High pressure refrigerating air dryer

PLH 15 – 550

Air – water cooled

EN - User’s maintenance and spare parts manual

74MD0019A4-EN_00

CE

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 **PLH** 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.

Contents

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.

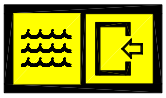

Danger hazard. Do not operate equipment with panels removed.

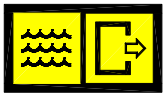

Maintenance or control operation to be performed by qualified personnel only [1].

Compressed air inlet connection point

Compressed air outlet connection point


Condensate drain connection point


Cooling water inlet connection point (Water-Cooled)


Cooling water outlet connection point (Water-Cooled)


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.
- 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.

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.

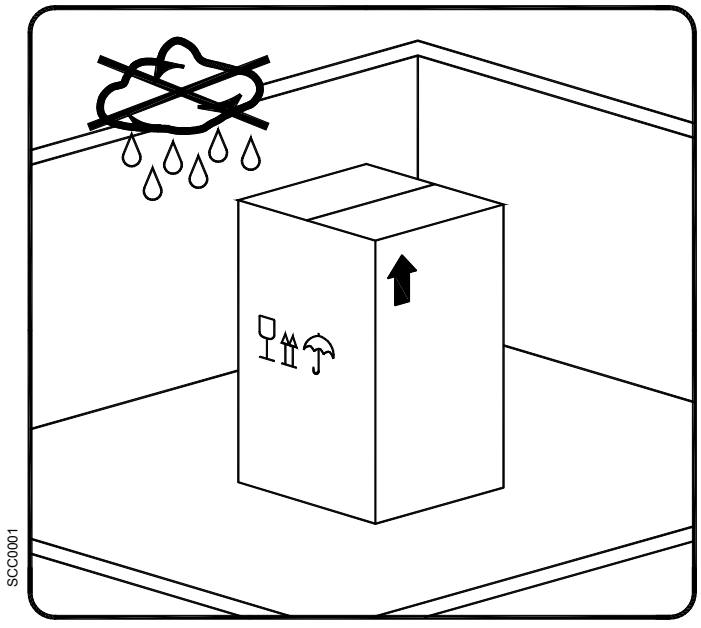
4 Installation

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



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 +34°F (+1°C) … +122°F (+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:

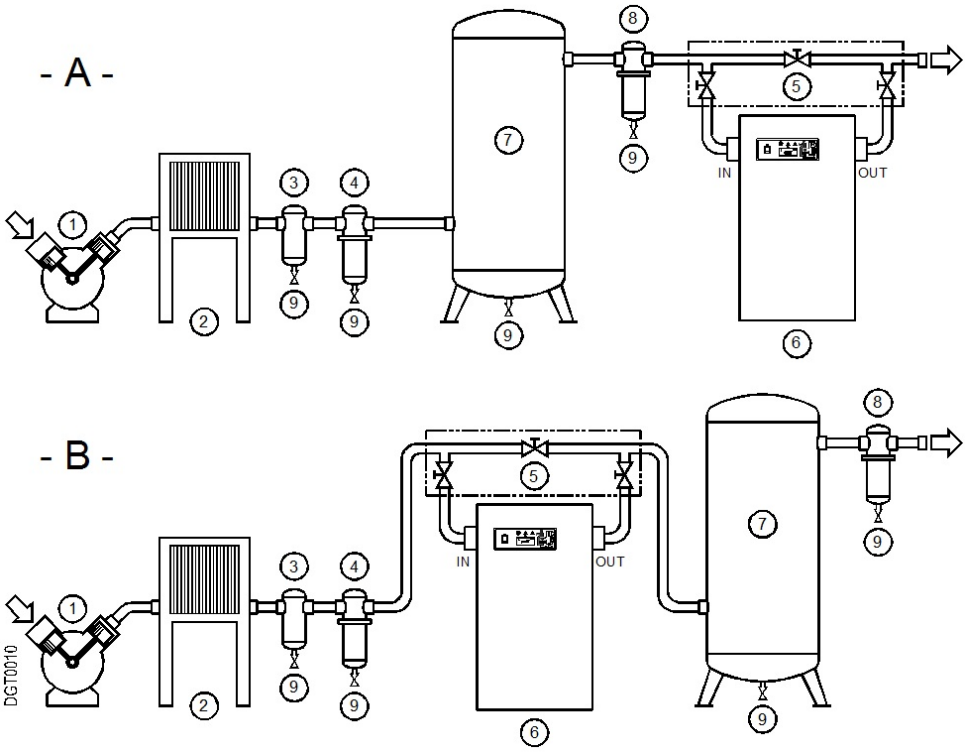
- Select a clean dry area, free from dust, and protected from atmospheric disturbances.
- The supporting area must be smooth, horizontal and able to hold the weight of the dryer.
- Minimum ambient temperature +34°F (+1°C).
- Maximum ambient temperature +122°F (+50°C).
- Ensure a proper cooling air replacement.
- 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.

NOTE : Dryers models PLH 15 – 80 can be wall-mounted. See fixing dimensions on dimensional drawings in the attachment section.
The hanging mounting inevitably causes the obstruction of the ventilation grid positioned on the panel facing the wall fixing. This obstruction, in any case, does not prejudge the efficiency of the ventilation inside the dryer which is guaranteed by other grids on the other panels.

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).

4.5 Correction factors

Correction factor for operating pressure modifications:									
Inlet air pressure	psig	200	300	400	500	550	580	650	725
	barg	14	21	28	34	38	40	45	50
Factor (F1)		0.53	0.71	0.84	0.94	0.98	1.00	1.05	1.10

Correction factor for ambient temperature modifications (Air-Cooled):									
Ambient temperature	ºF	≤ 80	90	95	100	105	110	115	122
	ºC	≤ 27	32	35	38	40	43	45	50
Factor (F2)		1.11	1.09	1.06	1.00	0.94	0.87	0.78	0.69

Correction factor for inlet air temperature modifications:								
Air temperature	ºF	≤ 90	100	110	122	130	140	150
	ºC	≤ 32	38	43	50	55	60	65
Factor (F3)		1.16	1.00	0.82	0.68	0.61	0.52	0.45

Correction factor for DewPoint modifications:					
DewPoint	ºF	38	41	45	50
	ºC	3	5	7	10
Factor (F4)		1.00	1.08	1.20	1.36

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 **PLH 100** has a nominal duty of 100 scfm (170 m³/h). What is the maximum allowable flow through the dryer under the following operating conditions:

Inlet air pressure = 550 psig (38 barg) — Factor (F1) = 0.98
Ambient temperature = 115°F (45°C) — Factor (F2) = 0.78
Inlet air temperature = 122°F (50°C) — Factor (F3) = 0.68
Pressure DewPoint = 50°F (10°C) — Factor (F4) = 1.36

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

Air flow capacity = 100 x 0.98 x 0.78 x 0.68 x 1.36 = 71 scfm (121 m³/h)

71 scfm is the maximum flow rate that the dryer can accept under these operating conditions.

How to select a suitable dryer for a given duty:

$$\textbf{Minimum std. air flow rate} = \frac{\textbf{Design air flow}}{\textbf{Factor (F1) x Factor (F2) x Factor (F3) x Factor (F4)}}$$

Example:
With the following operating parameters:

Design air flow = 100 scfm (170 m^3/h)
Inlet air pressure = 550 psig (38 barg) — Factor (F1) = 0.98
Ambient temperature = 115°F (45°C) — Factor (F2) = 0.78
Inlet air temperature = 110°F (43°C) — Factor (F3) = 0.82
Pressure DewPoint = 50°F (10°C) — Factor (F4) = 1.36

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:

$$\textbf{Minimum std. air flow rate} = \frac{\textbf{100}}{\textbf{0.98 x 0.78 x 0.82 x 1.36}} = \textbf{117 scfm (199 m³/h)}$$

Therefore the model suitable for the conditions above is **PLH 140** (**140 scfm [238 m³/h]** - nominal duty).

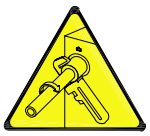
4.6 Connection to the compressed air system

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.

Pulsations and vibrations must be eliminated from the compressed air and IN/OUT piping to avoid possible fatigue failure.
Do not use the dryer to treat air containing corrosive substances for copper and its alloys.



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

4.7 Connection to the cooling water network (Water-Cooled)

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 temperature and the amount of cooling water must comply with the limits indicated on the technical characteristics chart. The cross section of the connection pipes, preferably flexible, must be free from rust, chips and other impurities. We recommend to use connecting pipes able to insulate the dryer from possible vibrations originating from the line (flexible hoses, vibration damping fittings, etc.).

We recommend the installation of a 500 micron filter to prevent a clogging of the heat exchanger.

Minimum cooling water requirements:

Temperature	59…86°F (15…30°C) (1)	HCO_3 / SO_4	>1.0 mg/l or ppm
Pressure	44...145 psig (3…10 barg) (2)	NH_3	<2 mg/l or ppm
Head pressure	> 44 psig (3 bar) (2) (3)	Cl^-	<50 mg/l or ppm
Total hardness	6.0…15 dH°	Cl_2	<0.5 mg/l or ppm
PH	7.5…9.0	H_2S	<0.05 mg/l or ppm
Conductivity	10…500 µS/cm or µmho/cm	CO_2	<5 mg/l or ppm
Residual solid particles	<30 mg/l or ppm	NO_3	<100 mg/l or ppm
Saturation Index SI	-0.2 < 0 < 0.2	Fe	<0.2 mg/l or ppm
HCO_3	70…300 mg/l or ppm	Al	<0.2 mg/l or ppm
SO_4^{2-}	<70 mg/l or ppm	Mn	<0.1 mg/l or ppm

Note : (1) – Other temperature on request - Check the data shown on the identification plate.
(2) – Other pressure on request - Check the data shown on the identification plate.
(3) – Pressure difference at dryer water connection points at maximum water flow - Other head pressure on request

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

4.8 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 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∆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.

4.9 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 controller) 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.
- **PLH 180-550 3phase** - Turn on the main switch - pos. A on the control panel.
- **PLH 180-550 3phase** - Wait at least two hours before starting the dryer (compressor crankcase heater must heat the oil of the compressor).
- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Turn ON the switch - pos. 1 on the control panel.
- Ensure that electronic controller is ON.
- Ensure the consumption matches with the values of the data plate.
- **PLH 180-550 3phase** - Check the rotation direction of the fan – 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.

5.3 Start-up and shut down

PLH 180-550 3phase - 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 (Air-Cooled).
- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Turn ON the switch - pos. 1 on the control panel.
- Ensure that electronic controller is ON.
- Wait a few minutes; verify that the DewPoint temperature displayed on electronic controller 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 controller is within range.
- Shut down the air compressor.
- After a few minutes, turn OFF the switch - pos. 1 on the control panel.

PLH 180-550 3phase - 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

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 :

PLH 15 - 40 - 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.)

PLH 50 - 550 : A DewPoint within 32°F (0°C) and +50°F (+10°C) displayed on 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 Technical data PLH 15 – 180 1/115/60

MODEL PLH		15-UP	30-UP	40-UP	50-UP	80-UP	100-UP	140-UP	180-UP
Air flow rate at nominal condition (1)	[scfm]	15	30	40	50	80	100	140	180
	[m3/h]	25	50	68	85	136	170	238	306
	[l/min]	425	850	1133	1416	2265	2832	3965	5097
Pressure DewPoint at nominal condition (1)	[°F (°C)]	38 (3)							
Nominal ambient temperature	[°F (°C)]	100 (38)							
Min...Max ambient temperature	[°F (°C)]	34…122 (1…50)							
Nominal inlet air temperature	[°F (°C)]	100 (38) max.150 (65)							
Nominal inlet air pressure	[psig (barg)]	580 (40)							
Max. inlet air pressure	[psig (barg)]	725 (50)							
Air pressure drop - Δp	[psi (bar)]	3.63 (0.25)	3.48 (0.24)	3.63 (0.25)	3.34 (0.23)		3.48 (0.24)		2.90 (0.20)
Inlet - Outlet connections	[NPT-F]	3/8"			3/4"				1"

Air-Cooled

		15-UP	30-UP	40-UP	50-UP	80-UP	100-UP	140-UP	180-UP
Refrigerant type		R134.a					R407C		
Refrigerant quantity (2)	[oz (kg)]	5.1/4 (0.15)		8.1/2 (0.24)	10.1/2 (0.30)	13.1/2 (0.38)	17.1/4 (0.49)	18 (0.51)	26.1/2 (0.75)
Cooling air fan flow	[cfm (m3/h)]	180 (300)					350 (600)		530 (900)
Heat Rejection	[btu/hr (kW)]	1800 (0.53)	2290 (0.67)	4090 (1.20)	4810 (1.44)	6790 (1.99)	12900 (3.78)	13100 (3.84)	13500 (3.96)
Standard Power Supply (2)	[Ph/V/Hz]	1/115/60							
Nominal electric consumption	[kW]	0.16	0.22	0.33	0.41	0.49	0.86	0.89	0.94
	[A]	1.5	2.0	3.0	3.7	4.4	7.6	8.2	8.6
Full Load Amperage FLA	[A]	3.1	4.5	5.3	7.1	8.7	12.5		12.6
Max. noise level at 1 m	[dbA]	< 70							
Weight	[lb (kg)]	62 (28)	64 (29)	71 (32)	84 (38)	86 (39)	110 (50)	117 (53)	196 (89)

Water-Cooled

		15-UP … 140-UP	180-UP
Refrigerant type		[-]	R407C
Refrigerant quantity (2)	[oz (kg)]	[-]	24 (0.68)
Max. cooling water inlet temp (3)	[°F (°C)]	[-]	86 (30)
Min...Max. cooling water inlet pressure	[psig (barg)]	[-]	45…145 (3…10)
Cooling water flow at 15°C	[US gpm (m3/h)]	[-]	0.53 (0.12)
Cooling water flow at 30°C	[US gpm (m3/h)]	[-]	1.94 (0.44)
Heat Rejection	[btu/hr (kW)]	[-]	13500 (3.96)
Control of cooling water flow		[-]	Automatic by valve
Cooling water connection	[NPT-F]	[-]	1/2"
Standard Power Supply (2)	[Ph/V/Hz]	[-]	1/115/60
Nominal electric consumption	[kW]	[-]	0.85
	[A]	[-]	7.8
Full Load Amperage FLA	[A]	[-]	11.8
Max. noise level at 1 m	[dbA]	[-]	< 70
Weight	[lb (kg)]	[-]	187 (85)

(1) The nominal condition refers to an ambient temperature of 100°F (38°C) with inlet air at 580 psig (40 barg) and 100°F (38°C).
(2) Check the data shown on the identification plate.
(3) Other temperature on request.

MODEL PLH		15-UE	30-UE	40-UE	50-UE	80-UE	100-UE	140-UE	180-UE	260-UE	350-UE	450-UE	550-UE
Air flow rate at nominal condition (1)	[scfm]	15	30	40	50	80	100	140	180	260	350	450	550
	[m3/h]	25	50	68	85	136	170	238	306	442	595	765	935
	[l/min]	425	850	1133	1416	2265	2832	3965	5097	7362	9911	12743	15575
Pressure DewPoint at nominal condition (1)	[°F (°C)]	38 (3)											
Nominal ambient temperature	[°F (°C)]	100 (38)											
Min...Max ambient temperature	[°F (°C)]	34...122 (1...50)											
Nominal inlet air temperature	[°F (°C)]	100 (38) max.150 (65)											
Nominal inlet air pressure	[psig (barg)]	580 (40)											
Max. inlet air pressure	[psig (barg)]	725 (50)											
Air pressure drop - Δp	[psi (bar)]	3.63 (0.25)	3.48 (0.24)	3.63 (0.25)	3.34 (0.23)		3.48 (0.24)		2.90 (0.20)	3.19 (0.22)		3.34 (0.23)	3.19 (0.22)
Inlet - Outlet connections	[NPT-F]	3/8"			3/4"				1"			1.1/2"	

Air-Cooled	Refrigerant type		R134.a				R407C						
	Refrigerant quantity (2)	[oz (kg)]	6 (0.17)	7 (0.20)	9.3/4 (0.28)	8.3/4 (0.25)	10.1/2 (0.30)	17.1/4 (0.49)	18 (0.51)	27.1/2 (0.78)	31 (0.88)	45.3/4 (1.30)	74 (2.10)	78 (2.20)
	Cooling air fan flow	[cfm (m3/h)]	120 (200)		180 (300)			350 (600)		530 (900)		1470 (2500)	1650 (2800)	2100 (3500)
	Heat Rejection	[btu/hr (kW)]	1540 (0.45)	1950 (0.57)	2300 (0.68)	3200 (0.94)	6700 (1.96)	12800 (3.75)	13000 (3.81)	13200 (3.87)	17200 (5.04)	20300 (5.95)	26700 (7.83)	27500 (8.06)
	Standard Power Supply (2)	[Ph/V/Hz]	1/230/60											
	Nominal electric consumption	[kW]	0.21	0.22	0.27	0.33	0.49	0.86	0.89	0.95	1.18	1.39	1.93	2.12
		[A]	1.2	1.3	1.5	1.6	2.9	3.8	4.1	4.3	5.4	6.4	8.8	9.7
	Full Load Amperage FLA	[A]	1.4	1.5	1.6	2.5	4.9	7.3		7.4	8.3	10.3	14.0	15.0
	Max. noise level at 1 m	[dbA]	< 70											
	Weight	[lb (kg)]	62 (28)	64 (29)	71 (32)	84 (38)	86 (39)	110 (50)	117 (53)	196 (89)	223 (101)	254 (115)	344 (156)	419 (190)

Water-Cooled	Refrigerant type		[-]					R407C					
	Refrigerant quantity (2)	[oz (kg)]	[-]					24.3/4 (0.70)	28.1/4 (0.80)	40.1/2 (1.15)	67 (1.90)	70.1/2 (2.00)	
	Max. cooling water inlet temp (3)	[°F (°C)]	[-]					86 (30)					
	Min...Max. cooling water inlet pressure	[psig (barg)]	[-]					45...145 (3...10)					
	Cooling water flow at 15°C	[US gpm (m3/h)]	[-]					0.53 (0.12)	0.66 (0.15)	0.70 (0.16)	0.88 (0.20)	1.01 (0.23)	
	Cooling water flow at 30°C	[US gpm (m3/h)]	[-]					1.94 (0.44)	2.55 (0.58)	2.69 (0.61)	3.04 (0.69)	3.35 (0.76)	
	Heat Rejection	[btu/hr (kW)]	[-]					13200 (3.87)	17200 (5.04)	20300 (5.95)	26700 (7.83)	27500 (8.06)	
	Control of cooling water flow		[-]					Automatic by valve					
	Cooling water connection	[NPT-F]	[-]					1/2"			3/4"		
	Standard Power Supply (2)	[Ph/V/Hz]	[-]					1/230/60					
	Nominal electric consumption	[kW]	[-]					0.86	1.10	1.20	1.65	1.75	
		[A]	[-]					4.0	5.1	5.7	7.6	8.1	
	Full Load Amperage FLA	[A]	[-]					7.1	8.0	9.6	13.3	14.3	
	Max. noise level at 1 m	[dbA]	[-]					< 70					
	Weight	[lb (kg)]	[-]					187 (85)	220 (100)	251 (114)	335 (152)	414 (188)	

(1) The nominal condition refers to an ambient temperature of 100°F (38°C) with inlet air at 580 psig (40 barg) and 100°F (38°C).
(2) Check the data shown on the identification plate.
(3) Other temperature on request.

6.3 Technical data PLH 180 – 550 3phase 3/460/60

MODEL PLH		180-UR	260-UR	350-UR	450-UR	550-UR
Air flow rate at nominal condition (1)	[scfm]	180	260	350	450	550
	[m3/h]	306	442	595	765	935
	[l/min]	5097	7362	9911	12743	15575
Pressure DewPoint at nominal condition (1)	[°F (°C)]	38 (3)				
Nominal ambient temperature	[°F (°C)]	100 (38)				
Min...Max ambient temperature	[°F (°C)]	34...122 (1...50)				
Nominal inlet air temperature	[°F (°C)]	100 (38) max.150 (65)				
Nominal inlet air pressure	[psig (barg)]	580 (40)				
Max. inlet air pressure	[psig (barg)]	725 (50)				
Air pressure drop - Δp	[psi (bar)]	2.90 (0.20)	3.19 (0.22)		3.34 (0.23)	3.19 (0.22)
Inlet - Outlet connections	[NPT-F]	1"			1.1/2"	

Air-Cooled	Refrigerant type		R134.a			R407C	
	Refrigerant quantity (2)	[oz (kg)]	31.3/4 (0.90)	34.1/2 (0.98)	51.1/4 (1.45)	63.1/2 (1.80)	68.3/4 (1.95)
	Cooling air fan flow	[cfm (m3/h)]	1470 (2500)	1650 (2800)		2100 (3600)	2200 (3700)
	Heat Rejection	[btu/hr (kW)]	13700 (4.02)	14200 (4.16)	14900 (4.37)	24900 (7.30)	32300 (9.47)
	Standard Power Supply (2)	[Ph/V/Hz]	3/460/60				
	Nominal electric consumption	[kW]	1.13	1.28	1.31	2.50	2.75
		[A]	1.8	1.9	2.0	3.9	4.2
	Full Load Amperage FLA	[A]	2.8			6.4	7.4
	Max. noise level at 1 m	[dbA]	< 70				
	Weight	[lb (kg)]	209 (95)	236 (107)	265 (120)	357 (162)	414 (188)

Water-Cooled	Refrigerant type		R134.a			R407C	
	Refrigerant quantity (2)	[oz (kg)]	28.1/4 (0.80)	31.3/4 (0.90)	45.3/4 (1.30)	56.1/2 (1.60)	63.1/2 (1.80)
	Max. cooling water inlet temp (3)	[°F (°C)]	86 (30)				
	Min...Max. cooling water inlet pressure	[psig (barg)]	45...145 (3...10)				
	Cooling water flow at 15°C	[US gpm (m3/h)]	0.48 (0.11)	0.57 (0.13)	0.62 (0.14)	0.84 (0.19)	0.97 (0.22)
	Cooling water flow at 30°C	[US gpm (m3/h)]	1.89 (0.43)	2.03 (0.46)	2.33 (0.53)	3.17 (0.72)	3.48 (0.79)
	Heat Rejection	[btu/hr (kW)]	13700 (4.02)	14200 (4.16)	14900 (4.37)	24900 (7.30)	32300 (9.47)
	Control of cooling water flow		Automatic by valve				
	Cooling water connection	[NPT-F]	1/2"			3/4"	
	Standard Power Supply (2)	[Ph/V/Hz]	3/460/60				
	Nominal electric consumption	[kW]	0.95	1.10	1.15	2.00	2.20
		[A]	1.7	1.8		2.6	3.2
	Full Load Amperage FLA	[A]	2.2			5.0	6.0
	Max. noise level at 1 m	[dbA]	< 70				
	Weight	[lb (kg)]	201 (91)	231 (105)	260 (118)	353 (160)	397 (180)

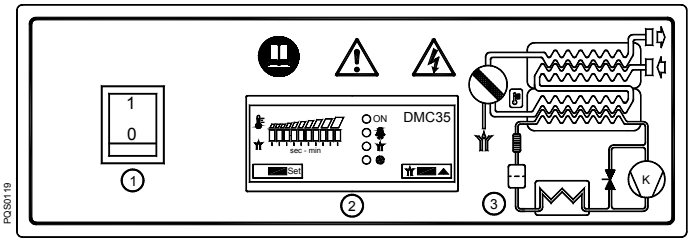
(1) The nominal condition refers to an ambient temperature of 100°F (38°C) with inlet air at 580 psig (40 barg) and 100°F (38°C).
(2) Check the data shown on the identification plate.
(3) Other temperature on request.

