REFRIGERATED AIR DRYER

PLH 15-3000 U

GB

USER'S MAINTENANCE AND SPARE PARTS MANUAL

GB

AIR-WATER COOLED

ISSUE • EDITION
2006

CE

Dear Customer,

thank you for choosing our product. In order to get the best performances in the use of this product, please read carefully this manual. 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 is subjected to a rigorous test to ensure the absence of any manufacturing faults and to demonstrate that the device can perform all the functions for which it has been designed.

Once the dryer has been properly installed according to the instructions in this manual, it will be ready for use without any further adjustment.

The operation is fully automatic, and the maintenance is limited to few controls and some cleaning operations, as detailed in the following chapters.

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

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

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

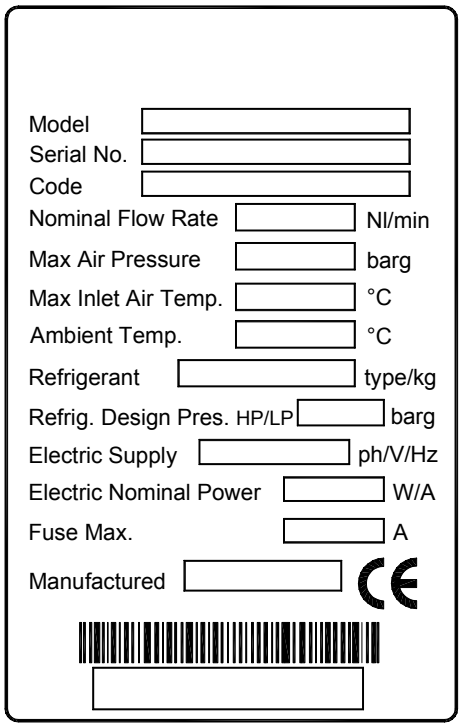
IDENTIFICATION PLATE

The product identification plate, on the back of the dryer, shows all the primary data of the machine.

Upon installation, fill in the table copying the data shown on the identification plate. These data must always be referred to the manufacturer or to the dealer when information or spares are needed, even during the warranty period.

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

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



WARRANTY CONDITIONS

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

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

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

The warranty will be immediately voided in case of even small changes or alterations to the dryer.

To require repairs during the warranty period, the data reported on the identification plate must be notified.

1.1 DEFINITION OF THE SAFETY SYMBOLS USED

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

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

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

Danger hazard. Part or system under pressure.

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

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

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

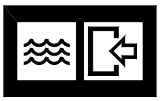
Danger hazard. It's absolutely forbidden to operate the machine when the panels are not in place.

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

Compressed air inlet connection point.

Compressed air outlet connection point.

Condensate drain connection point.



Cooling water inlet connection point (Water-Cooled).

Cooling water outlet connection point (Water-Cooled).

Operations which can be worked out by the operator of the machine, if qualified **1**.

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

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

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

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

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

1.2 WARNINGS

Compressed air is a highly hazardous energy source. Never work on the dryer with parts under pressure. Never point the compressed air or the condensate drain jet towards anybody. The user is responsible for the installation of the dryer, which has to be executed on the basis of the instructions given in the “Installation” chapter. Otherwise, the warranty will be voided and dangerous situations for the personnel and/or damages to the machine could occur.

Only qualified personnel can use and service electrically powered devices. Before attempting any maintenance action, the following conditions must be satisfied:
Ensure that any part of the machine is under voltage and that it cannot be connected to the mains.
Ensure that any part of the dryer is under pressure and that it cannot be connected to the compressed air system.

These refrigeration air dryers contain R134.a & R404A HFC type refrigerant fluid, not considered potential ozone depleting. Maintenance on refrigeration systems must be carried out only by refrigeration engineers according to local rules.
R134.a & R404A may be dangerous for men only if it is present in bulk concentrations. In case of leaks the room is to be aired before any intervention.

Any change to the machine or to the relevant operating parameters, if not previously verified and authorised by the Manufacturer, in addition to create the possibility of dangerous conditions will void the warranty.

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

1.3 PROPER USE OF THE DRYER

This dryer has been designed, manufactured and tested only to be used to separate the humidity normally contained in compressed air. Any other use has to be considered improper. The Manufacturer will not be responsible for any problem arising from improper use; the user will be in any case responsible for any resulting damage. Moreover, the correct use requires the compliance with the installation conditions, in particular :

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

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

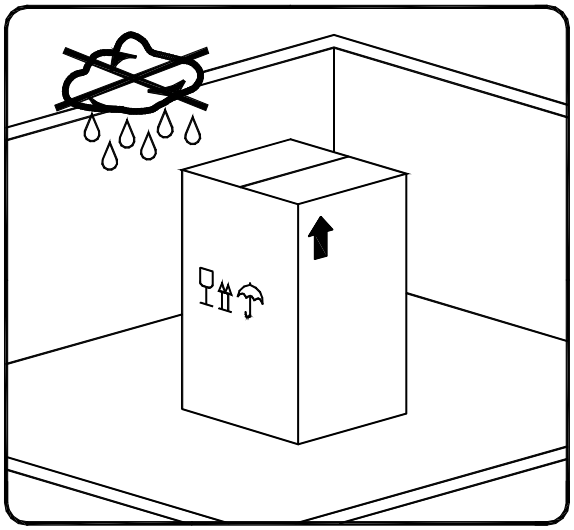
The purpose of the machine is the separation of water and eventual oil particles present in compressed air. The dried air cannot be used for breathing purposes or for operations leading to direct contact with foodstuff.
This dryer is not suitable for the treatment of dirty air or of air containing solid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

2.1 TRANSPORT

Once verified the integrity of the packaging, place the unit near the installation point and unpack the contents.

- To move the packaged unit we suggest to use a suitable trolley or forklift. Transportation by hands is discouraged.
- Keep the dryer always in vertical position. Turning it upside down some parts could be irreparably damaged.
- Handle with care. Heavy blows could cause irreparable damage.

2.2 STORAGE



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

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

If not in use, the dryer can be stored in its packaging in a dust free and protected site at a maximum temperature of 115°F (46°C), and a specific humidity not exceeding the 90%. Should the stocking time exceed 12 month, please contact the manufacturer.

The packaging materials are recyclable. Each single material must be properly disposed in a manner complying with the rules in force in the destination country.

2.3 INSTALLATION SITE

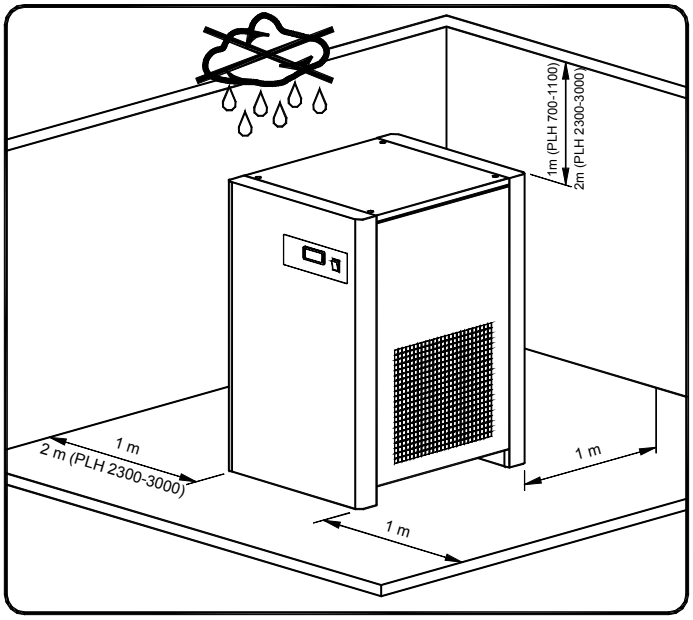
Particular care is required in selecting the installation site, as an improper location could jeopardise the proper operation of the dryer.
This unit is not suitable to be used in explosive atmosphere, where risk of fire could exist, or in presence of gaseous or solid polluting material.

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

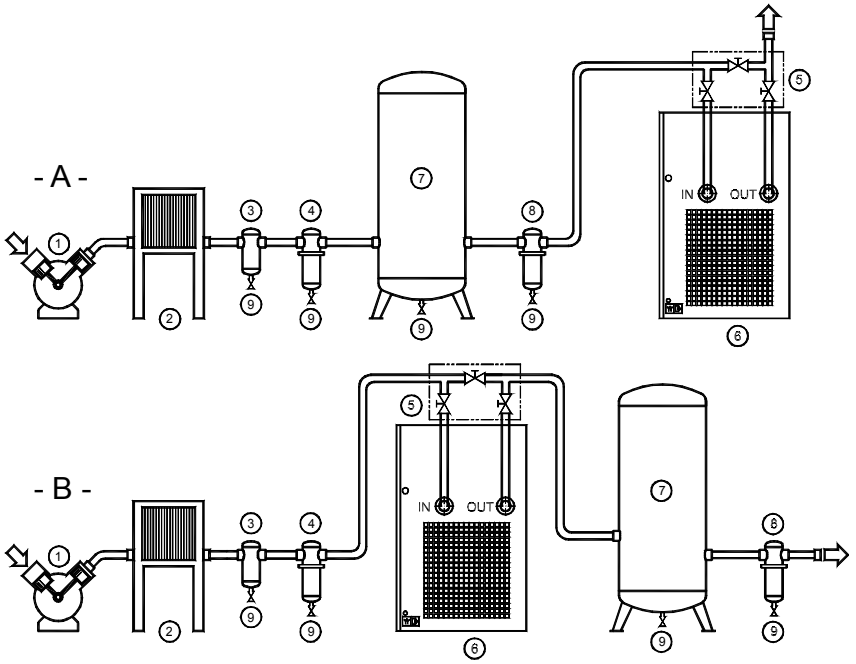
Minimal installation requirements :

- Select a clean room dry, free from dust, and protected from atmospheric disturbances.
- The supporting area must be smooth, horizontal and able to hold the weight of the dryer.
- Minimum ambient temperature +35°F (+1.5°C).
- Maximum ambient temperature +115°F (+46°C).
- Allow at list a clearance of 40in (1m) on each side of the dryer (80in - 2m PLH 2300-3000 dryers), for proper ventilation and to facilitate eventual maintenance operations.

