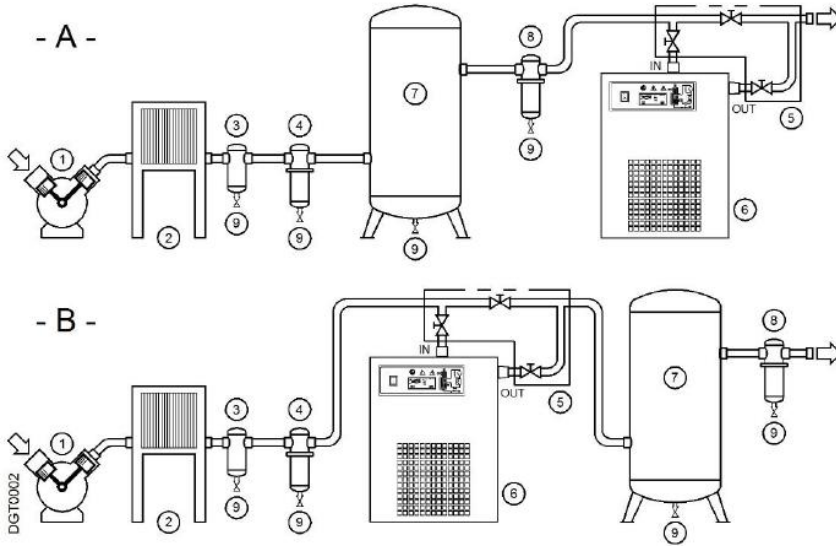
- Select a clean dry area, free from dust, and protected from atmospheric disturbances.
- The supporting area must be smooth, horizontal and able to hold the weight of the dryer.
- Minimum ambient temperature +1°C.
- Maximum ambient temperature +50°C.
- Ensure a proper cooling air replacement.
- Allow a sufficient clearance on each side of the dryer for proper ventilation and to facilitate maintenance operations.

The dryer does not require attachment to the floor surface.



Do not block, even partially, ventilation grid.
Avoid any possible re-circulation of the exhaust cooling air.
Protect the dryer from air drafts or forced cooling air conditions.

4.4 Installation layout



- 1 Air compressor
- 2 Aftercooler
- 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).

Installation

4.5 Correction factors

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

Correction factor for ambient temperature, inlet temperature and DewPoint changes (F2) :																
Ambient Temp. [°C]		≤30			35			40			45			50		
DewPoint [°C]		5	7	10	5	7	10	5	7	10	5	7	10	5	7	10
Inlet air Temperature [°C]	≤40	1.03	1.26	1.45	0.99	1.21	1.39	0.94	1.15	1.32	0.87	1.06	1.22	0.78	0.96	1.10
	45	0.85	1.04	1.20	0.82	1.00	1.15	0.78	0.95	1.09	0.72	0.88	1.01	0.65	0.79	0.91
	50	0.69	0.84	0.97	0.66	0.81	0.93	0.63	0.77	0.88	0.58	0.71	0.82	0.52	0.64	0.74
	55	0.59	0.72	0.83	0.57	0.69	0.79	0.54	0.66	0.75	0.50	0.61	0.70	0.54	0.55	0.63
	60	0.51	0.62	0.72	0.49	0.60	0.69	0.47	0.57	0.66	0.43	0.53	0.61	0.39	0.47	0.55
	65	0.46	0.56	0.65	0.44	0.54	0.62	0.42	0.51	0.59	0.39	0.48	0.55	0.35	0.43	0.49
	70	0.43	0.52	0.60	0.41	0.50	0.58	0.39	0.48	0.55	0.36	0.44	0.51	0.32	0.40	0.45

How to find the air flow capacity:	
Air flow capacity = Nominal duty x Factor (F1) x Factor (F2)	
<p>Example: A TFD 22 has a nominal duty of 132 m³/h. What is the maximum allowable flow through the dryer under the following operating conditions: Inlet air pressure = 8 barg → Factor (F1) = 1.05</p> <p> Ambient temperature = 40°C Pressure DewPoint = 10°C Inlet air temperature = 50°C } Factor (F2) = 0.88</p> <p>Each item of data has a corresponding numerical factor which multiplied by the design air flow is as follows:</p>	
Air flow capacity = 132 x 1.05 x 0.88 = 122 m³/h	
122 m³/h 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 = $\frac{\text{Design air flow}}{\text{Factor (F1) x Factor (F2)}}$	
<p>Example: With the following operating parameters: Design air flow = 100 m³/h Inlet air pressure = 6 barg → Factor (F1) = 0.93</p> <p> Ambient temperature = 45°C Pressure DewPoint = 7°C Inlet air temperature = 60°C } Factor (F2) = 0.53</p> <p>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:</p>	
Minimum std. air flow rate = $\frac{100}{0.93 \times 0.53} = 203 \text{ m}^3/\text{h}$	
Therefore the model suitable for the conditions above is TFD 45 (270 m³/h - nominal duty).	

4.6 Connection to the compressed air system



Operations to be performed by qualified personnel only.

Never work on system under pressure.

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

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

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 final refrigerator could result necessary. In order to perform maintenance operations, it is recommended to install a dryer by-pass system.



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.

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 SHOWN IN THE DIAGRAM.

FAILING WILL RESULT IN DAMAGE.

4.7 Electrical connections



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

Before connecting the unit to the electrical supply, verify the data nameplate for the proper electrical information. Voltage tolerance is +/- 10%.

Dryer are supplied with power cord and plug (two poles and ground) or with a junction box.

Be sure to provide the proper fuses or breakers based on the data information located on the nameplate.

A residual-current device (RCD) with $I_{\Delta n} = 0.03A$ is suggested. 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.



Important: ensure that the dryer is earthed.
Do not use any socket adapters at the mains plug.
If the mains plug needs to be replaced, this must only be done by a qualified electrician.

TFD 150 — 220



CAUTION:

ATTENTION SHOULD BE PAID ON THE ROTATING DIRECTION OF THE COMPRESSOR!

The rotating direction of the compressor in this machine is checked out by a Reverse Phase Protector (RPP).

If the compressor does not run, the rotating direction must be changed by swapping two phases. These changes have to be done only by a qualified electrician.

DO NOT BY PASS RPP PROTECTION: BY OPERATING THE MACHINE IN WRONG ROTATING DIRECTION, THE COMPRESSOR WILL FAIL IMMEDIATELY AND THE WARRANTY WILL BE VOIDED.



Important: ensure that the dryer is earthed.
Do not use any socket adapters at the mains plug.
If the mains plug needs to be replaced, this must only be done by a qualified electrician.

4.8 Condensate drain



The condensate is discharge at the system pressure.
Drain line should be secured.



Never point the condensate drain line towards anybody.

The dryer comes already fitted with a timed condensate drainer (solenoid valve controlled by electronic instrument) or with an electronic condensate drainer (optional).

Connect and properly fasten the condensate drain to a collecting plant or container.
The drain cannot be connected to pressurized systems.



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

5 Start-up

5.1 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.

5.2 First start-up



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



Sequence of operations (refer to paragraph 7.1 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 switch - pos. 1 on the control panel.
- Ensure that electronic instrument is ON.
- Ensure the consumption matches with the values of the data plate.
- 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.



TFD 150 — 220

CAUTION:

ATTENTION SHOULD BE PAID ON **THE ROTATING DIRECTION OF THE COMPRESSOR!**

The rotating direction of the compressor in this machine is checked out by a Reverse Phase Protector (RPP).

If the compressor does not run, the rotating direction must be changed by swapping two phases. These changes have to be done only by a qualified electrician.

DO NOT BY PASS RPP PROTECTION: BY OPERATING THE MACHINE IN WRONG ROTATING DIRECTION, THE COMPRESSOR WILL FAIL IMMEDIATELY AND THE WARRANTY WILL BE VOIDED.

5.3 Start-up and shut down



TFD 150 — 220 - 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 7.1 Control Panel)

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



Shut down (refer to paragraph 7.1 Control Panel)

- Check that the DewPoint temperature indicated on the electronic instrument is within range.
- Shut down the air compressor.
- After a few minutes, turn OFF the switch - pos. 1 on the control panel.



TFD 150 — 220 - Dryer remote control ON-OFF

- Remove jump on terminals 1 and 2 of the terminal strip and wire a dry contact — potential free (see electric diagram).
- Turn ON the switch - pos. 1 on the control panel.
- Close contact on terminal 1 and 2 switch ON the dryer
- Open contact on terminal 1 and 2 switch OFF the dryer

Start-up



Use dry contacts only (potential free) suitable for 230 Vac. Assure an adequate isolation of potentially dangerous powered parts.



CAUTION :

AUTO-RESTART / REMOTE ON-OFF.

THE DRYER MAY POWER UP WITHOUT BEING ACTED UPON.

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

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

During the operation, the refrigerant 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.

Frequent starts may cause irreparable damage.

The user is responsible for compliance with these rules.

6 Technical Data
6.1 TFD 6 -120

MODEL	TFD	6	10	15	22	30	45	60	72	85	100	120	22-E	30-E	45-E	60-E	72-E	85-E	100-E	120-E
Air flow rate at nominal condition (1)	[m ³ /h]	38	60	90	132	180	270	360	432	510	600	720	132	180	270	360	432	510	600	720
	[l/min]	600	1000	1500	2200	3000	4500	6000	7200	8500	10000	12000	2200	3000	4500	6000	7200	8500	10000	12000
	[scfm]	21	35	53	78	106	159	212	254	300	353	777	78	106	159	212	254	300	353	777
Pressure DewPoint at nominal condition (1)																				
Nominal ambient temperature																				
Min...Max ambient temperature																				
Nominal inlet air temperature (max.)																				
Nominal inlet air pressure																				
Max. inlet air pressure																				
Air pressure drop - Δp																				
Inlet - Outlet connections																				
Refrigerant type																				
Refrigerant quantity (2)																				
Cooling air fan flow																				
Heat Rejection																				
Standard Power Supply (2)																				
Nominal electric consumption																				
Nominal electric consumption																				
Full Load Amperage FLA																				
Max. noise level at 1 m																				
Weight																				

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

(2) Check the data shown on the identification plate.

Technical Data

6.2 TFD 150 – 220

MODEL	TFD	150	180	220	150-R	180-R	220-R	150-F	180-F	220-F
Air flow rate at nominal condition (1)	[m3/h]	900	1110	1320	900	1110	1320	900	1110	1320
	[l/min]	15000	18500	22000	15000	18500	22000	15000	18500	22000
	[scfm]	530	653	777	530	653	777	530	653	777
Pressure DewPoint at nominal condition (1)		7								
Nominal ambient temperature		35								
Min... Max ambient temperature		1 ... 50								
Nominal inlet air temperature (max.)		45 (70)								
Nominal inlet air pressure		7								
Max. inlet air pressure		14								
Air pressure drop - Δp		0,27	0,18	0,25	0,27	0,18	0,25	0,27	0,18	0,25
Inlet - Outlet connections		G 2"	G 2 1/2"		G 2"	G 2 1/2"		G 2"	G 2 1/2"	
Refrigerant type		R407C								
Refrigerant quantity (2)		1,65	1,70	1,90	1,75	1,70	2,00	1,75	1,70	2,00
Cooling air fan flow		4050	6250	6250	4200	6350	6350	4200	6350	6350
Heat Rejection		11,70	14,40	17,20	14,90	15,60	18,90	14,90	15,60	18,90
Standard Power Supply (2)		3/400/50								
Nominal electric consumption		2,60	3,50	3,80	3,75	3,80	4,40	3,75	3,80	4,40
Full Load Amperage FLA		4,7	6,2	6,7	6,2	6,3	6,5	9,9	10,0	11,6
Max. noise level at 1 m		8,7	10,2	11,2	8,7	8,7	10,5	8,7	8,7	10,5
		< 75								
Weight		160	190	198	160	190	198	164	194	202

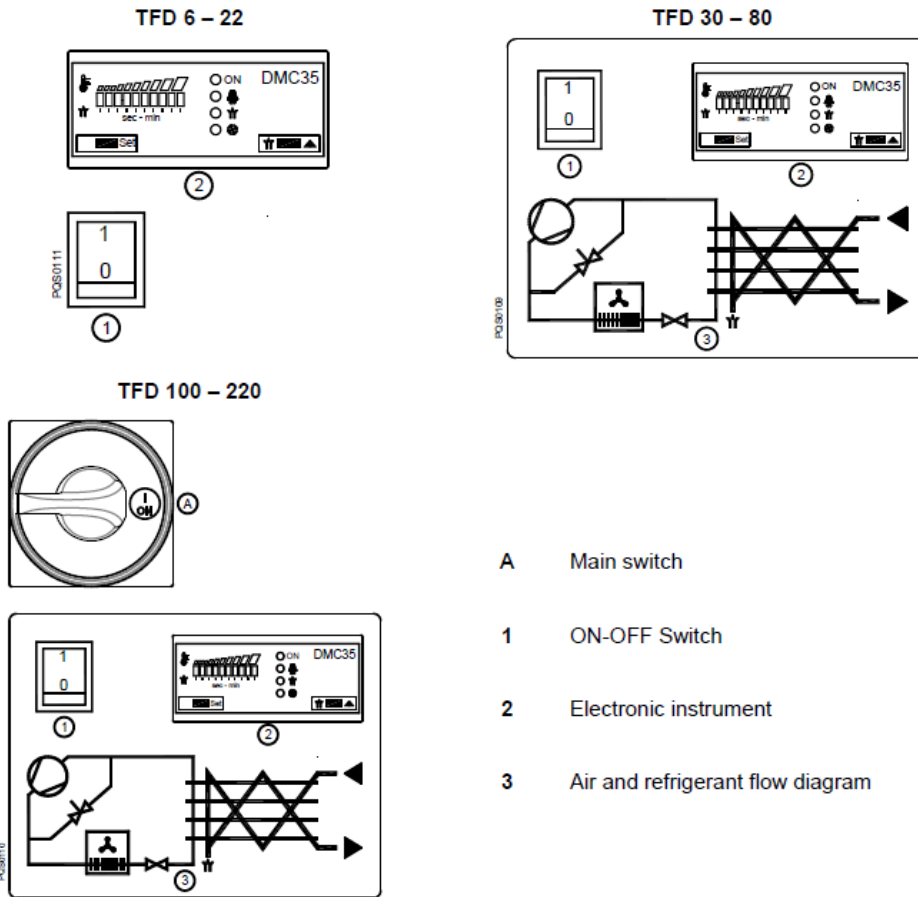
(1) The nominal condition refers to an ambient temperature of +25°C with inlet air at 7 barg and +35 °C.

(2) Check the data shown on the identification plate.

7 Technical description

7.1 Control panel

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

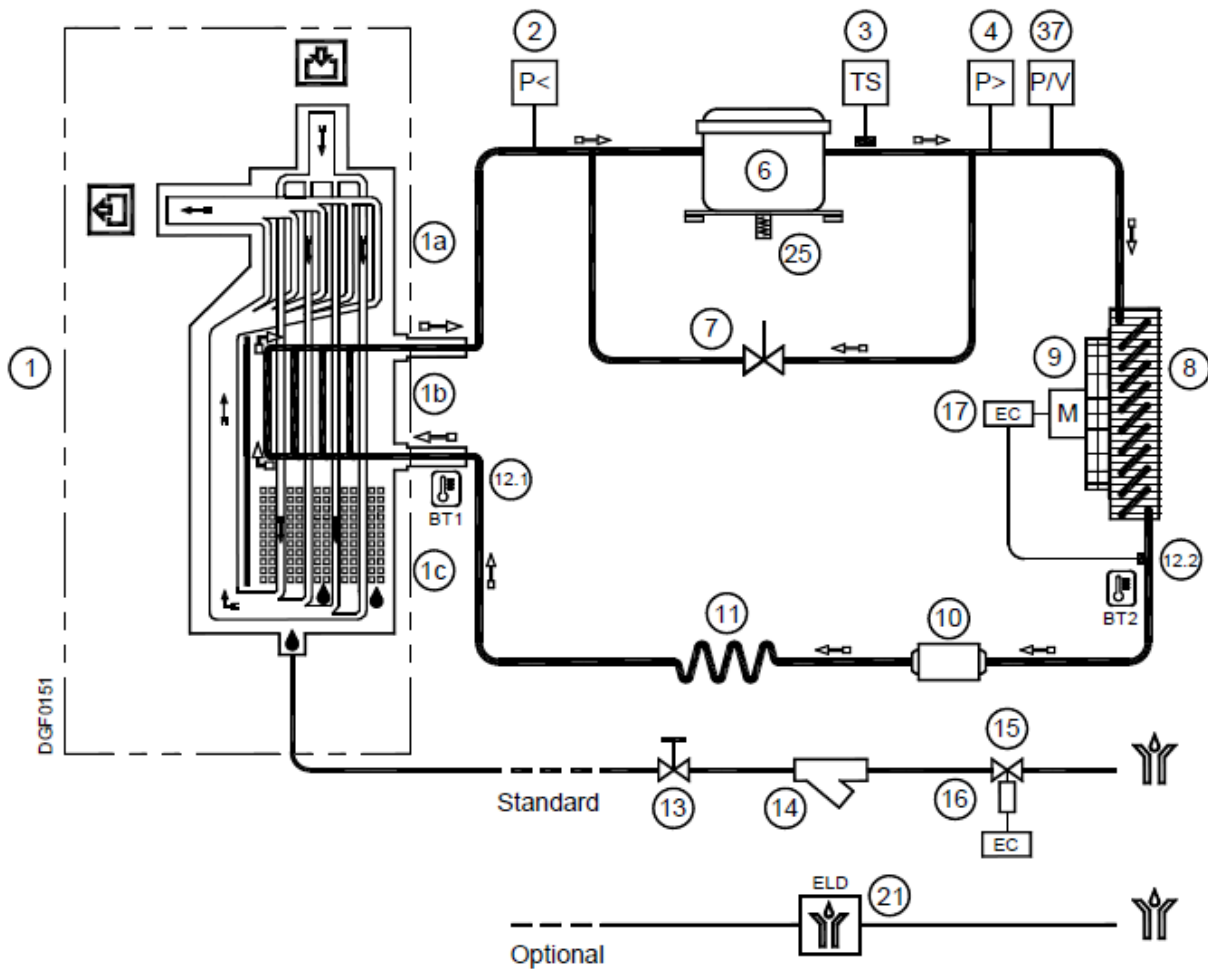


7.2 Operation

Operating principle - The dryer models described in this manual operate all on the same principle. 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.