7 Technical description

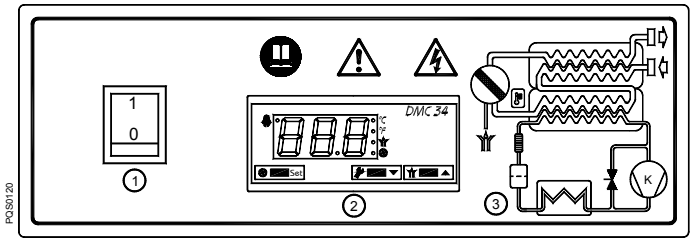
7.1 Control panel

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

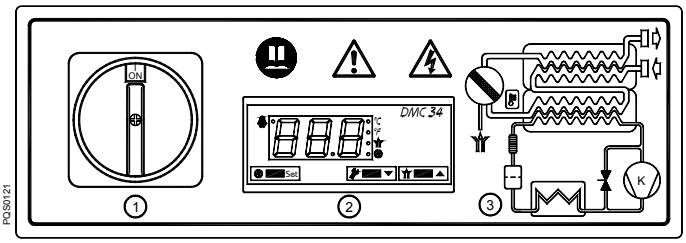
PLH 15 – 40



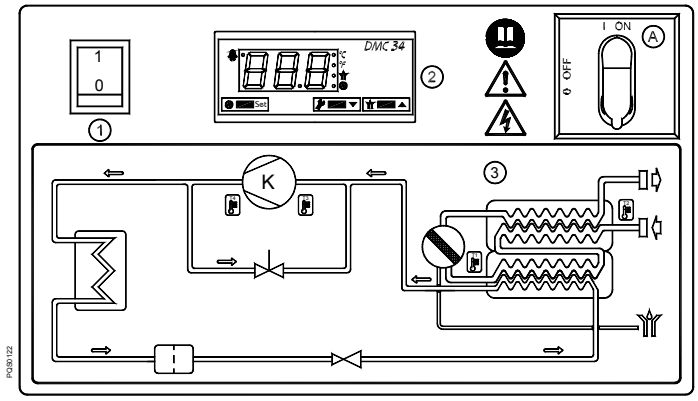
PLH 50 – 80



PLH 100 – 550



PLH 180 – 550 3phase



A Main switch

1 ON-OFF switch

2 Electronic controller

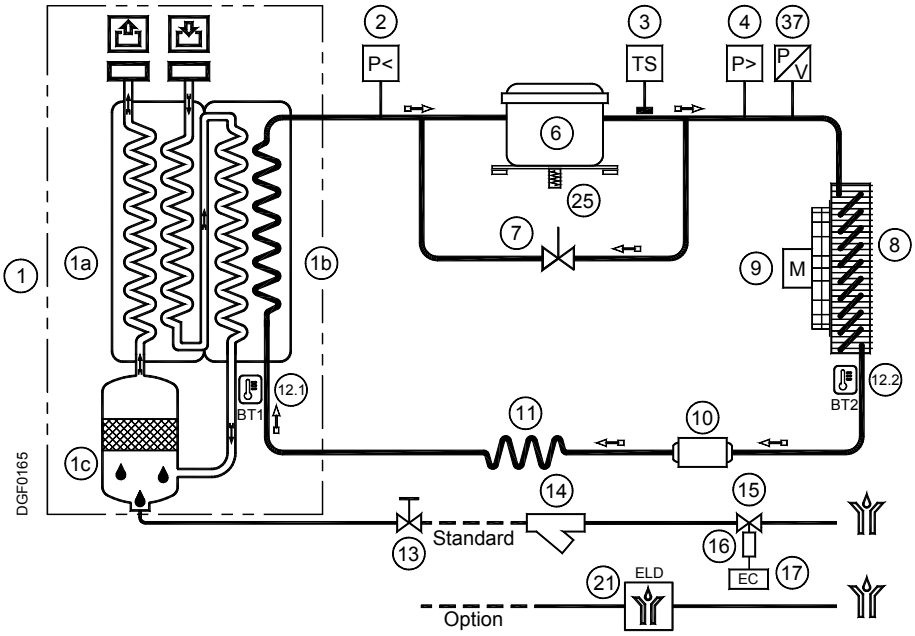
3 Air and refrigerant flow diagram

7.2 Operation

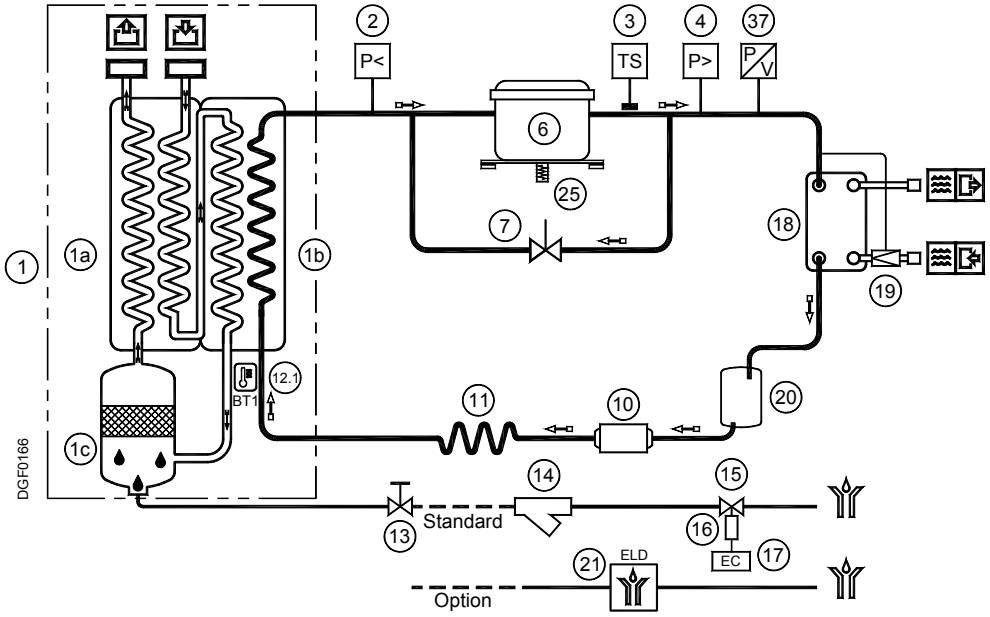
Operating principle - The dryer models described in this manual operate all on the same principle. The hot moisture laden air enters an air to air heat exchanger. The air then goes through the evaporator, also known as the air to refrigerant heat exchanger. The temperature of the air is reduced to approximately +36°F (+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 (Air-Cooled)



7.4 Flow diagram (Water-Cooled)



1 Heat exchanger group
1a Air-to-air heat exchanger
1b Air-to-refrigerant heat exchanger
1c Condensate separator
2 Refrigerant pressure switch LPS (PLH 450-550 & PLH 180-550 3phase)
3 Safety thermo switch TS (PLH 100-550 & PLH 180-550 3phase)
4 Refrigerant pressure switch HPS
6 Compressor
7 Hot gas by-pass valve
8 Condenser (Air-Cooled)
9 Condenser fan (Air-Cooled)
10 Filter dryer
11 Capillary tube
12.1 Temperature probe BT1 – DewPoint
12.2 Temperature probe BT2 – Fan control (PLH 15-40)
13 Condensate drain service valve
14 Condensate drain strainer
15 Condensate drain solenoid valve
16 Coil for condensate drain solenoid valve
17 Electronic controller
18 Condenser (Water-Cooled)
19 Condenser water regulating valve (Water-Cooled)
20 Refrigerant accumulator (Water-Cooled)
21 Electronic drainer
25 Compressor crankcase heater (PLH 180-550 3phase)
37 Pressure transducer BP2 (PLH 50-550 & PLH 180-550 3phase)

Compressed air flow direction

Refrigerant gas flow direction

7.5 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 refrigerant 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.

7.6 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.

7.7 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.

7.8 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.

Water valve setting : R134.a pressure 145 psig (± 7.3 psi) [10 barg (± 0.5 bar)]
R407C pressure 232 psig (± 7.3 psi) [16 barg (± 0.5 bar)]

7.9 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.

7.10 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.

7.11 Air-to-air heat exchanger

The purpose of this exchanger is to drop the heat of the incoming compressed air onto the outgoing cold air. The benefits of this solution are essentially two: the incoming air is already partially cooled so the refrigerating circuit can be sized as to assure a limited thermal heat, with a 40÷50% energy saving. Secondly no cold air is allowed into the compressed air line, thus preventing the system's pipes sweating.

7.12 Air-to-refrigerant heat exchanger

Also called evaporator. The liquid formed in the condenser is evaporated in this part of the circuit. In the evaporation phase the refrigerant tends to absorb the heat from the compressed air present in the other side of the exchanger.
Refrigerant and air are in counter flow, thus contributing to limit pressure drop and to provide efficient thermal exchange

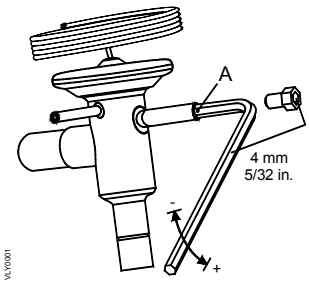
7.13 Condensate separator

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

7.14 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. +36°F (+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 ¼" 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 29.0 psig (+ 1.45 / -0 psi) [2.0 barg (+0.1 / -0 bar)]
R407C pressure 65.3 psig (+1.45 / -0 psi) [4.5 barg (+0.1 / -0 bar)]

7.15 Refrigerant pressure switches LPS – HPS

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

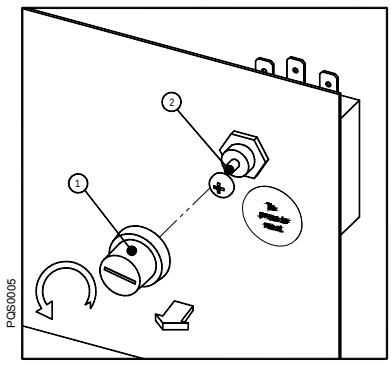
LPS : Low-pressure protection device on the suction side of the compressor, trips if the pressure drops below the pre-set value. The values are automatically reset when the nominal conditions are restored.

Calibrated pressure : R 134.a Stop 10.2 psig (0.7 barg) - Restart 24.7 psig (1.7 barg)
R 407 C Stop 24.7 psig (1.7 barg) - Restart 39.2 psig (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 134.a Stop 290 psig (20 barg) - Manual reset P<203 psi (P<14 bar)
R 407 C Stop 435 psig (30 barg) - Manual reset P<334 psi (P<23 bar)

7.16 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).

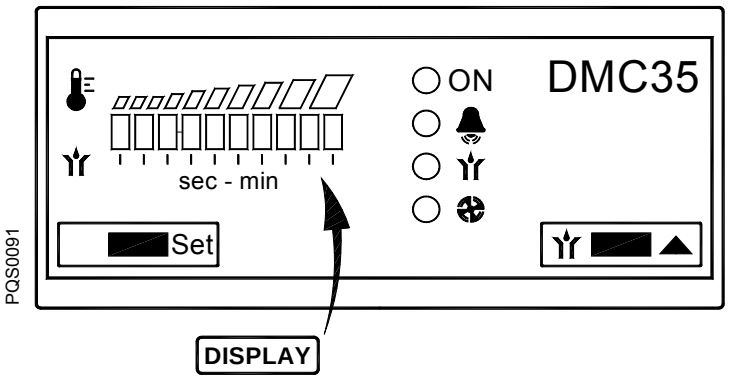
TS setting : temperature 235,4°F (113°C) (+0 / -6 °K)

7.17 Compressor crankcase heater

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.

7.18 Electronic controller DMC35 (PLH 15 - 40)



ON Led – Power ON

Led - Alarm active

Led - Drain ON

Led – Condenser fan ON

Set Button – Setup menu access

Button – Increase / Drain test

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.

7.18.1 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 .

7.18.2 How to switch off the dryer

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

7.18.3 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).

7.18.4 How is controlled the condenser fan

A temperature probe BT2 is located on the discharge side of the condenser. The condenser fan is activated (ON) when the T2 temperature is higher than FANon setting (approx. 35°C / 96°F) and led is ON.

Condenser fan stops when T2 temperature is lower than FANoff setting (approx. 30°C/86°F).

7.18.5 How is controlled the drain solenoid valve

Drain solenoid valve is activated (ON) for Ton seconds (standard 2 seconds) every Toff 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.

7.18.6 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 Set and for at least 5 seconds.

Led ○ ON is lit and a certain numbers 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 → 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 → 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 → 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 Set button to exit total hours display (if no button is pressed after 30 seconds the menu is exited automatically).

7.18.7 How to change the operating parameters

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 Set for at least 2 seconds to enter the setup menu.

Access to the menu is confirmed by led ○ ON flashing.

Keep Set pressed and use arrows to change the value. Release the button Set to confirm the value. Press shortly Set to skip to following parameter.

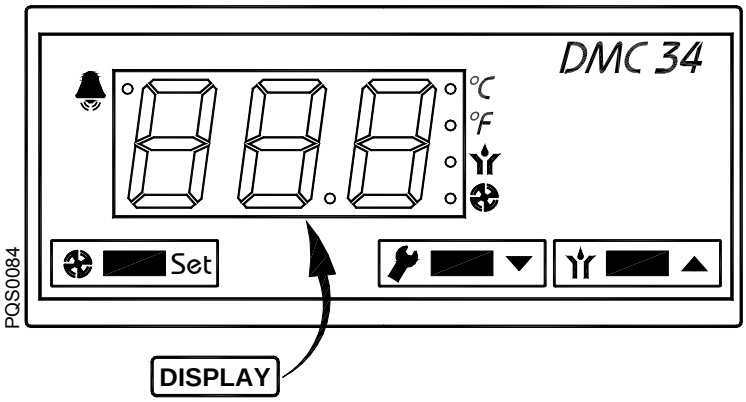
Press to exit setup menu (if no button is pressed after 2 minutes the menu is exited automatically).

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) : TON set at the 10th led (right) keep drain output always powered and led ○ always off (used if electronic drainer is installed)

7.19 Electronic controller DMC34 (PLH 50 - 550)



- Led - Temperature in °C
- Led - Temperature in °F
- Led – Drain ON
- Led – Fan ON
- Led – Alarm/Service
- Button – Setup menu access / Condensing
- Button – Decrease / Service
- Button – Increase / Drain test

The DMC34 displays DewPoint temperature, controls the condenser fan activation, handles a service reminder and keep record of the total hours of operation of the dryer.

7.19.1 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 the display shows the DewPoint temperature.
The condensate drain test is always active using the button .

7.19.2 How to switch off the dryer

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

7.19.3 How to display the operating parameters

During normal operation, the display shows the DewPoint temperature (in °C or °F).
Press and hold Set button to display condensing pressure.
Press and hold button to display hours until the next service.
Press and hold Set + buttons to display total hours of operation of the dryer (cannot be reset).

NOTE : with led °C on temperatures are in °C and pressure in barg; with led °F on temperatures are in °F and pressure in psig.
The total hours of operation and the hours until the next service are shown in the field 0…999 hours and in thousands of hours from 01.0 hours on (example : if the display shows number 35 it means 35 hours; if the display shows number 3.5 it means 3500 hours).

7.19.4 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.

When a service warning / alarm is active, the led is lighted or flashing.

Service warnings / alarms are automatically reset as soon as the problem is solved and dryer is powered again. Scheduled Service reminder requires manual reset.

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

Service Warning / Alarm	Description
flashing + PF 1 on display	PF1 - Probe 1 Failure : failure temperature probe BT1
flashing + PF2 on display	PF2 - Probe 2 Failure : failure pressure probe BP2
flashing + HdP on display	HdP - High DewPoint: DewPoint too high Set BT1>HdS, delay Hdd / Reset BT1<HdS-1°C (HdS-2°F)
flashing + LdP on display	LdP - Low DewPoint : DewPoint too low Set BT1< -1°C (30°F), delay 5 minutes / Reset T1> 1°C (34°F)
flashing + SrU on display	SrV - Service : maintenance service time expired SrV

7.19.5 How is controlled the condenser fan

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 (R134a approx. 11 barg/160 psig – R407C approx. 18 barg/260 psig) and led is ON. Condenser fan stops when BP2 pressure is lower than FANoff setting (R134a approx. 8 barg/115 psig – R407C approx. 14 barg/203 psig).

7.19.6 How is controlled the drain solenoid valve

Drain solenoid valve is activated (ON) for ton seconds (standard 2 seconds) every toF 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, DMC34 is set to keep always powered the drain output (ton = ON).

7.19.7 How to reset the service reminder timer

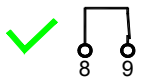
With dryer OFF keep pressed buttons Set + , power the dryer and switch it on using the ON-OFF switch (pos.1 paragraph 7.1).

After 5 seconds display shows SrU, release buttons Set + , keep pressed button for 5 seconds. Timer has been reset and controller start to operate regularly.

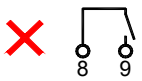
Service reminder timing can be reset at any time, even before the timing has expired.

7.19.8 Operation of the failure / alarm dry contact

The DMC34 is equipped with a dry contact (potential free) to display failure and/or alarm conditions.



Dryer powered and no service warning / alarm is active.



Dryer not powered or service warning / alarm is active.

7.19.9 How to change the operating parameters

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 simultaneously press buttons Set + ▲ for at least 5 seconds to enter the setup menu.

Access to the menu is confirmed by message **ton** on the display (first parameter of menu).

Keep Set pressed to display the value of the selected parameter and use arrows ▼ and ▲ to change the value. Release the button Set to confirm the value and skip to following parameter.

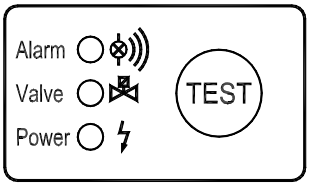
Press ▼ + ▲ to exit setup menu (if no button is pressed after 2 minutes the menu is exited automatically).

ID	Description	Limits	Resolution	Standard setup
ton	Ton – drain time ON : time ON condensate drain valve ON = Electronic drainer installed	ON 00 … 20 sec	1 sec	2
toF	ToF - drain time OFF : pause time for condensate drain valve	1 … 20 min	1 min	1
HdS	HdS – High DewPoint Setting : Alarm threshold for a high DewPoint (the alarm disappears when the temperature drop 1°C / 2°F below alarm point)	0.0…25.0 °C or 32 … 77 °F	0.5 °C or 1 °F	20 or 68
Hdd	Hdd - High DewPoint Delay : high DewPoint alarm enable delay	01 … 20 minutes	1 min	15
SrU	SrV - Service Setting: setting of service warning timer. 00 = service warning timer disabled.	00.0 … 20.0 (x 1000) hours	0.5 (x1000) hours	08.0
SrC	SrC – Service Contact : configuration of the alarm dry contact for the service warning timer. YES = activate the contact / NO = NOT activate the contact	YES / NO	-	YES
SCL	SCL - Scale: display scale of temperatures and pressure (°C = temperatures in °C and pressure in barg; °F = temperatures in °F and pressure in psig)	°C … °F	-	°C

7.20 Electronic drainer (optional)

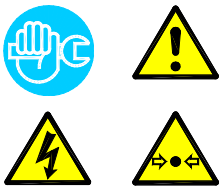
Instead of the usual drain system (a solenoid valve controlled by means of electronic controller); an electronic level controlled drainer can be installed as option. This drainer consists of a condensate accumulator where a capacitive sensor continuously checking liquid level is placed: as soon as the 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



Power Led	On - drain ready to work / supplied
Valve Led	On - membrane solenoid valve open / discharging
Alarm Led	Flashing - drain in alarm condition
TEST Button	Discharge test (keep pushed for 2 seconds)

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 and 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 controller is correct.
- Check the proper operation of the condensate drain systems.
- Verify the condenser for cleanliness (Air-Cooled).

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 aluminum fins of the cooling package (Air-Cooled)

- 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
- Replace compressed air filters

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.	⇨ Verify that the system is powered. ⇨ Verify the electric wiring. ⇨ **PLH 180-550 3phase** - Blow of fuse (FU3 on the electric diagram) of the auxiliary circuit - replace it and check the proper operation of the dryer.
◆ The compressor doesn’t work.	⇨ Activation of the compressor internal thermal protection - wait for 30 minutes, then retry. ⇨ Verify the electric wiring. ⇨ **If installed** - Replace the internal thermal protection and/or the start-up relay and/or the start-up capacitor and/or the working capacitor. ⇨ The pressure switch HPS has been activated - see specific point. ⇨ **If installed** - The pressure switch LPS has been activated - see specific point. ⇨ **If installed** - The safety thermo switch TS has been activated - see specific point ⇨ If the compressor still doesn’t work, replace it.
◆ Condenser’s fan doesn’t work (Air-Cooled).	⇨ Verify the electric wiring. ⇨ The electronic controller is faulty – replace it. ⇨ **If installed** - Fan relay / power contactor (see KF / KV1 on the electric diagram) is faulty - replace it. ⇨ **PLH 180-550 3phase** - Blow of fuse (FU1 on the electric diagram) - replace it and check the proper operation of the dryer. ⇨ There is a leak in the refrigerant 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 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 (Air-Cooled). ⇨ 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 (Air-Cooled) ⇨ The condenser fan doesn’t work - see specific point (Air-Cooled). ⇨ The cooling water is too hot - restore nominal conditions (Water-Cooled). ⇨ The cooling water flow is insufficient - restore nominal conditions (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 nominal setting. ⇨ There is a leak in the refrigerant circuit - contact a refrigeration engineer.