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



2.4 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

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

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

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

2.5 CORRECTION FACTORS

Inlet air pressure	psig	200	300	400	500	550	600	650	725
	barg	14	21	28	35	38	40	45	50
Factor		0.71	0.81	0.89	0.95	0.97	1.00	1.02	1.05

Correction factor for ambient temperature changes (Air-Cooled):							
Ambient temperature	ºF	80	90	100	105	110	115
	ºC	27	32	38	40	43	46
Factor		1.22	1.11	1.00	0.94	0.89	0.83

Correction factor for inlet air temperature changes:							
Air temperature	ºF	90	100	110	120	130	140	150
	ºC	32	38	43	49	55	60	65
Factor		1.16	1.00	0.85	0.73	0.63	0.54	0.47

Correction factor for DewPoint changes:					
DewPoint	ºF	33-39	40-44	45-49	50-54
	ºC	0.5-4	4.1-7	7.1-9.5	9.6-12
Factor		1.00	1.09	1.22	1.40

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 Nm^3/h)**. What is the maximum allowable flow through the dryer under the following operating conditions:

- Inlet air pressure = 650 psig (45 barg)
- Ambient temperature = 105°F (40°C)
- Inlet air temperature = 130°F (55°C)
- Pressure DewPoint = 38°F (3°C)

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

Air flow capacity	=	100	x	1.02	x	0.94	x	0.63	x	1.00

= **60.5 scfm** → This is the maximum flow rate that the dryer can accept under these operating conditions.

How to select a suitable dryer for a given duty:

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

Example:

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

- Design air flow = 90 (153 Nm^3/h)
- Inlet air pressure = 650 psig (45 barg)
- Ambient temperature = 105°F (40°C)
- Inlet air temperature = 130°F (55°C)
- Pressure DewPoint = 38°F (3°C)

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

Minimum Std. air flow rate	=	90	÷	1.02	÷	0.94	÷	0.63	÷	1.00

= **149 scfm** → Therefore the model suitable for the conditions above is **PLH 180** (**180 scfm** or **306 Nm^3/h** - nominal duty).

2.6 CONNECTION TO THE COMPRESSED AIR SYSTEM

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

The temperature and the amount of air entering the dryer must comply with the limits reported on the data plate. In case of treatment of air at particularly high temperatures, the installation of a final refrigerator could result necessary. The cross section of the connecting piping, which must be free from dust, rust, chips and other impurities, must be consistent with the flow-rate of the dryer.
In order to facilitate the maintenance operations, we suggest installing a by-pass group.
In realising the dryer, particular measures have been taken in order to limit the vibration which could occur during the operation.
Therefore we recommend to use connecting pipes able to insulate the dryer from possible vibrations originating from the line (flexible hoses, vibration damping fittings, etc.).

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

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

The temperature and the amount of cooling water must comply with the limits indicated on the technical characteristics chart.
The cross section of the connection pipes, preferably flexible, must be free from rust, chips and other impurities, must be consistent with the flow-rate of the dryer.

2.8 CONNECTION TO THE MAINS

The connection to the mains, to be carried out by qualified personnel, and the safety systems must comply with local rules and laws.

Before connecting the unit to the electric power, verify that the voltage and the frequency available on the mains correspond to the data reported on the data plate of the dryer. In terms of voltage, a ±5% tolerance is allowed.
Dryer supplied at 115/1/60 voltage comes with a mains connecting cable already installed and ending with a North-American standard plug 2 poles + ground. Dryer supplied at 230/1/60 and 460/3/60 voltages comes with a box for the connection to the mains.
The mains socket must be provided with a **mains magneto-thermal differential breaker** (IΔn=0.3A), adjusted on the basis of the consumption of the dryer (see the nominal values on the data plate of the dryer).
The cross section of the power supply cables must comply with the consumption of the dryer, while keeping into account also the ambient temperature, the conditions of the mains installation, the length of the cables, and the requirements enforced by the local Power Provider.

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

2.9 CONDENSATE DRAIN

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

The dryer comes already fitted with tubing in flexible plastics (1/4" - 6 mm or 3/8" - 10 mm diameter and 60in - 1500 mm long) for the connection to the collection plant.
The condensate drain occurs through a solenoid valve protected with a mechanical strainer. In order to avoid clogging of the solenoid valve, the condensate coming from the separator is previously filtered, then discharged. The solenoid valve coil is operated by electronic instrument (dryer controller).
If an electric strainer is installed, the intervention times are determined by the internal capacitive sensor (see specific paragraph).
Connect and properly fasten the condensate drain to a collecting plant or container.
The drain cannot be connected to pressurised systems.

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

3.1 PRELIMINARY OPERATION

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

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

The start-up must be performed by qualified personnel.
It's mandatory that the engineer in charge adopt safety operational conditions complying with the local safety and accident prevention requirements.

The same engineer will be responsible for the proper and safe operation of the dryer.
Never operate the dryer if the panels are not in place.

3.2 FIRST START-UP

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

3.2.1 FIRST START-UP OF DRYERS SERIES PLH 15-40

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

- Ensure that all the steps of the “Installation” chapter have been observed.
- Ensure that the connection to the compressed air system is correct and that the piping is suitably fixed and supported.
- Ensure that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Ensure that the by-pass system (if installed) is closed.
- Ensure that the manual valve of the condensate drain circuit is open.
- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Turn on the main switch - pos. 1 on the control panel.
- Verify that the TAN 03 analog thermometer indicates the DewPoint.
- Ensure the consumption matches with the values of the data plate.
- **Ensure the fan works properly - wait for its first interventions (Air-Cooled).**
- Allow the dryer temperature to stabilise at the pre-set value.
- Slowly open the air inlet valve.
- Slowly open the air outlet valve.
- Slowly close the central by-pass valve of the system (if installed).
- Check the piping for air leakage.
- Ensure the drain is regularly cycling - wait for its first interventions.

3.2.2 FIRST START-UP OF DRYERS SERIES PLH 50-3000

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

DMC14 Electronic Instrument

- Ensure that all the steps of the “Installation” chapter have been observed.
- Ensure that the connection to the compressed air system is correct and that the piping is suitably fixed and supported.
- Ensure that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Ensure that the by-pass system (if installed) is closed and the dryer is isolated.
- Ensure that the manual valve of the condensate drain circuit is open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Turn on the main switch - pos. 1 on the control panel.
- Check that the mains detection light of the ON/OFF button - pos. 6 of the control panel - is ON.
- Wait at least two hours before starting the dryer (compressor crankcase heater must heat the oil of the compressor) - only models PLH 700-3000.

DMC20 Electronic Instrument

- Ensure that all the steps of the “Installation” chapter have been observed.
- Ensure that the connection to the compressed air system is correct and that the piping is suitably fixed and supported.
- Ensure that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Ensure that the by-pass system (if installed) is closed and the dryer is isolated.
- Ensure that the manual valve of the condensate drain circuit is open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- Turn on the main switch - pos. 1 on the control panel.
- Check that "crankcase oil heater" and "Stand-by" leds on DMC20 are ON.
- Wait at least two hours before starting the dryer (compressor crankcase heater must heat the oil of the compressor) - only models PLH 700-3000.

- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Switch ON the dryer button "I - ON" of the ON/OFF switch - pos. 6 on the control panel.
- Ensure that DMC14 electronic instrument is ON.
- Ensure the consumption matches with the values of the data plate.
- **Check that the rotation direction of the fan corresponds with the arrows on the condenser (Air-Cooled).**
- Allow the dryer temperature to stabilise at the pre-set value.
- Slowly open the air inlet valve.
- Slowly open the air outlet valve.
- Slowly close the central by-pass valve of the system (if installed).
- Check the piping for air leakage.
- Ensure the drain is regularly cycling - wait for its first interventions.

- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Switch ON the dryer keeping the “Dryer Start-up” button on DMC20 pressed for at least 2 seconds.
- Check that “compressor ON” led on DMC20 is ON.
- Ensure the consumption matches with the values of the data plate.
- **Check that the rotation direction of the fan corresponds with the arrows on the condenser (Air-Cooled).**
- Allow the dryer temperature to stabilise at the pre-set value.
- Slowly open the air inlet valve.
- Slowly open the air outlet valve.
- Slowly close the central by-pass valve of the system (if installed).
- Check the piping for air leakage.
- Ensure the drain is regularly cycling - wait for its first interventions.