7.3 Flow diagram



- | | | | |
|----|---|------|--|
| 1 | Alu-Dry module | 11 | Capillary tube |
| 1a | Air-to-air heat exchanger | 12.1 | Temperature probe BT1 – DewPoint |
| 1b | Air-to-refrigerant heat exchanger | 12.2 | Temperature probe BT2 – Fan control (TFD 6-22) |
| 1c | Condensate separator | 13 | Condensate drain service valve |
| 2 | Refrigerant pressure switch LPS (TFD 100-220) | 14 | Condensate drain strainer |
| 3 | Safety thermo switch TS (TFD 60-220) | 15 | Condensate drain solenoid valve |
| 4 | Refrigerant pressure switch HPS (TFD 100-220) | 16 | Coil for condensate drain solenoid valve |
| 6 | Compressor | 17 | Electronic instrument |
| 7 | Hot gas by-pass valve | 21 | Electronic drainer |
| 8 | Condenser | 25 | Compressor crankcase heater (TFD 150-220) |
| 9 | Condenser fan | 37 | Pressure Transducer BP2 – Fan control (TFD 30-220) |
| 10 | Filter dryer | | |

→ Compressed air flow direction

⇨ Refrigerant gas flow direction

7.4 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 refrigerant gas, flowing through the coils before reaching the compression cylinders cools the electric motor. The thermal protection protects the compressor from overheating and over currents. The protection is automatically restored as soon as the nominal temperature conditions are reached.

7.5 Condenser

The condenser is the component in which the gas coming from the compressor is cooled down and condensed becoming a liquid.

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.

7.6 Filter dryer

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

7.7 Capillary tube

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

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

7.8 Alu-Dry module

The heat exchanger module houses the air-to-air, the air-to-refrigerant heat exchangers and the demister type condensate separator. The counter flow of compressed air in the air-to-air heat exchanger ensures maximum heat transfer. The generous cross section of flow channel within the heat exchanger module leads to low velocities and reduced power requirements. The generous dimensions of the air-to-refrigerant heat exchanger plus the counter flow gas flow allows full and complete evaporation of the refrigerant (preventing liquid return to the compressor). The high efficiency condensate separator is located within the heat exchanger module. No maintenance is required and the coalescing effect results in a high degree of moisture separation.

Technical Description

7.9 Hot Gas By-pass Valve

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



ADJUSTMENT

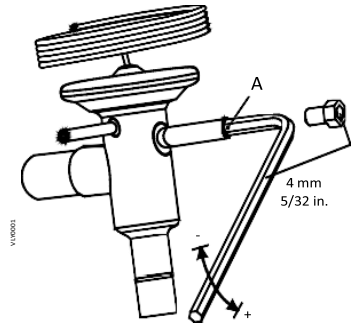
The hot gas by-pass valve is adjusted during the manufacturing testing phase. As a rule no adjustment is required; anyway if it is necessary the operation must be carried out by an experienced refrigerating engineer.

WARNING

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

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

Hot gas setting : R134.a pressure 2.0 barg (+0.1 / -0 bar)
R407C pressure 4.5 barg (+0.1 / -0 bar)



7.10 Refrigerant Pressure Switches LPS – HPS

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

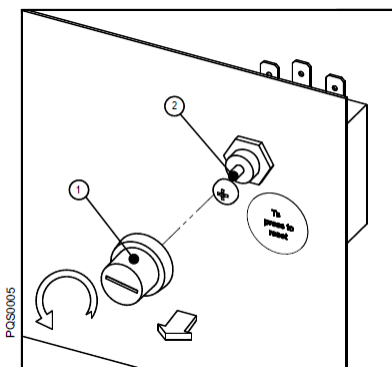
LPS: Low-pressure protection device on the suction side of the compressor, trips if the pressure drops below the pre-set value. The values are automatically reset when the nominal conditions are restored.

Calibrated Pressure : R 407 C Stop 1.7 barg - Restart 2.7 barg

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

Calibrated Pressure : R 407 C Stop 30 barg - Manual reset (P<23 bar)

7.11 Safety Thermo Switch TS

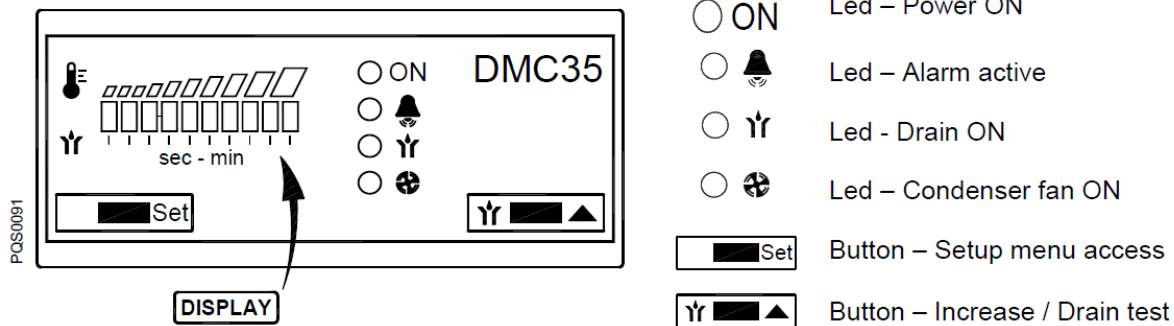


To protect the operating safety and the integrity of the dryer, a thermo switch (TS) is installed on the refrigerant gas circuit. The thermo switch sensor, in case of unusual discharge temperatures, stops the refrigerating compressor before it is permanently damaged.

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

TS setting: Temperature 113 °C (+0 / -6 °K)

7.12 Compressor Crankcase Heater



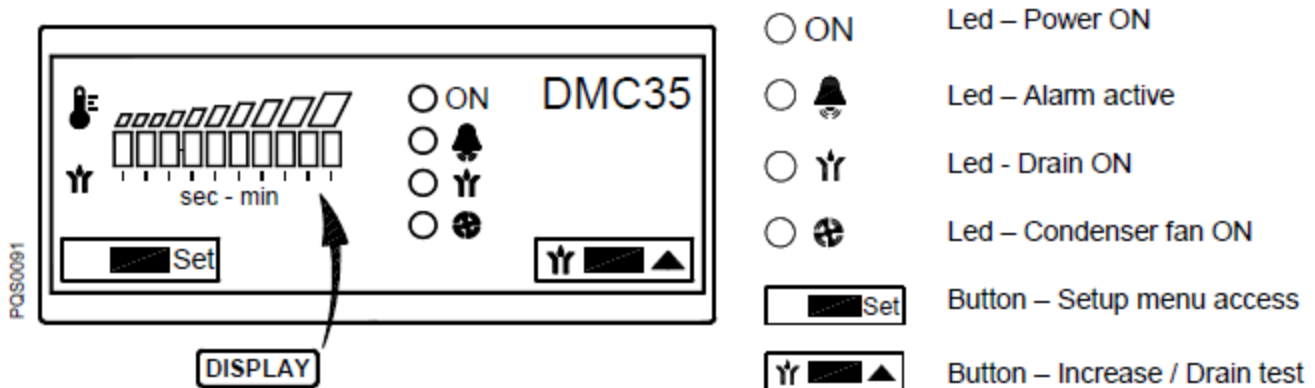
The DMC35 displays DewPoint temperature, controls the condenser fan activation, controls the timed drainer and keep record of the total hours of operation of the dryer.

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.






7.13 Electronic Instrument DMC 15 (Standard)



The DMC35 displays DewPoint temperature, controls the condenser fan activation, controls the timed drainer and keep record of the total hours of operation of the dryer.

Technical Description

7.13.1 How to Switch On the Dryer

- Power the dryer and switch it on using the ON-OFF switch (pos.1 paragraph 7.1).
- During normal operation led  ON is ON and the display shows the DewPoint temperature by means of two coloured areas (green and red) above a 10 Led display :
 - Green area - operating conditions ensuring an optimal DewPoint;
 - Red area - DewPoint too high, the dryer is operating with high thermal load (high inlet air temperature, high ambient temperature, etc.). Compressed air treatment may be improper.
- Led  shows that one or more service warnings / alarms are active.
- Led  shows that condensate drain solenoid valve is ON.
- Led  shows that condenser fan is ON.
- The condensate drain test is always active using the button .









7.13.2 How to Switch Off the Dryer

- Switch it off using the ON-OFF switch (pos. 1 paragraph 7.1).



7.13.3 How a Service Warning / Alarm is Displayed



- A service warning / alarm is an unusual event that must recall the attention of the operators / maintenance technicians. It does not stop the dryer.
- Service warnings / alarms are automatically reset as soon as the problem is solved and dryer is powered again.

NOTE: the operator / maintenance technician must inspect the dryer and verify / solve the problem that generated the service warning.

Service Warning / Alarm	Description
Led   and display 1st (left) and 10th (right) led are flashing	Failure BT1 (DewPoint) temperature probe.
Led   and led   are flashing	Failure BT2/BP2 (fan control) probe. NOTE : fan is forced always ON.
Led   and display 1st (left) led are flashing	DewPoint too low (lower than -1°C / 30°F).



7.13.4 How is controlled the condenser fan


TFD 6-22 A temperature probe BT2 is located on the discharge side of the condenser. The condenser fan is activated (ON) when the BT2 temperature is higher than FANon setting (approx. 35°C/96°F) and led   is ON. Condenser fan stops when BT2 temperatures is lower than FANoff setting (approx. 30°C/86°F).



TFD 30-220 A pressure probe BP2 is located on the discharge side of the compressor. The condenser fan is activated (ON) when the BP2 pressure is higher than FANon setting (approx. 18 barg/260 psig) and led   is ON. Condenser fan stops when BP2 pressure is lower than FANoff setting (approx. 14 barg/203 psig).

Technical Description

7.13.5 How is controlled the drain solenoid valve



Drain solenoid valve is activated (ON) for T_{ON} seconds (standard 2 seconds) every T_{OFF} minutes (standard 1 minute).
Led   shows that condensate drain solenoid valve is ON.


The condensate drain test is always active using the button .



NOTE : if an electronic drainer is installed, DMC35 is set to keep always powered the drain output, Led   is always OFF and condensate drain test does not work.




7.13.6 How to display the total hours of operation

Total hours of operation are recorded into DMC35 and are shown through the dew point indication bar (max value 109900 hours, cannot be reset).


With dryer ON press buttons  and  for at least 5 seconds.


Led  is lit and a certain number of leds of dew point indication bar are light up. The number of leds lit define the 1st digit of hour counter (ie : no leds lit \rightarrow 1st digit =0)

Press  button, led  is lit and a certain numbers of leds of dew point indication bar are light up. The number of leds lit define the 2nd digit of hour counter (ie : n.3 leds lit \rightarrow 2nd digit = 3)

Press  button, led   is lit and a certain numbers of leds of dew point indication bar are light up. The number of leds lit define the 3rd digit of hour counter (ie : n.8 leds lit \rightarrow 3rd digit = 8)

Total operating hours : 0 3 8 x 100 (fixed multiplying ratio) = 3800 hours

Press  button repeatedly to scroll the displaying of 3 digits again.


Press  button to exit total hours display (if no button is pressed after 30 seconds the menu is exited automatically).


7.13.7 How to change the operating parameters – SETUP Menu




The setup menu can be used to change the dryer's operating parameters.





Only qualified personnel must be allowed to access to the setup menu. The manufacturer is not responsible for malfunctioning or failure due to modification to the operating parameters.





With dryer ON press button  for at least 2 seconds to enter the setup menu.

Access to the menu is confirmed by led  flashing.



Keep  pressed and use arrows  to change the value. Release the button  to confirm the value.

Press shortly  to skip to following parameter.

Press  to exit setup menu (if no button is pressed after 2 minutes the menu is exited automatically).

Display	Description	Limits	Resolution	Standard setup
Synchronous flashing led  ON + led 	T_{ON} – drain time ON : time ON condensate drain valve (1)	1 ... 6 sec	1 sec	2
Non-Synchronous flashing led  ON + led 	T_{OFF} - drain time OFF : pause time for condensate drain valve	1 ... 10 min	1 min	1

NOTE : parameter values are displayed on the 10 led display where 1st (left) led is the lowest limit and 10th (right) is the highest limit.

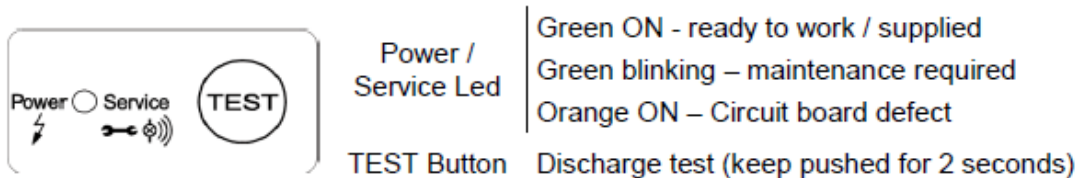
NOTE (1): T_{ON} set at the 10th led (right) keep drain output always powered and led   always off (used if electronic drainer is installed).

Technical Description

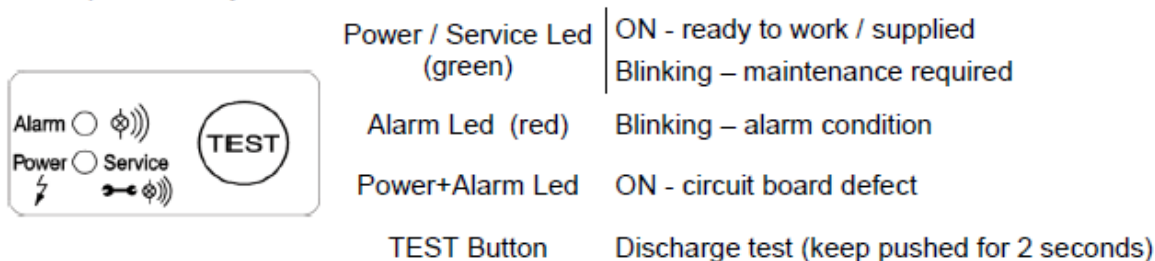
7.14 Electronic Drainer (Optional)

Instead of the usual drain system (a solenoid valve controlled by means of electronic instrument); an electronic level controlled drainer can be installed as option. This drainer consists of a condensate accumulator where a capacitive sensor continuously checking liquid level is placed: as soon as the accumulator is filled, the sensor passes a signal to the electronic control and a diaphragm solenoid valve will open to discharge the condensate. For a complete condensate discharge the valve opening time will be adjusted exactly for each single drain operation. 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 TFD 6 – 85



Control panel for dryers TFD 100 – 220



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.

PLEASE REFER TO INSTRUCTION MANUAL OF ELECTRONIC DRAINER

8 Maintenance, Troubleshooting, Spare Parts & Dismantling

8.1 Checks and Maintenance



Only qualified personnel should perform troubleshooting and or maintenance operations.

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

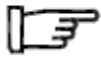


- no part of the machine is powered and that it cannot be connected to the mains supply.
- no part of the machine is under pressure and that it cannot be connected to the compressed air system.
- maintenance personnel have read and understand the safety and operation instructions in this manual.



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

Daily



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

Every 200 hours or monthly



MAX 2 bar / 30 psig

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



- Close the manual condensate drain valve, unscrew the strainer (if installed) 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 "Disconnects-Tabs" 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 flexible hoses, and replace if necessary.
- At the end, check the operation of the machine.