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ Dew Point too low	⇨ **PLH 15-40** - The fan is always ON - Led ○ 🔔 and led ○ ✣ are flashing - see specific point. ⇨ **PLH 50-550** - The fan is always ON – Led ○🔔 is flashing + display PF2 - see specific point (Air-Cooled). ⇨ Ambient temperature is too low - restore nominal conditions (Air-Cooled). ⇨ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore nominal setting.
◆ 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 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 controller is faulty – repace 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 specific paragraph).
◆ 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 controller is faulty - replace it ⇨ Electronic drainer is dirty (see specific paragraph).
◆ Water within the line.	⇨ 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.
◆ 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 (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 nominal conditions (Water-Cooled). 5. The cooling water flow is insufficient - restore nominal conditions (Water-Cooled). ⇨ 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.

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ **If installed –** TS safety thermo switch has been activated.	⇨ Check which of the following has caused the activation : 1. Eccessive 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 (Air-Cooled). 4. The condenser unit is dirty - clean it (Air-Cooled). 5. The fan doesn't work - see specific point (Air-Cooled). 6. The hot gas by-pass valve requires re-adjusting – contact a specialized technician to restore nominal setting. 7. The temperature of the cooling water is too low – restore nominal conditions (Water-Cooled). 8. The cooling water flow adjusting valve requires re-adjusting - contact a specialized technician to restore nominal setting (Water-Cooled). 9. 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 - Led ○ 🔔 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 controller is faulty - replace it.
◆ DMC35 - Leds ○ 🔔 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 controller is faulty - replace it.
◆ DMC35 Led ○ 🔔 and display 1st (left) led are flashing	⇨ DewPoint too low - see specific point. ⇨ The BT1 DewPoint probe is faulty - replace it. ⇨ The electronic controller is faulty - replace it.
◆ DMC35 The last led of the display is flashing	⇨ DewPoint too high - see specific point. ⇨ The BT1 DewPoint probe is faulty - replace it. ⇨ The electronic controller is faulty - replace it.
◆ DMC34 – Led ○🔔 is flashing + display PF 1.	⇨ Verify the electric wiring of BT1 DewPoint probe. ⇨ The BT1 DewPoint probe is faulty - replace it. ⇨ The electronic controller is faulty - replace it.
◆ DMC34 – Led ○🔔 is flashing + display PF2.	⇨ Verify the electric wiring of BP2 fan control probe. ⇨ The BP2 fan control probe is faulty - replace it. ⇨ The electronic controller is faulty - replace it.
◆ DMC34 – Led ○🔔 is flashing + display HdP.	⇨ DewPoint too high - see specific point. ⇨ The BT1 DewPoint probe is faulty - replace it. ⇨ The electronic controller is faulty - replace it.
◆ DMC34 – Led ○🔔 is flashing + display LdP.	⇨ DewPoint too low - see specific point. ⇨ The BT1 DewPoint probe is faulty - replace it. ⇨ The electronic controller is faulty - replace it.
◆ DMC34 – Led ○🔔 is flashing + display SrU.	⇨ Service reminder timer has expired – dryer requires service. ⇨ Perform the proper service to the dryer. ⇨ Reset the service reminder timer.

8.3 Spare parts

Spare parts list is printed on a dedicated sticker applied inside the dryer. On this sticker each spare part is identified with its ID Number and related Spare Part Number. Here below the cross reference table between ID Numbers and exploded drawings Ref. with their description and quantity installed in the dryers.

ID N.		DESCRIPTION	PLH											
			15	30	40	50	80	100	140	180	260	350	450	550
2	LPS	Pressure switch											1	1
3	TS	Safety thermo switch								1	1	1	1	1
4	HPS	Pressure switch	1	1	1	1	1	1	1	1	1	1	1	1
37		Pressure transducer				1	1	1	1	1	1	1	1	1
6	MC	Compressor	1	1	1	1	1	1	1	1	1	1	1	1
7		Hot gas by-pass valve	1	1	1	1	1	1	1	1	1	1	1	1
8		Condenser	1	1	1	1	1	1	1	1	1	1	1	1
9	MV	Complete fan										1	1	1
9.1	MV	Fan motor	1	1	1	1	1	1	1	1	1			
9.2		Fan blade	1	1	1	1	1	1	1	1	1			
9.3		Fan grid		1	1	1	1	1	1	1	1			
10		Filter drier	1	1	1	1	1	1	1	1	1	1	1	1
12	BT	Temperature probe	2	2	2	1	1	1	1	1	1	1	1	1
13		Condensate drain valve/strainer	1	1	1	1	1	1	1	1	1	1	1	1
15	EVD	Condensate drain solenoid valve	1	1	1	1	1	1	1	1	1	1	1	1
16		Coil for condensate drain solenoid valve	1	1	1	1	1	1	1	1	1	1	1	1
17	DMC35	Electronic instrument	1	1	1									
	DMC34					1	1	1	1	1	1	1	1	1
19		Water regulating valve (water cooled)								1	1	1	1	1
21	ELD	Electronic drainer	1	1	1	1	1	1	1	1	1	1	1	1
		Service unit for electronic drainer	1	1	1	1	1	1	1	1	1	1	1	1
22	S1	Lighted switch	1	1	1	1	1	1	1					
	QS	Main switch								1	1	1	1	1
	KF	Solid State Relay										1	1	1

ID N.		DESCRIPTION	PLH 3 PHASE				
			180	260	350	450	550
2	LPS	Pressure switch	1	1	1	1	1
3	TS	Safety thermo switch	1	1	1	1	1
4	HPS	Pressure switch	1	1	1	1	1
37		Pressure transducer	1	1	1	1	1
6	MC	Compressor	1	1	1	1	1
7		Hot gas by-pass valve	1	1	1	1	1
8		Condenser	1	1	1	1	1
9	MV	Complete fan	1	1	1	1	1
10		Filter drier	1	1	1	1	1
12	BT	Temperature probe	1	1	1	1	1
14		Y strainer	1	1	1	1	1
15	EVD	Condensate drain solenoid valve	1	1	1	1	1
16		Coil for condensate drain solenoid valve	1	1	1	1	1
17	DMC34	Electronic instrument	1	1	1	1	1
19		Water regulating valve (water cooled)	1	1	1	1	1
21	ELD	Electronic drainer	1	1	1	1	1
		Service unit for electronic drainer	1	1	1	1	1
22	S1	Lighted switch	1	1	1	1	1
	QS	Main switch	1	1	1	1	1
60	FU	Fuse kit	1	1	1	1	1
	KC1-KV1	Contactor	2	2	2	2	2
	TF	Transformer	1	1	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 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 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 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	1430
R407C - HFC	R32/125/134a (23/25/52) CHF2CF3/CH2F2/CH2FCF3	1000 ppm	1773,85

8.5 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	R407C, R134a, Oil
Canopy and supports	Carbon steel, Epoxy paint
Refrigerating compressor	Steel, Copper, Aluminium, Oil
Heat exchanger	Stainless steel, Copper
Condensate separator	Stainless steel
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. 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.

9 Attachments

Exploded views – List of components

1	Combined heat exchanger
1c	Condensate separator
2	Refrigerant pressure switch LPS
3	Safety thermo switch TS
4	Refrigerant pressure switch HPS
6	Compressor
7	Hot-gas bypass valve
8	Condenser (Air-Cooled)
9	Condenser fan (Air-Cooled)
9.1	Motor
9.2	Blade
9.3	Grid
10	Filter dryer
11	Capillary tube
12	Temperature probe BT1
13	Condensate drain service valve
14	Condensate drain strainer
15	Condensate drain solenoid valve
16	Coil for condensate drain solenoid valve
17	Electronic controller
18	Condenser (Water-Cooled)
19	Condenser water-regulating valve (Water-Cooled)
20	Refrigerant accumulator
21	Electronic drainer
22	Main switch
37	Pressure transducer BP2
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 connecting plug
62	Electric box
66	QE door
81	Flow diagram sticker

Electric diagrams – List of components

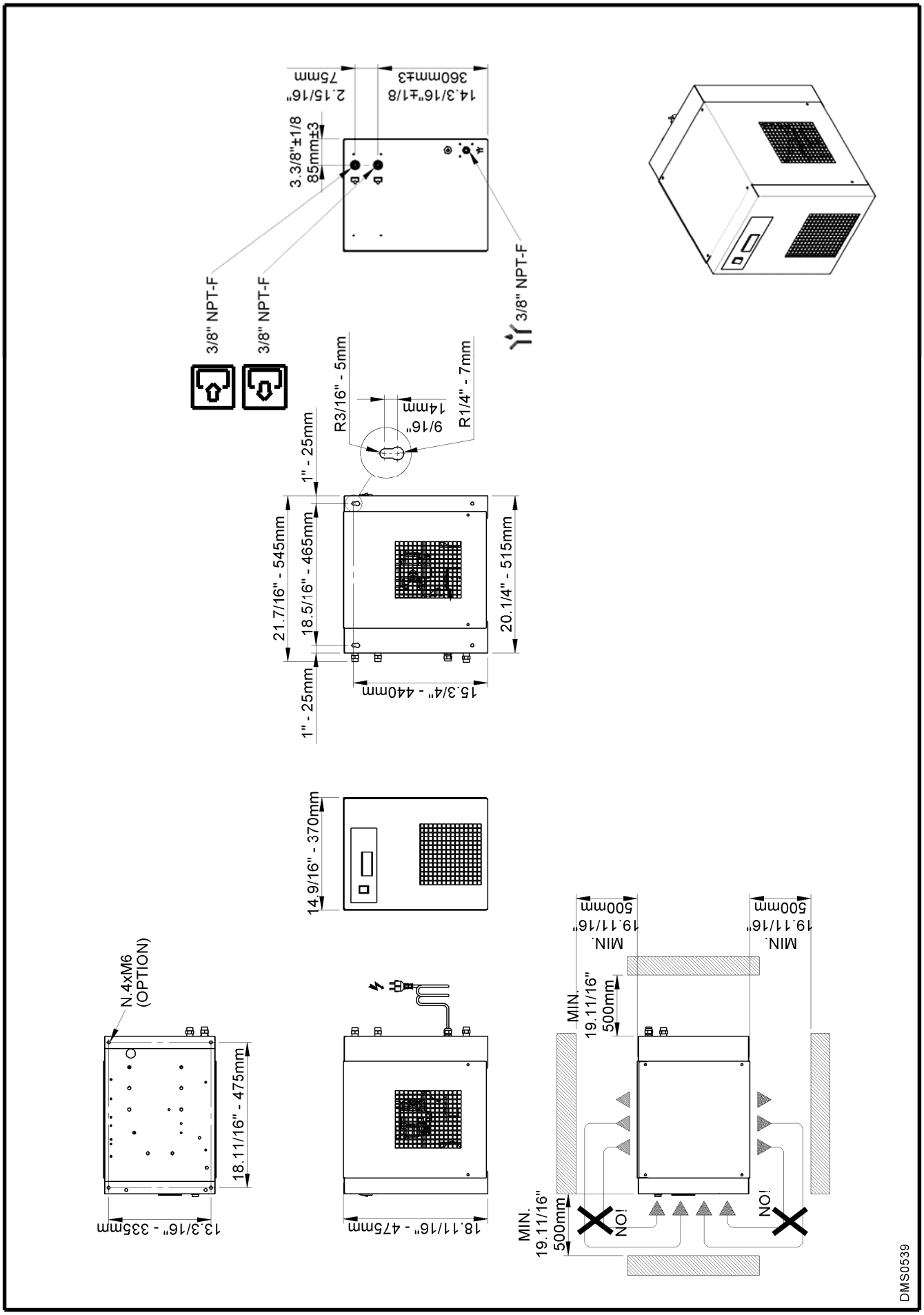
MC1	Compressor
KT	Compressor thermal protection
KR	Compressor starting relay
CS	Compressor starting capacitor
CR	Compressor operating capacitor
MV1	Condenser fan
KV	Fan thermal protection
CV	Fan starting capacitor
DMC35	Electronic controller
DMC34	Electronic controller
BT1 -2	Temperature probes
BP2	Pressure transducer
LPS	Low pressure switch
HPS	High pressure switch
TS	Safety thermo switch
EVD	Timed condensate drain solenoid valve
ELD	Electronic drainer
S1	ON-OFF switch
QS	Main switch with door block
RC	Compressor crankcase heater
BOX	Electrical box

NT1	Air-Cooled only
NT2	Verify transformer connection according to power supply voltage
NT3	Jump if not installed
NT4	Provided and wired by customer
NT5	Limit of equipment
NT6	Timed drain output
NT7	Water Cooled only

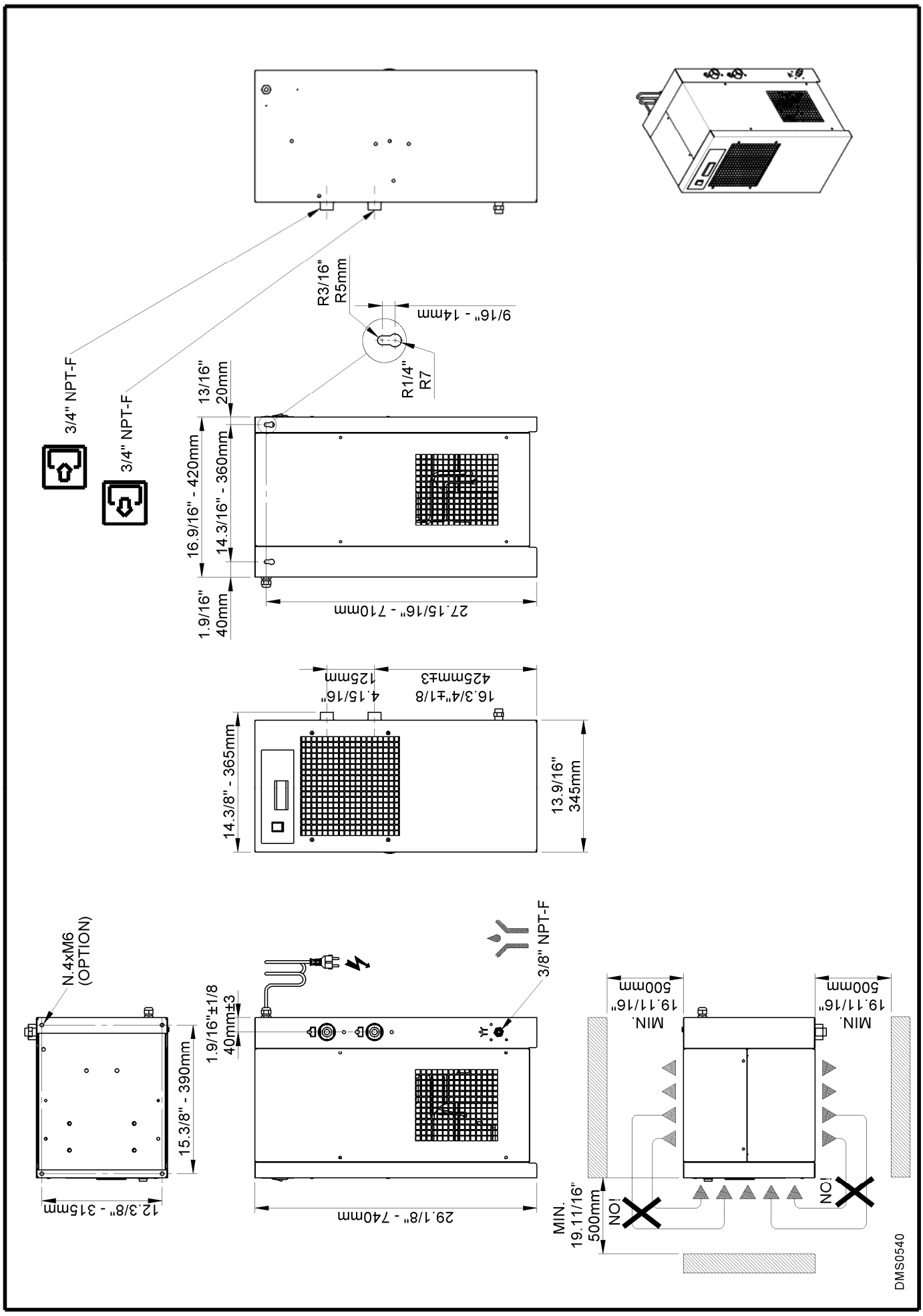
BN	Brown
BU	Blue
BK	Black
YG	Yellow / Green
OR	Orange
RD	Red
WH	White
WH/BK	White / Black

9.1 Dryers dimensions

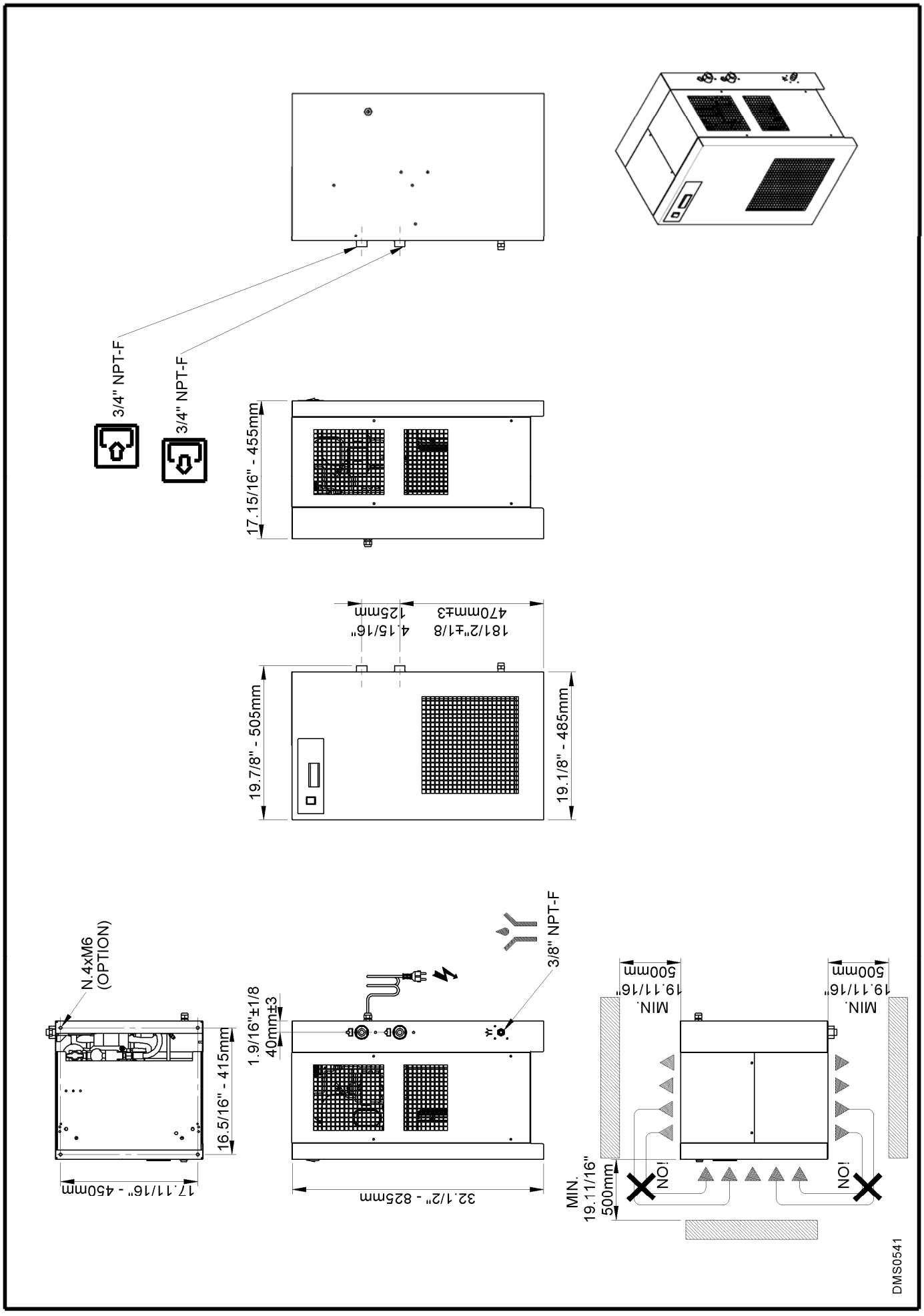
9.1.1 PLH 15 – 40



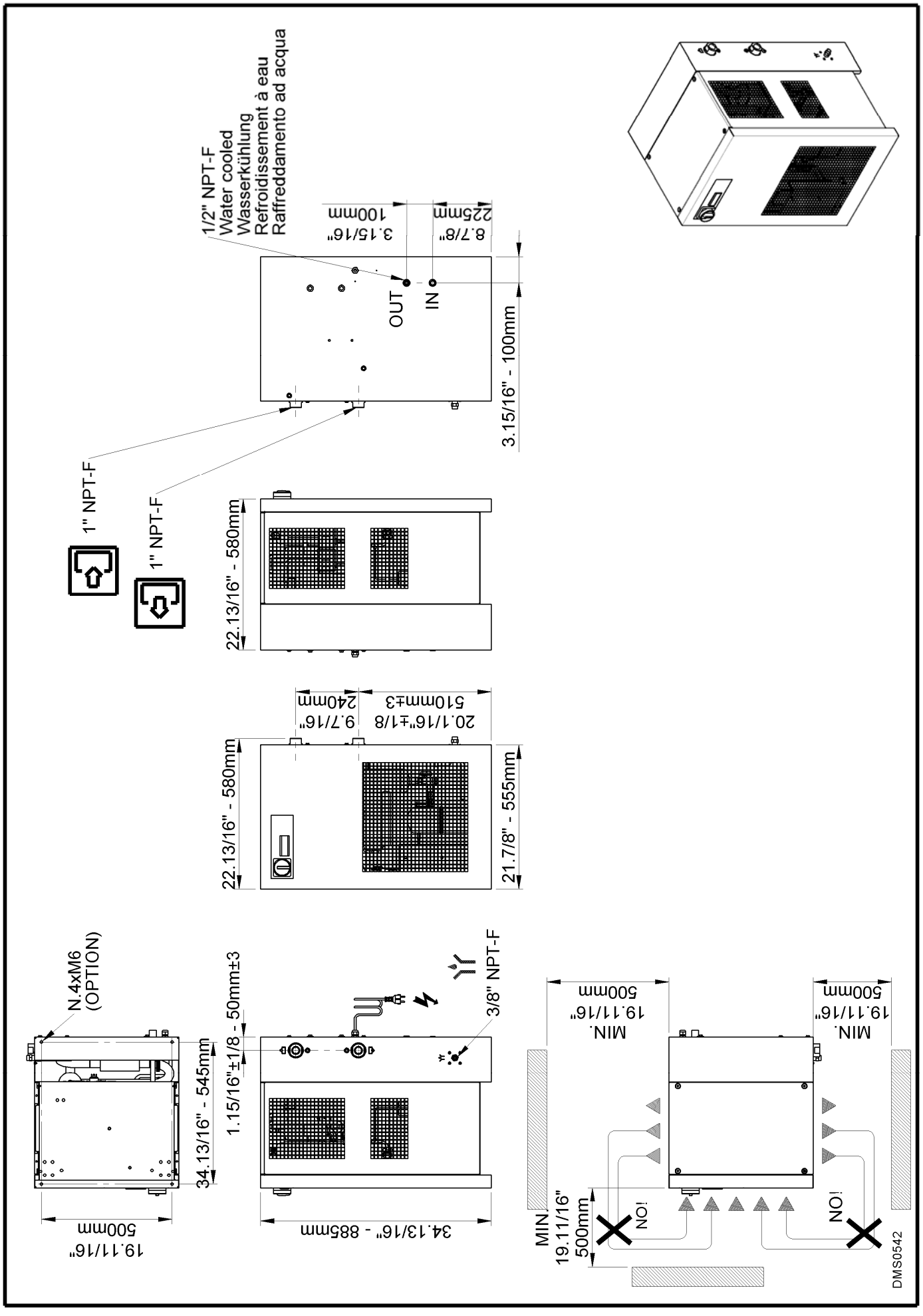
9.1.2 PLH 50 – 80


3/4" NPT-F
3/4" NPT-F
R3/16"
R5mm
9/16" - 14mm
R1/4"
R7
13/16"
20mm
16.9/16" - 420mm
14.3/16" - 360mm
1.9/16"
40mm
27.15/16" - 710mm
16.3/4"±1/8
425mm±3
4.15/16"
125mm
14.3/8" - 365mm
13.9/16"
345mm
N.4xM6
(OPTION)
1.9/16"±1/8
40mm±3
3/8" NPT-F
15.3/8" - 390mm
12.3/8" - 315mm
29.1/8" - 740mm
MIN.
19.11/16"
500mm
MIN.
19.11/16"
500mm
NO!
NO!
MIN.
19.11/16"
500mm
DMS0540