3.3 OPERATION AND SWITCHING OFF

3.3.1 OPERATION AND SWITCHING OFF OF DRYERS SERIES PLH 15-40

Operation (refer to paragraph 5.1 Control Panel) :

- Check the condenser for cleanliness (Air-Cooled).
- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Verify that the system is powered.
- Turn on the main switch - pos. 1 on the control panel.
- Wait a few minutes; verify that the DewPoint temperature displayed on the TAN 03 analog thermometer is correct and that the condensate is regularly drained.
- Switch on the air compressor.

Switching OFF (refer to paragraph 5.1 Control Panel) :

- Verify that the temperature displayed on the TAN 03 analog thermometer is correct.
- Switch OFF the air compressor.
- After a few minutes, switch OFF the main switch - pos. 1 of the control panel of the dryer.

NOTE : A DewPoint included in the green operating area of the TAN03 instrument (coloured analog bar) is correct according to the possible working conditions (flow-rate, temperature of the incoming air, ambient temperature, etc.)

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

3.3.2 OPERATION AND SWITCHING OFF OF DRYERS SERIES PLH 50-3000

NOTE : 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 (only models PLH 700-3000).

Operation (refer to paragraph 5.1 Control Panel) :

DMC14 Electronic Instrument

- Check the condenser for cleanliness (Air-Cooled).
- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Check that the mains detection light of the ON/OFF button - pos. 6 of the control panel - is ON.
- Switch ON the dryer button "I - ON" of the ON/OFF switch - pos. 6 on the control panel.
- Ensure that DMC14 electronic instrument is ON.
- Wait a few minutes; verify that the operating temperature displayed on electronic instrument DMC14 is correct and that the condensate is regularly drained.
- Switch on the air compressor.

DMC20 Electronic Instrument

- Check the condenser for cleanliness (Air-Cooled).
- Ensure the cooling water flow and temperature is adequate (Water-Cooled).
- Check that "crankcase oil heater" and "Stand-by" leds on DMC20 are ON.
- Switch ON the dryer keeping the “Dryer Start-up” button on DMC20 pressed for at least 2 seconds.
- Check that “compressor ON” led on DMC20 is ON.
- Wait a few minutes; verify that the operating temperature displayed on electronic instrument DMC20 is correct and that the condensate is regularly drained.
- Switch on the air compressor.

Switching OFF (refer to paragraph 5.1 Control Panel) :

DMC14 Electronic Instrument

- Check that the temperature indicated on the DMC14 is within range.
- Switch OFF the air compressor.
- After a few minutes, switch OFF the dryer pressing the "O - OFF" button of the ON/OFF switch - pos. 6 on the control panel.

DMC20 Electronic Instrument

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

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

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

PLH MODEL		/ AC Air-Cooled							
		15	**30**	**40**	**50**	**80**	**100**	**140**	**180**
Air flow rate at nominal condition [1]	[scfm]	15	30	40	50	80	100	140	180
	[Nm^3/h]	25	50	68	85	136	170	238	306
	[Nl/min]	425	850	1133	1416	2265	2832	3965	5097
Pressure DewPoint at nominal condition [1]	[°F – °C]	38 – 3							
Nominal (max.) ambient temperature	[°F – °C]	100 (115) – 38 (46)							
Min. ambient temperature	[°F – °C]	35 – 1.5							
Nominal (max.) inlet air temperature	[°F – °C]	100 (150) – 38 (65)							
Nominal inlet air pressure	[psig – barg]	600 – 40							
Max. inlet air pressure	[psig – barg]	725 – 50							
Air pressure drop - Δp	[psi]	3.63	3.48	3.63	3.34	3.34	3.48	3.48	2.90
	[bar]	0.25	0.24	0.25	0.23	0.23	0.24	0.24	0.20
Inlet - Outlet connections	[NPT-F]	3/8”	3/8”	3/8”	1/2”	1/2”	3/4”	3/4”	1”
Refrigerant type		R134.a						R404A	
Refrigerant quantity [2]	[oz]	5.1/2	7	10	10.1/2	13.1/2	18.1/2	22	30.1/2
	[kg]	0.15	0.20	0.28	0.30	0.38	0.52	0.63	0.87
Cooling air flow	[cfm]	180	180	180	180	240	350	350	530
	[m^3/h]	306	306	306	306	408	595	595	900
Heat load	[Btu/h]	1650	2100	2500	3500	5800	5800	8500	8500
Nominal refrigeration compressor power	[HP]	1/8	1/6	1/6	1/4	1/3+	1/3	1/2	1/2
Standard Power Supply [2]	[Ph/V/Hz]	115/1/60							
Nominal electric absorption	[W]	200	240	310	350	540	700	1100	1200
	[A]	2.2	2.6	3.9	4.2	6.0	6.4	9.8	10.2
Max. electric absorption	[W]	230	350	380	450	648	840	1270	1310
	[A]	2.8	3.4	4.4	4.8	6.3	7.0	11.6	11.8
Max. level noise at 401in (1m)	[dbA]	< 70							
Weight	[lbs]	62	64	70	79	82	119	130	185
	[kg]	28	29	32	36	37	54	59	84

[1] The nominal condition refers to an ambient temperature of 100°F (38°C) with inlet air at 600psig (40barg) and 100°F (38°C).

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

		/ AC Air-Cooled										
PLH MODEL		**15**	**30**	**40**	**50**	**80**	**100**	**140**	**180**	**260**	**350**	**450**
Air flow rate at nominal condition [1]	[scfm]	15	30	40	50	80	100	140	180	260	350	450
	[Nm³/h]	25	50	68	85	136	170	238	306	442	595	765
	[Nl/min]	425	850	1133	1416	2265	2832	3965	5097	7362	9911	12743
Pressure DewPoint at nominal condition [1]	[°F – °C]	38 – 3										
Nominal (max.) ambient temperature	[°F – °C]	100 (115) – 38 (46)										
Min. ambient temperature	[°F – °C]	35 – 1.5										
Nominal (max.) inlet air temperature	[°F – °C]	100 (150) – 38 (65)										
Nominal inlet air pressure	[psig – barg]	600 – 40										
Max. inlet air pressure	[psig – barg]	725 – 50										
Air pressure drop - Δp	[psi]	3.63	3.48	3.63	3.34	3.34	3.48	3.48	2.90	3.19	3.19	3.34
	[bar]	0.25	0.24	0.25	0.23	0.23	0.24	0.24	0.20	0.22	0.22	0.23
Inlet - Outlet connections	[NPT-F]	3/8”	3/8”	3/8”	1/2”	1/2”	3/4”	3/4”	1”	1”	1”	1.1/2”
Refrigerant type		R134.a						R404A				
Refrigerant quantity [2]	[oz]	5.1/2	7	10	10.1/2	13.1/2	18.1/2	22	30.1/2	42.1/2	53	63.1/2
	[kg]	0.15	0.20	0.28	0.30	0.38	0.52	0.63	0.87	1.20	1.50	1.80
Cooling air flow	[cfm]	180	180	180	180	240	350	350	530	1400	1600	2200
	[m³/h]	306	306	306	306	408	595	595	900	2380	2720	3740
Heat load	[Btu/h]	1650	2500	2500	4000	5800	5800	8500	8500	11900	17500	20400
Nominal refrigeration compressor power	[HP]	1/8	1/6	1/6	1/4	1/3+	1/3	1/2	1/2	5/8	1.1/8	1.1/4
Standard Power Supply [2]	[Ph/V/Hz]	230/1/60										
Nominal electric absorption	[W]	190	270	300	380	500	700	1100	1200	1400	1730	2550
	[A]	1.1	1.5	1.7	2.1	2.7	4.0	4.9	5.1	6.1	7.9	11.8
Max. electric absorption	[W]	230	310	350	450	760	840	1270	1310	1600	2120	3000
	[A]	1.4	1.7	1.9	2.4	3.8	4.8	5.8	5.9	7.3	9.5	13.9
Max. level noise at 401in (1m)	[dbA]	< 70										
Weight	[lbs]	62	64	70	79	82	119	130	185	192	240	293
	[kg]	28	29	32	36	37	54	59	84	87	109	133

[1] The nominal condition refers to an ambient temperature of 100°F (38°C) with inlet air at 600psig (40barg) and 100°F (38°C).