Every 8000 hours



- Replace Electronic drainer service unit

8.2 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.	<p>⇒ Verify that the system is powered.</p> <p>⇒ Verify the electric wiring.</p> <p>⇒ TFD 120-220 - Blow of fuse (FU2 on the electric diagram) of the auxiliary circuit - replace it and check the proper operation of the dryer</p>
◆ The compressor doesn't work.	<p>⇒ Activation of the compressor internal thermal protection - wait for 30 minutes, then retry.</p> <p>⇒ Verify the electric wiring.</p> <p>⇒ If installed - Replace the internal thermal protection and/or the start-up relay and/or the start-up capacitor and/or the working capacitor.</p> <p>⇒ If installed - The pressure switch HPS has been activated - see specific point.</p> <p>⇒ If installed - The pressure switch LPS has been activated - see specific point.</p> <p>⇒ If installed - The safety thermo switch TS has been activated - see specific point</p> <p>⇒ TFD 150-220 - during first startup – power phases of compressor are not connected properly (see RPP on the electric diagram) – Change rotating direction swapping two phases of the power supply of dryer. These changes have to be done only by a qualified electrician. DO NOT BY PASS RPP PROTECTION: BY OPERATING THE MACHINE IN WRONG ROTATING DIRECTION, THE COMPRESSOR WILL FAIL IMMEDIATELY AND THE WARRANTY WILL BE VOIDED</p> <p>⇒ TFD 120-220 – one phase of power supply is missing (see RPP on the electric diagram) – restore the missing phase.</p> <p>⇒ TFD 120-220 - Blow of fuse (FU1 on the electric diagram) - replace it and check the proper operation of the dryer.</p> <p>⇒ If the compressor still doesn't work, replace it.</p>
◆ Condenser's fan doesn't work.	<p>⇒ Verify the electric wiring.</p> <p>⇒ The DMC35 electronic instrument is faulty – replace it.</p> <p>⇒ Fan relay / power contactor (see KF/KV1 on the electric diagram) is faulty - replace it.</p> <p>⇒ TFD 150-220 - Blow of fuse (FU1 on the electric diagram) - replace it and check the proper operation of the dryer.</p> <p>⇒ There is a leak in the refrigerant circuit - contact a refrigeration engineer.</p> <p>⇒ If the fan still doesn't work, replace it.</p>

Maintenance, Troubleshooting, Spare Parts and Dismantling

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ DewPoint too high.	<ul style="list-style-type: none"> ⇒ The dryer doesn't start - see specific point. ⇒ The DewPoint probe BT1 doesn't correctly detect the temperature - ensure the sensor is pushed into the bottom of probe well. ⇒ The Compressor doesn't work - see specific point. ⇒ The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation. ⇒ The inlet air is too hot - restore nominal conditions. ⇒ The inlet air pressure is too low - restore nominal conditions. ⇒ The inlet air flow rate is higher than the rate of the dryer - reduce the flow rate - restore nominal conditions. ⇒ The condenser is dirty - clean it. ⇒ The condenser fan doesn't work - see specific point. ⇒ The dryer doesn't drain the condensate - see specific point. ⇒ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore nominal setting. ⇒ There is a leak in the refrigerant circuit - contact a refrigeration engineer.
◆ Dew Point too low	<ul style="list-style-type: none"> ⇒ The fan is always ON - the  yellow LED of DMC35 electronic instrument is flashing - see specific point. ⇒ Ambient temperature is too low - restore nominal conditions. ⇒ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore nominal setting.
◆ Excessive pressure drop within the dryer.	<ul style="list-style-type: none"> ⇒ The dryer doesn't drain the condensate - see specific point. ⇒ The DewPoint is too low - the condensate is frost and blocks the air - see specific point. ⇒ Check for throttling the flexible connection hoses.
◆ The dryer doesn't drain the condensate	<ul style="list-style-type: none"> ⇒ The condensate drain service valve is closed - open it. ⇒ Condensate 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 drain solenoid valve is failed – replace it. ⇒ Electronic instrument is faulty – replace it. ⇒ The DewPoint is too low - the condensate is frost and blocks the air - see specific point. ⇒ Inlet compressed air pressure is too low and condensate is not drained – restore nominal conditions. ⇒ Electronic drainer is not operating correctly (see paragraph 7.14).
◆ The dryer continuously drains condensate.	<ul style="list-style-type: none"> ⇒ 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 ⇒ Electronic drainer is dirty (see paragraph 7.14).
◆ Water within the line.	<ul style="list-style-type: none"> ⇒ The dryer doesn't start - see specific point. ⇒ If 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.

Maintenance, Troubleshooting, Spare Parts and Dismantling

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ If installed –HPS 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. 2. The condenser is dirty - clean it. 3. The condenser fan doesn't work - see specific point. ⇒ Reset the pressure switch pressing the button on the controller itself - verify the dryer for correct operation. ⇒ HPS pressure switch is faulty - contact a refrigeration engineer to replace it.
◆ If installed – LPS low pressure switch has been activated.	⇒ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer. ⇒ The pressure switch reset automatically when normal conditions are restored - check the proper operation of the dryer.
◆ If installed – TS safety thermo switch has been activated.	⇒ 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. The hot gas by-pass valve requires re-adjusting – contact a specialized technician to restore nominal setting. 7. Refrigerant gas leak - contact a refrigeration engineer. ⇒ Reset the thermo switch by pressing the button on the thermo switch itself – verify the correct operation of the dryer. ⇒ TS thermo switch is faulty - replace it.
◆ DMC35 -   and display 1st (left) and 10th (right) led are flashing.	⇒ Verify the electric wiring of BT1 DewPoint probe. ⇒ The BT1 DewPoint probe is faulty - replace it. ⇒ The electronic instrument is faulty - replace it.
◆ DMC35   and   are flashing	⇒ Verify the electric wiring of BT2/BP2 fan control probe. ⇒ The BT2/BP2 fan control probe is faulty - replace it. ⇒ The electronic instrument is faulty - replace it.
◆ DMC35   and display 1st (left) led are flashing	⇒ DewPoint too low - see specific point. ⇒ The BT1 DewPoint probe is faulty - replace it. ⇒ The electronic instrument is faulty - replace it.
◆ DMC35 Display 10th (right) led is flashing	⇒ DewPoint too high - see specific point. ⇒ The BT1 DewPoint probe is faulty - replace it. ⇒ The electronic instrument is faulty - replace it.

Maintenance, Troubleshooting, Spare Parts and Dismantling

8.3 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 system 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.

ID N.	DESCRIPTION	PART NUMBER	TFD										
			6	10	15	22	30	45	60	72	85	100	120
2	LPS	Pressure switch	5655NNN084									1	1
3	TS	Safety thermo switch	56141NN000						1	1	1		
4	HPS	Pressure switch	5655NNN082									1	1
37		Pressure transducer	5622NNN010				1	1	1	1	1	1	1
6	MC	Compressor	5015110104	1									
			5015110107		1								
			5015110117			1							
			5015110016				1						
			5030116005					1					
			5030116015						1				
			5030116020						1	1			
			5030116025								1		
			5030116040									1	1
7		Hot gas by-pass valve	64140SS160	1	1	1	1						
			64140SS151					1	1	1	1	1	1
8		Condenser	5810005007A	1									
			5810018004A		1	1							
			5810023004A				1						
			5810030006A					1					
			5810060006A						1				
			5810098006A						1	1			
			5810080005A								1		
			5810120002									1	1
9	MV	Complete fan	5250110004						1	1	1		
			5250110003									1	1
9.1	MV	Fan motor	5210110005A	1									
			5210110011A		1	1							
			5210110017A				1						
			5210110025A					1					
			5210110022A						1				
9.2		Fan blade	5215000010	1									
			5215000019		1	1							
			5215000023				1						
			5215000025					1					
			5215000034						1				
9.3		Fan grid	5225000010		1	1	1						
			5225000027					1					
			5225000030						1				
			5225000039									1	1
10		Filter drier	6650SS007	1	1	1	1						
			6650SSN001					1					
			6650SSN002						1	1	1	1	1
12	BT	Temperature probe	5625NNN046	2	2	2	2	1	1	1	1	1	1
13-14		Condensate drain valve/strainer	64355MN012	1	1	1	1	1					
13			64310MF150						1	1	1	1	1
14		Y strainer	64355FF011						1	1	1	1	1
15	EVD	Condensate drain solenoid valve	64320FF080	1	1	1	1	1					
			64320FF082						1	1	1	1	1
16		Coil for condensate drain solenoid valve	64N22MM001	1	1	1	1	1					
			64N22MM003						1	1	1	1	1
17	DMC35	Electronic instrument	5620150020	1	1	1	1						
			5620150021					1	1	1	1	1	1
21	ELD	Electronic drainer	2210BEK001J	1	1	1	1	1	1	1	1	1	1
		Service unit for electronic drainer	2210BEK067	1	1	1	1	1	1	1	1	1	1
22	S1	Lighted switch	5450SZN011	1	1	1	1	1	1	1	1	1	1
22	QS	Main switch	5450SZN147									1	1
	KF	Solid state relay	5456REL202						1	1	1	1	1

Maintenance, Troubleshooting, Spare Parts and Dismantling

ID N.		DESCRIPTION	PART NUMBER	TFD							
				22-E	30-E	45-E	60-E	72-E	85-E	100-E	120-E
2	LPS	Pressure switch	5655NNN084							1	1
3	TS	Safety thermo switch	56141NN000				1	1	1		
4	HPS	Pressure switch	5655NNN082							1	1
37		Pressure transducer	5622NNN010		1	1	1	1	1	1	1
6	MC	Compressor	5015115011	1							
			5030115005		1						
			5030115015			1					
			5030115020				1	1			
			5030115025						1		
			5030115030							1	1
7		Hot gas by-pass valve	64140SS180	1							
			64140SS151		1	1	1	1	1	1	1
8		Condenser	5810023004A	1							
			5810030006A		1						
			5810060000A			1					
			5810080005A				1		1		
			5810098006A					1			
			5810120002							1	1
9	MV	Complete fan	5250115012				1	1	1		
			5250110003							1	1
9.1	MV	Fan motor	5210110017A	1							
			5210115002A		1						
9.2		Filter drier	5210110022A			1					
			5215000023	1							
			5215000025		1						
9.3		Fan grid	5215000035			1					
			5225000010	1							
			5225000027		1						
			5225000030			1					
10		Filter drier	5225000039							1	1
			6650SSS007	1							
			6650SSN001		1						
12	BT	Temperature probe	6650SSN002			1	1	1	1	1	1
			5625NNN046	2	1	1	1	1	1	1	1
13-14		Condensate drain valve/strainer	64355MN012	1	1	1					
13			64310MF150				1	1	1	1	1
14		Y strainer	64355FF011				1	1	1	1	1
15	EVD	Condensate drain solenoid valve	64320FF080	1	1	1					
			64320FF085				1	1	1	1	1
16		Coil for condensate drain solenoid valve	64N22MM001	1	1	1					
			64N22MM003				1	1	1	1	1
17	DMC35	Electronic instrument	5620150020	1							
			5620150021		1	1	1	1	1	1	1
21	ELD	Electronic drainer	2210BEK001J	1	1	1	1	1	1	1	1
		Service unit for electronic drainer	2210BEK057	1	1	1	1	1	1	1	1
22	S1	Lighted switch	5450SZN011	1	1	1	1	1	1	1	1
22	QS	Main switch	5450SZN147							1	1
	KF	Solid state relay	5456REL202				1	1	1	1	1

ID N.		DESCRIPTION	PART NUMBER	TFD								
				150	180	220	150-R	180-R	220-R	150-F	180-F	220-F
2	LPS	Pressure switch	5655NNNN082	1	1	1	1	1	1	1	1	
3	TS	Safety thermo switch	56141NN000	1	1	1	1	1	1	1	1	
4	HPS	Pressure switch	5655NNNN084	1	1	1	1	1	1	1	1	
37		Pressure transducer	5622NNNN010	1	1	1	1	1	1	1	1	
			5030340015			1			1			
6	MC	Compressor	5030340014	1								
			5030340017		1		1	1		1	1	
			5030340010A									
7		Hot gas by-pass valve	64140SS151	1	2	2	1	2	1	2	2	
8		Condenser	5810120002	1	1	1	1	1	1	1	1	
9	MV	Complete fan	5250190000A	1			1		1			
			5250355001		1	1		1		1	1	
9.3		Fan grid	5225000039	1			1			1		
			5225000040		1	1		1		1	1	
10		Filter drier	6650SSN002	1	1	1	1	1	1	1	1	
12	BT	Temperature probe	5625NNNN046	1	1	1	1	1	1	1	1	
13		Condensate drain valve/strainer	64310MF150	1	1	1						
			64355MN012				1	1		1	1	
14		Y strainer	64355FF011	1	1	1						
15	EVD	Condensate drain solenoid valve	64320FF082	1	1	1						
			64320FF085				1	1	1	1	1	
16		Coil for condensate drain solenoid valve	64N22MM001	1	1	1						
			64N22MM003				1	1		1	1	
17	DMC35	Electronic instrument	5620150021	1	1	1	1	1	1	1	1	
21	ELD	Electronic drainer	2210BEK002J	1	1	1	1	1	1	1	1	
		Service unit for electronic drainer	2210BEK056	1	1	1	1	1	1	1	1	
22	S1	Lighted switch	5450SZN011	1	1	1	1	1	1	1	1	
	QS	Main switch	5450SZN147	1	1	1	1	1	1	1	1	
100	TR	Transformer	5440TFT021						1	1	1	

8.4 Maintenance Operation on the Refrigeration Circuit



Maintenance and service on refrigerating systems must be carried out only by certified refrigerating engineer 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 environment.

This dryer comes ready to operate and filled with R134a or R407C type refrigerant fluid.



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

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

Refer to the dryer nameplate for refrigerant type and quantity.

Characteristics of refrigerants used:

Refrigerant	Chemical formula	TLV	GWP
R134a - HFC	CH ₂ FCF ₃	1000 ppm	1430
R407C - HFC	R32/125/134a (23/25/52) CHF ₂ CF ₃ /CH ₂ F ₂ /CH ₂ FCF ₃	1000 ppm	1773.85

8.5 Dismantling of the Dryer

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



Part	Material
Refrigerant fluid	R407C, R134a, Oil
Canopy and Supports	Carbon steel, Epoxy paint
Refrigerating compressor	Steel, Copper, Aluminium, Oil
Alu-Dry Module	Aluminium
Condenser Unit	Aluminium, Copper, Carbon steel
Pipe	Copper
Fan	Aluminium, Copper, Steel
Valve	Brass, Steel
Electronic Level Drain	PVC, Aluminium, Steel
Insulation Material	Synthetic 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.

Refrigerant contains droplets of lubrication oil released by the refrigerating compressor.

Do not dispose this fluid in the environment. It has to be discharged from the dryer with a suitable device and then delivered to a collection centre where it will be processed to make it reusable.

9 Attachments

Exploded views – List of Components

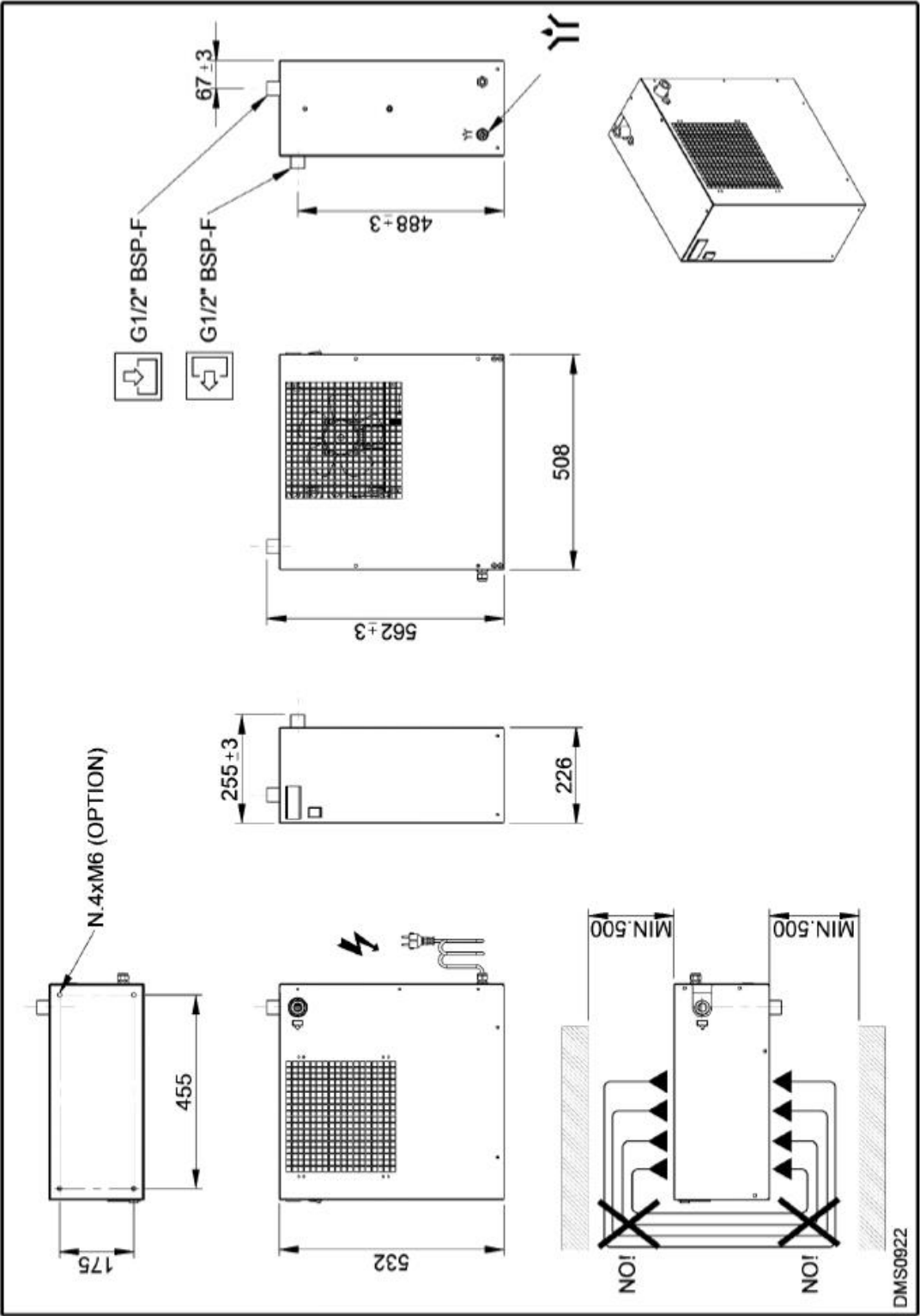
1	Alu-Dry module	21	Electronic drainer
1.1	Insulation material	22	Main switch
2	Refrigerant pressure switch LPS	37	Pressure transducer
3	Safety thermo switch TS	51	Front panel
4	Refrigerant pressure switch HPS	52	Back panel
6	Compressor	53	Right lateral panel
7	Hot-gas bypass valve	54	Left lateral panel
8	Condenser	55	Cover
9	Condenser fan	56	Base plate
9.1	Motor	57	Upper plate
9.2	Blade	58	Support beam
9.3	Grid	59	Support bracket
10	Filter dryer	60	Control panel
11	Capillary tube	61	Electric connecting plug
12	Temperature probe	62	Electric box
13	Condensate drain service valve	66	QE door
14	Condensate drain strainer	81	Flow diagram sticker
15	Condensate drain solenoid valve	83	HP Service valve
16	Coil for condensate drain solenoid valve	84	LP Service valve
17	Electronic instrument	100	Trasformer