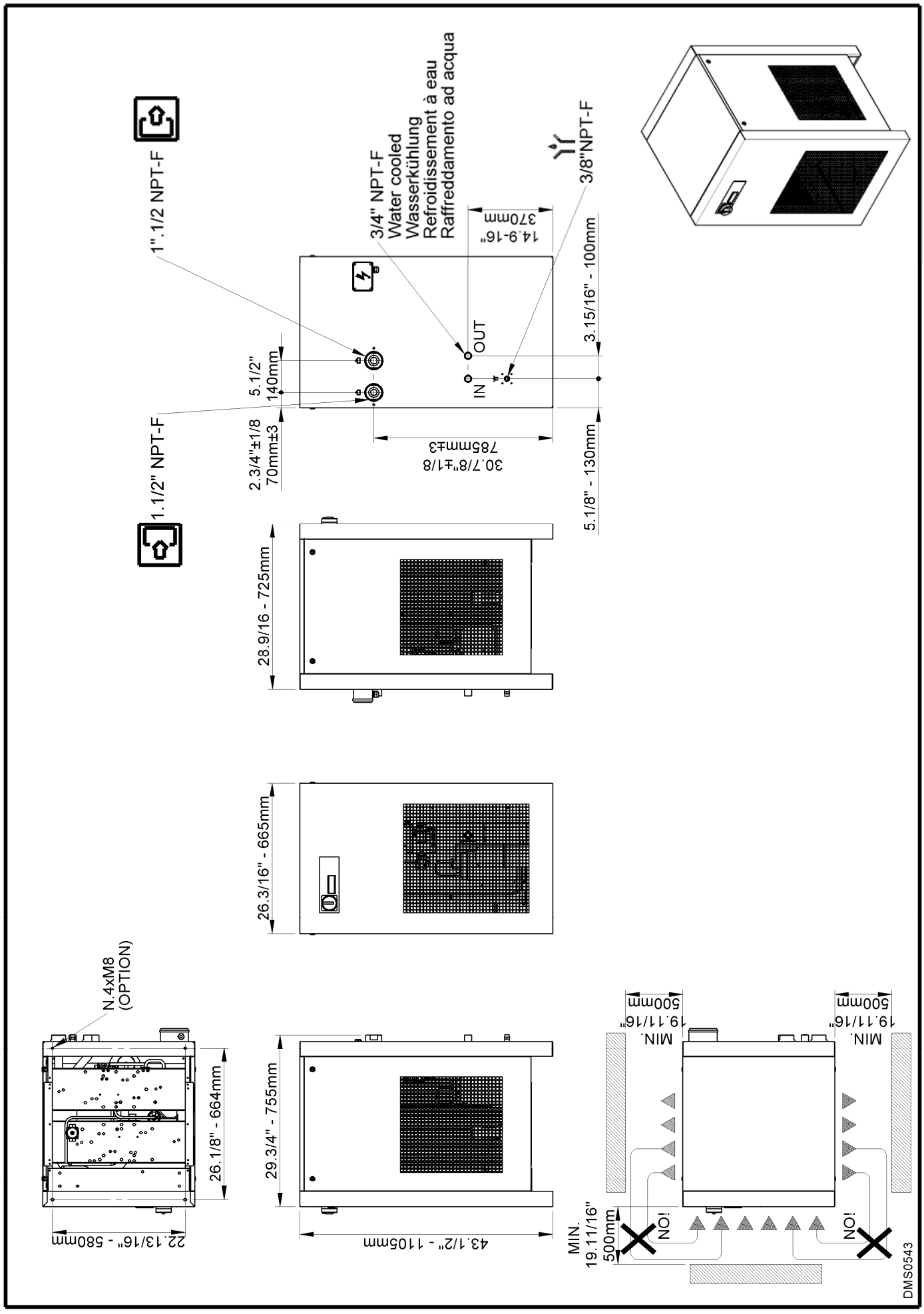
9.1.3 PLH 100 – 140



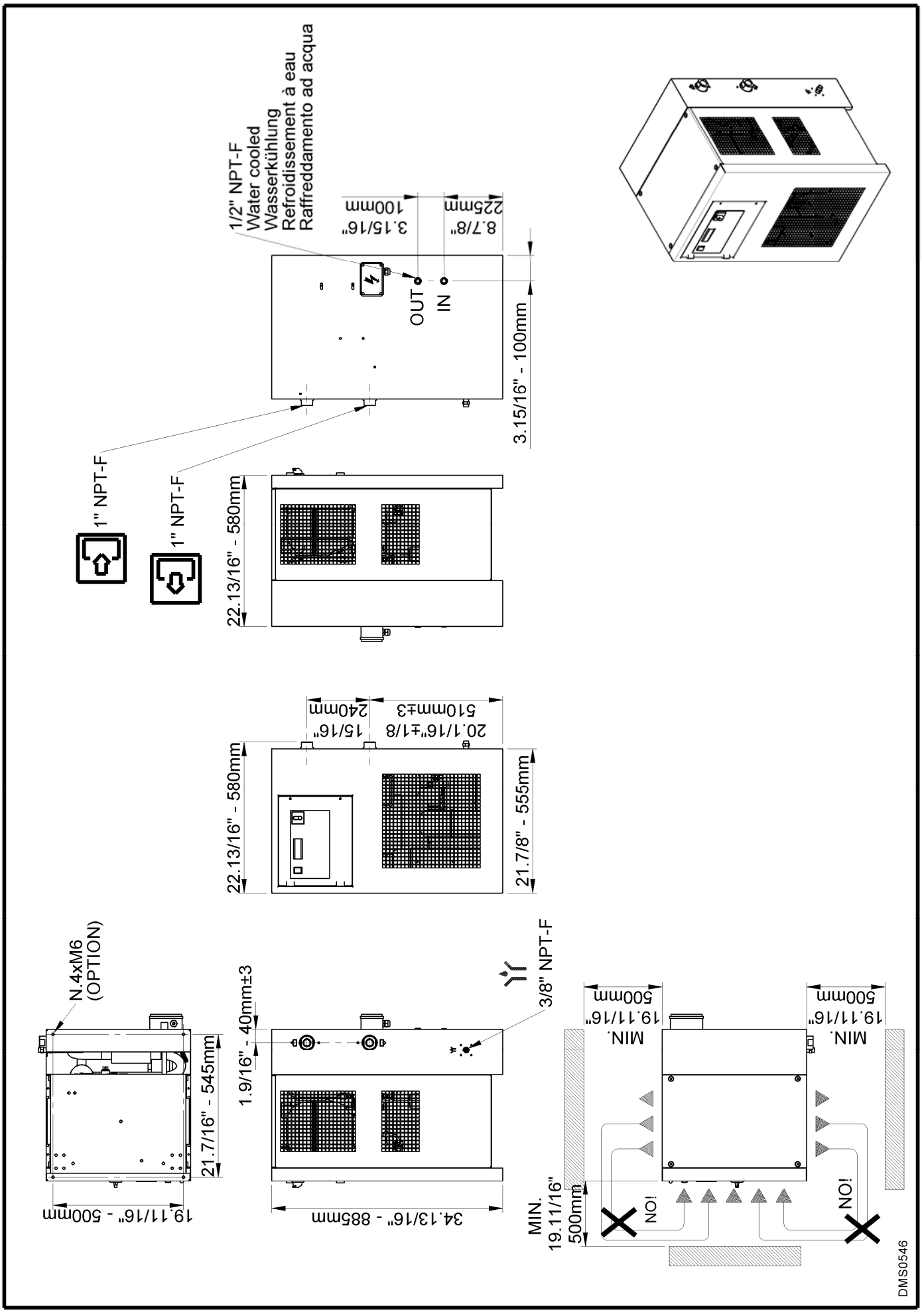
9.1.4 PLH 180 – 350



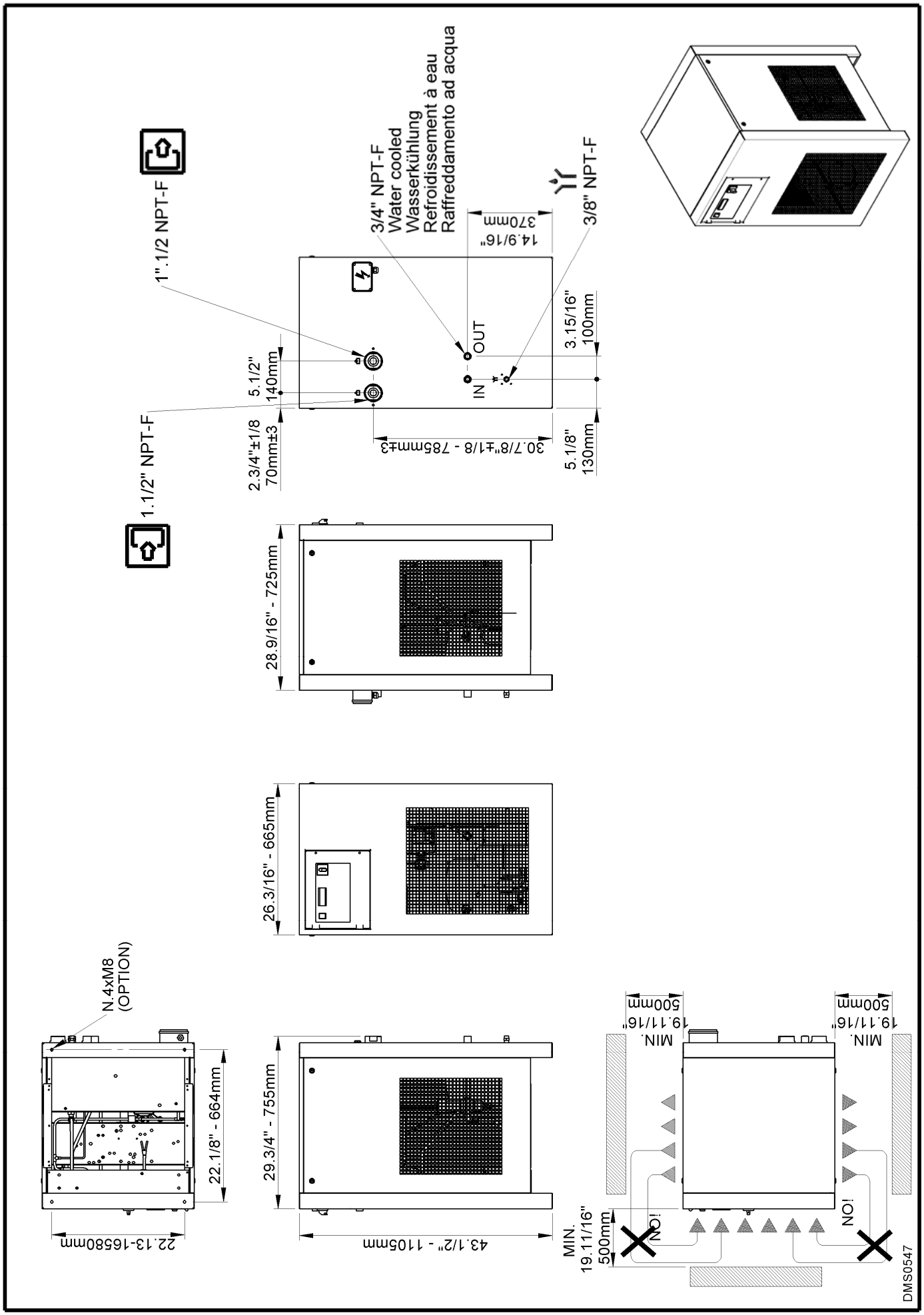
9.1.5 PLH 450 – 550



9.1.6 PLH 180 – 350 3phase

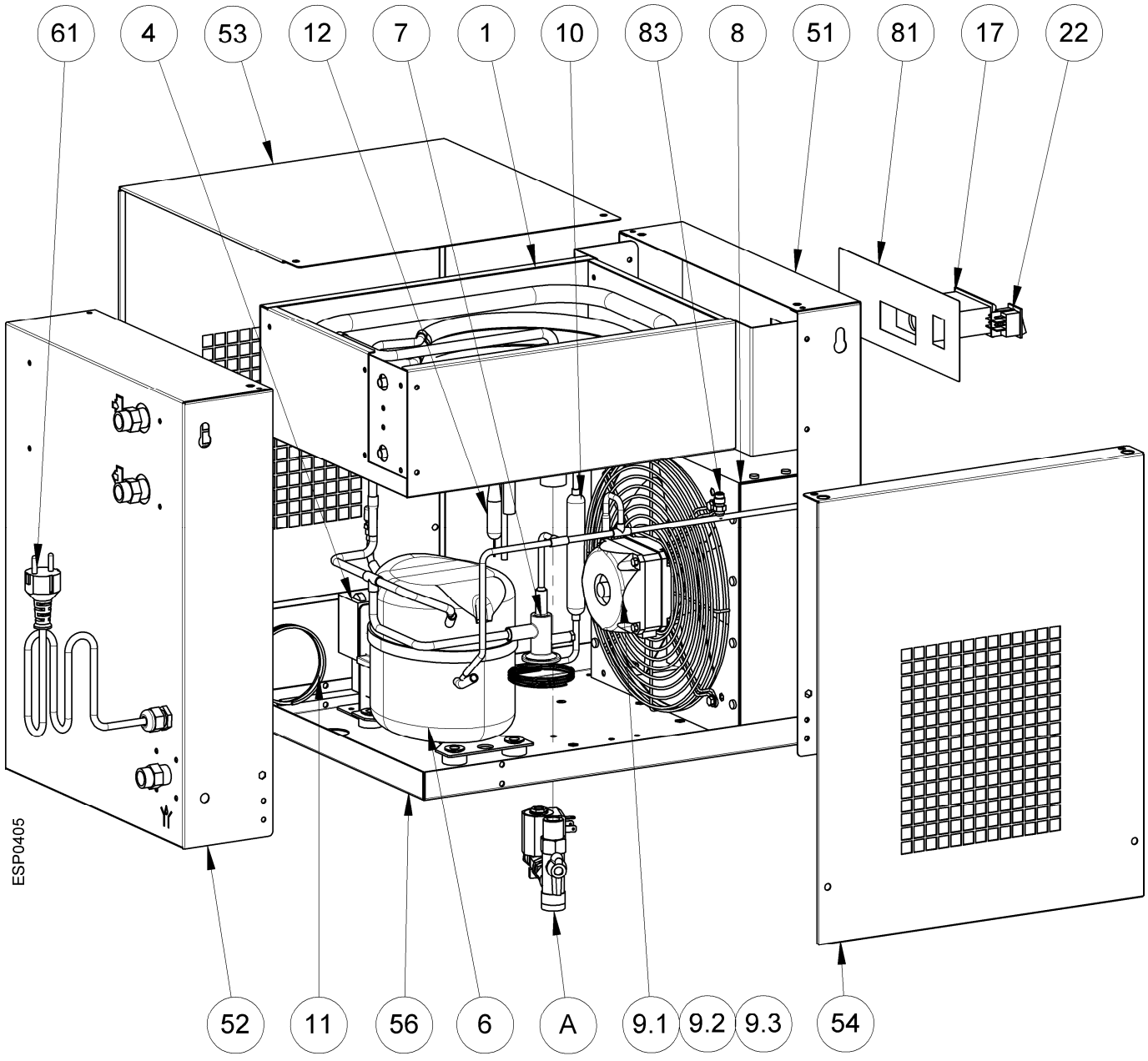


9.1.7 PLH 450 – 550 3phase

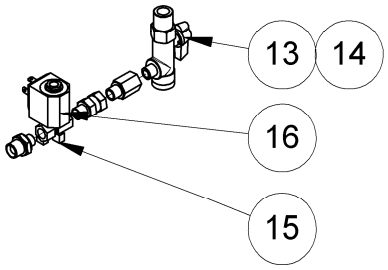


9.2 Exploded views

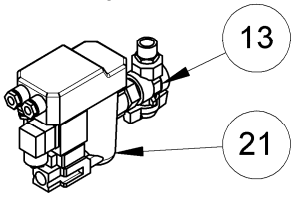
9.2.1 PLH 15 – 40



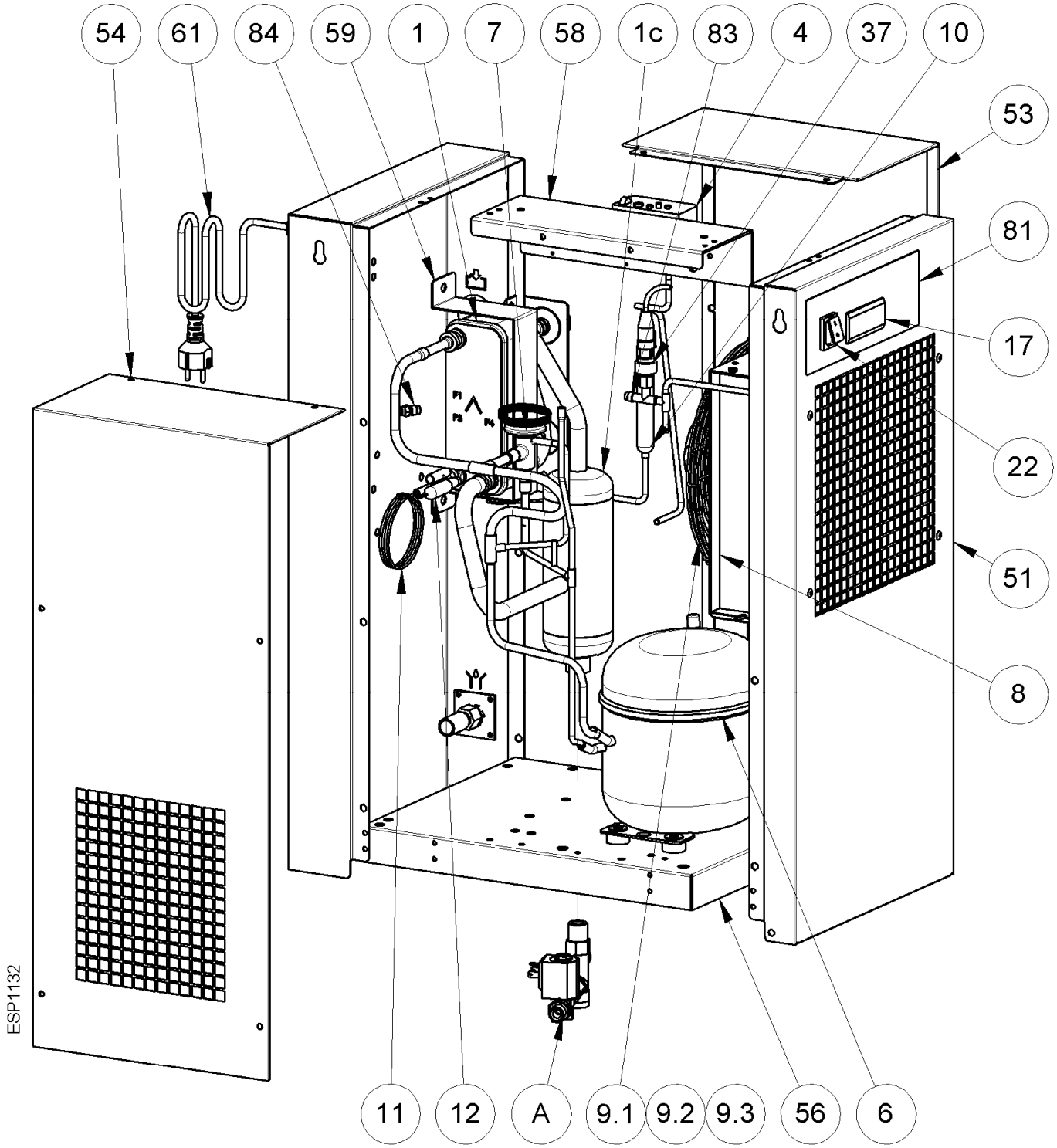
Pos. A standard



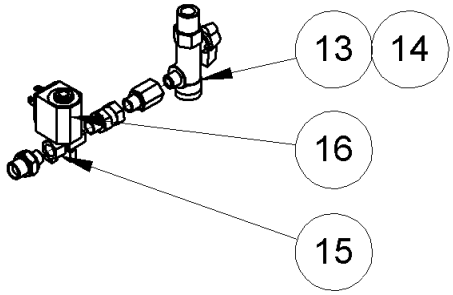
Pos. A optional



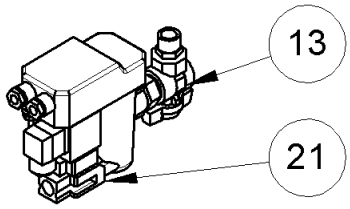
9.2.2 PLH 50 – 80



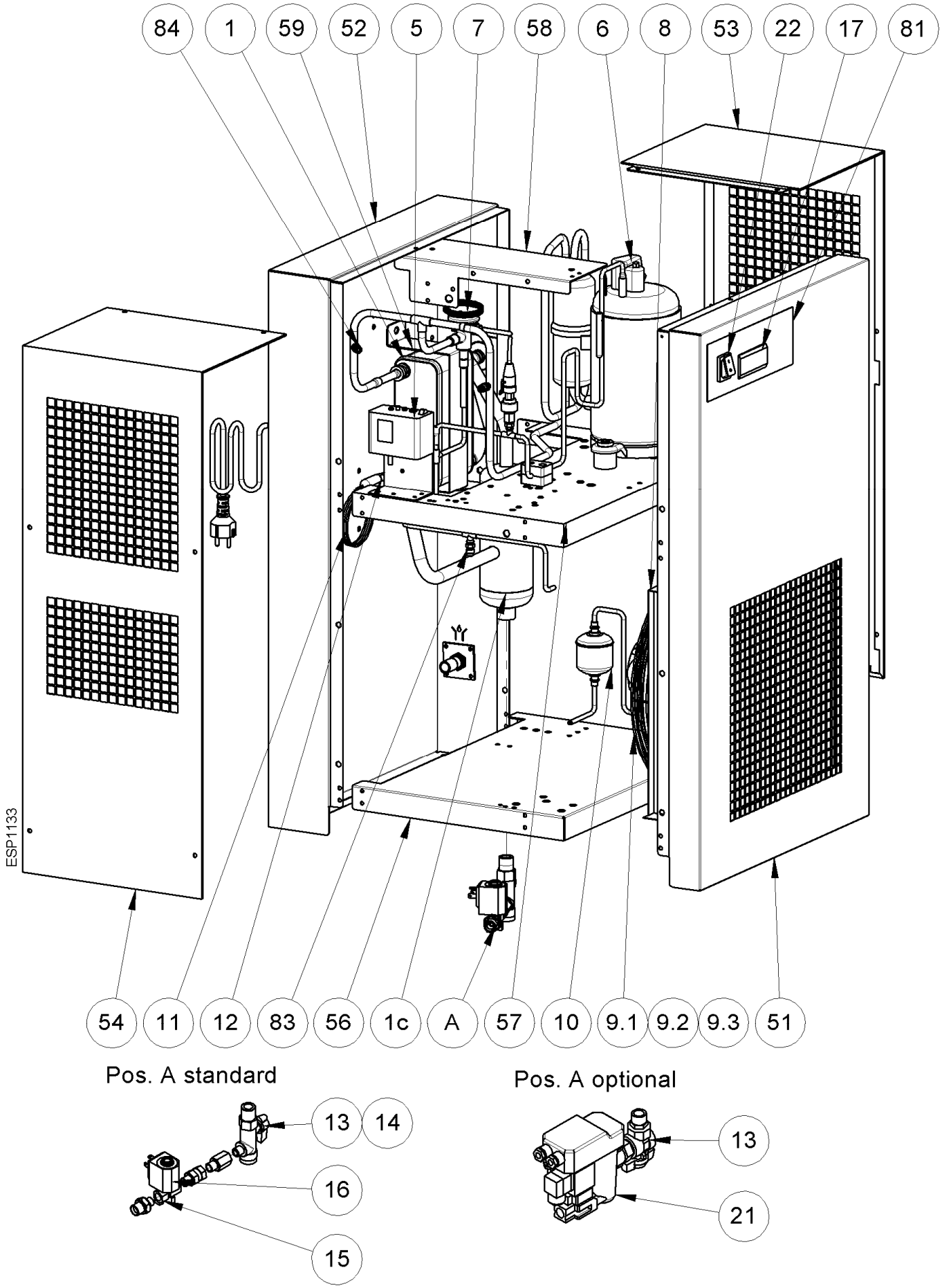
Pos. A standard



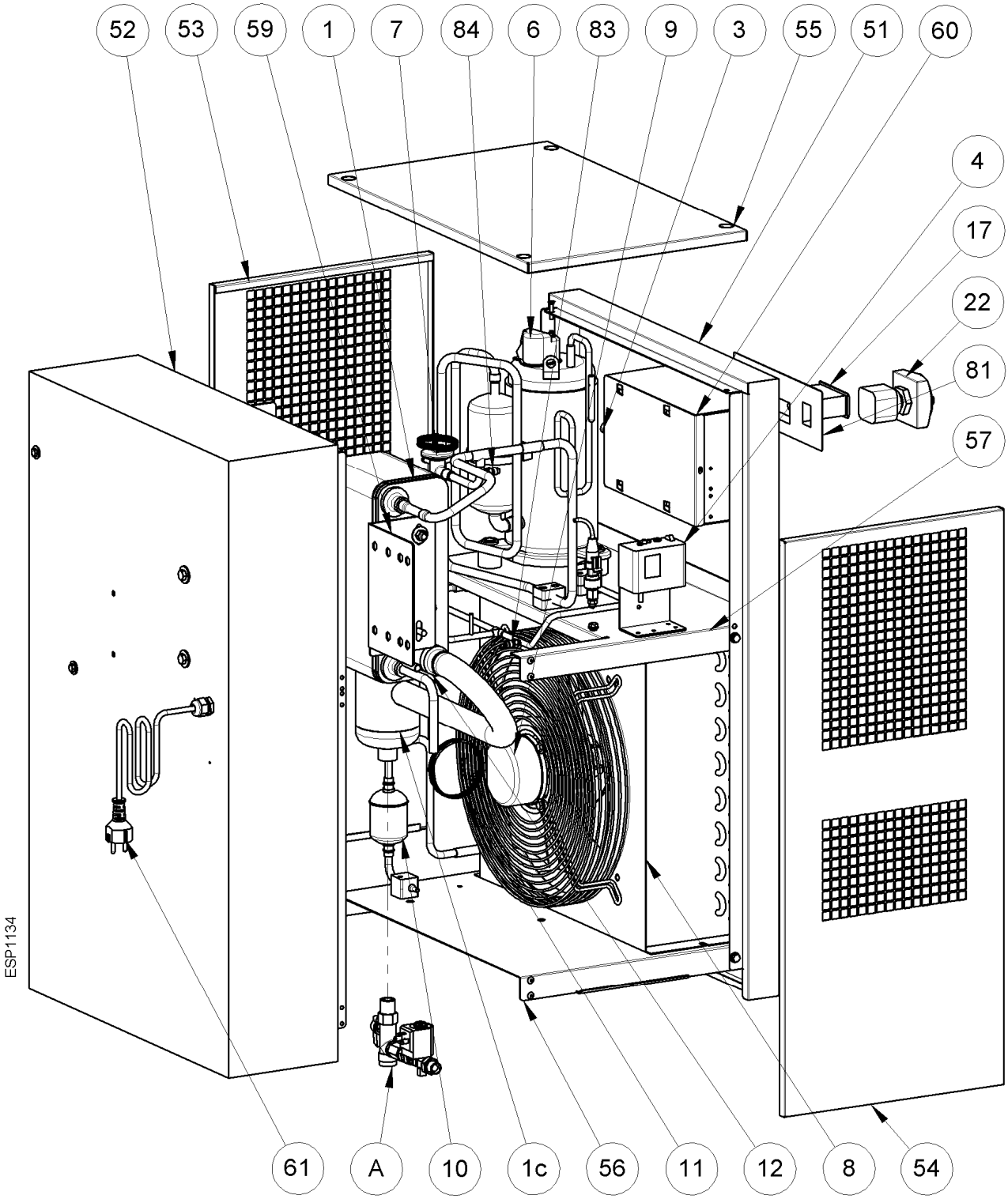