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

PLH MODEL		/ AC Air-Cooled					
		550	**700**	**900**	**1100**	**2300**	**3000**
Air flow rate at nominal condition [1]	[scfm]	550	700	900	1100	2300	3000
	[Nm^3/h]	935	1190	1530	1870	3910	5100
	[Nl/min]	15575	19820	25485	31150	65130	84950
Pressure DewPoint at nominal condition [1]	[°F – °C]	38 – 3					
Nominal (max.) ambient temperature	[°F – °C]	100 (115) – 38 (46)					
Min. ambient temperature	[°F – °C]	35 – 1.5					
Nominal (max.) inlet air temperature	[°F – °C]	100 (150) – 38 (65)					
Nominal inlet air pressure	[psig – barg]	600 – 40					
Max. inlet air pressure	[psig – barg]	725 – 50					
Air pressure drop - Δp	[psi]	3.19	3.19	3.34	3.19	3.63	3.63
	[bar]	0.22	0.22	0.23	0.22	0.25	0.25
Inlet - Outlet connections	[NPT-F]	1.1/2”	2”	2”	2”	ANSI 2.1/2” 600# RF	ANSI 2.1/2” 600# RF
Refrigerant type		R404A					
Refrigerant quantity [2]	[oz]	60	65	95	158.1/2	318	342
	[kg]	1.70	1.85	2.70	4.50	9.00	9.70
Cooling air flow	[cfm]	2200	4400	4400	4400	11200	11200
	[m^3/h]	3740	7475	7475	7475	19030	19030
Heat load	[Btu/h]	27600	39500	50600	56300	81900	91700
Nominal refrigeration compressor power	[HP]	1.3/4	2.3/4	3.1/4	3.3/4	5.1/4	6
Standard Power Supply [2]	[Ph/V/Hz]	460/3/60					
Nominal electric absorption	[W]	2650	4300	5200	5600	9400	10500
	[A]	4.4	6.6	7.8	8.5	13.9	15.0
Max. electric absorption	[W]	2900	5000	6100	6600	10800	12000
	[A]	5.0	7.5	9.1	9.6	15.7	17.0
Max. level noise at 401in (1m)	[dbA]	< 70					
Weight	[lbs]	309	511	525	573	948	992
	[kg]	140	232	238	260	430	450

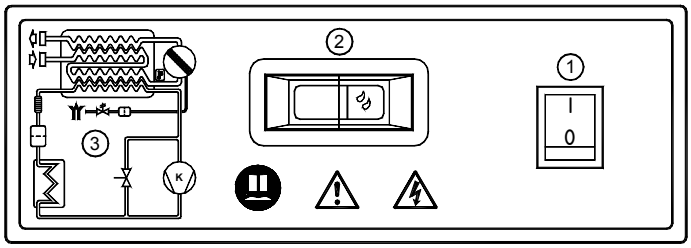
[1] The nominal condition refers to an ambient temperature of 100°F (38°C) with inlet air at 600psig (40barg) and 100°F (38°C).

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

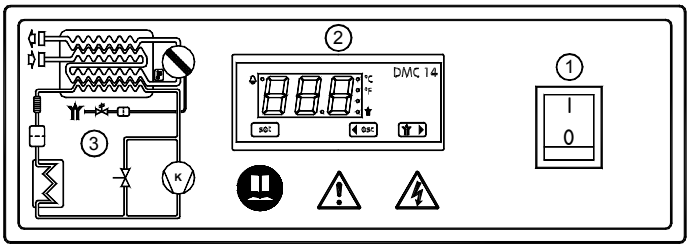
5.1 CONTROL PANEL

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

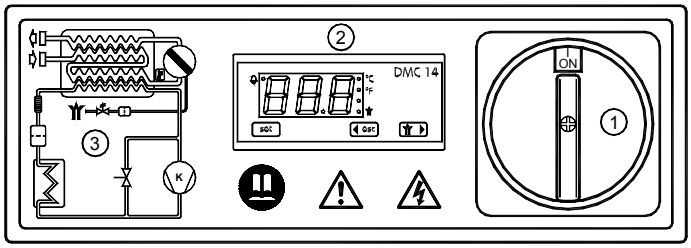
PLH 15-40 – TAN03



PLH 50-180 – DMC14

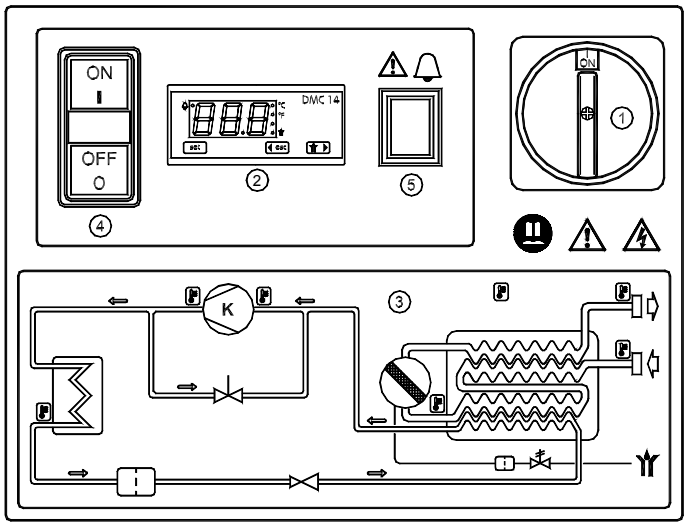


PLH 260-450 – DMC14

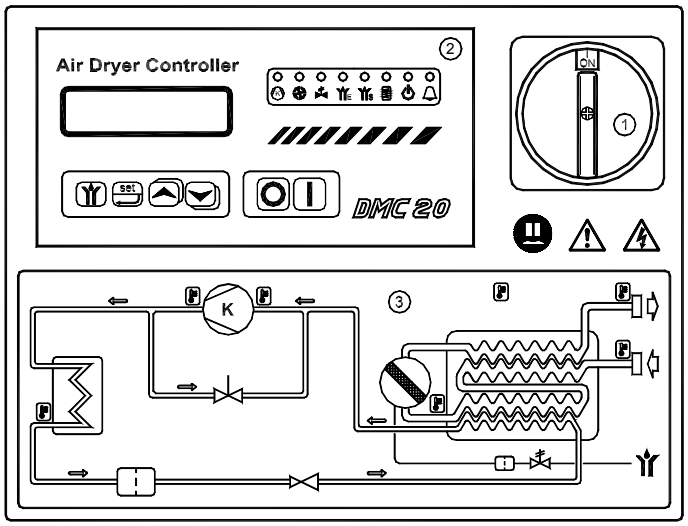


1. Main switch
2. Electronic control instrument
3. Air and refrigerating gas flow diagram
4. ON/OFF switch with mains detecting light
5. Alarm light

PLH 550-3000 – DMC14



PLH 550-3000 – DMC20



5.2 OPERATION

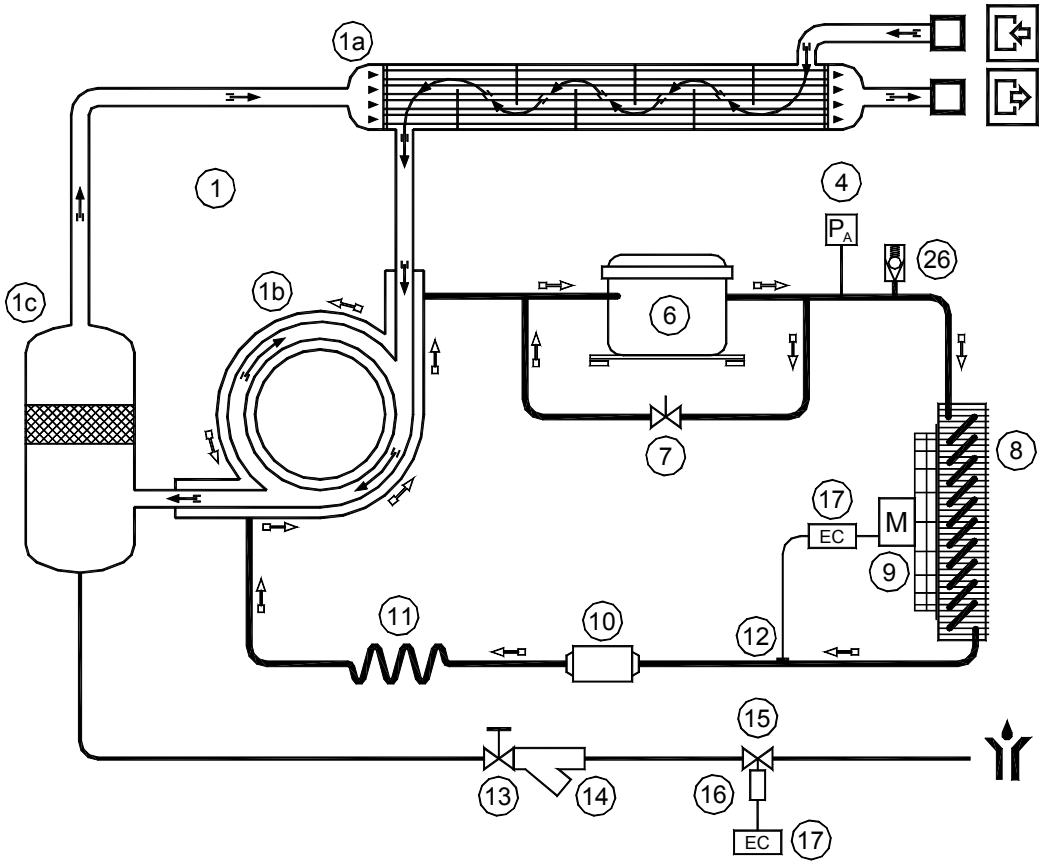
The dryer described in this manual basically consists of two separated circuits: a compressed air circuit, divided into two heat exchangers, and a refrigeration circuit.