Electric Diagrams – List of Components

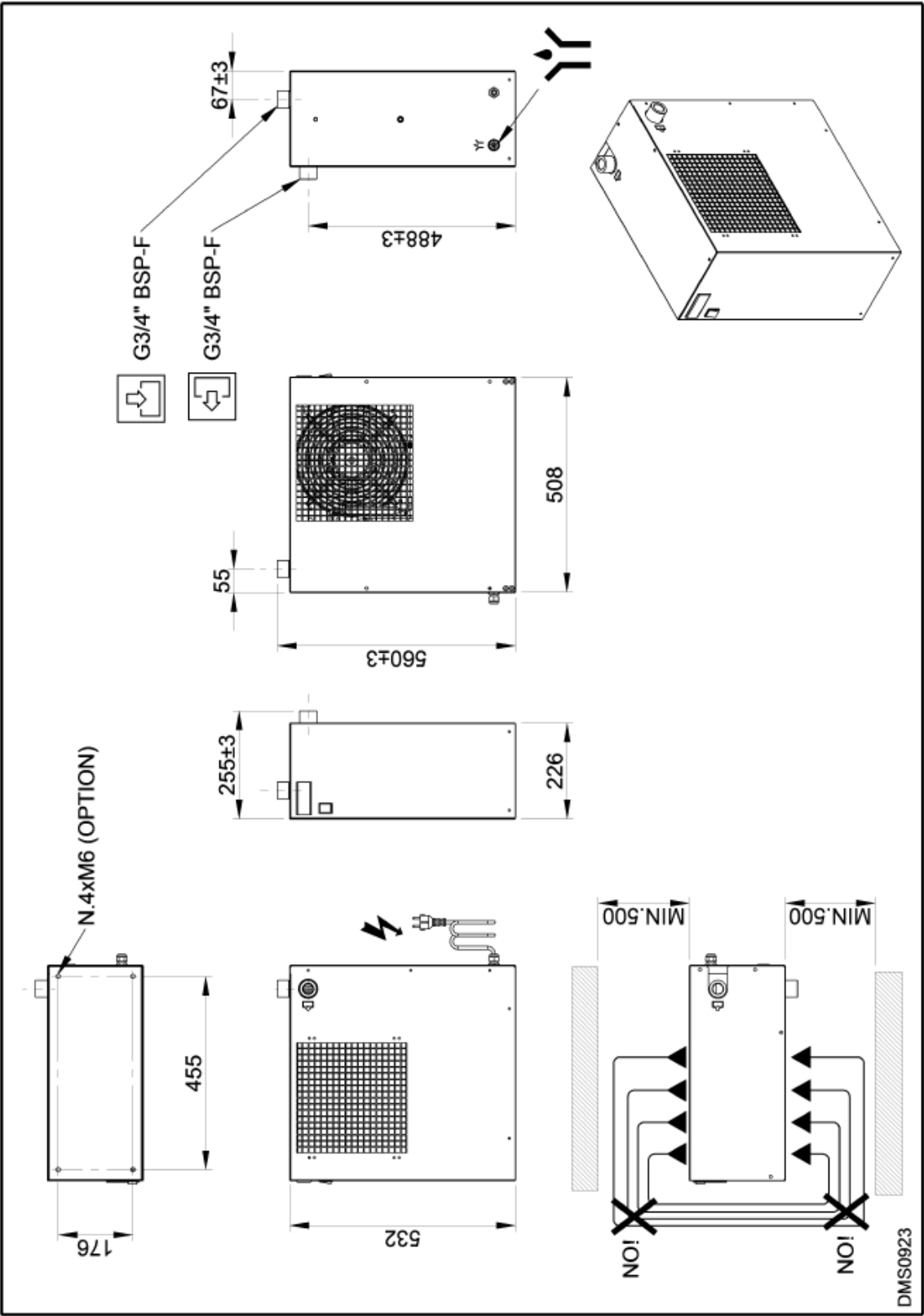
MC1	Compressor	LPS	Low pressure switch
KT	Compressor thermal protection	HPS	High pressure switch
KR	Compressor starting relay	TS	Safety thermo switch
CS	Compressor starting capacitor	EVD	Timed condensate drain solenoid valve
CR	Compressor operating capacitor	ELD	Electronic drainer
MV1	Condenser fan	S1	ON-OFF switch
KV	Fan thermal protection	QS	Main switch with door block
CV	Fan starting capacitor	RC	Compressor crankcase heater
DMC35	Electronic instrument	BOX	Electrical box
BT1-2	Temperature probes	RPP	Reverse phase protector
BP2	Pressure Transducer		
NT1	Air-Cooled only	NT5	Limit of equipment
NT2	Verify transformer connection according to power supply voltage	NT6	Timed drain output
NT3	Jump if not installed	NT7	Water Cooled only
NT4	Provided and wired by customer		
BN	Brown	OR	Orange
BU	Blue	RD	Red
BK	Black	WH	White
YG	Yellow / Green	WH/BK	White / Black