Pos. A optional



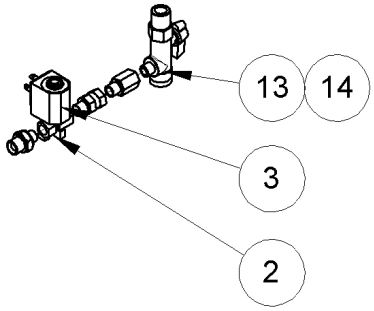
9.2.3 PLH 100 – 140



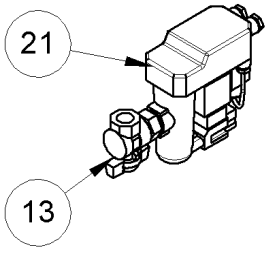
9.2.4 PLH 180 – 350 Air Cooled



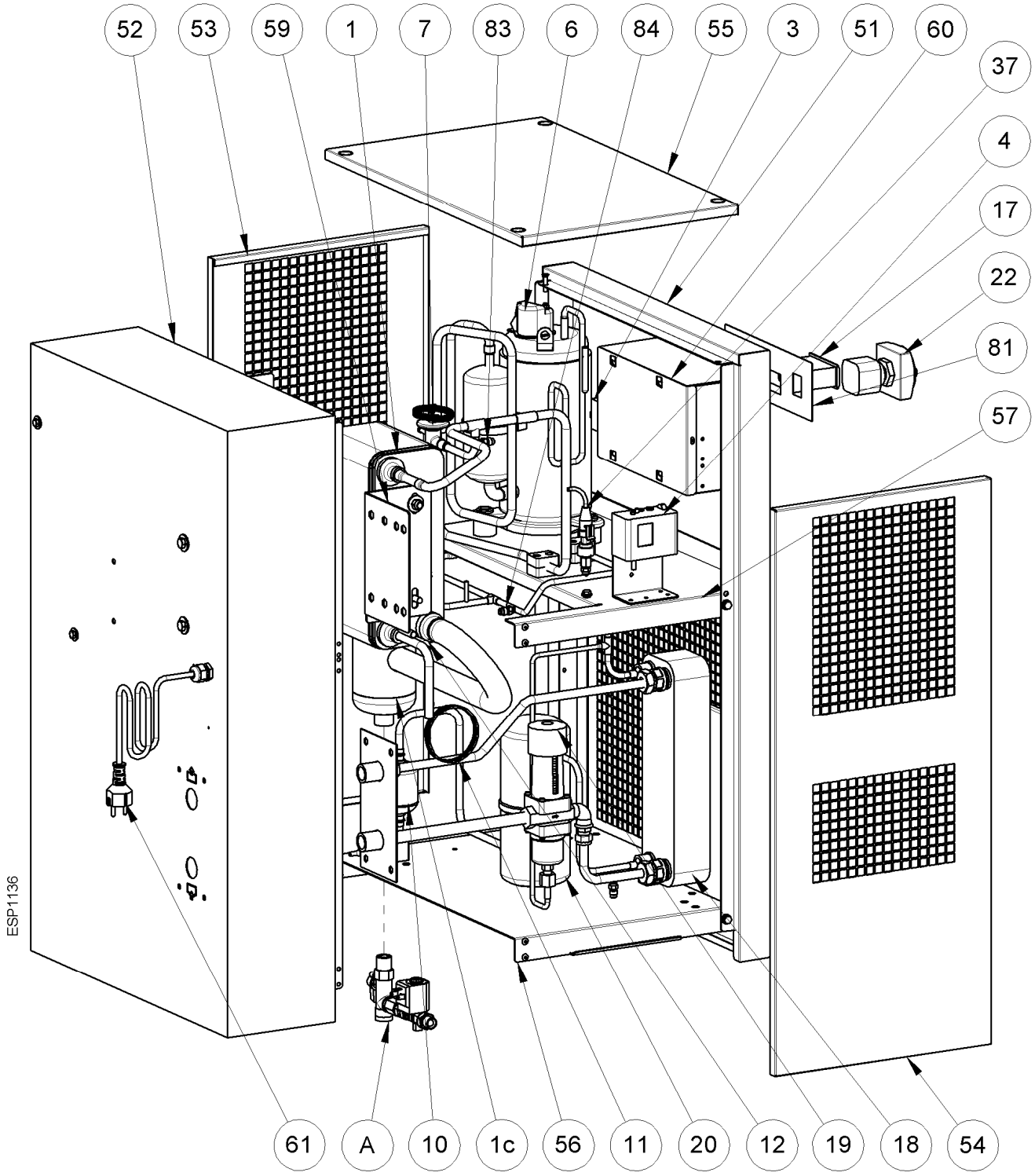
Pos. A standard



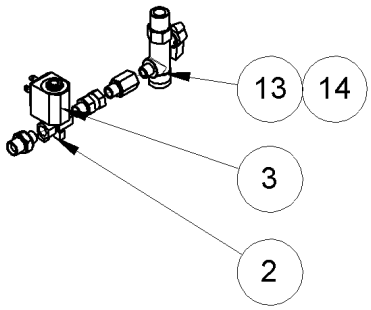
Pos. A optional



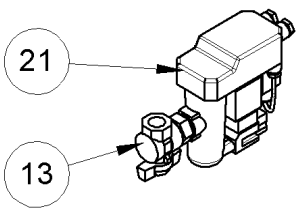
9.2.5 PLH 180 – 350 Water Cooled



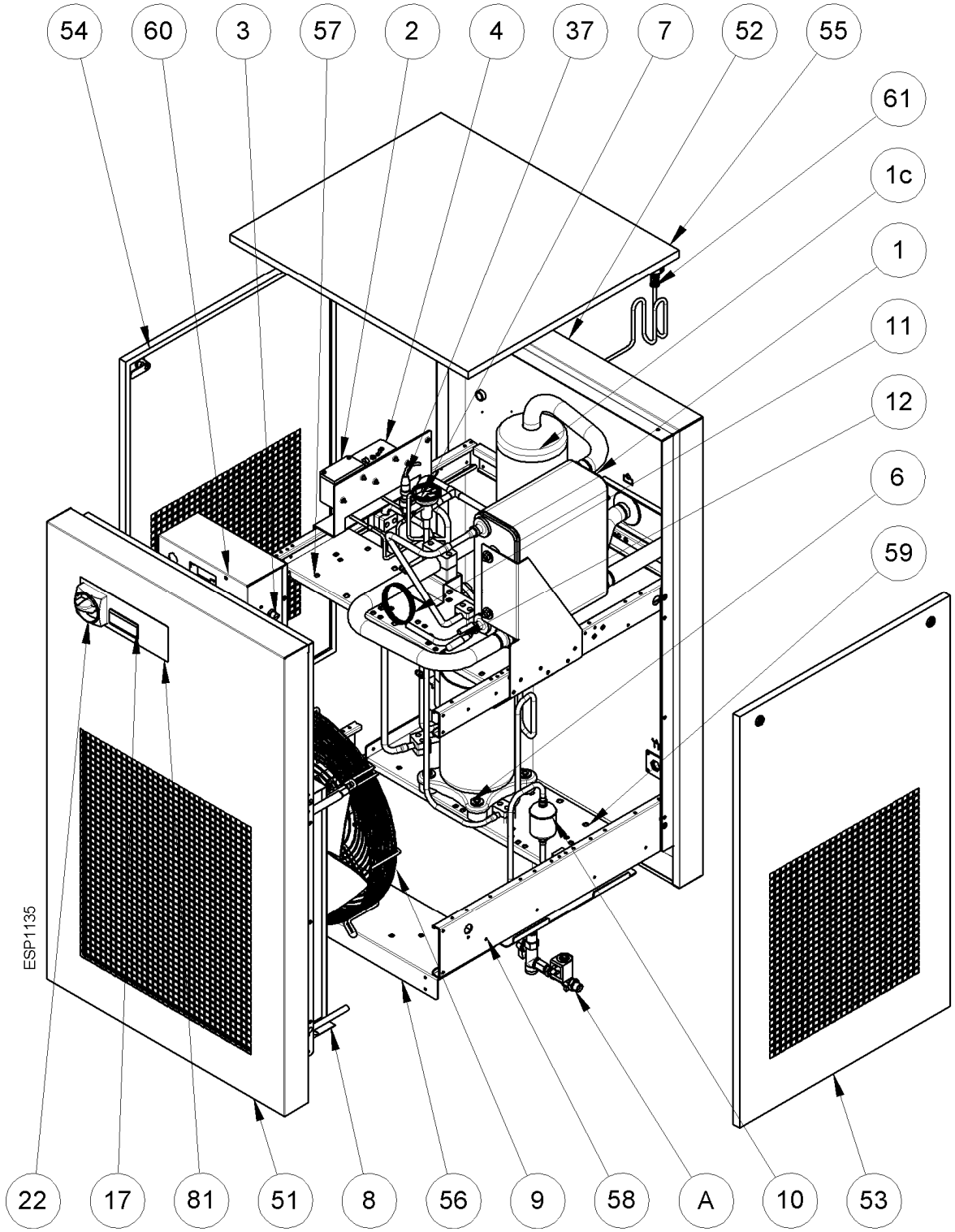
Pos. A standard



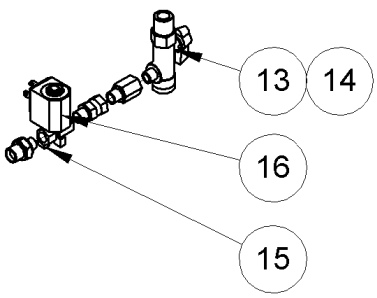
Pos. A optional



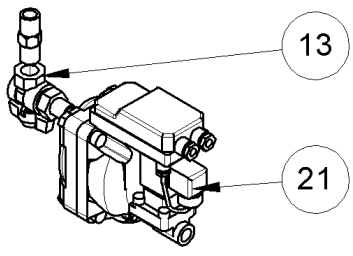
9.2.6 PLH 450 – 550 Air Cooled



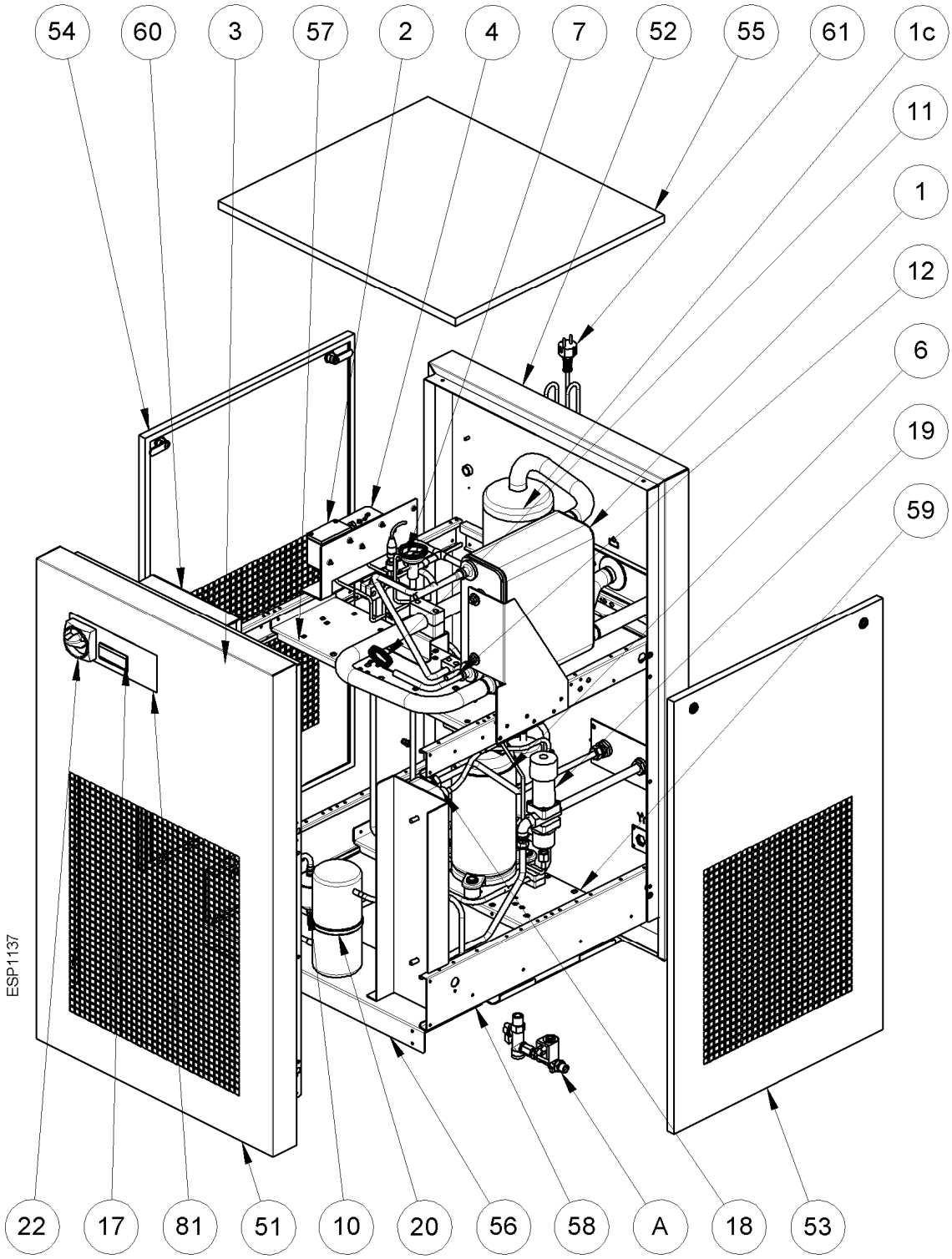
Pos. A standard

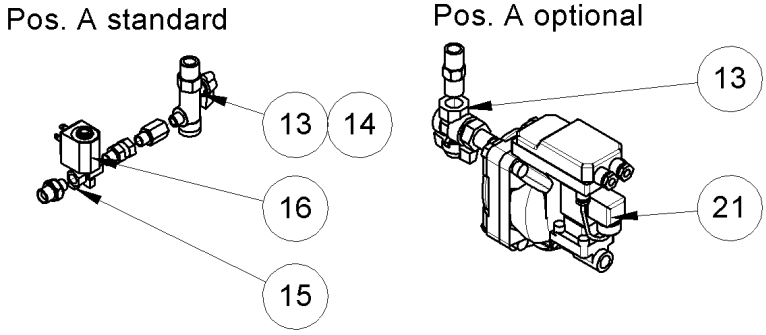


Pos. A optional