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

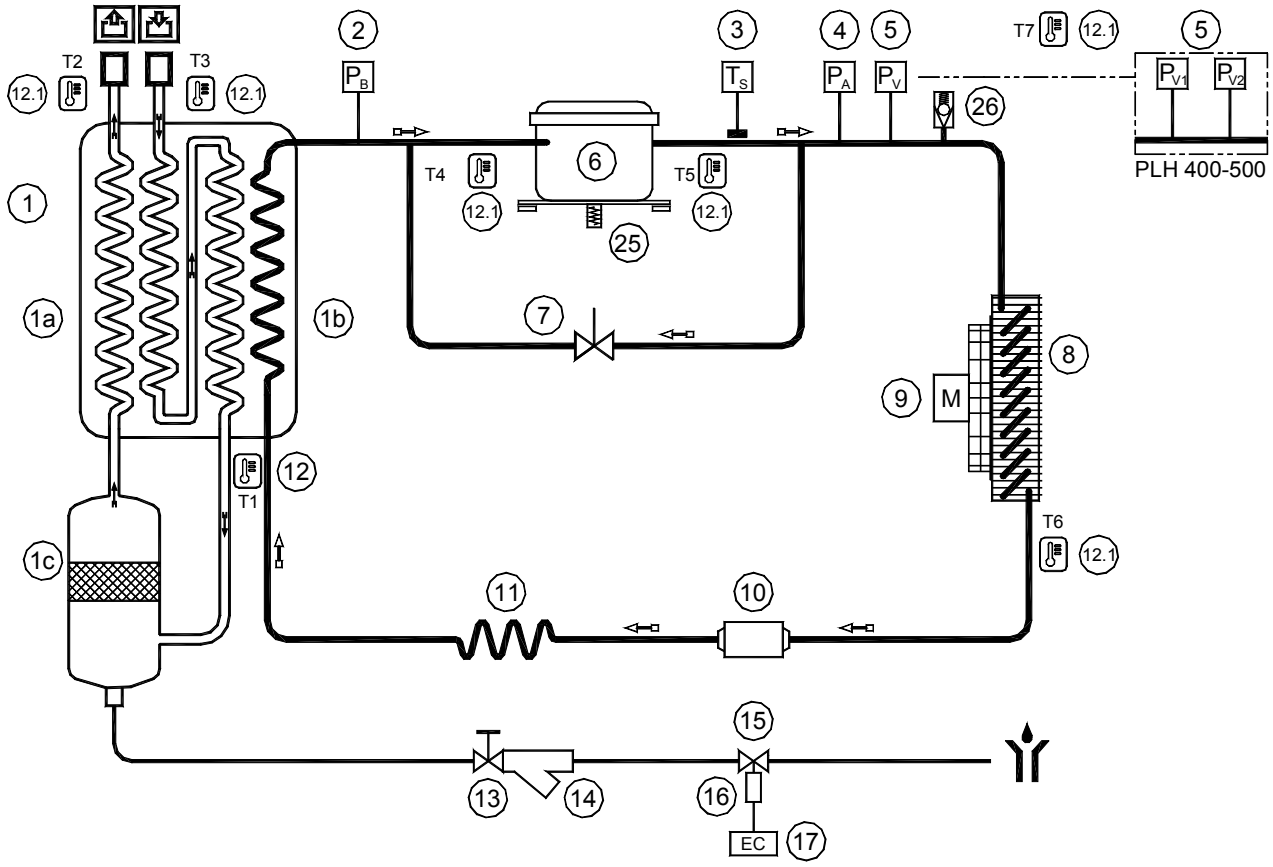
The cooled air goes through the air-to-air exchanger, where it partially warms up in cooling down the entering warm air (pre-refrigeration).

The refrigeration circuit needed for these operations is basically composed of a refrigeration compressor, a condenser and the evaporator, also called air-to-refrigerant exchanger.

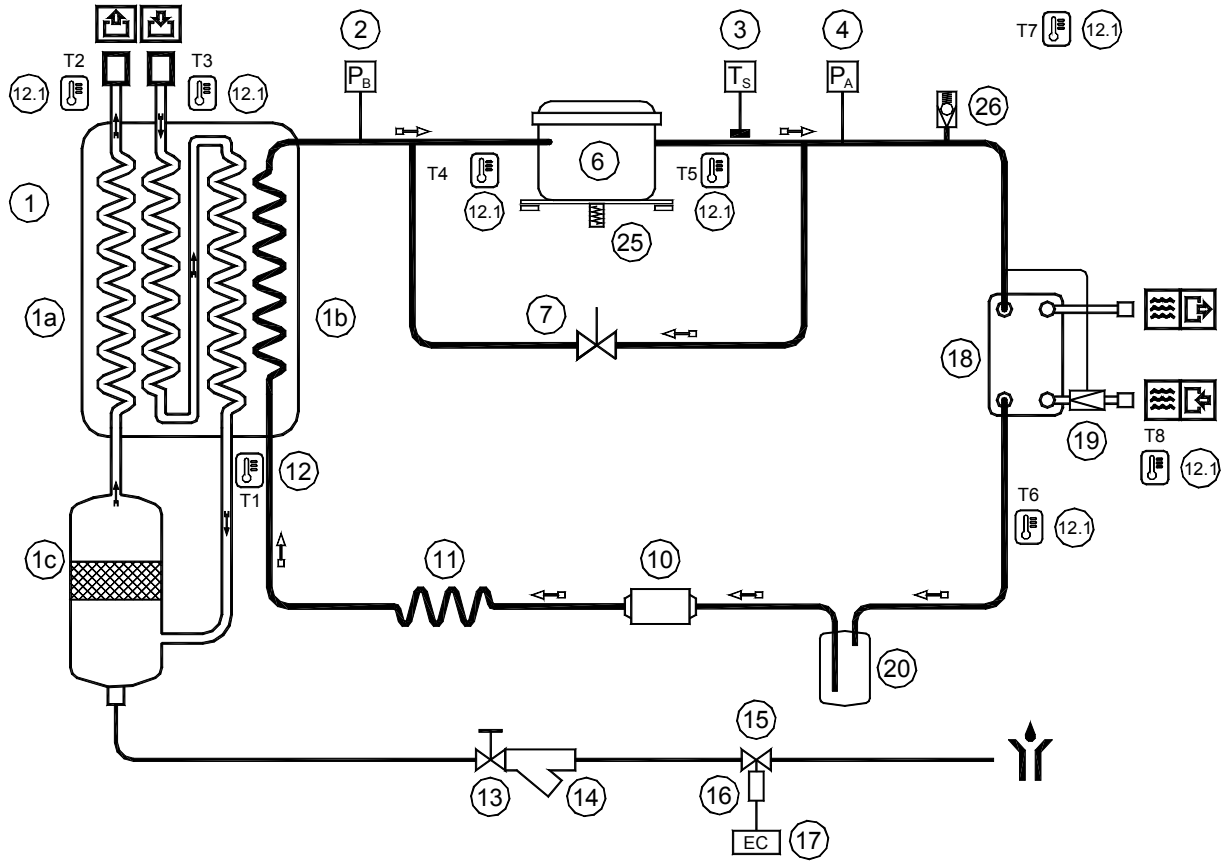
5.3 FLOW DIAGRAM PLH 15-40 /AC (Air-Cooled)



5.4 FLOW DIAGRAM PLH 50-3000 /AC (Air-Cooled)



5.5 FLOW DIAGRAM PLH 260-3000 /WC (Water-Cooled)



(1)	Combined heat exchanger	(11)	Capillary tube
	a - Air-to-air heat exchanger	(12)	T1 Temperature probe (DewPoint)
	b - Air-to-refrigerant exchanger	12.1	Temp. Probes T2-T8 → DMC20 (if installed)
	c - Condensate separator	(13)	Condensate drain service valve
(2)	Refrigerant pressure-switch P_B (PLH 550-3000)	(14)	Y-shaped condensate drain strainer
(3)	T_S safety thermo-switch (PLH 260-3000)	(15)	Condensate drain solenoid valve
(4)	Refrigerant gas pressure switch P_A	(16)	Coil for cond. drain solenoid valve
(5)	Refrigerant pressure-switch (fan) P_V	(17)	EC = Electronic control instrument
	(PLH 50-1100) → P_{V1} - P_{V2} (PLH 2300-3000)	(18)	Condenser (Water-Cooled)
(6)	Refrigerating compressor	(19)	Condenser water regulating valve (water-Cooled)
(7)	Hot gas by-pass valve	(20)	Liquid receiver (water-cooled)
(8)	Condenser (Air-Cooled)	...	
(9)	Condenser fan	(25)	Compressor crankcase heater (PLH 900-3000)
(10)	Dehydration filter	(26)	Refrigerant relief valve
	Compressed air flow direction		Refrigerating gas flow direction

5.6 REFRIGERATING COMPRESSOR

The refrigerating compressor is the pump of the system where the gas coming from the evaporator (low pressure side) is compressed up to the condensation pressure (high pressure side). All the compressors used are manufactured by primary companies and are designed for applications where high compression ratios and wide temperature changes are present.
The fully sealed construction is perfectly gas tight, so ensuring high-energy efficiency and long useful life. The pumping unit is supported by dumping springs, in order to consistently reduce the acoustic emission and the vibration diffusion. The electric motor is cooled down by the aspirated refrigerating gas, which goes through the coils before reaching the compression cylinders. The internal thermal protection protects the compressor from overheating and overcurrents. The protection is automatically restored as soon as the nominal temperature conditions are reached.