9.1 Dryer Dimensions

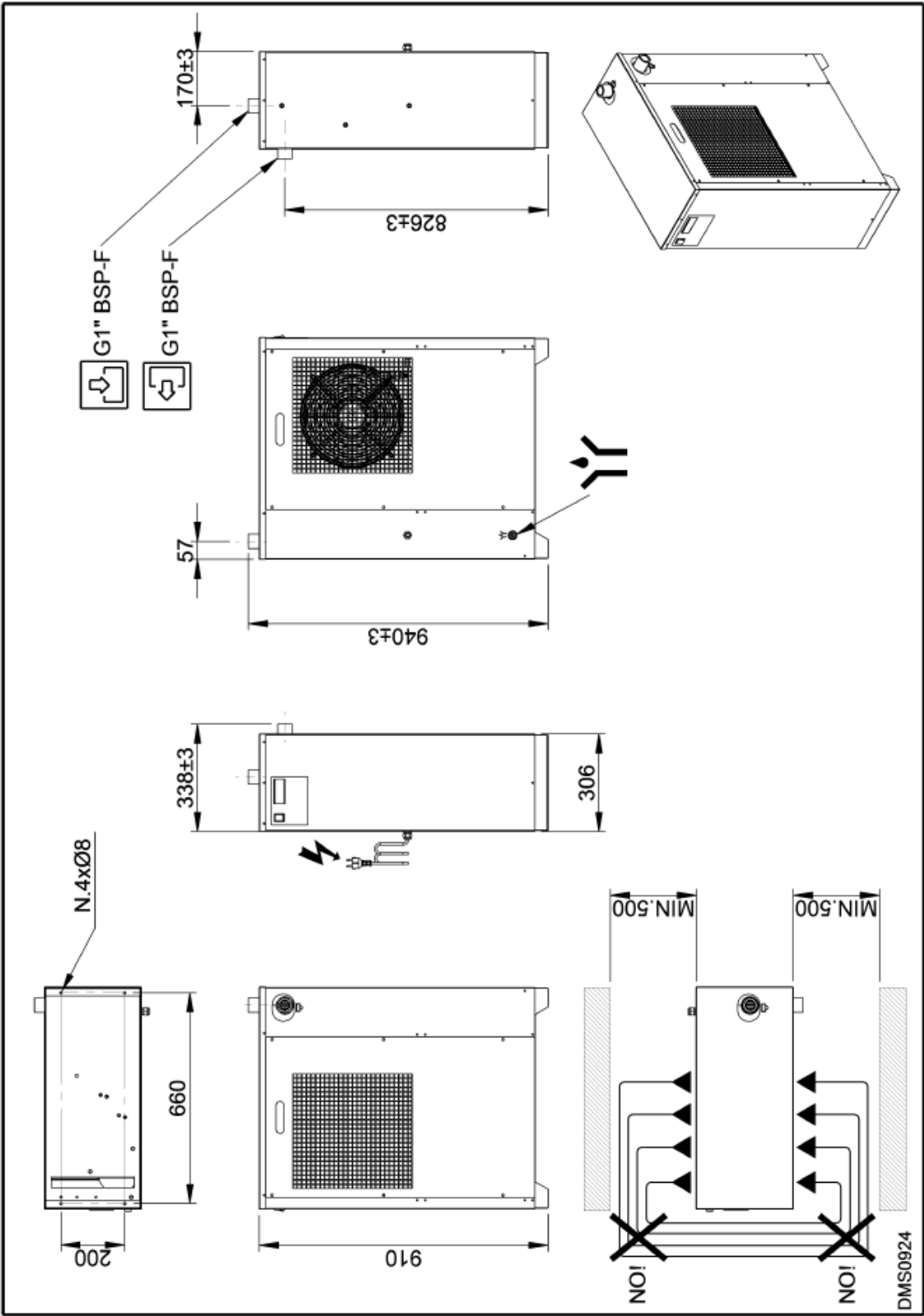
9.1.1 TFD 6 – 10



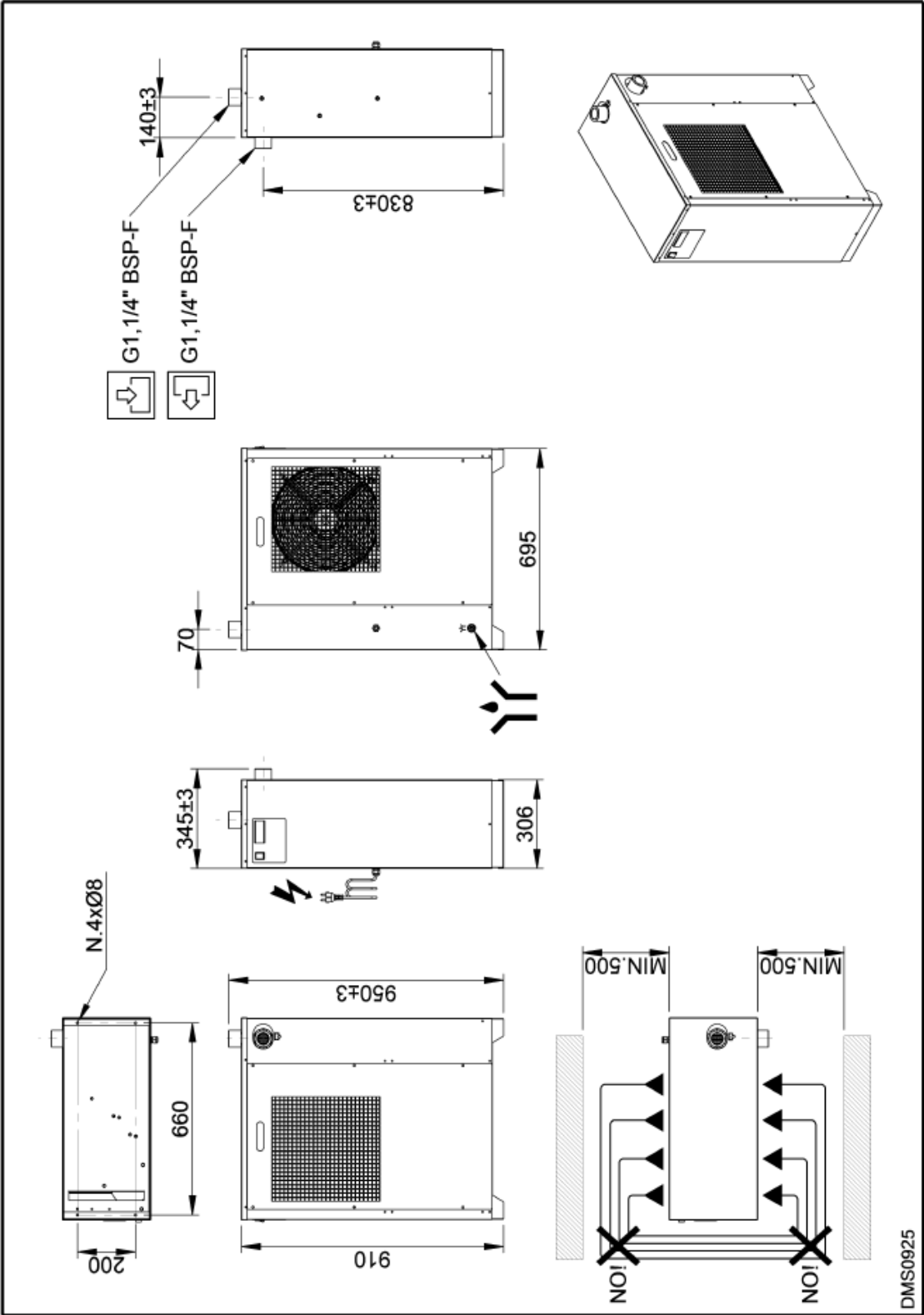
9.1.2 TFD 15 - 22



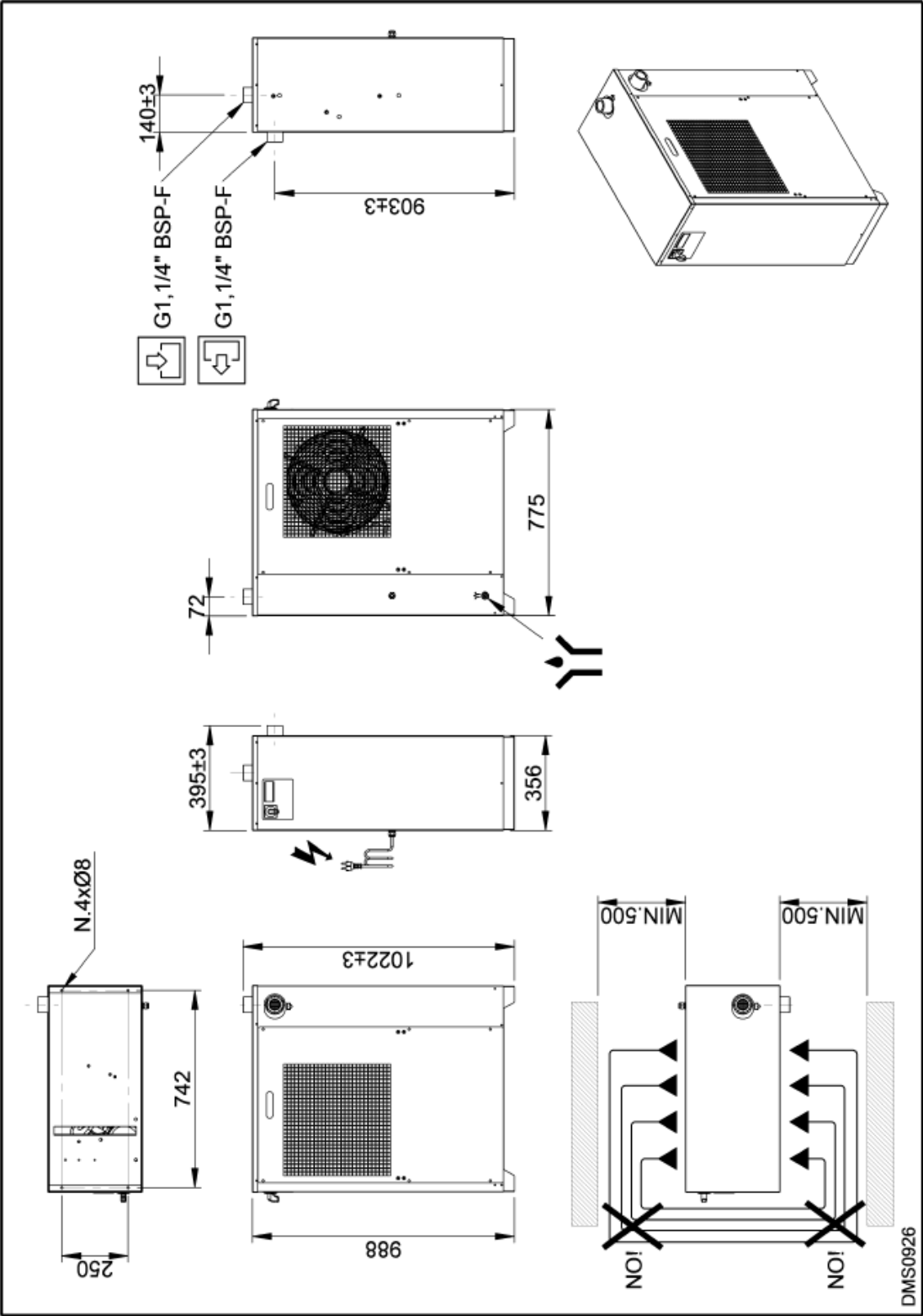
9.1.3 TFD 30



9.1.4 TFD 45

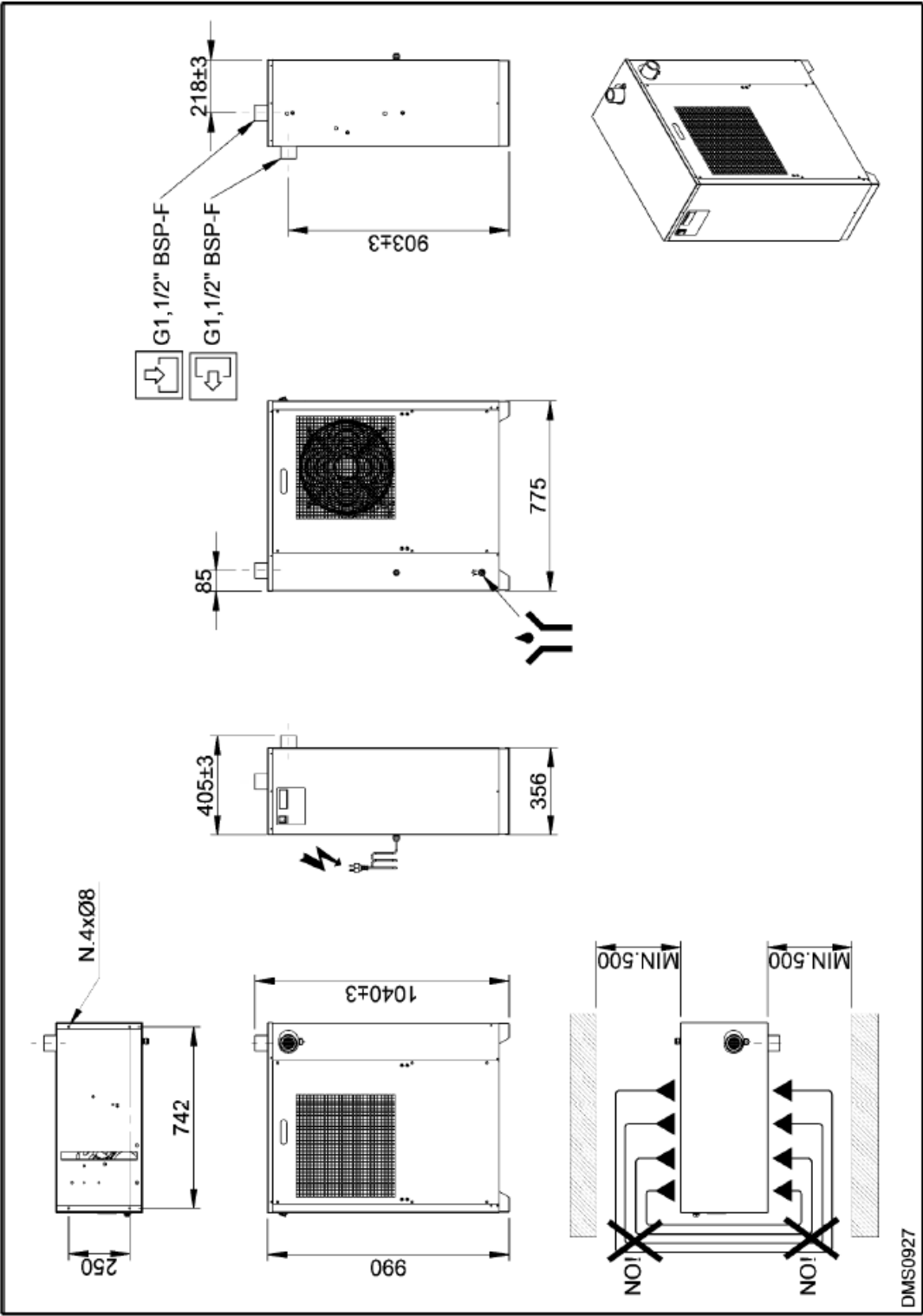


9.1.5 TFD 60

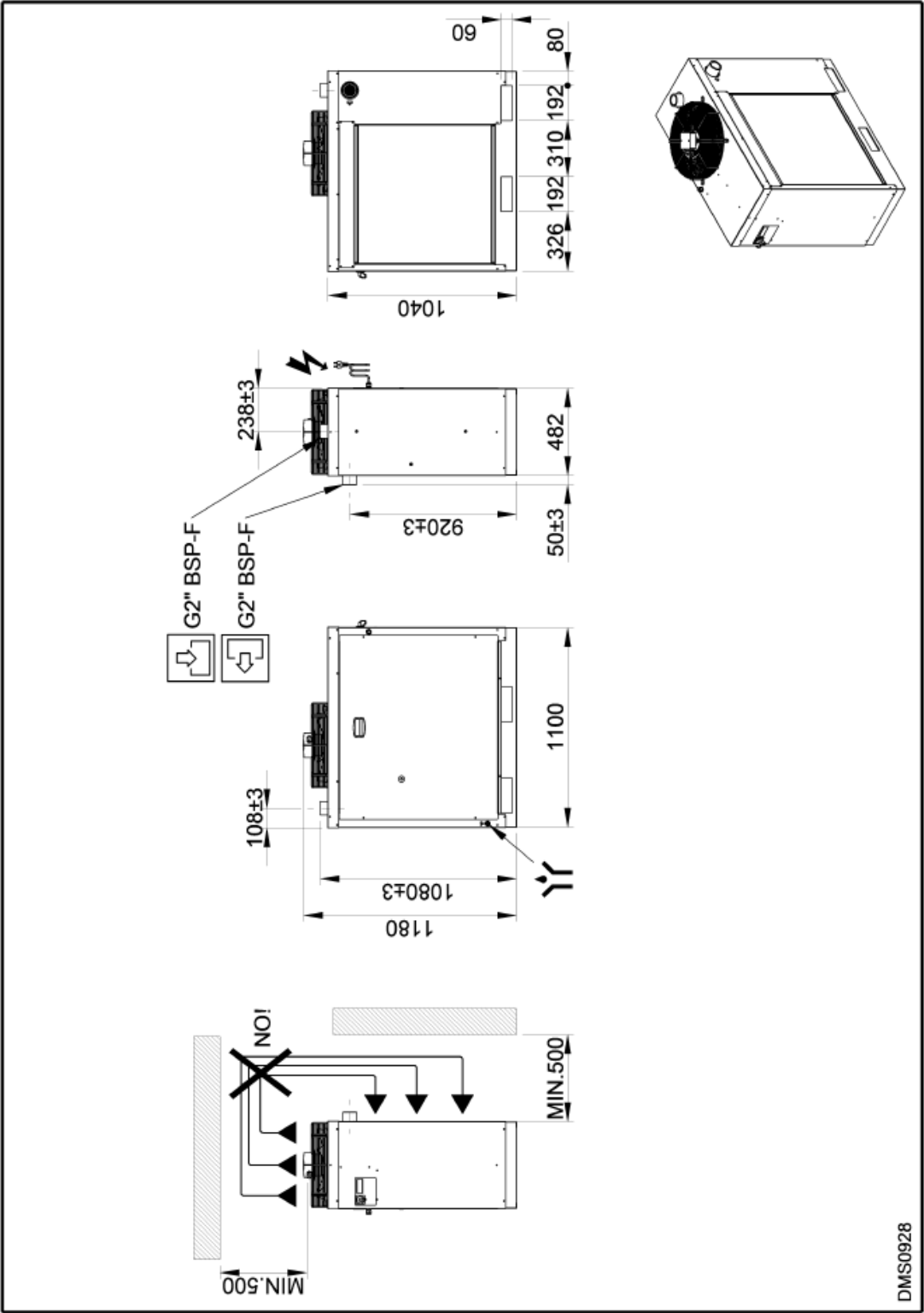


9.1.6 TFD

72 - 85



9.1.7 TFD 100 - 150

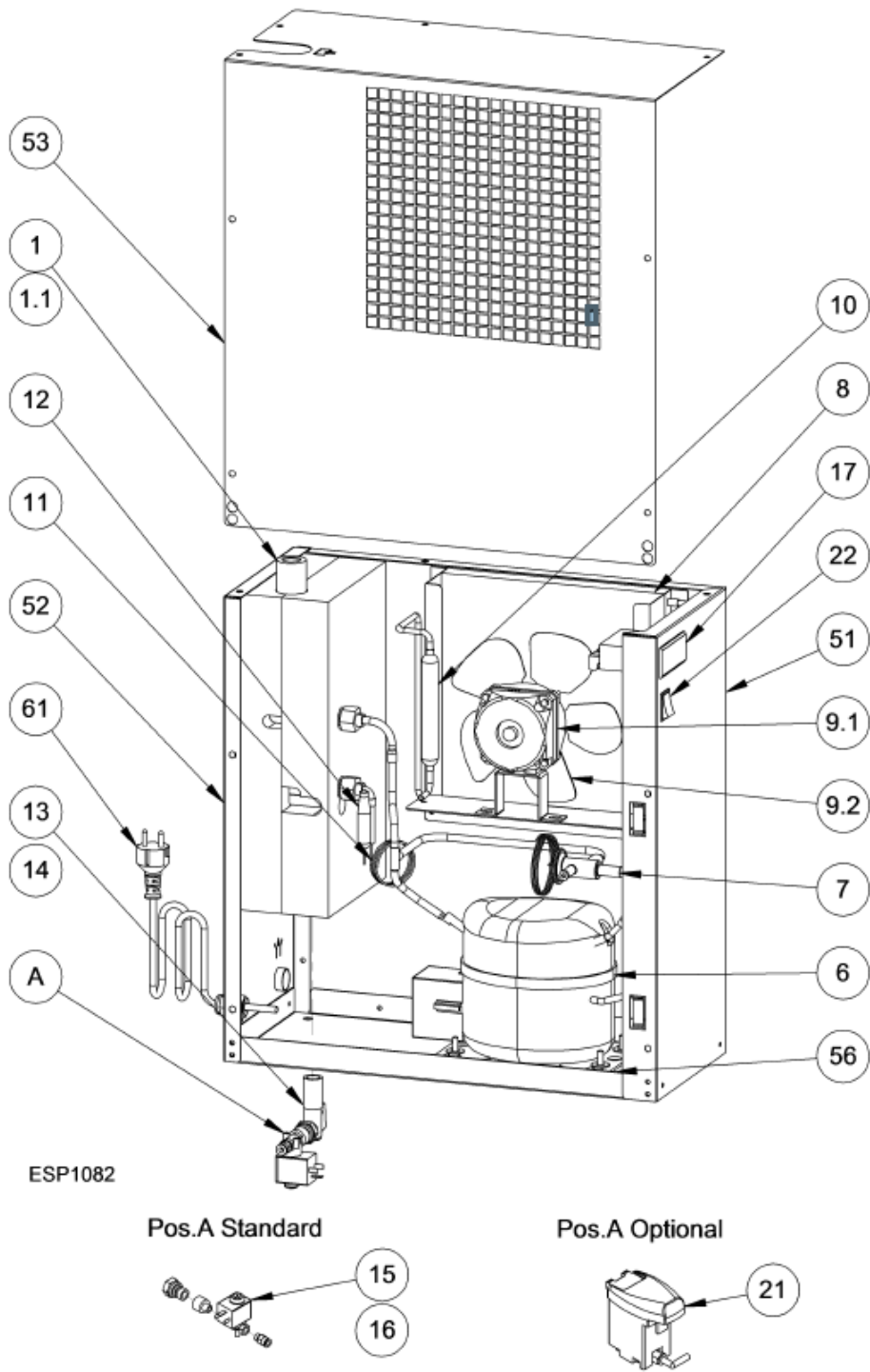


9.1.8 TFD 180 – 220