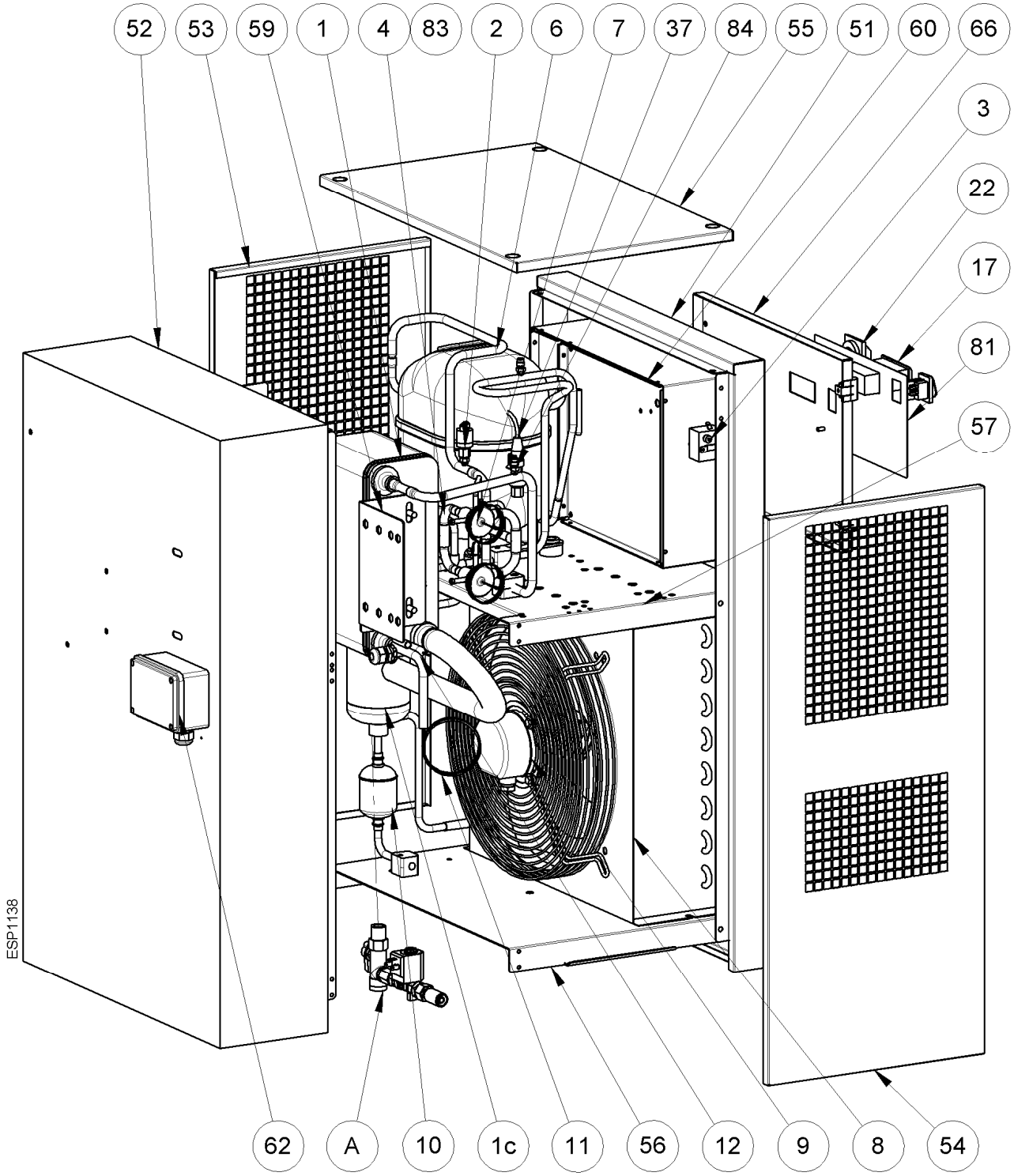


9.2.7 PLH 450 – 550 Water Cooled

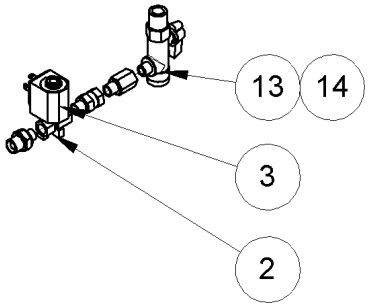




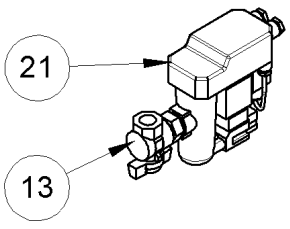
9.2.8 PLH 180 – 350 3phase Air Cooled



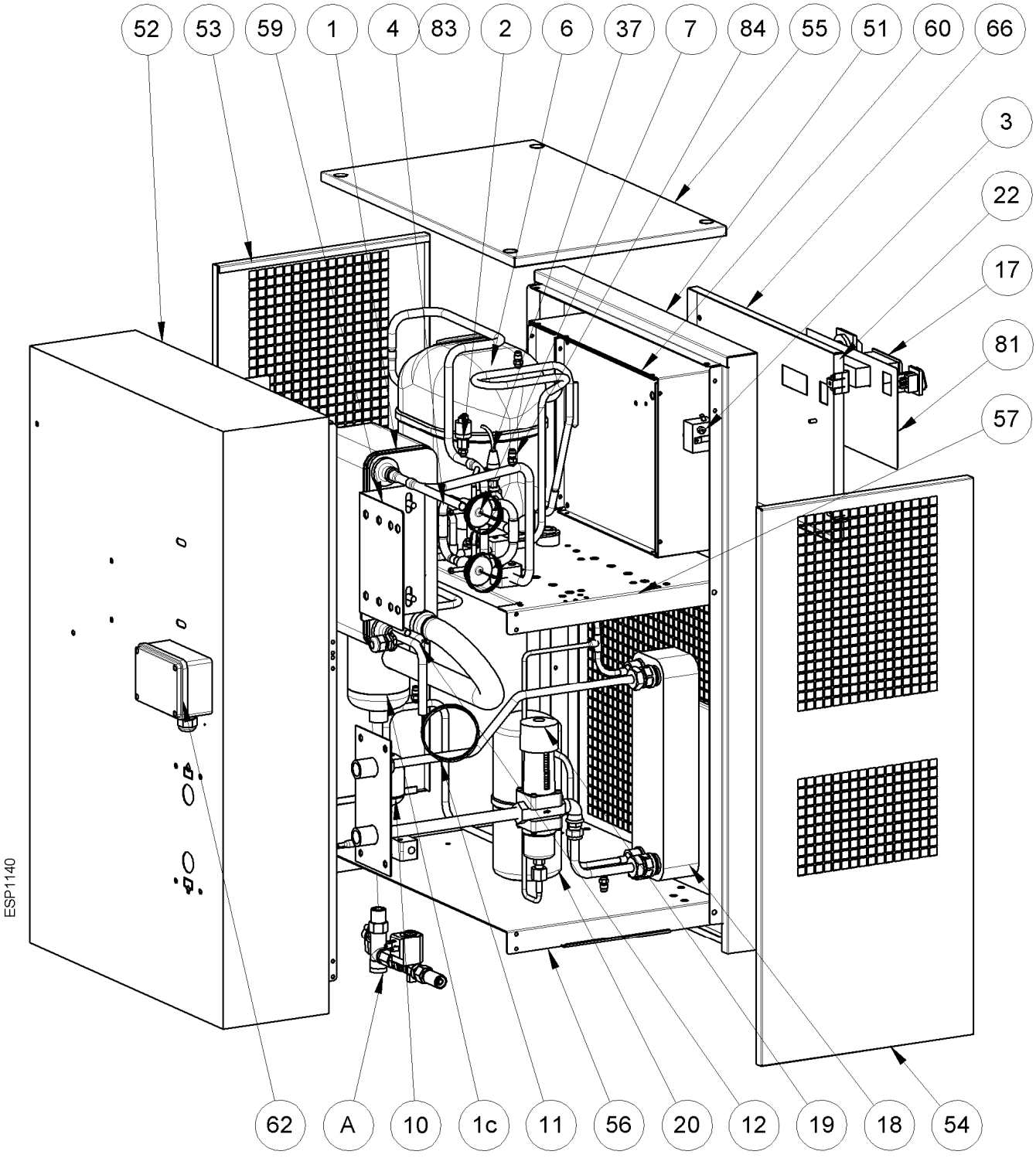
Pos. A standard



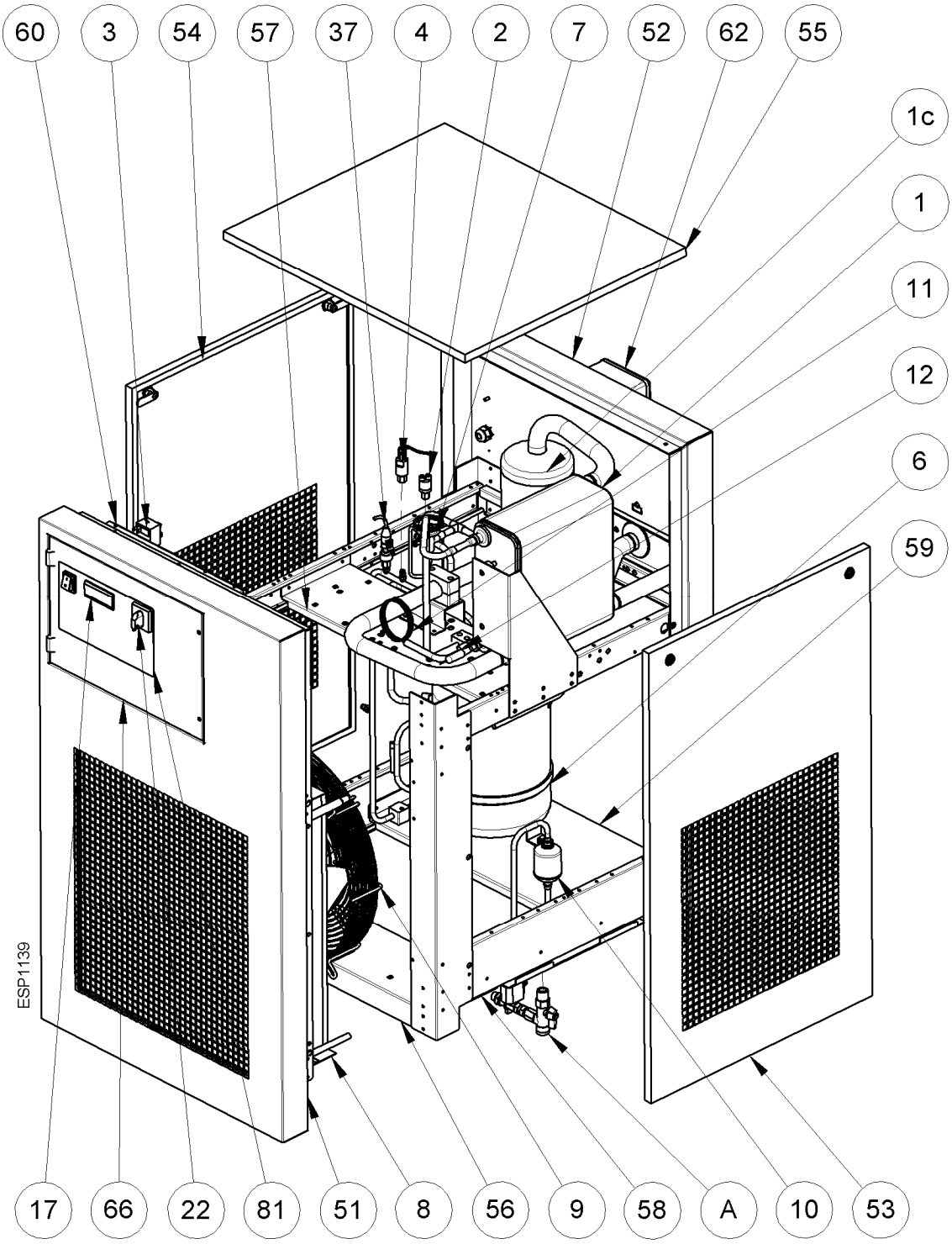
Pos. A optional



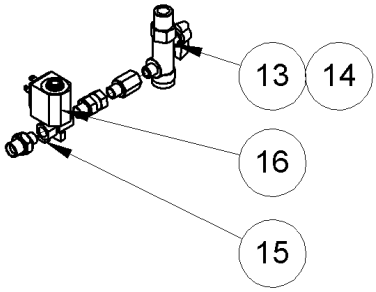
9.2.9 PLH 180 – 350 3phase Water Cooled



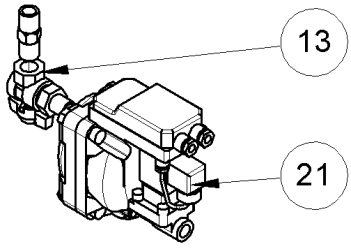
9.2.10 PLH 450 – 550 3phase Air Cooled



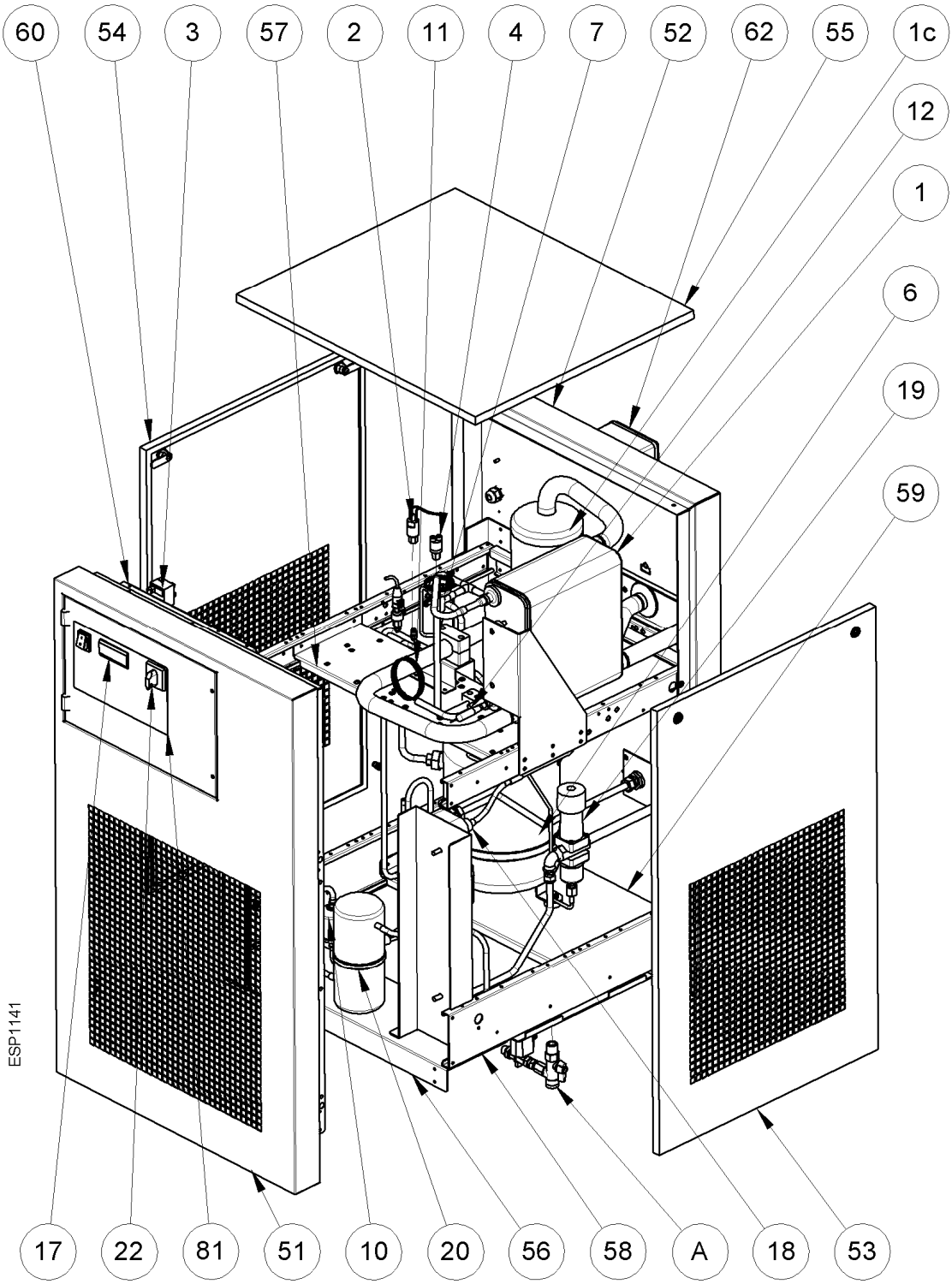
Pos. A standard

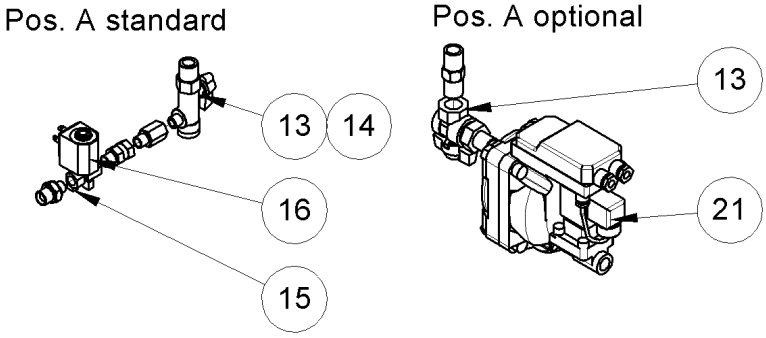


Pos. A optional



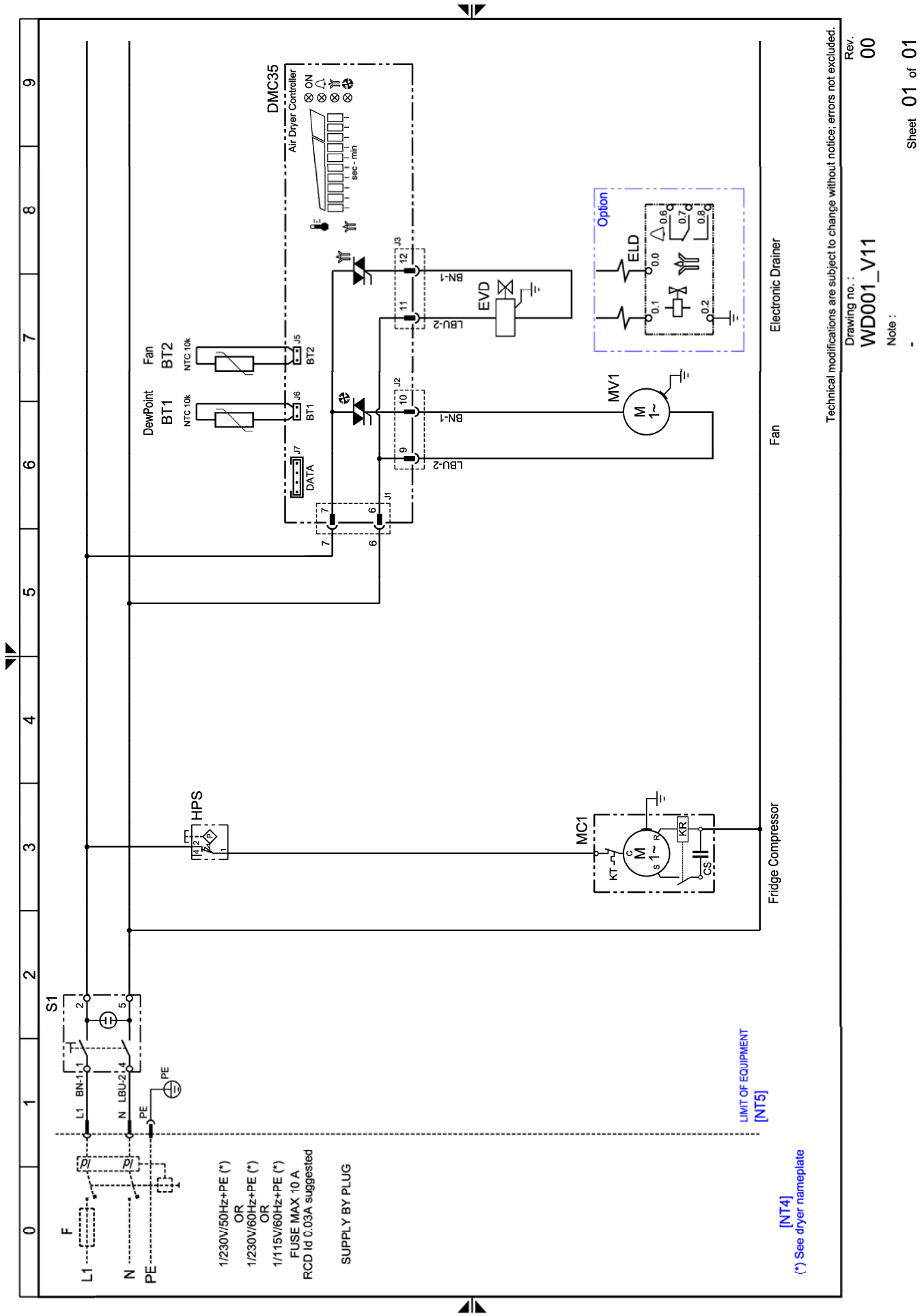
9.2.11 PLH 450 – 550 3phase Water Cooled