5.7 CONDENSER (Air-Cooled)

The condenser is the element in which the gas coming from the compressor is cooled down and condensed becoming a liquid. Mechanically, it is formed by a copper tubing circuit (with the gas flowing inside) immersed in an aluminium blades package.
The cooling operation occurs via a high efficiency axial ventilator which, in applying pressure on the air contained within the dryer, forces it into the blades package.
It is mandatory that the temperature of the ambient air will not exceed the nominal values. It is important **TO KEEP THE UNIT FREE FROM DUST AND OTHER IMPURITIES**.

5.8 CONDENSER (Water-Cooled)

The condenser is the element 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 IMPURITIES AND OTHER CORROSIVE SUBSTANCES**.

5.9 CONDENSER WATER REGULATING VALVE (Water-Cooled)

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

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

ADJUSTMENT
The condenser water regulating valve is adjusted during the testing phase to a pre-set value that covers 90% of the applications. However, sometimes the extreme operating conditions of the dryer may require a more accurate calibration.
During start-up, a qualified technician should check the condensing pressure/temperature and if necessary adjust the valve by using the screws on the valve itself.
To increase the condensing temperature, turn the adjusting screws counter-clockwise; to lower it turn the screws clock-wise. Adjust the valve in order to guarantee a condensing temperature of 108-113 °F (42-45 °C).

5.10 DEHYDRATION FILTER

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

5.11 CAPILLARY TUBE

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

5.12 PLH 15-40 EVAPORATOR

Also called air-to-refrigerant heat exchanger. The liquid that formed in the condenser evaporates in this part of the circuit. During the evaporation phase, the refrigerant tends to absorb the heat from the compressed air in the other side of the exchanger.
The copper exchanger and the refrigerant flow opposite of the air flow contribute to limit the pressure drop and obtain efficient thermal exchanges.

5.13 PLH 15-40 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 head, with a 40÷50% energy saving. Secondly no cold air is allowed into the compressed air line, thus preventing the formation of condensate on the external surface of the system's tubes.

5.14 PLH 50-3000 COMBINED HEAT EXCHANGER

The combined heat exchanger is made of an air-to-air and air-to-refrigerant exchanger. The exchange surface is obtained through stainless steel corrugated blades positioned one on top of the other and copper brazed. The circuits that are created between the blades and the connections are such as to assure the counter-current of the flows. The purpose of the air-to-air exchanger is to release the heat of the incoming compressed air to 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 head, with a 40÷50% energy saving. Secondly no cold air is allowed into the compressed air line, thus preventing the formation of condensate on the external surface of the system's tubes.
The liquid that formed in the condenser evaporates in the air-to-refrigerant exchanger. During the evaporation phase, the refrigerant tends to absorb the heat from the compressed air in the other side of the exchanger, so that the air coming out of the air-to-refrigerant exchanger is cooled at the Dew Point temperature.

5.15 REFRIGERANT RELIEF VALVE

When, due to any kind of fault or malfunctioning, the pressure of the refrigerating gas circuit is higher than the nominal conditions, the P_A pressure switch will stop the refrigerating compressor.
A safety valve that requires no adjustment, has been installed as a further safety device, also to prevent the problems caused by over-pressures of the refrigerating gas. The purpose of this valve is to release the over-pressures inside the circuit. After this gas leak, the dryer is no longer capable of operating correctly. An extraordinary maintenance intervention is needed to check and especially eliminate the cause that generated the over-pressure, in addition to reloading the refrigerating gas.

5.16 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

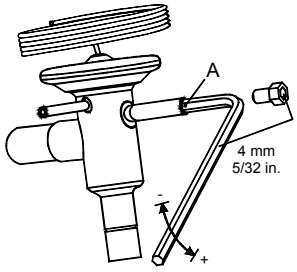
The hot gas by-pass valve is adjusted during the manufacturing testing phase. As a rule no adjustment is required; anyway if it is necessary the operation must be carried out by an experienced refrigeration engineer.

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

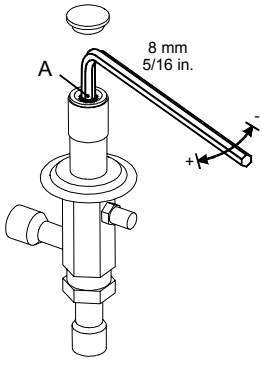
Without compressed air flow through the dryer, rotate the adjusting screw (position A on the drawing) until the following value is reached:

Hot gas setting (R134.a) :	temperature 33°F (+0.5 / -0 °K)
	pressure 29 psig (+1.45 / -0 psi)
	temperature 0.5°C (+0.5 / -0 °K)
	pressure 2.0 barg (+0.1 / -0 bar)
Hot gas setting (R404A) :	temperature 33°F (+0.5 / -0 °K)
	pressure 75.4 psig (+1.45 / -0 psi)
	temperature 0.5 °C (+0.5 / -0 °K)
	pressure 5.2 barg (+0.1 / -0 bar)

PLH 15-1100



PLH 2300-3000



5.17 REFRIGERANT PRESSURE SWITCH PA - PB - PV

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

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

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

Calibrated pressure : R 404 A Stop 14.5 psig - Restart 72.5 psig
R 404 A Stop 1.0 barg - Restart 5.0 barg

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

Calibrated pressure : R 404 A Stop 418 psig - Manual reset
R 404 A Stop 28.8 barg - Manual reset

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

Calibrated pressure : R 134.a Start 160 psig (117°F) - Stop 116 psig (97°F) - Tolerance ± 14.5 psi
R 134.a Start 11 barg (47°C) - Stop 8 barg (36°C) - Tolerance ± 1 bar

PLH 100-450 R 404 A Start 290 psig (113°F) - Stop 232 psig (97°F) - Tolerance ± 14.5 psi
R 404 A Start 20 barg (45°C) - Stop 16 barg (36°C) - Tolerance ± 1 bar

PLH 550-1100 R 404 A Start 290 psig (113°F) - Stop 261 psig (104°F) - Tolerance ± 14.5 psi
R 404 A Start 20 barg (45°C) - Stop 18 barg (40°C) - Tolerance ± 1 bar

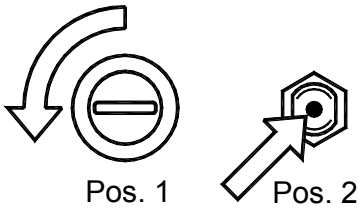
PV1 : Fan control pressure switch is placed at the discharge side of refrigeration compressor. It keeps the condensation temperature/pressure constant within preset limits (Air-Cooled) – Low Speed.

Calibrated pressure : R 404 A Start 261 psig (104°F) - Stop 305 psig (117°F) - Tolerance ± 14.5 psi
R 404 A Start 18 barg (40°C) - Stop 21 barg (47°C) - Tolerance ± 1 bar

PV2 : Fan control pressure switch is placed at the discharge side of refrigeration compressor. It keeps the condensation temperature/pressure constant within preset limits (Air-Cooled) – High Speed.

Calibrated pressure : R 404 A Start 297 psig (115°F) - Stop 334 psig (124°F) - Tolerance ± 14.5 psi
R 404 A Start 20.5 barg (46°C) - Stop 23 barg (51°C) - Tolerance ± 1 bar

5.18 SAFETY THERMO-SWITCH T_S



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

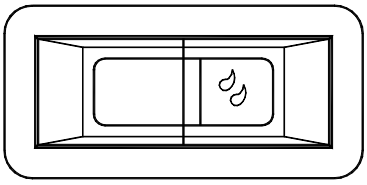
T_S : Manually reset the thermo-switch only after the nominal operating conditions have been restored. Unscrew the relative cap (see pos.1 in the figure) and press the reset button (see pos.2 in the figure).

5.19 COMPRESSOR CRANKCASE HEATER (PLH 700-3000)

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

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

5.20 TAN03 ANALOG THERMOMETER

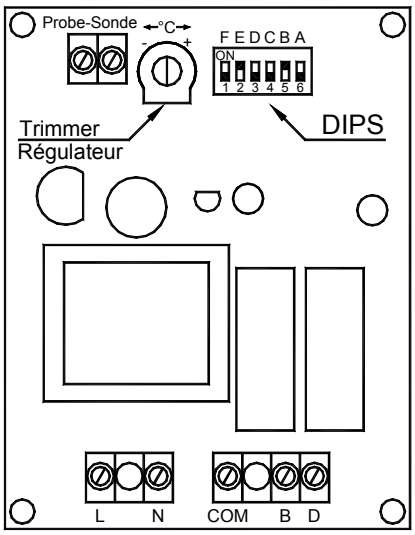


Thermometer TAN03, through its analog display, shows the DewPoint detected by the probe positioned in the evaporator.

OPERATION – while the dryer is operating, the display indicates the current operating DewPoint, shown by means of a three colour (blue-green-red) analog bar over the display itself.