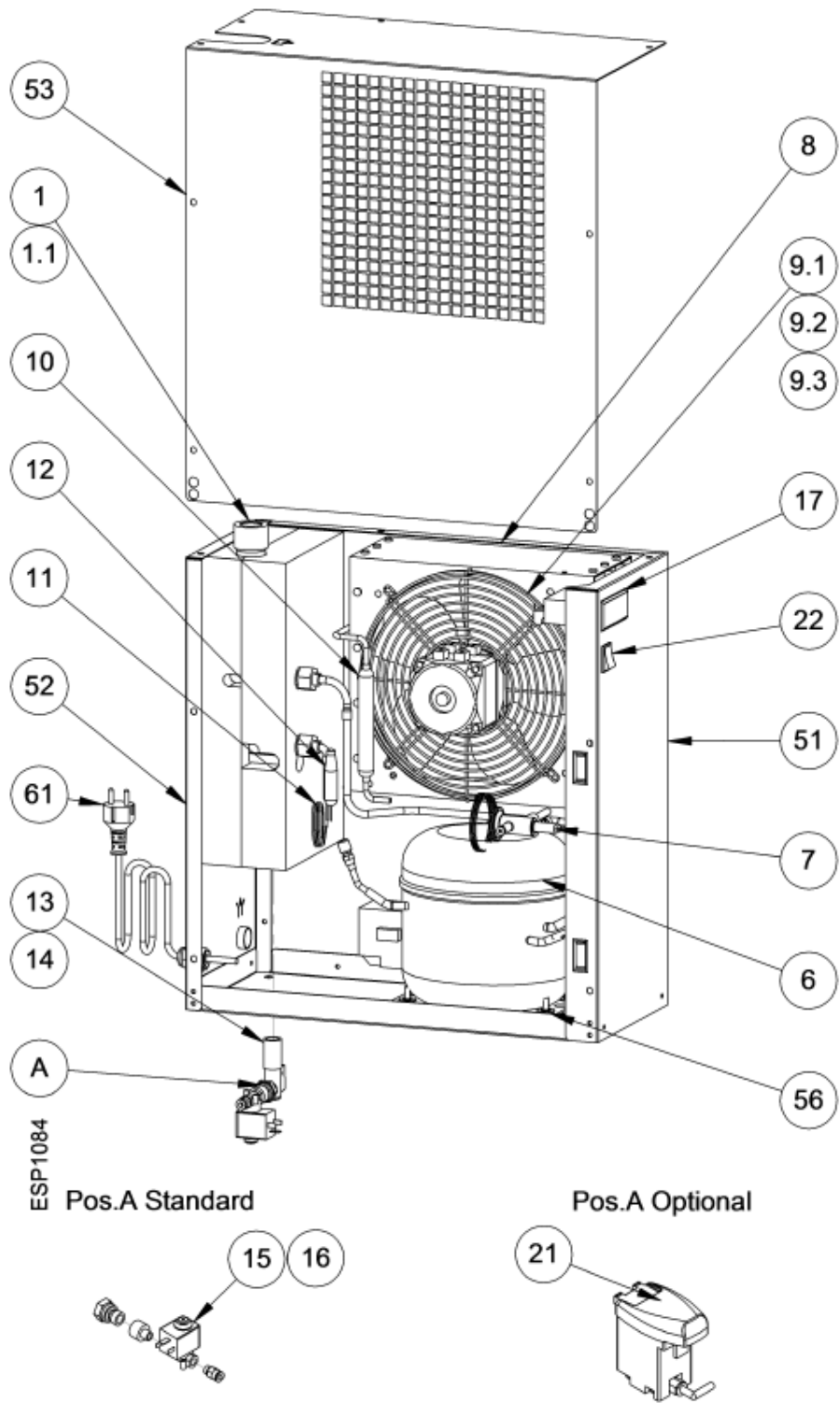


9.2 Exploded Views

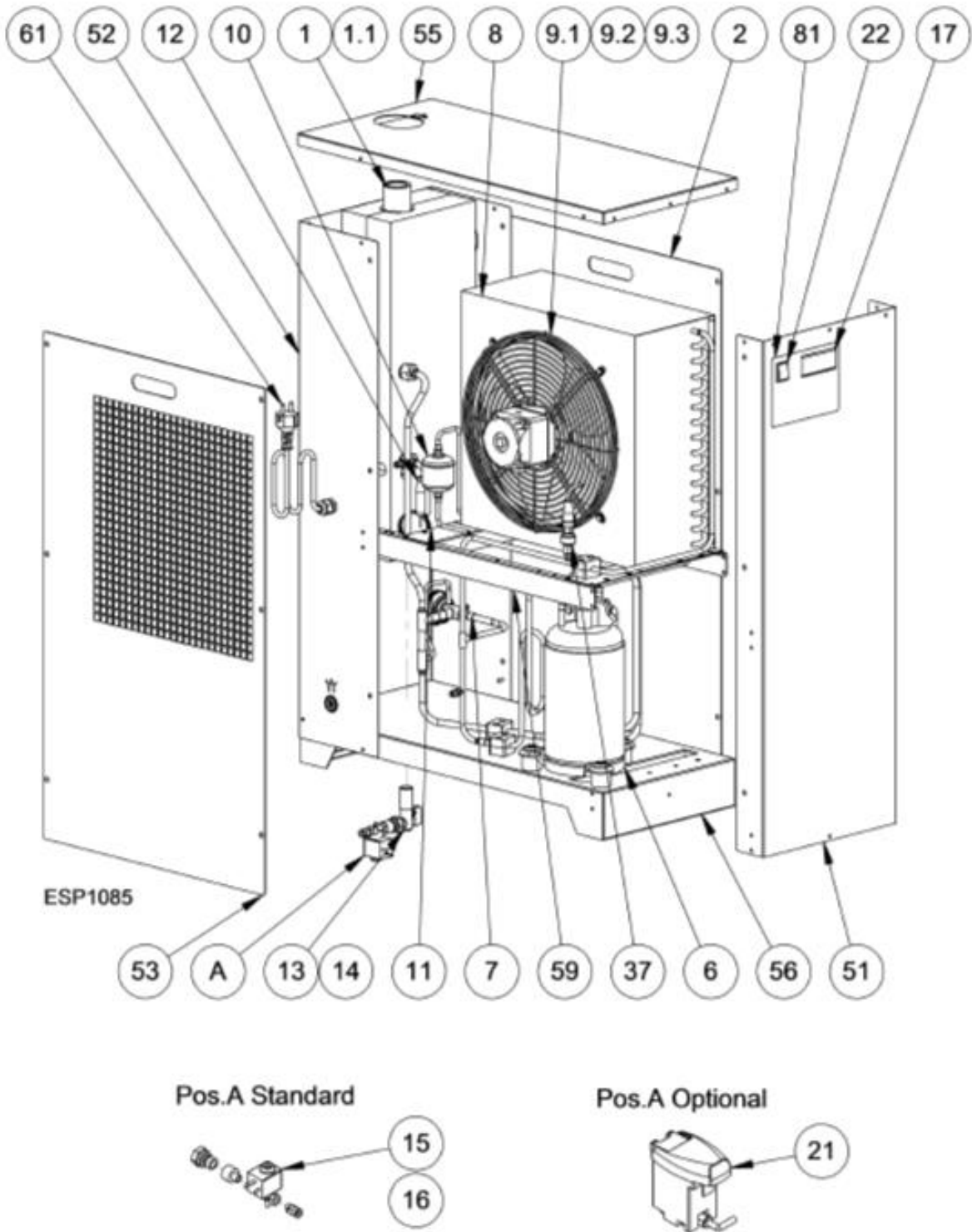
9.2.1 TFD 6



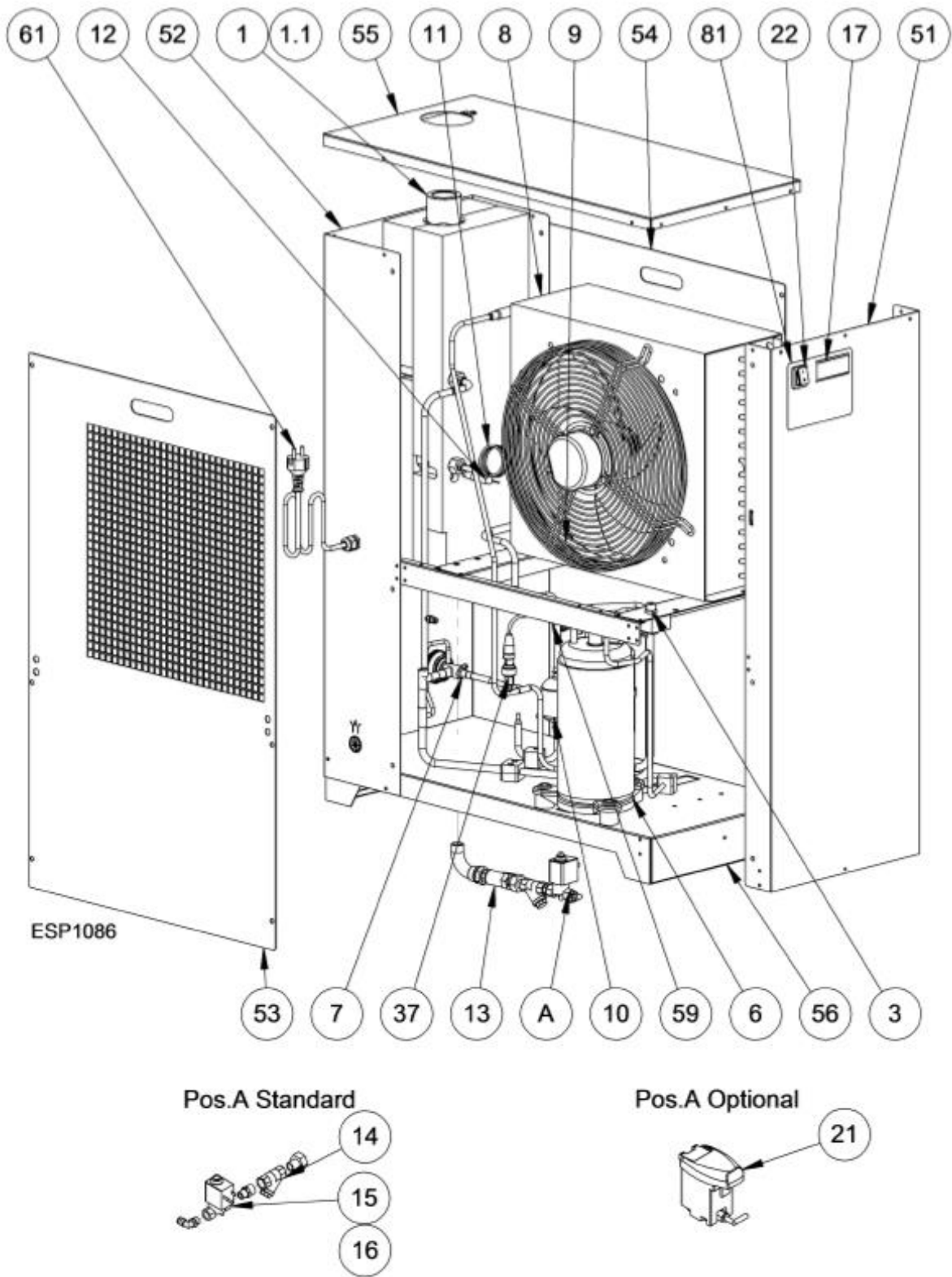
9.2.2 TFD 10 - 22



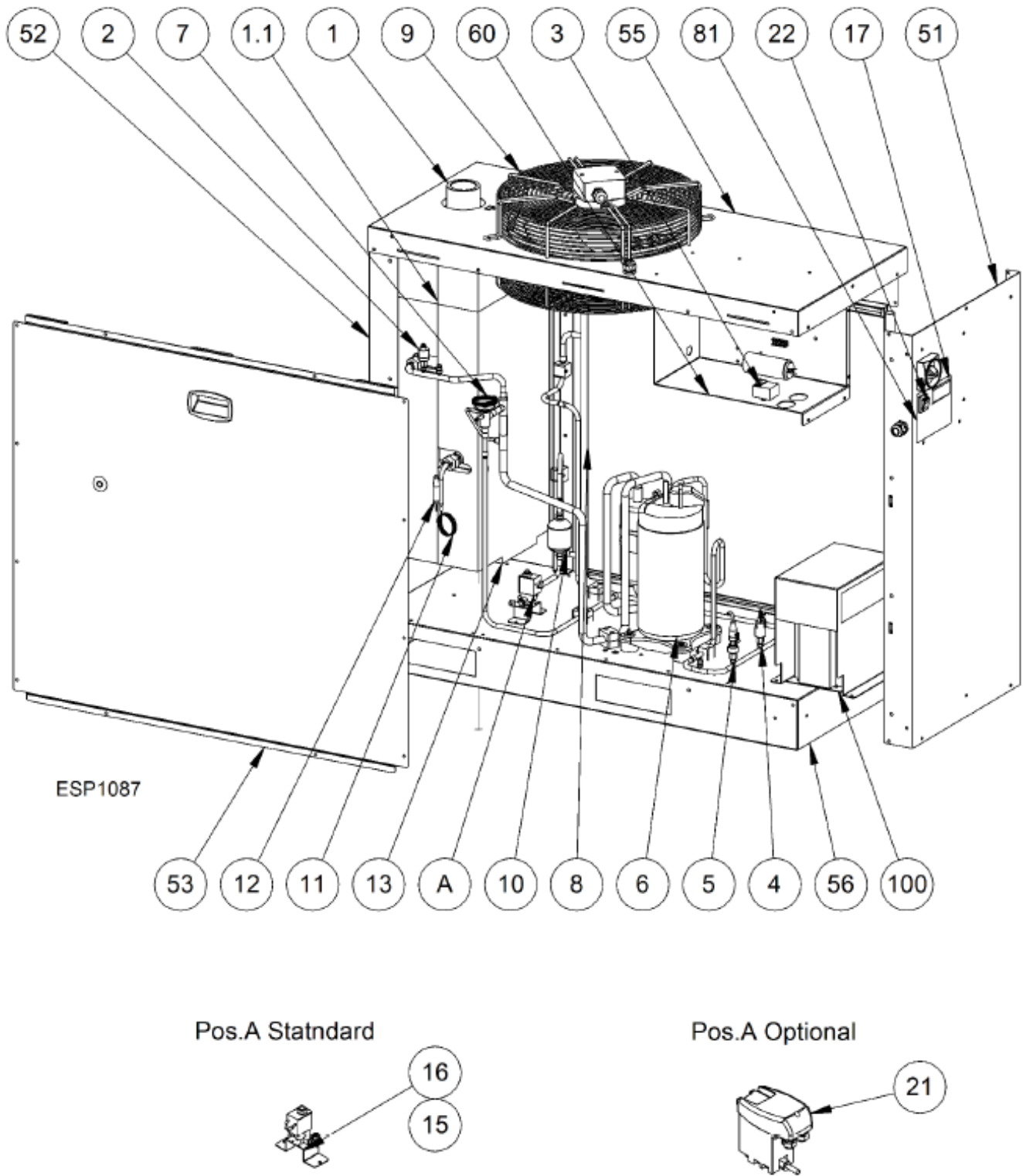
9.2.3 TFD 30 - 45



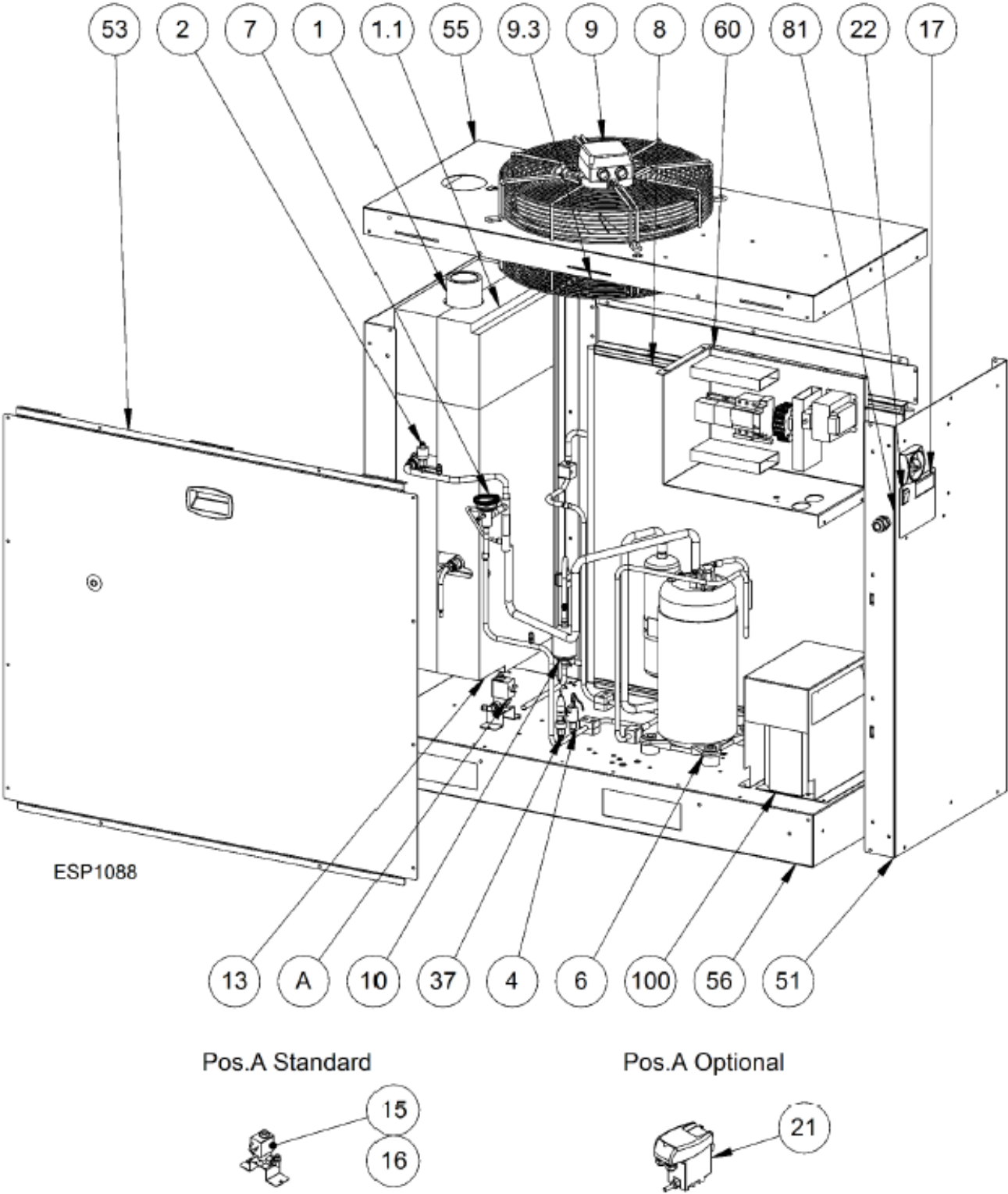
9.2.4 TFD 60 - 85



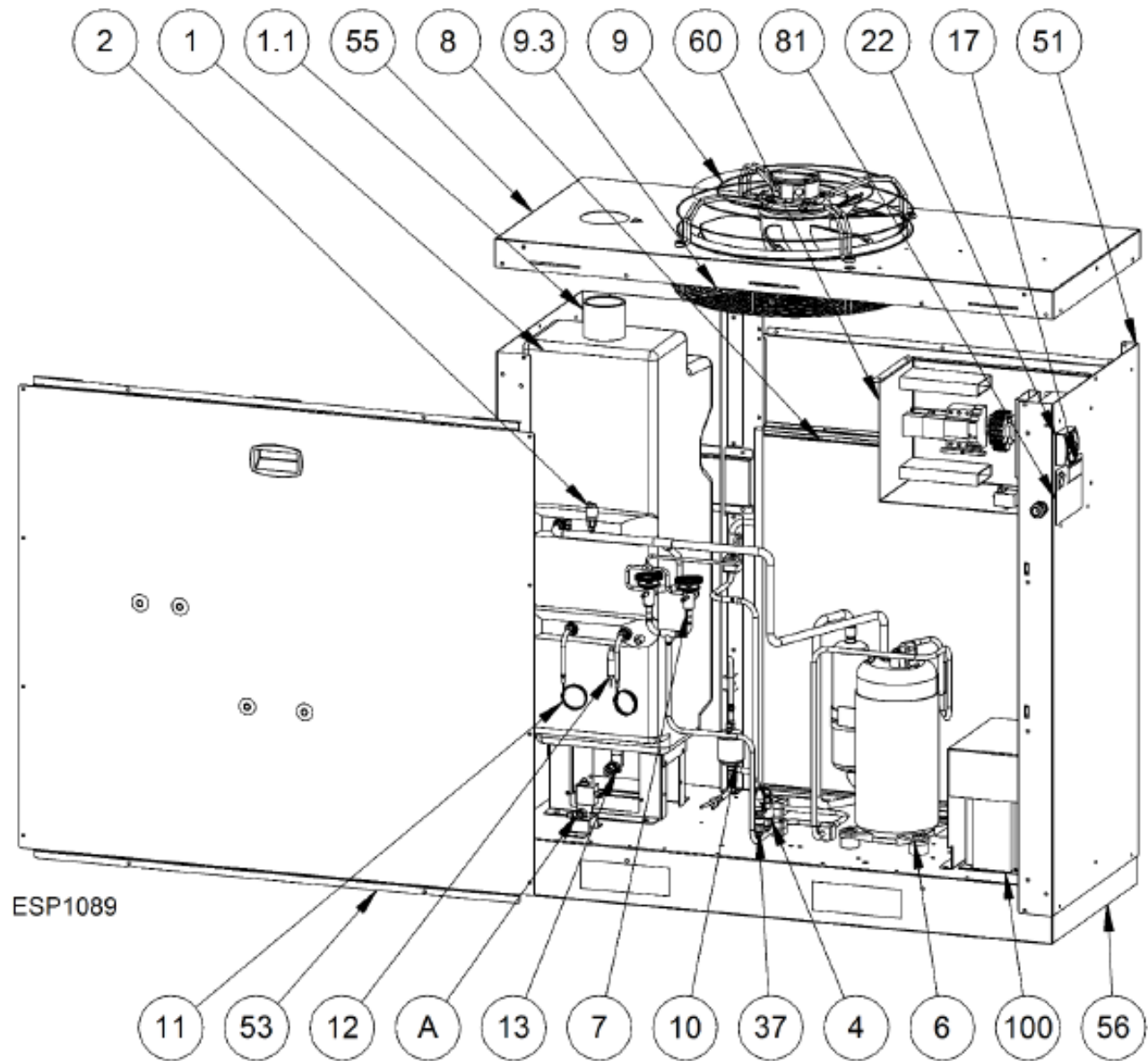
9.2.5 TFD 100 - 120



9.2.6 TFD 150

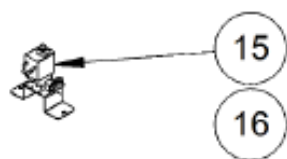