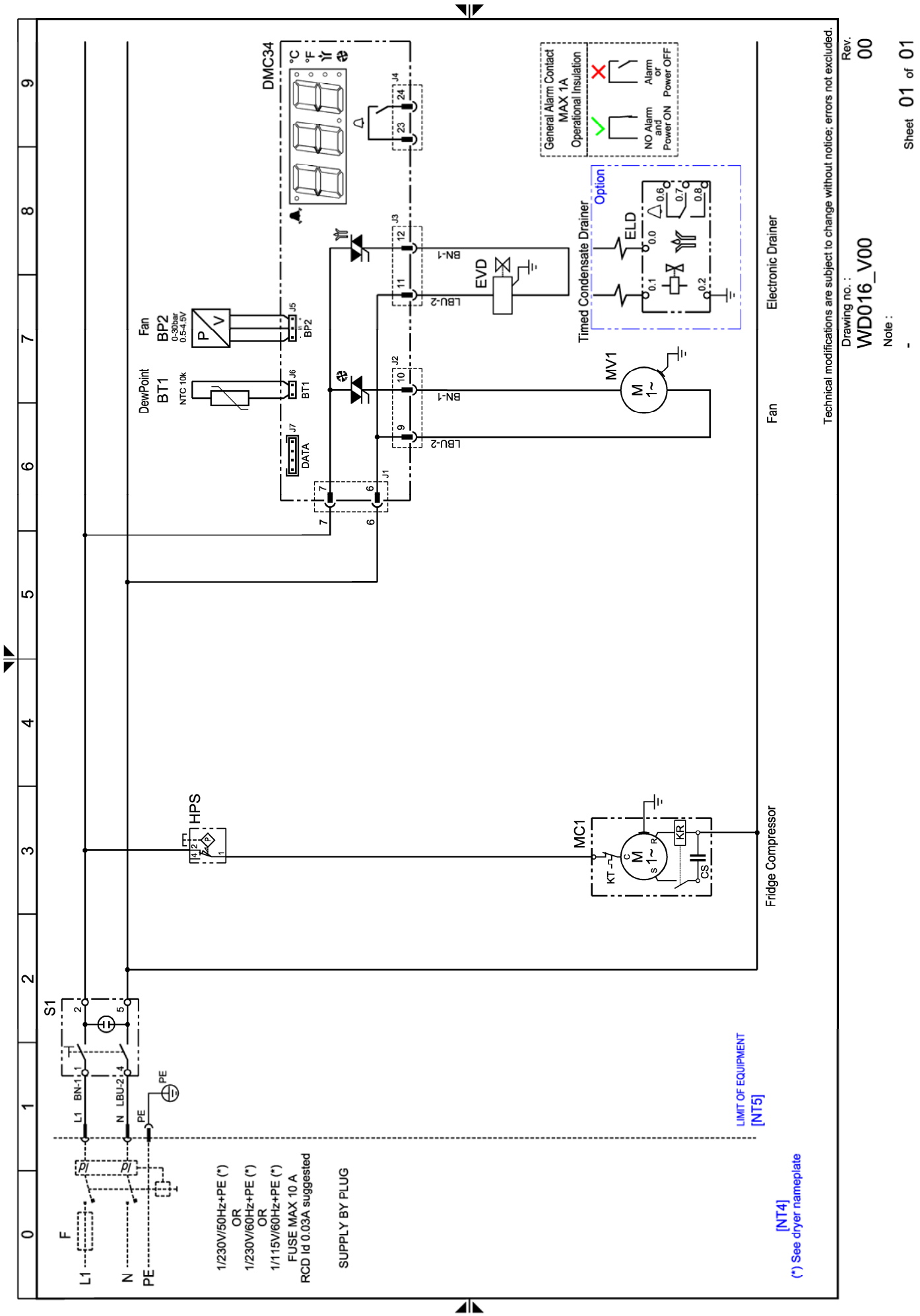


9.3 Electric diagrams

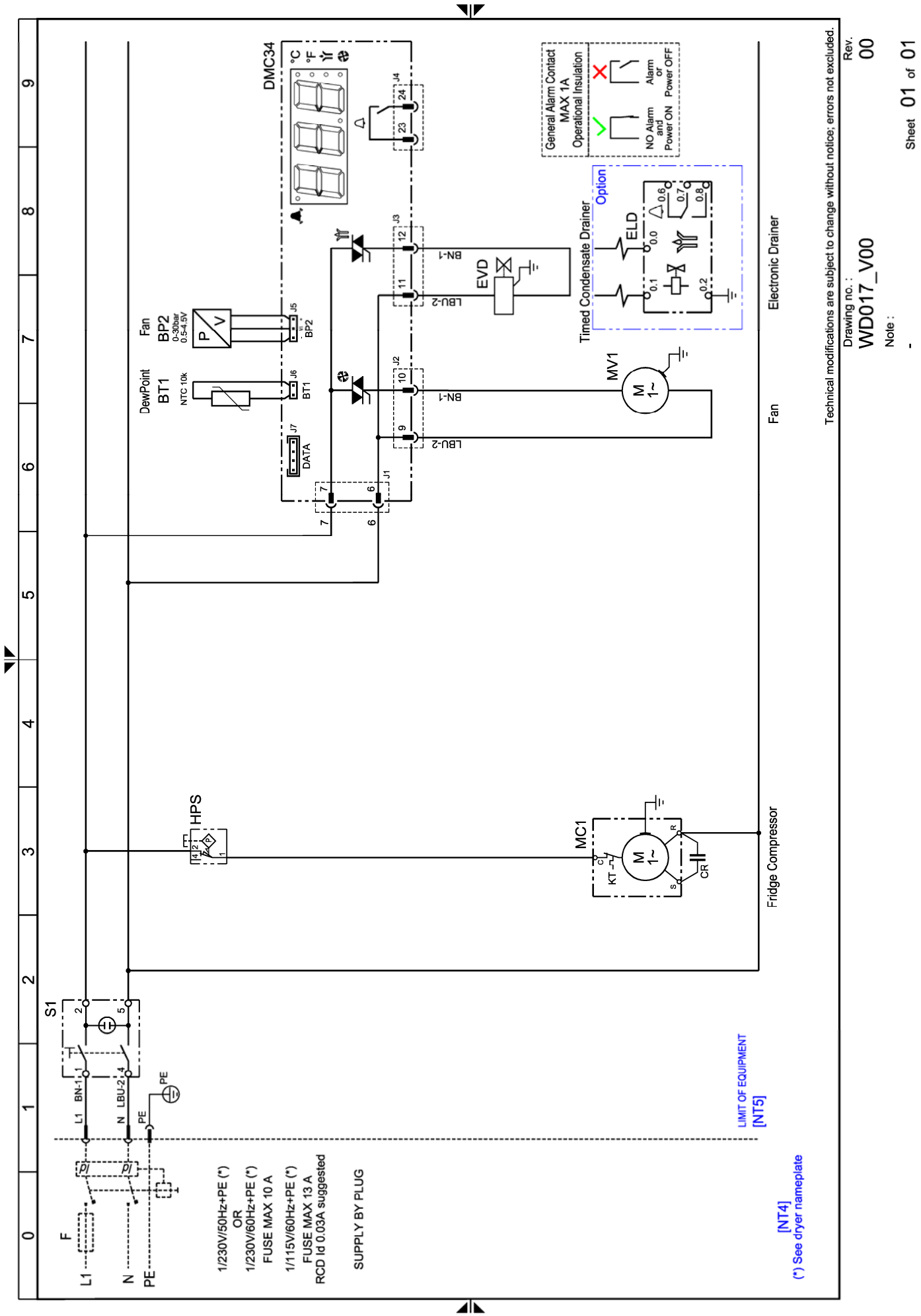
9.3.1 PLH 15 – 40



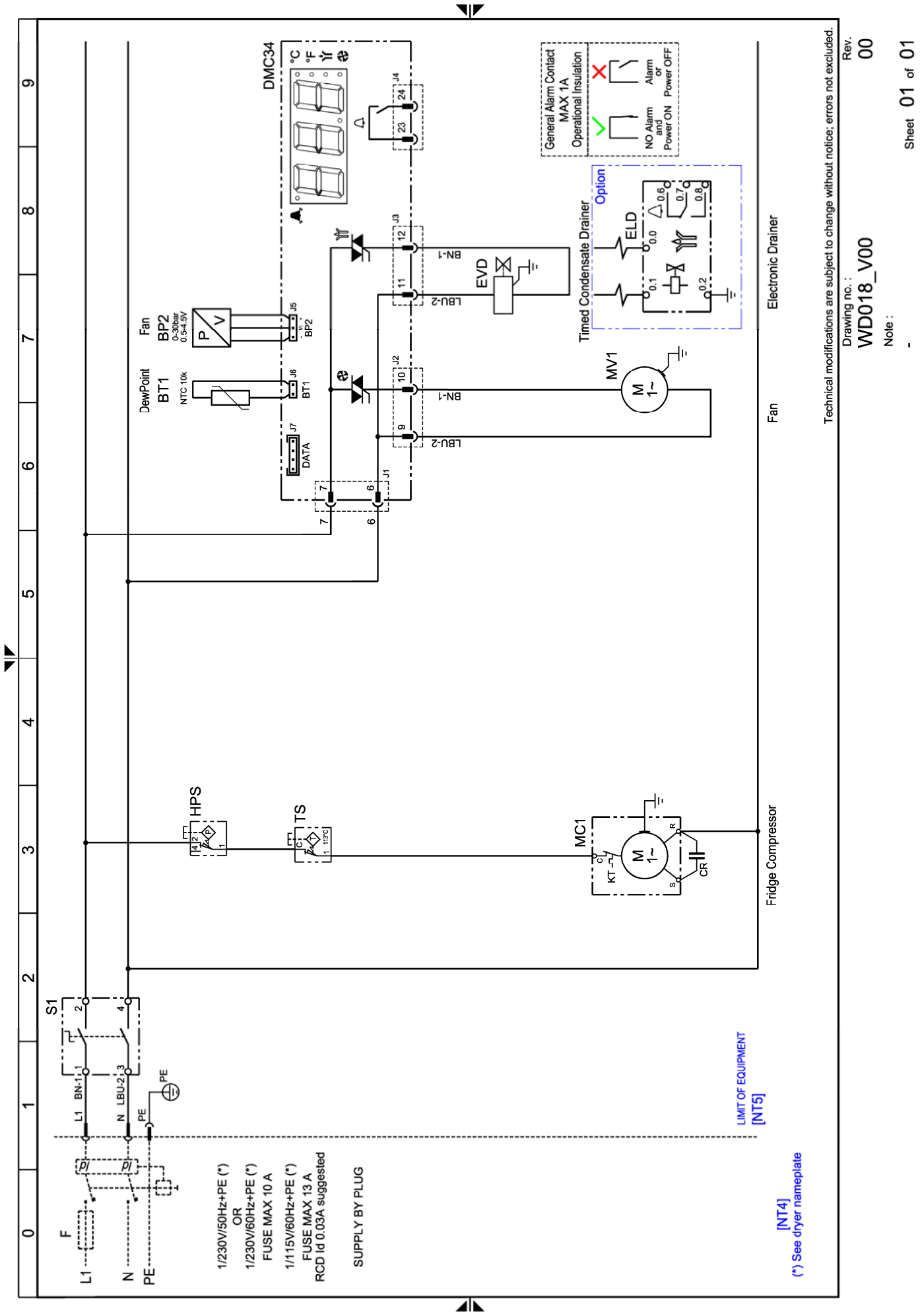
9.3.2 PLH 50 – 80


DMC34
°C
°F
J4
24
23
J3
12
11
J2
10
9
J1
7
6
J5
BP2
J6
BT1
J7
DATA
Fan
BP2
0-30bar
0.5-4.5V
DewPoint
BT1
NTC 10k
BN-1
LBU-2
EVD
Timed Condensate Drainer
Option
ELD
0.0
0.1
0.2
0.6
0.7
0.8
General Alarm Contact
MAX 1A
Operational Insulation
NO Alarm and Power ON
Alarm or Power OFF
MV1
M
1~
HPS
MC1
KT
KR
CS
S1
L1
N
PE
BN-1
LBU-2
F
1/230V/50Hz+PE (*)
OR
1/230V/60Hz+PE (*)
OR
1/115V/60Hz+PE (*)
FUSE MAX 10 A
RCD Id 0.03A suggested
SUPPLY BY PLUG
LIMIT OF EQUIPMENT
[NT5]
[NT4]
(*) See dryer nameplate
Fan
Electronic Drainer
Fridge Compressor
Technical modifications are subject to change without notice; errors not excluded.
Rev. 00
Drawing no. : WD016_V00
Note : -
Sheet 01 of 01

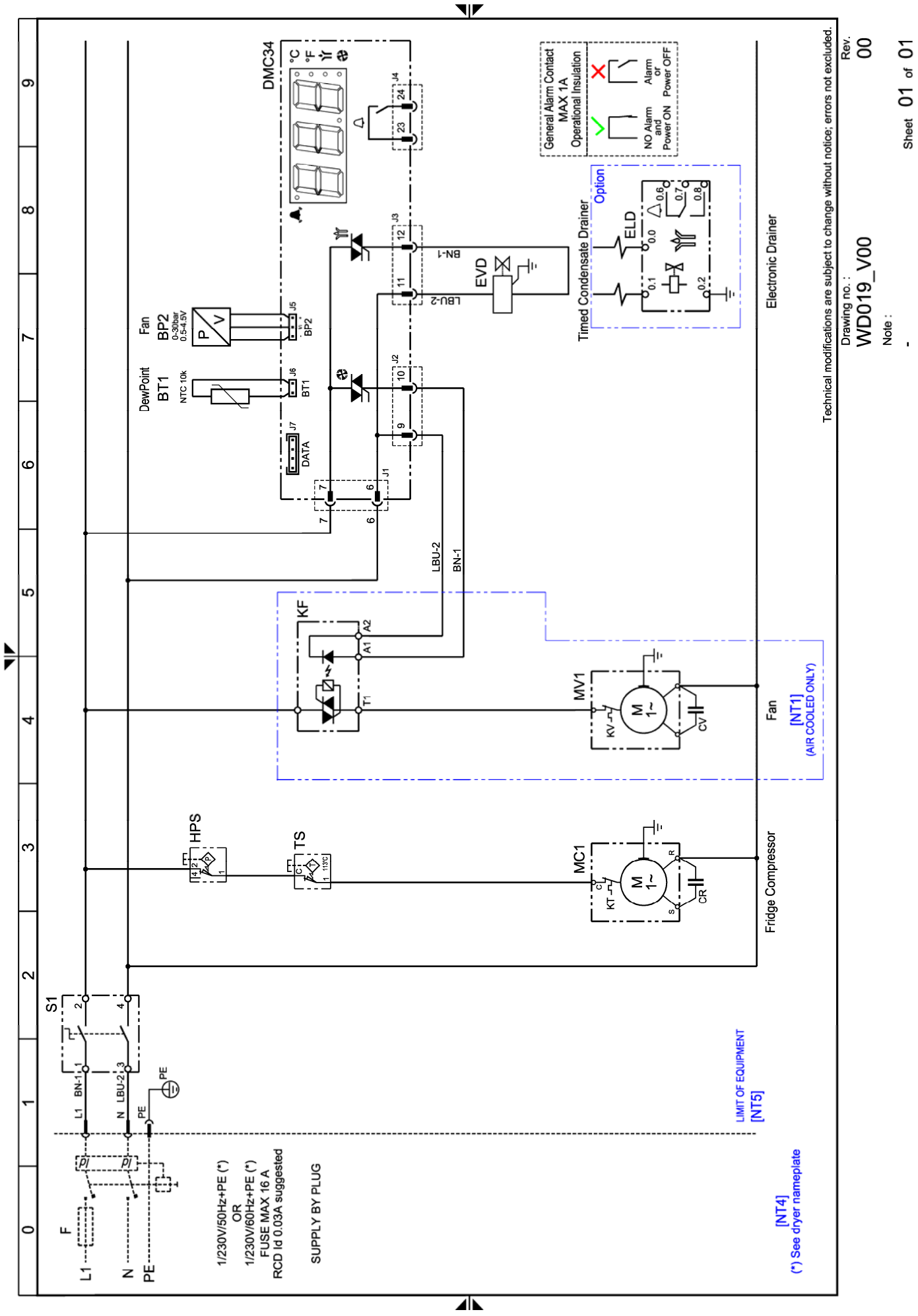
9.3.3 PLH 100 – 140



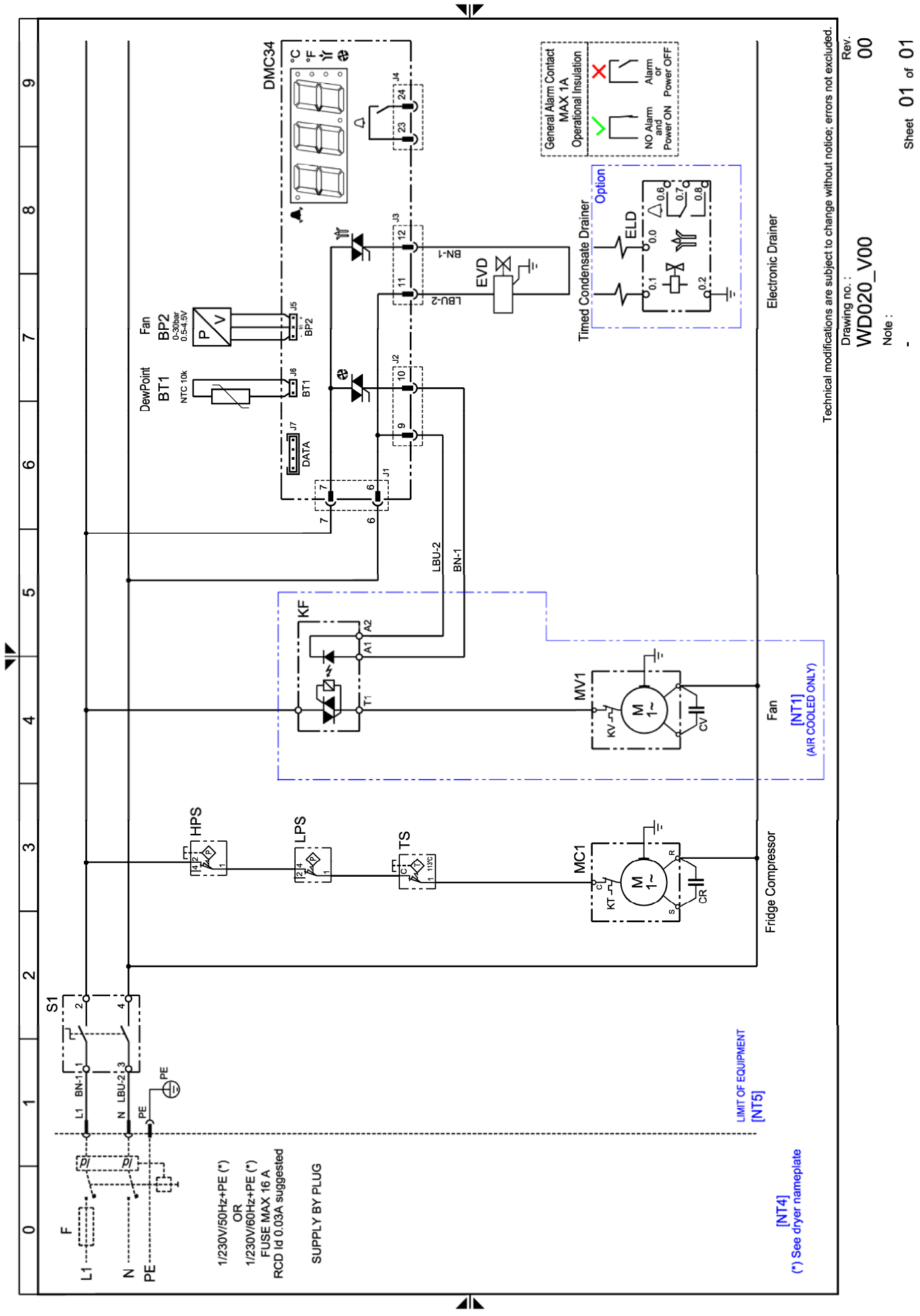
9.3.4 PLH 180 – 260



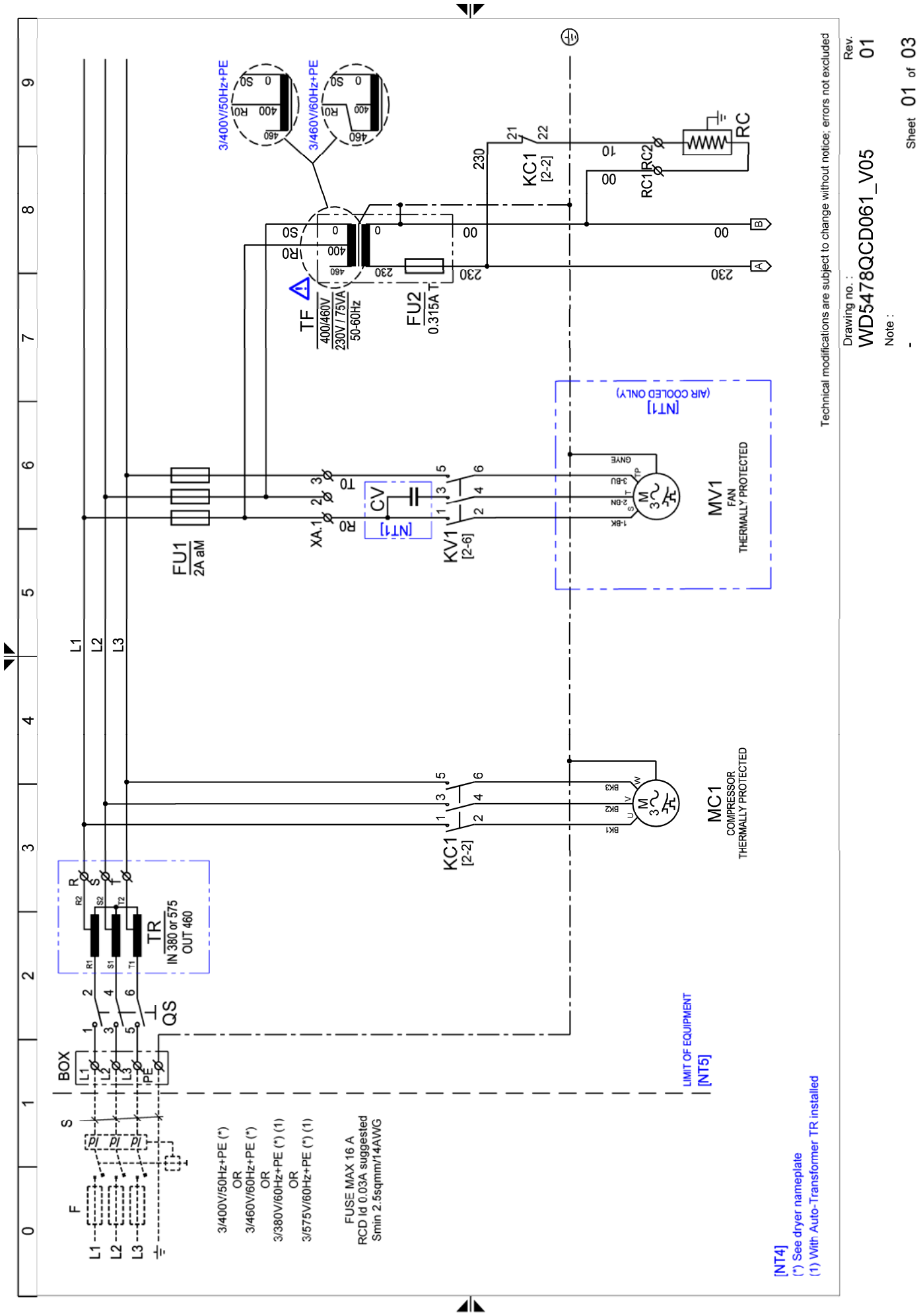
9.3.5 PLH 350


DMC34
°C °F
J4 24 23
J3 12 11
J2 10 9
J1 7 6
J5 BP2
J6 BT1
J7 DATA
Fan
BP2
0-30bar
0.5-4.5V
DewPoint
BT1
NTC 10k
BN-1
LBU-2
EVD
General Alarm Contact
MAX 1A
Operational Insulation
NO Alarm and Power ON
Alarm or Power OFF
Timed Condensate Drainer
Option
ELD
Electronic Drainer
KF
A2
A1
T1
MV1
KV
CV
M 1~
Fan
[NT1]
(AIR COOLED ONLY)
HPS
TS
MC1
KT
CR
Fridge Compressor
S1
L1
N
PE
F
1/230V/50Hz+PE (*)
OR
1/230V/60Hz+PE (*)
FUSE MAX 16 A
RCD Id 0.03A suggested
SUPPLY BY PLUG
LIMIT OF EQUIPMENT
[NT5]
[NT4]
(*) See dryer nameplate
Technical modifications are subject to change without notice; errors not excluded.
Drawing no. : WD019_V00
Rev. 00
Note : -
Sheet 01 of 01