- Blue section - the dryer is working with very low load conditions, the DewPoint of the dryer is quite low;
- Green section - operating conditions ensuring an optimal DewPoint;
- Red section - DewPoint of the dryer too high, the treatment of the compressed air may be improper. In particular operating conditions, a DewPoint under pressure displayed in the first part of the red area can be considered correct, compatibly with the actual operating parameters (compressed air flow, air inlet temperature, ambient temperature).

5.21 DMC6 ELECTRONIC INSTRUMENT (AIR DRYER CONTROLLER)



The DMC6 controls different operations of the dryer, through certain parameters such as condensation temperature and condensate drain times. The condenser fan is activated through a probe positioned at the end of the evaporator; it controls the functioning of condensate drain solenoid valve through the cyclic electronic timer.

The DMC6 is adjusted during the final test of the dryer. In case of particular requirements concerning the operation management, the user can change the setting of the programmed parameters.

The parameters which can be set up are the following:

SET-POINT SET-UP

Set-Point is the activation temperature of the condenser fan.

Set-Point is factory standard setted at 84.2 to 86 °F (29 to 30 °C), with a fix hysteresis - Δt - equal to 3.6 °F (2 ºK). In this way, the fan is activated when the temperature rises over 84.2 to 86 °F (29 to 30 °C) and deactivated when the temperature falls below 80.6 to 82.4 °F (27 to 28 °C).

To adjust the Set-Point follow next steps:

- Put your thermometer probe in contact with the condenser outlet pipe close to the DMC6 probe.
- Switch ON the dryer and wait few minutes.
- Using a small screw driver rotate the set-point adjusting trimmer so the fan starts at a temperature between 84.2 and 86 °F (from 29 to 30 °C). By rotating the trimmer clockwise, the set-point will increase up to a top value of approx. 95°F (35°C); by rotating the trimmer counter clockwise, the set-point will decrease down to a minimum value of approx 77°F (25°C).

NOTE : Any non authorised intervention will void the warranty.

DRAINING TIME SET-UP

It is possible to adjust two times:

- T_{ON} - activation time of the condensate drain solenoid valve.
- T_{OFF} - pause time between two consecutive activation of the condensate drain solenoid valve.

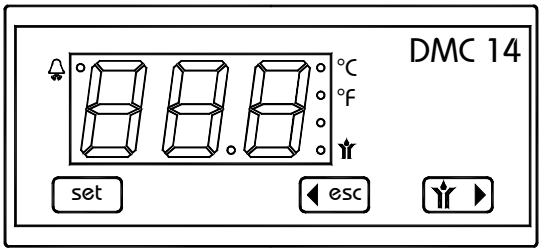
To modify these two times, simply move the 6 micro-switches (DIPS) following the schedule below:

	T_{OFF} - pause time							**T_{ON} - activation time**		
DIPS	**D+E+F**	**D+E**	**D+F**	**E+F**	**F**	**E**	**D**	**C**	**B**	**A**
Time [sec]	210	180	150	90	30	60	120	1	2	4

DIPS A, B & C adjust activation time (T_{ON}).

DIPS D, E & F adjust pause time (T_{OFF}); pause time can be cumulated (i.e. DIPS E+F, D+F, D+E and D+E+F).
Standard setting : DIP B and E set to ON equal to TON = 2 sec and TOFF = 60 sec. Drain solenoid valve will be activated 2 seconds every 60 seconds.

5.22 DMC14 ELECTRONIC INSTRUMENT (AIR DRYER CONTROLLER)



set Button - access to set-up.
esc Button - exit to set-up / value dencrement.
Button - condensate drain test / value increment.
LED - dryer in alarm condition.
● °C LED - it shows the current temperature scale (°C).
● °F LED - it shows the current temperature scale (°F).
● LED - condensate drain solenoid valve activated.

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

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

If the probe is faulty, the instrument also shows “PF” message (Probe Failure), and alarm activation is immediate. In case of “DewPoint too low” condition (ASL parameter, that is fix and equal to 28.5°F or -2°C), the alarm signal is delayed of a fix time (AdL parameter) equal to 30 sec, while for “DewPoint too high” condition the value (ASH parameter) is set by the user and the signal is activated with AdH delay time, that can be also set up by the operator (the instrument is already adjusted during final test of the dryer, please see following values). When DewPoint returns into operating temperature (set range), the alarm condition is deactivated.
DMC14 allows also remote annunciation of this alarm condition of the dryer :
- with dryer off or in alarm conditions there is no voltage from terminal 4 and 9 of electronic instrument (please also see electric drawings into the attachments);
- whereas, with dryer on and correct operating DewPoint, there is voltage from terminal 4 and 9 of electronic instrument (please also see electric drawings into the attachments).

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

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

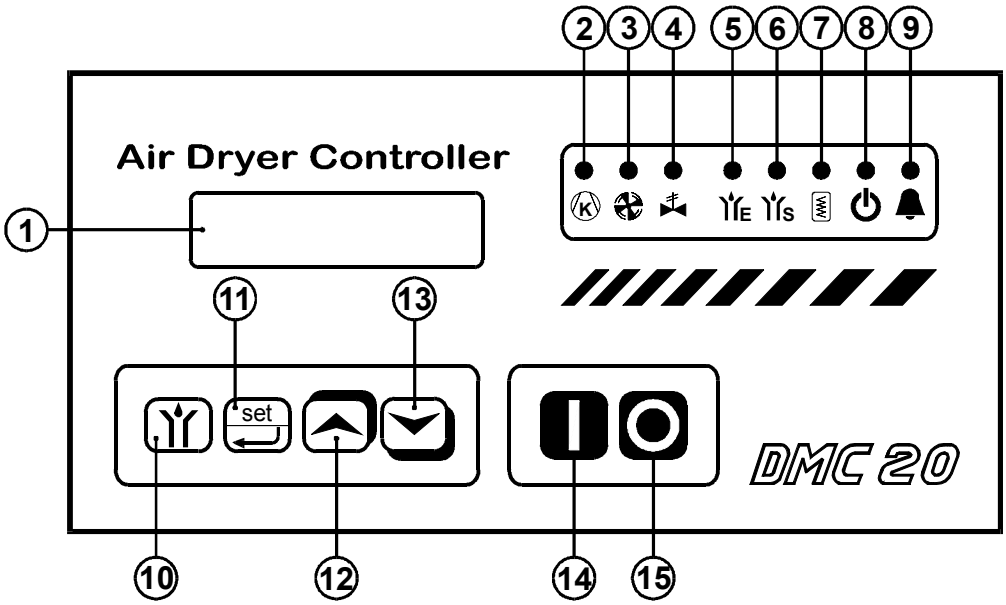
SET-UP (PROGRAMMING)

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

Display	Description	Value range	Set value	Equal to
Ton	Activation time of the condensate drain solenoid valve.	01 … 20	02	2 sec
ToF	Pause time of the condensate drain solenoid valve.	01 … 20	01	1 min
ASH	Alarm threshold for a high DewPoint .	0.0 … 68.0	60	60°F
AdH	ASH alarm time before signal	00 … 20	20	20 min
SCL	Temperature scale	°C … °F	°F	° Fahrenheit
Fixed parameters :	ASL (low DewPoint alarm) = -2°C or 28.5°F	AdL (signal delay) = 30 sec		

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

5.23 DMC20 ELECTRONIC INSTRUMENT (AIR DRYER CONTROLLER - Optional)



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

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

5.23.1 DISPLAY MESSAGES

When the main switch is turned ON, all the characters of the DMC20 display are activated for 2 seconds. Afterwards, the software release appears, and finally the two lines of the display are ready for their normal functions.
When the dryer is in stand-by condition, the display shows "Stand-by", and the "crankcase oil heater" and "Stand-by" leds are ON. If the remote command is in use, the display shows "Stand-by Remote".
To switch ON the dryer, keep the button [14] "Dryer Start-up" pressed for at least 2 seconds. **NOTE : DMC20 has an internal timer that cannot allow to restart the compressor before 2 minutes after the switch off.** The upper line of the display will show the DewPoint. The following parameters can be selected and displayed on the lower line:

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

The parameter to be displayed on the lower line is selected pressing the [12] or [13] keys.
In alarm condition, the list of the parameters to be displayed will include the DewPoint.
To switch OFF the dryer, keep the [15] button "Dryer Stop" pressed for at least 2 seconds.