9.2.7 TFD 180 - 220



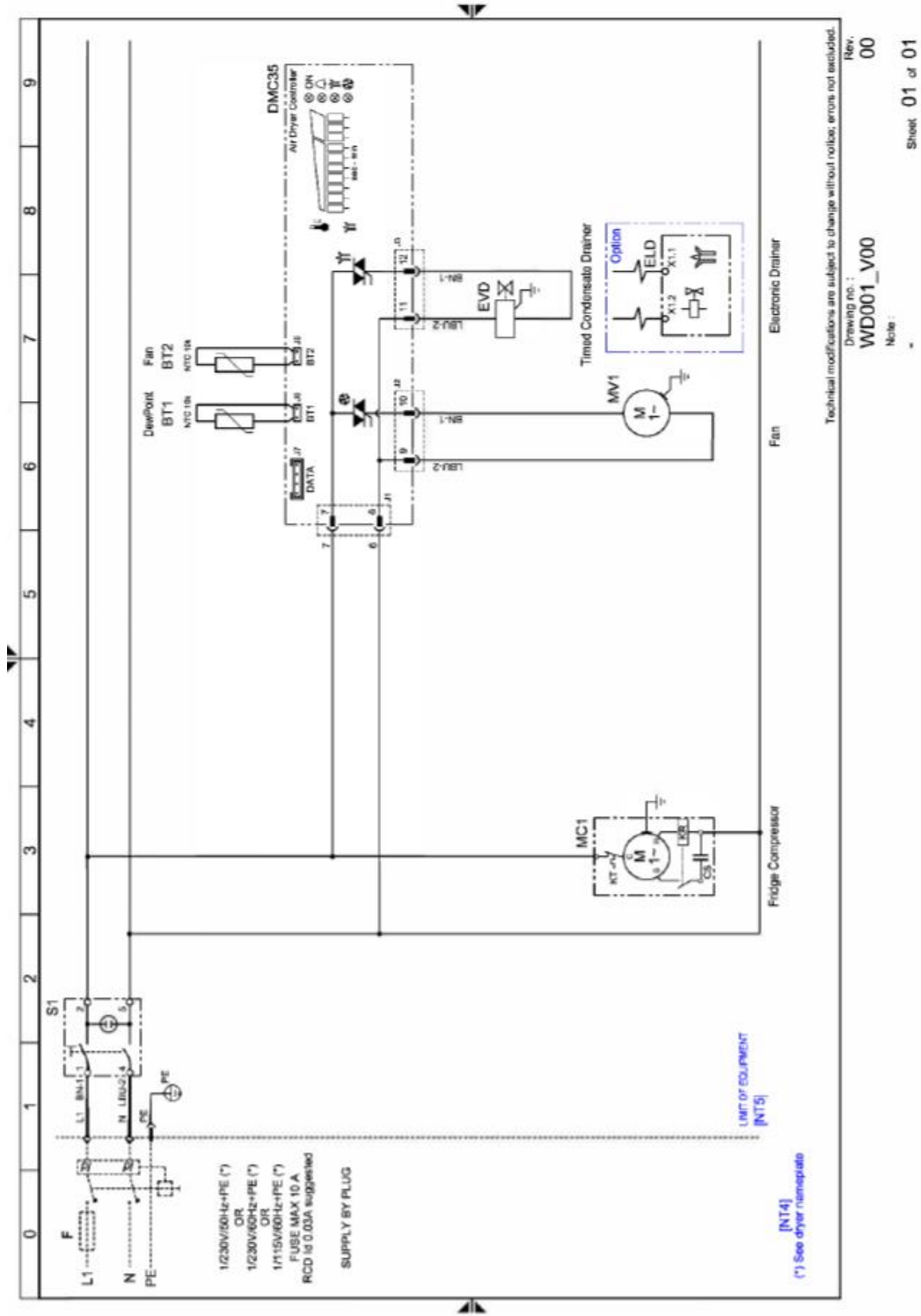
Pos.A Standard

Pos.A Optional

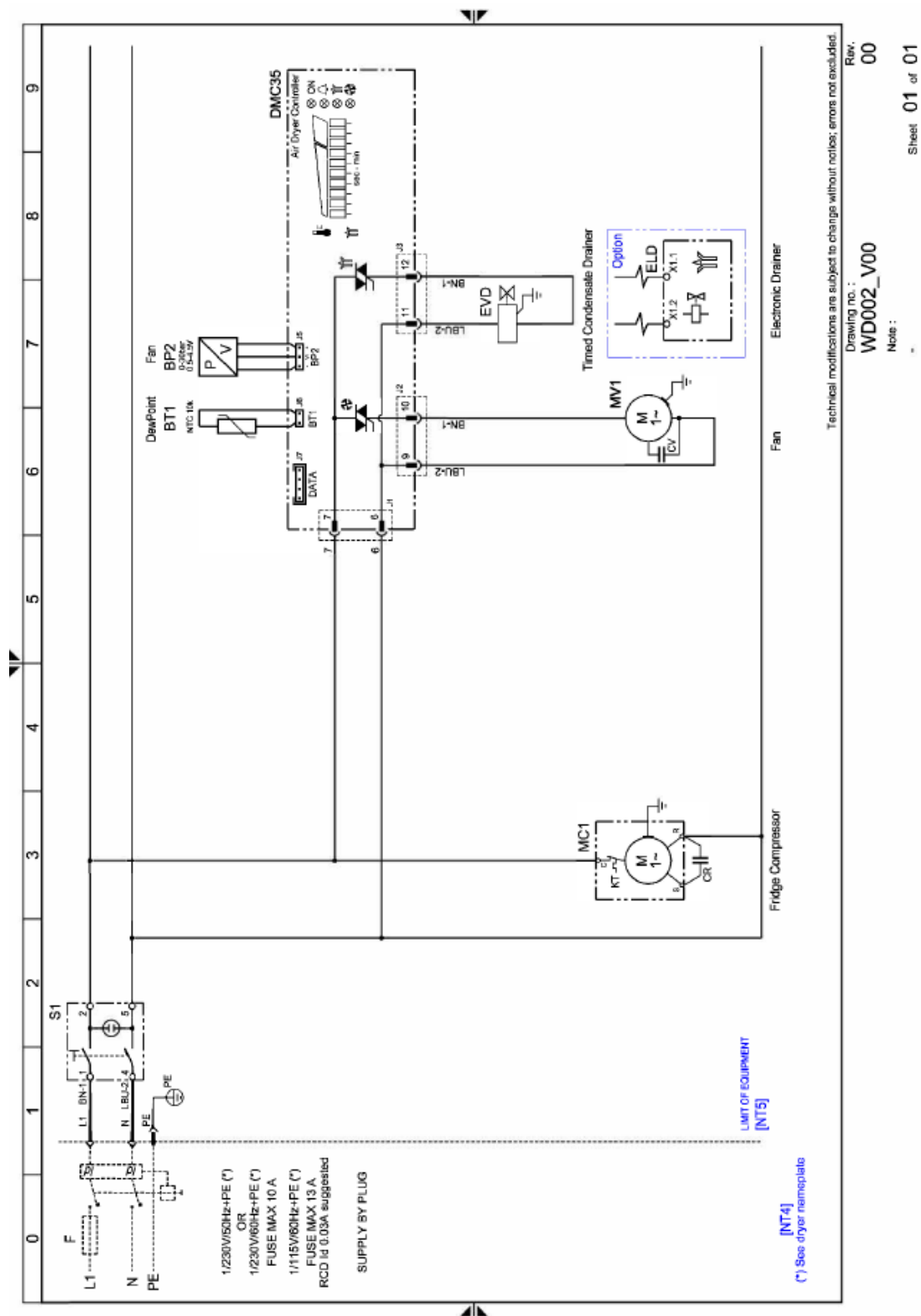


9.3 Electric Diagrams

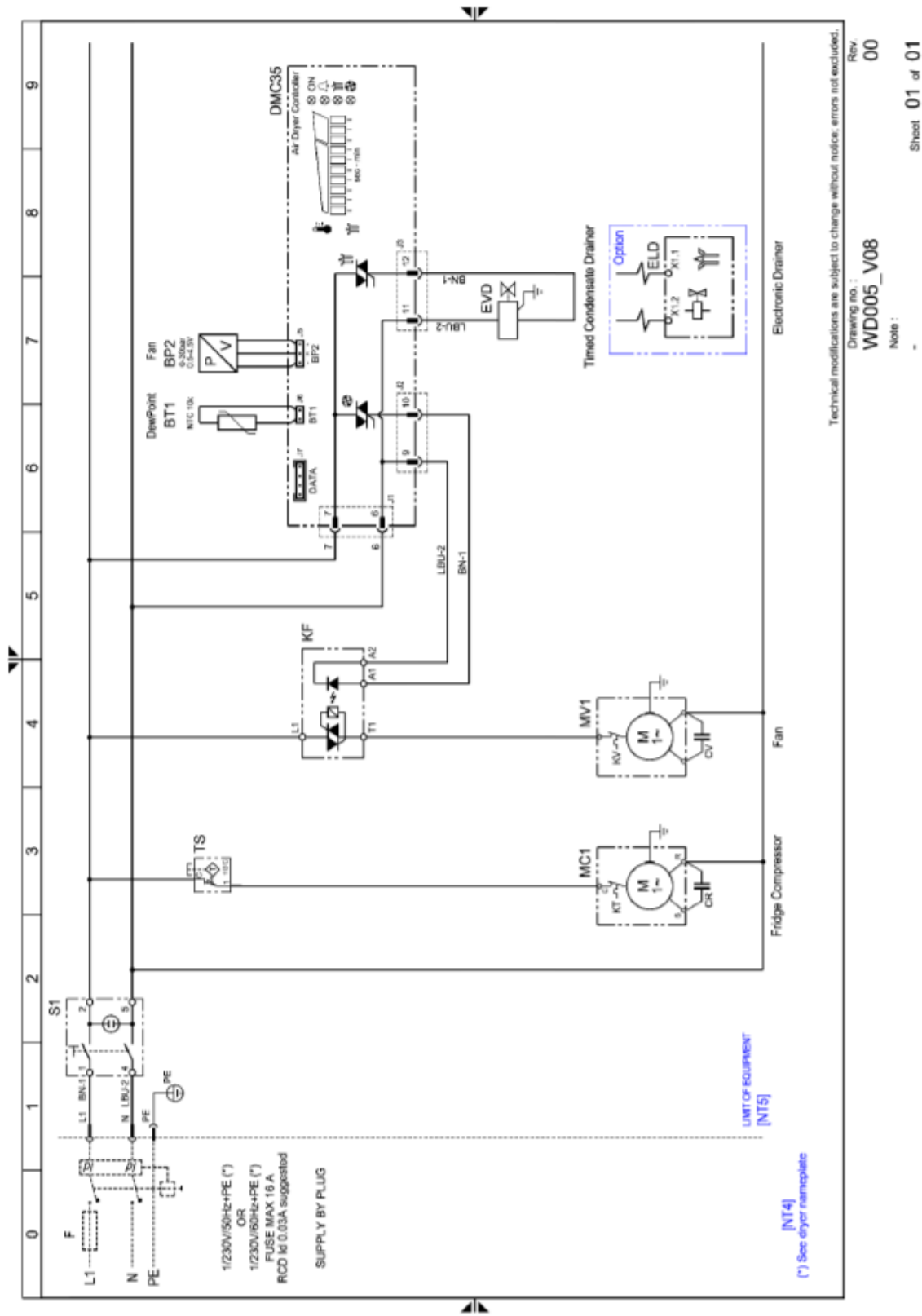
9.3.1 TFD 6 - 22



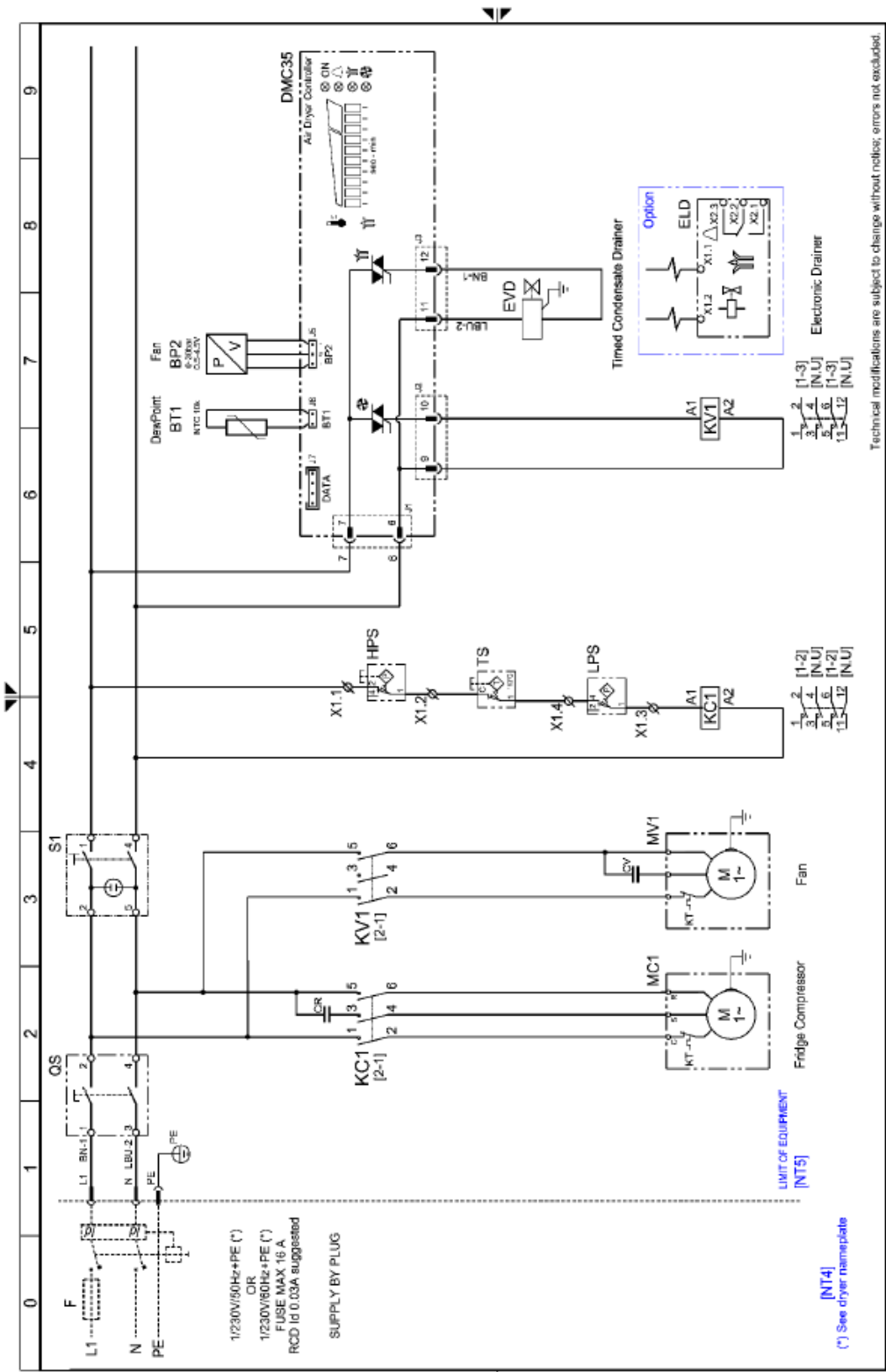
9.3.2 TFD 30 - 45



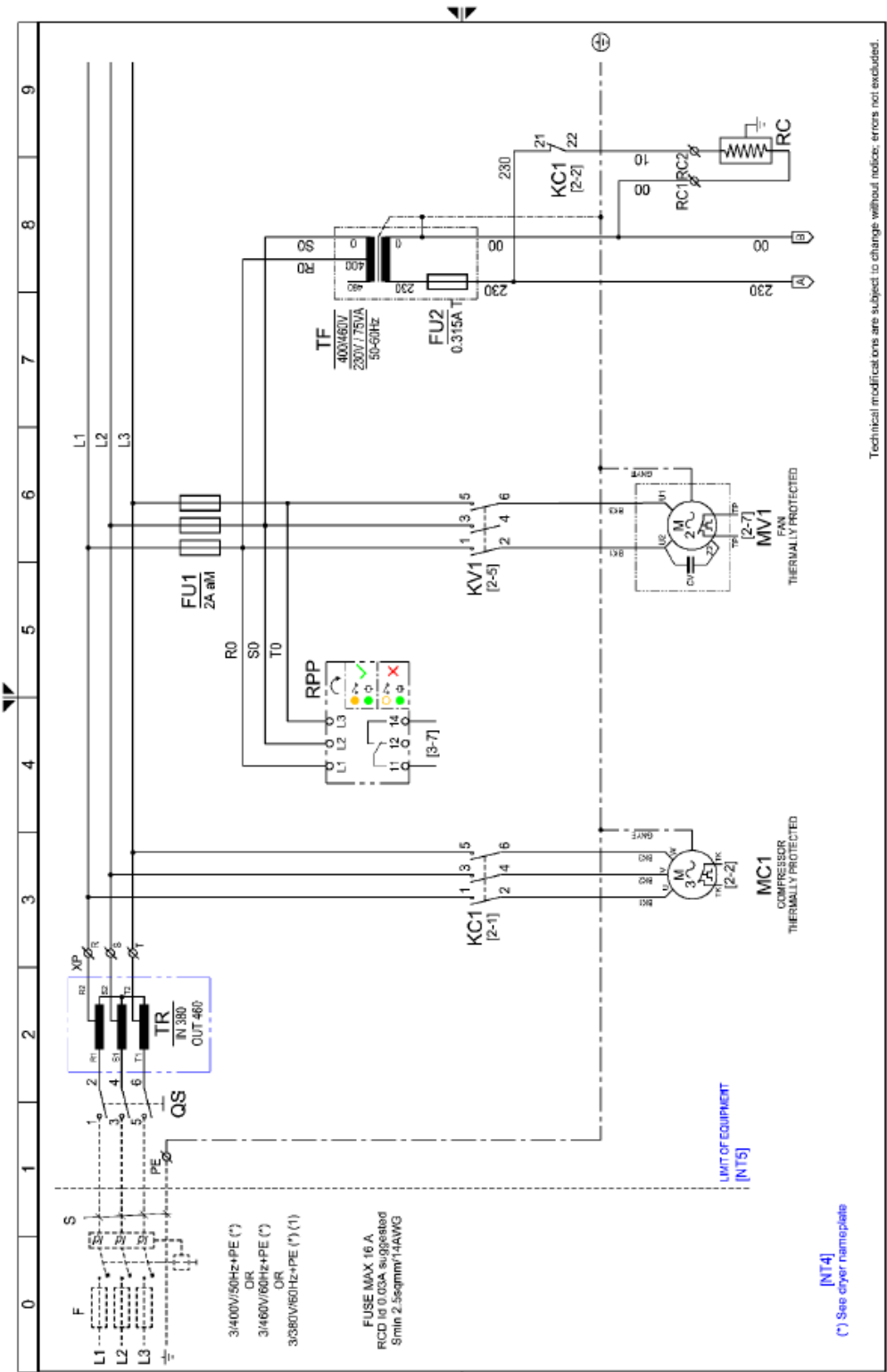
9.3.3 TFD 60 - 85



9.3.4 TFD 100 -120



9.3.5 TFD 150





Drawing no. : Rev.