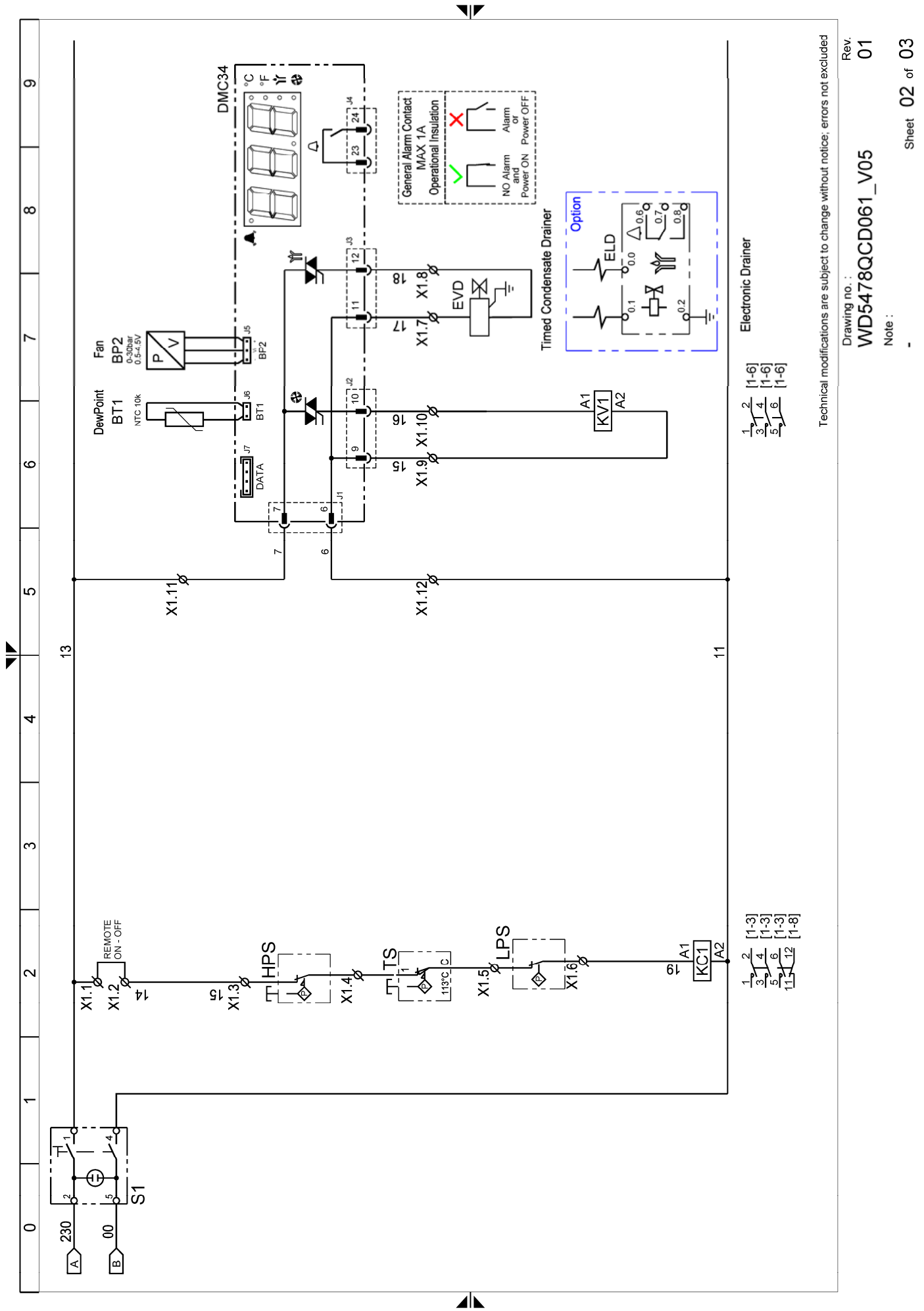
9.3.6 PLH 450 – 550



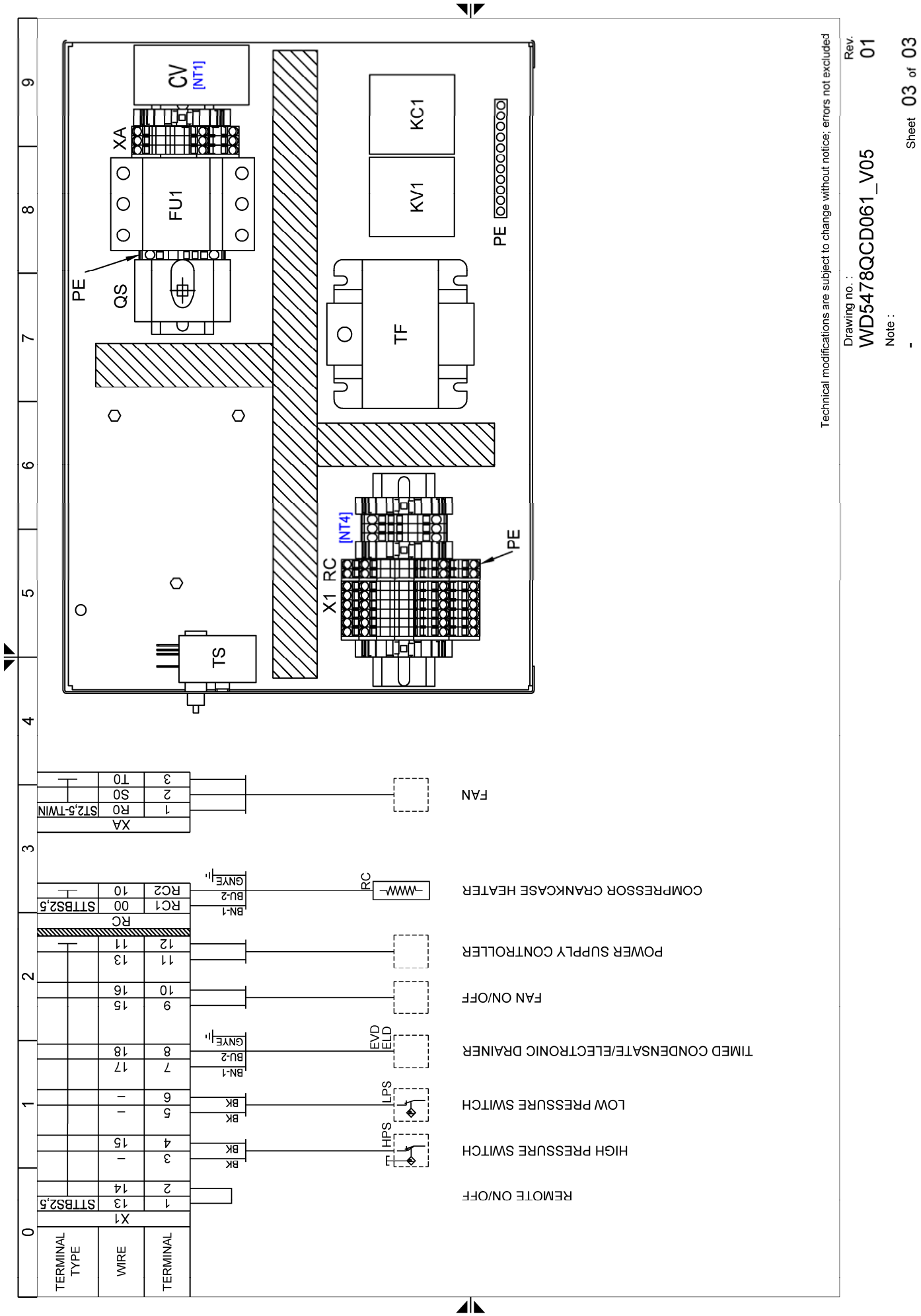
9.3.7 PLH 180 – 350 3phase Sheet 1 of 3



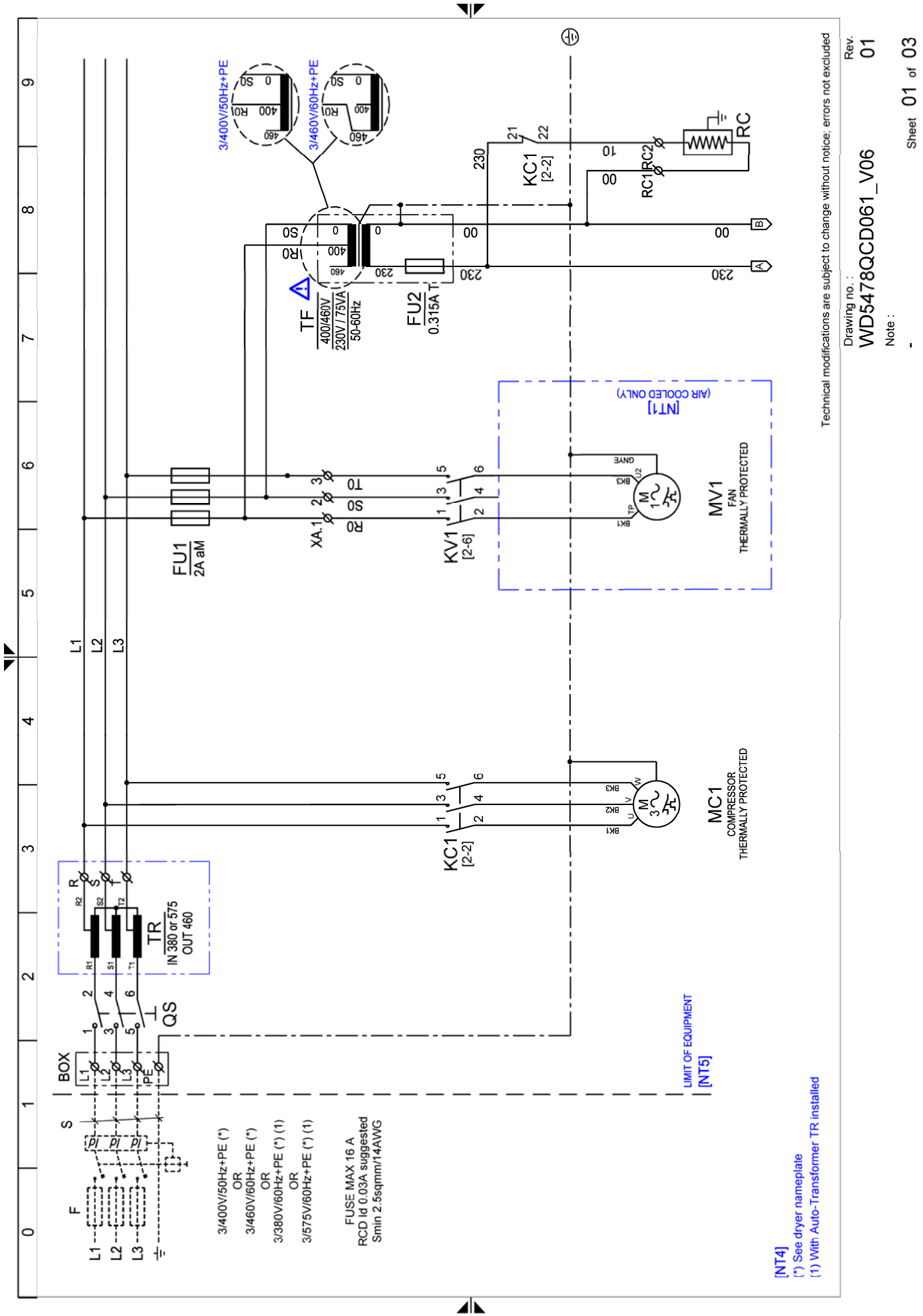
9.3.8 PLH 180 – 350 3phase Sheet 2 of 3



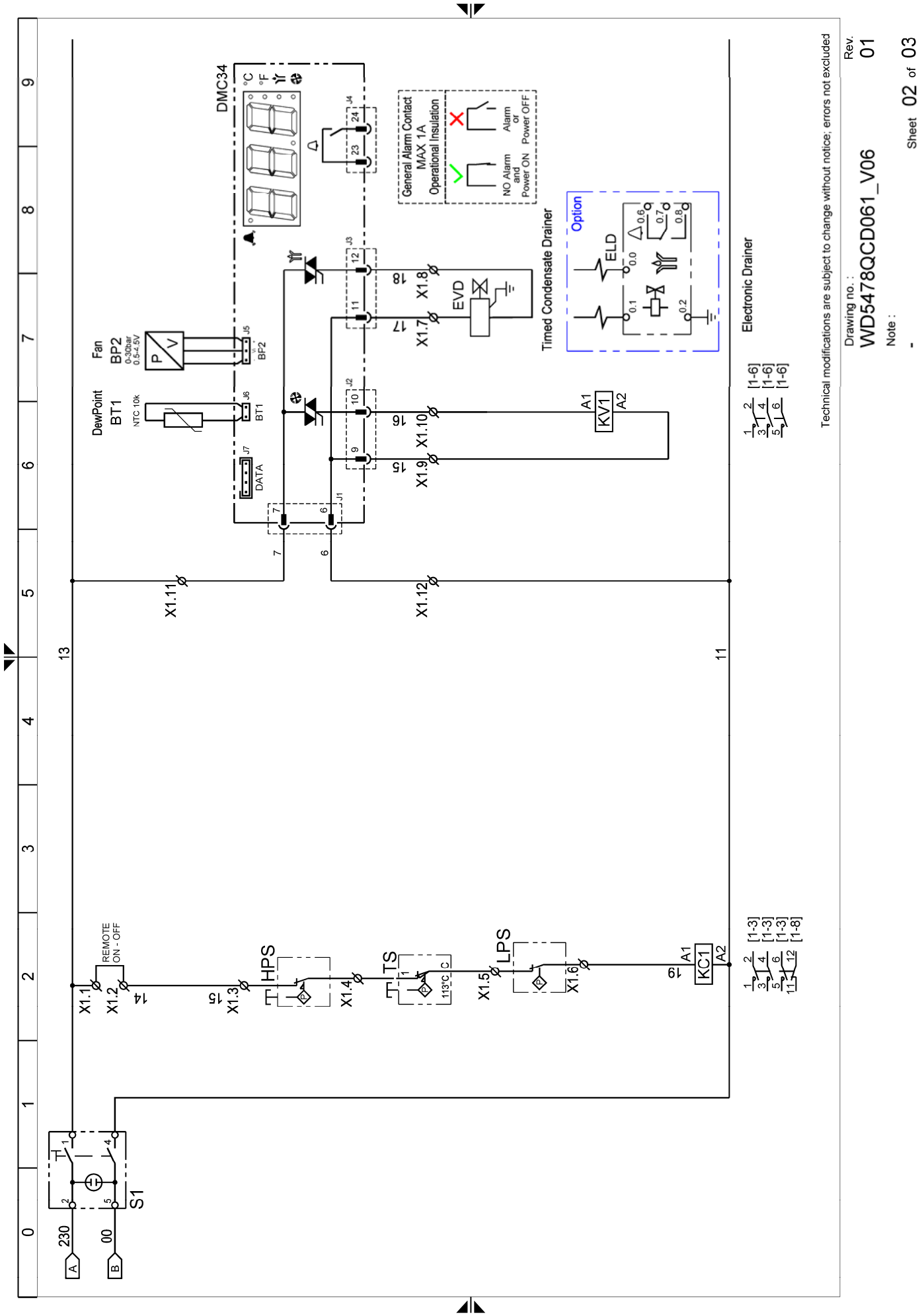
9.3.9 PLH 180 – 350 3phase Sheet 3 of 3



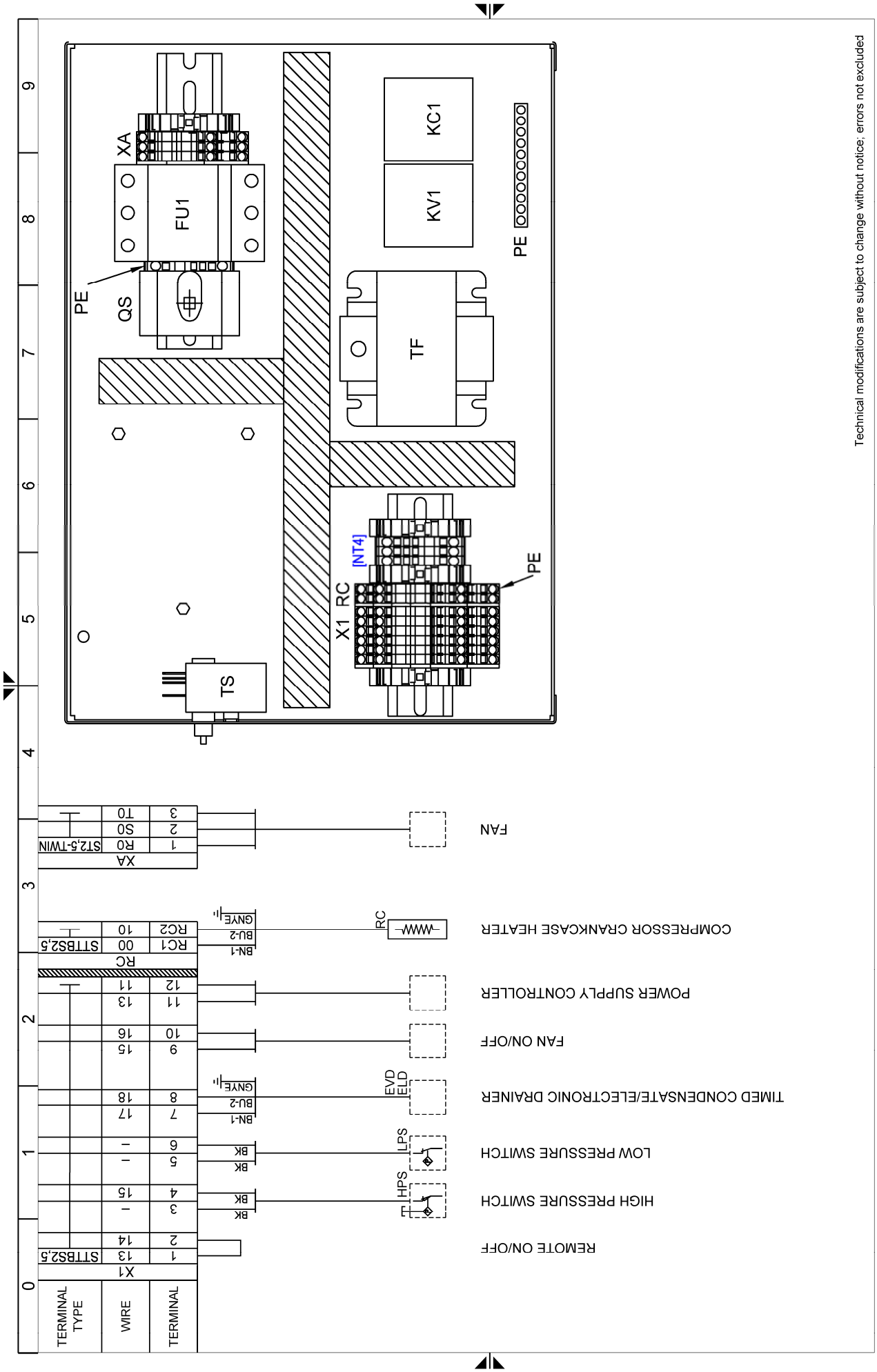
9.3.10 PLH 450 – 550 3phase Sheet 1 of 3



9.3.11 PLH 450 – 550 3phase Sheet 2 of 3



9.3.12 PLH 450 – 550 3phase Sheet 3 of 3



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COSTRUTTORE / *MANUFACTURER :*

FRIULAIR S.r.l.

Sede Legale e Operativa:

33050 - Cervignano del Friuli (UD) – ITALY
Via Cisis, 36 - S.S.352 Km 21 Fraz. Strassoldo

www.friulair.com

Istruzioni originali in **ITALIANO -** Con riserva di modifiche ed errori
Original instructions are in **ITALIAN -** Subject to technical changes without prior notice; errors not excluded

EN - Subject to technical changes without prior notice; errors not excluded / Translation of original instructions