Note :

Sheet 02 of 03

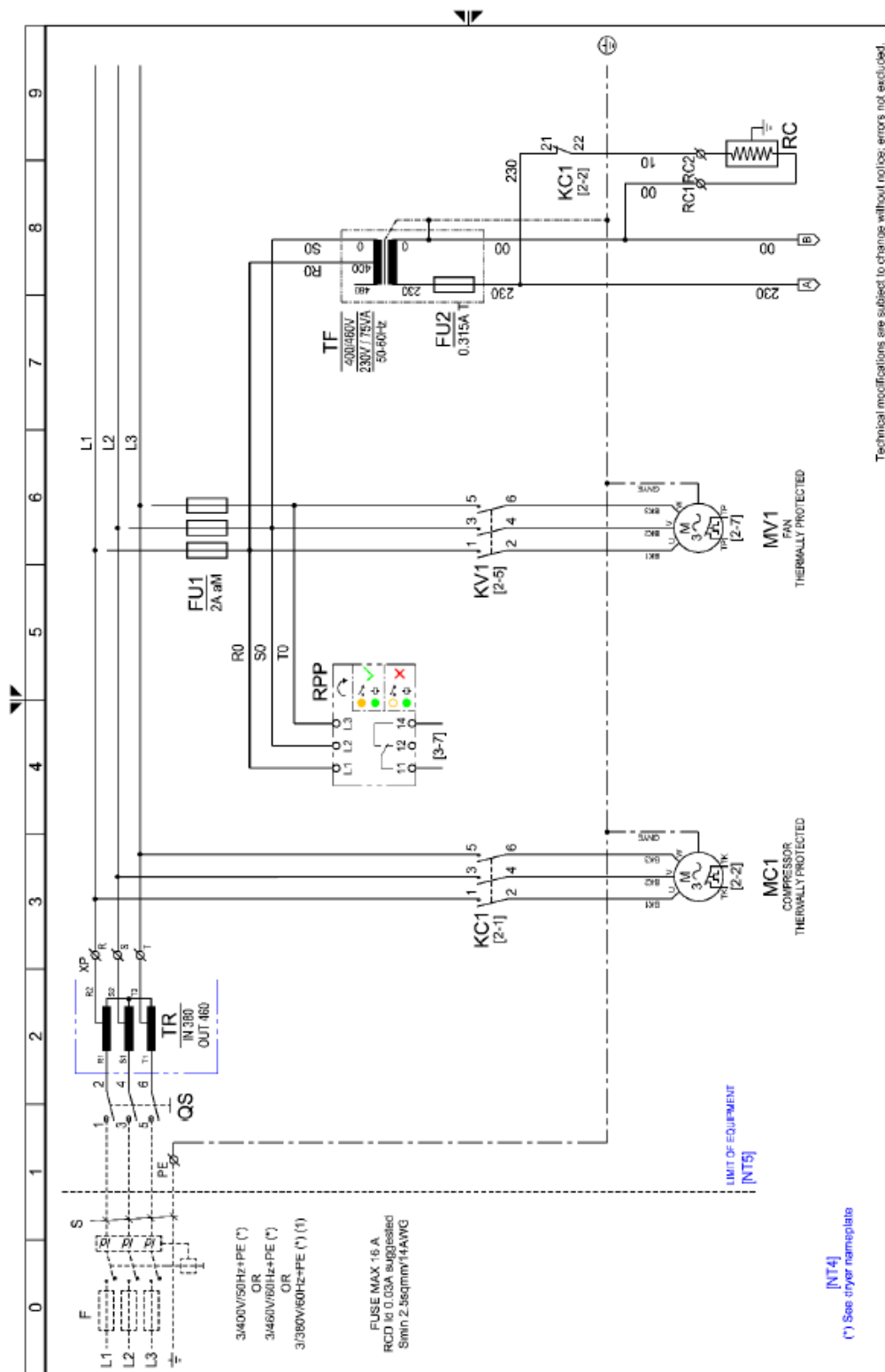


Drawing no. : _____ Rev. _____

Note :

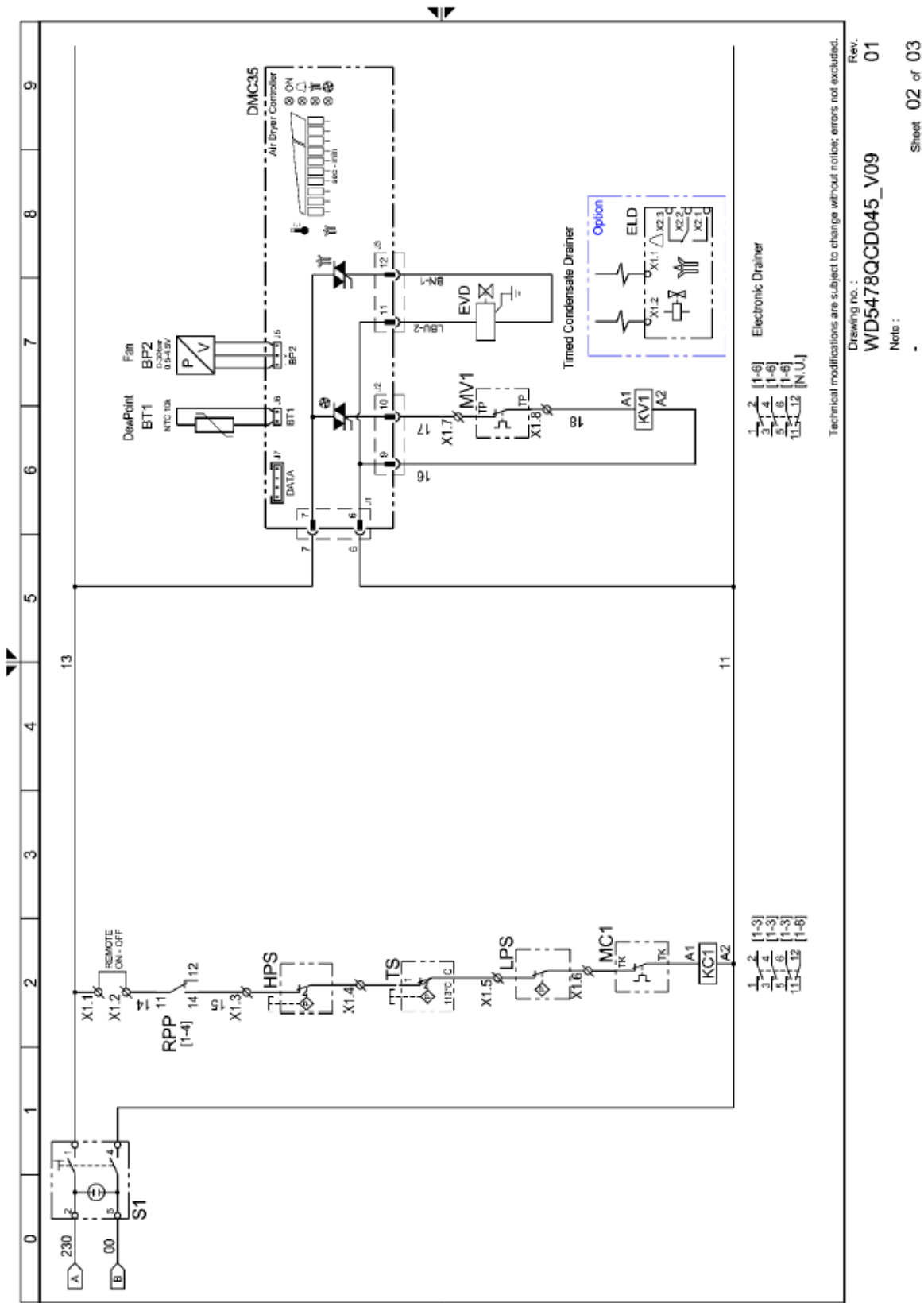
Sheet 03 of 03

9.3.6 TFD 180 – 220



Technical modifications are subject to change without notice; errors not excluded.

Drawing no.: **WD5478QCD045_V09** Rev. **01**
 Note: Sheet **01** of **03**





Drawing no.: _____ Rev. _____

Note :

Sheet 03 of 03

10 Declaration "CE" of Conformity



DECLARATION "CE" OF CONFORMITY

FRIULAIR s.r.l. Headquarters: via Cisis, 36 - Cervignano del Friuli (UDINE) – ITALY
Thailand production plant: 49/5 Moo 5, Tungsukhla, Sriracha, Chonburi 20230 - THAILAND

Declares under its sole responsibility that the following compressed air dryers models:

Model	Design Pressure (bar)	2014/68/EU Module
TFD 6, TFD 10, TFD 15, TFD 22	16	SEP – Art.4 Para.3
TFD 30, TFD 45, TFD 60	14	SEP – Art.4 Para.3
TFD 72, TFD 85, TFD 100, TFD 120, TFD 150, TFD 180, TFD 220	14	H

Are in conformity with the following European Union Directives:

2014/68/EU – Notified Body: British Engineering Services, Manchester, UK. - No. 0040
for equipment under Module H
2006/42/EC
2014/30/EU
2014/35/EU
2011/65/EU

Norms:

ASME VIII Div.1	EN378-2	EN14119	EN14120	EN10028-3
EN12100	EN12451	EN13849-1	EN61000-6-2	EN61000-6-4
EN60204-1				

Name and address of the person authorised to compile the technical file:

Sandro Mascellani – via Cisis, 36 – Cervignano del Friuli (UDINE) – ITALY

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Cervignano del Friuli , 27.10.2017

The President

Luigi Vaccaro

Warranty

Pilot Air Compressors Pty Ltd **manufactured goods - 1 Year Warranty and 3 Year Warranty (where applicable)**

(DATE)

Pilot Air Compressors Pty Ltd (**Pilot Air**) warrants to the first purchaser of goods (manufactured by it) (Product) from Pilot Air and the last purchaser prior to installation that, subject to compliance with the Conditions of Warranties below that:

1. For a period of 12 months from the date of purchase, the Product will be free from defects due to defective factory workmanship or materials; and
2. For a period of 12 months from the date of purchase that Pilot Air branded accessories supplied by Pilot Air will be free from defects due to defective factory workmanship or materials.
3. The compressor pump only (and excluding all other components of the unit) in the following units:
 - a. TM Series Units
 - b. Classic K Series Units
 - c. Petrol Industrial Series Units
 - d. Three Phase Industrial Series Units

will be free from defects due to defective factory workmanship or materials for a period of 3 years from the date of purchase.

4. The 'DCR', 'PAC' and 'FP' Series of Rotary Screw type compressors will be free from defects due to defective factory workmanship or materials for 3,000 working hours in the first 12 months from the date of purchase. This warranty is extended to a period of 2 years for the air end of the DCR PAC and FP Series Compressors.
5. Where compressors are powered with either petrol or diesel engines, the engine only is subject to the warranty provided by the manufacturer of the engine.
6. Non-Pilot Air accessories (meaning accessories which are not Pilot Air manufactured and branded) which are supplied by Pilot Air are not covered by this warranty. Purchasers are referred to the individual manufacturer's warranty. Purchasers can request a copy of the applicable warranties by contacting Pilot Air using the contact details below.

Warranty

Conditions of Warranties

The warranties specified herein are subject to the following conditions:

- (a) Pilot Air will not be liable for a breach of any of its warranties unless the Claimant provides proof of purchase of the Product and makes a written claim to Pilot Air at the address set out below, either within 30 days after the defect would have become reasonably apparent, or if the defect was reasonably apparent prior to installation, then the claim must be made prior to installation;
- (b) The warranties are not transferable;
- (c) The Product must be installed, operated, maintained and serviced strictly in accordance with the relevant Pilot Air literature current at the time of installation and must be installed in conjunction with the components or products specified in the Pilot Air literature. To obtain copies of such literature go to www.pilotair.com.au or telephone Pilot Air on (02) 9648 3099;
- (d) If the claimant chooses to rely upon any warranty specified herein the claimant's sole remedy under the warranty for breach of the warranty is (at Pilot Air's option) that Pilot Air will either supply replacement Product, rectify the affected Product or pay for the cost of the replacement or rectification of the affected product;
- (e) In the circumstances where the guarantees under the Australian Consumer Law do not apply in respect to the purchase of its Products, Pilot Air will not be liable for any losses or damages (whether direct or indirect) including property damage or personal injury, consequential loss, economic loss or loss of profits, arising in contract or negligence or howsoever arising. Without limiting the foregoing, Pilot Air will not be liable for any claims, damages or defects arising from misuse of the Product, inadequate maintenance and storage of the Product, repairs rendered necessary or arising from the use of non- genuine Pilot Air parts in the product, normal wear and tear maintenance of the Product, deterioration of any part of the Product due to normal wear and tear, work performed on the Product other than by an authorised Pilot Air service technician or their agent, use of the Product for any purpose other than which it was intended to be used, use of the Product after essential parts and accessories have been removed, operating the Product continuously under excessive load, and if the serial/model label has been removed or obscured on the Product;
- (f) In circumstances where the guarantees under the Australian Consumer Law do not apply in respect to the purchase of its Product/s: all warranties, conditions, liabilities and obligations other than those specified herein are excluded to the fullest extent allowed by law.
- (g) Parts repaired or replaced under any warranty specified herein are warranted only for the remaining period of the original warranty period.

Warranty

- (h) All defective parts that are the subject of a claim under any warranty specified herein become the property of Pilot Air.
- (i) The warranties specified herein do not apply to the following parts or conditions and cannot be relied upon in the situation whereby:
 - i) any Pilot Air product or part has been subject to misuse, negligence, accidental damage, improper or inadequate use, inadequate maintenance or improper storage or been operated under unusual conditions or continuously under excessive load;
 - ii) the defect has been caused by the use of non-genuine Pilot Air parts;
 - ii) the defect or deterioration was due to normal use, fair wear and tear and exposure, unless due to any defect in material or workmanship;
 - iv) work was undertaken on any Pilot Air product or part by an unauthorised Pilot Air agent;
 - v) the serial /model label has been removed from any Pilot Air product or part;
 - vi) normal maintenance items/parts including valves and piston rings
- (j) Warranty repairs on all 240 Volt and portable units shall be on a back to base basis that the Claimant is required to return the Product to the nominated warranty agent as advised by Pilot Air, provided that such costs are not significant;
- (k) The replacement or repair of any defective part or correction of operating faults under any warranty specified herein is to be made only after Pilot Air, or its authorised representative, have examined the unit to their satisfaction, with their decision being final.
- (l) In the circumstances where Pilot Air accepts or it is determined by Pilot Air that the claimant has a valid claim under this warranty, and subject to paragraph (m) below, Pilot Air will bear all of the claimant's reasonable and proximate expenses incurred as a result of claiming under this warranty. The claimant is to inform Pilot Air in writing to the address identified below within 21 days from when the claimant first makes a claim under this warranty of all such claims and expenses and provide it with copies of all receipts and invoices where relevant before any reimbursement is made by Pilot Air to the claimant. The claimant is responsible for all other costs of claiming under this warranty.

Warranty

- (m) Pilot Air will not be responsible for any courier, transport or freight related costs whatsoever associated with the return to it of any defective Product that have not first been approved by it. Pilot Air reserves the right to first inspect any defective Product and decide how, if at all, the defective Product is to be returned to it. Any unapproved courier, transport or freight related costs will be to the claimant's account.

Important Note:

If you acquire goods from Pilot Air as a consumer according to the Australian Consumer Law, our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Any rights a consumer may have under any warranty specified herein are in addition to other rights and remedies of a consumer under a law in relation to the goods to which these warranties relate. Nothing in this document shall exclude or modify any legal rights a customer may have under the Australian Consumer Law or otherwise which cannot be excluded or modified at law.

Contact details if you wish to make a claim under any warranty specified herein:

For more information or to make a claim under any warranty specified herein please telephone Pilot Air on (02) 9648 3099, email Pilot Air via our website: <http://www.pilotair.com.au> or write to Pilot Air at:

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