5.23.2 ALARMS

Any alarm condition is indicated by the flashing of the [9] led "Alarm" and the DMC20 actives a buzzer tone in order to alert the operator. The operator can stop the buzzer by pressing any key.
The cause of the alarm will be displayed on the upper line of the LCD display

Alarm Message	Cause	Intervention Point	Intervention Delay	Remarks
Protection Comp.	Thermal/electrical protection of the compressor	-	No delay	The dryer is stopped
Protection Fan (Air-Cooled)	Thermal/electrical protection of the fan	-	No delay	The dryer is stopped
STOP Compr. LP	Refrigerant low pressure switch (PB)	R404A = 1.0 barg = 14.5 psig	No delay	The dryer is stopped
STOP Compr. HP	Refrigerant high pressure switch (PA)	R404A = 30.5 barg = 442 psig	No delay	The dryer is stopped
Condens. HIGH	Condensation temperature too high (probe T6)	122 - 158 °F 50 - 70 °C	0.5-20 min adjustable	The dryer is stopped
DewPoint LOW	DewPoint low (probe T1)	14 - 32°F -10 - 0 °C	0.5-20 min adjustable	The operator can select if stop the dryer
DewPoint HIGH	DewPoint high (probe T1)	50 - 68 °F 10 - 20 °C	0.5-30 min adjustable	The operator can select if stop the dryer
Probe Fault	One of the probes is faulty	-	No delay	The dryer does not stop

ALARMS MEMORY

When the **"Start at Power Up"** and **"Recovery After !"** functions are deactivated (Note, this is the standard factory setting, set at **"NO**") any alarm causing the dryer to stop and any anomaly with one or more probes (Probe Fault) is stored in the memory of DMC20. To reset the alarm memory the dryer is to be switched OFF (keep the button [15] "Dryer Stop" pressed for at least 2 seconds). The dryer is then to be switched ON again (keep the button [14] "Dryer Start-up" pressed for at least 2 seconds). If the alarm is no longer in effect the dryer will run correctly, otherwise the alarm message will appear again.
When **"Start at Power Up"** and **"Recovery After !"** functions are activated (customer selected setting **"yes**") any alarm which has caused the stop of the dryer and any anomaly with one or more probes (Probe Fault) is automatically reset once nominal conditions return and the dryer will run again automatically.
Any alarm, which is not causing the stop of the dryer, is reset automatically when nominal working conditions return.

5.23.3 SET-UP

The DMC20 is adjusted during the final test of the dryer. Where particular requirements concerning the operation or the alarm management exist, the user can change the setting of the programmed parameters.
Set-up parameters are divided in two levels: anybody can access the level 1, while the access to level 2 is reserved to authorised personnel provided with the password. The password is specified in the last page of this manual.
To access to Set-up mode the [11] "Set-up access" button must be depressed for at least 2 seconds. Then it will be possible to display the desired parameter using the [12] and [13] keys. To modify the displayed parameter, use the [12] and [13] keys, while keeping the [11] key depressed.
During Set-up, the upper line of the display will display the selected parameter, while the lower line will show the current value of the same parameter.
To exit Set-up mode, press simultaneously the [12] and [13] keys, or wait 20 seconds.

NOTE : **The character "!" means "Alarm"**

DESCRIPTION OF SET-UP PARAMETERS

LEVEL 1

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

- **DewPoint Set** : Not Used.
- **DewPoint Diff.** : Not Used.
- **E Drain Time** : Not Used.
- **E Drain Pause** : Not Used.
- **S Drain Time** : Setting of the condensate drainage time of the solenoid valve located on the condensate separator
- **S Drain Pause** : Setting of the pause time between two successive condensate drain cycles of the valve located on the condensate separator.
- **Display Contrast** : Adjustment of the contrast of the LCD display, depending on the observation angle, the illumination, the ambient temperature, etc.

LEVEL 2

- **Min DewPoint** : Not Used.
- **Max DewPoint** : Not Used.
- **Low DewPoint !** : Setting of the threshold activating the alarm for the low DewPoint.
- **Low DP ! Diff.** : This is the differential temperature to deactivate the low DewPoint alarm.
- **Low DP ! Delay** : Setting in minutes of the delay for the low DewPoint alarm. For example, setting the "Low DewPoint !" value on -5, the "Low DP ! Diff." value on 6, and the "Low DP ! Delay" value on 10, the alarm is activated when the DewPoint remains below -5°C (23°F) for at least 10 minutes and goes off as soon as the DewPoint goes over +1ºC (34°F).
- **Low DP ! Stop** : Selecting “YES”, it is possible to enable the low DewPoint alarm to switch OFF the dryer; otherwise a simple alarm signal is displayed.
- **High DewPoint !** : Setting of the activation threshold for the high DewPoint.
- **High DP ! Diff.** : This is the differential temperature to deactivate the high DewPoint alarm.
- **High DP ! Delay** : Setting in minutes of the delay for the high DewPoint alarm. For example, setting the "High DewPoint !" value on 15, the "High DP ! Diff." value on -5, and the "High DP ! Delay" value on 10, the alarm is activated when the DewPoint remains over 15°C (59°F) for at least 10 minutes a goes off as soon as the DewPoint goes below +10ºC (50°F).
- **High DP ! Stop** : Selecting “YES”, it is possible to enable the high DewPoint alarm to switch OFF the dryer, otherwise a simple alarm signal is displayed.
- **Condensation !** : Setting of the activation threshold for the condensing temperature too high.
- **Condens.! Diff.** : This is the differential temperature to deactivate the high condensing temperature alarm.
- **Condens.! Delay** : Setting in minutes of the delay for the alarm when the condensing temperature is too high. For example, setting the "Condensation !" value on 60, the "Condens.! Diff." value on -5, and the "Condens.! Delay" value on 10, the alarm is activated when the condensing temperature remains over +60°C (140°F) for at least 10 minutes and goes off as soon as it falls, below +55ºC (131°F). **NOTE:** the condensing temperature,” too high alarm” will switch OFF the dryer.
- **Start at Power Up** : At factory setting of “NO”, each time the dryer is powered ON it will always enter the Stand-by condition; Selecting “YES”, the dryer will continue the function it was performing at the moment of the power cut off (Stand-by if it was in Stand-by conditions, ON if it was ON).

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

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

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

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

SET-UP PARAMETERS TABLE

	Parameter	Description	Adjustment Range	Std Value
LEVEL 1	Pass Code ?	Password to access level 2	0 ÷ 255	0
	Language	Selection of the language for dialogue and alarm messages	Italian - English German - French	
	DewPoint Set	Activation temperature of the hot gas solenoid valve	Min ÷ Max DewPoint	1.0 ºC (33.8 °F)
	DewPoint Diff.	Differential temperature of the hot gas solenoid valve	0.2 ÷ 10.0 ºK (32.4 to 50 °F)	0.2 ºK (32.4 °F)
	E Drain Time	Evaporator discharge time	0 ÷ 50 sec	3 sec
	E Drain Pause	Pause between two Evaporator discharges	0.5 ÷ 10 min	4.0 min
	S Drain Time	Discharge time of the condensate separator	0 ÷ 50 sec	4 sec
	S Drain Pause	Pause between two condensate separator discharges	0.5 ÷ 10 min	1.0 min
	Display Contrast.	Adjustment of the Display contrast	0 ÷ 100	50
LEVEL 2	Min DewPoint	Minimum value for the DewPoint setting range	-19.9 ÷ 19.9 ºC (-3.8 to 67.8 °F)	1.0 ºC (33.8 °F)
	Max DewPoint	Maximum value for the DewPoint setting range	Min DewPoint ÷ 19.9 ºC (to 67.8 °F)	4.0 ºC (39.2 °F)
	Low ! DewPoint	Temperature of interv. for the too low DewPoint alarm	-10.0 ÷ 0.0 ºC (14 to 32 °F)	-5 ºC (23 °F)
	Low DP ! Diff.	Differential temperature for the too low DewPoint alarm	1.0 ÷ 10.0 ºK (33.8 to 50 °F)	6 ºK (43 °F)
	Low DP ! Delay	Delay time for the too low DewPoint alarm	0.5 ÷ 20 min	10 min
	Low DP ! Stop	STOP enabled in case the DewPoint of the dryer is too low	YES/NO	NO
	High DewPoint !	Temperature of interv. for the too high DewPoint alarm	10.0 ÷ 20.0 ºC (50 to 68 °F)	15 ºC (43 °F)
	High DP ! Diff.	Differential temperature for the too high DewPoint alarm	-1.0 ÷ -10.0 ºK (14 to 30 °F)	-5 ºK (23 °F)
	High DP ! Delay	Delay time for the too high DewPoint alarm	0.5 ÷ 30 min	20 min
	High DP ! Stop	STOP enabled in case the DewPoint of the dryer is too high	YES/NO	NO
	Condensation !	Temperature of intervention for the too high condensation temperature alarm	50.0 ÷ 70.0 ºC (122 to 158 °F)	60.0 ºC (140 °F)
	Condens ! Diff.	Differential temp. for the too high condensation temperature alarm	-1.0 ÷ -10.0 ºK (14 to 30 °F)	-5 ºK (23 °F)
	Condens. ! Delay	Delay time for the too high condensation temp. alarm	0.5 ÷ 20 min	10 min
	Start at Power Up	Machine enabled to restore its operation after a power black out	YES/NO	NO
	Recovery After !	Automatic alarms reset	YES/NO	NO
	Peripheral No.	Unit address for serial communication	01 ÷ 255	01

5.23.4 REMOTE COMMAND

It is possible to remotely switch the dryer ON and OFF by means of a simple switch connected with two wires to the DMC20 (see terminal 20 and 21 on the electric diagram). Closing the contact of the command switch, on the display appears the message "Stand-by Remote", and no functions will be selectable on the local panel; as soon as the contact is opened, the dryer returns to the previous condition (Stand-by if it was in Stand-by condition, ON if it was ON).

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

5.23.5 REMOTE ALARM SIGNAL

A voltage free contact is provided for remote annunciation of any alarm condition of the dryer (see terminal 22, 23 and 24 on the electric diagram).

5.23.6 ACCESS CODE

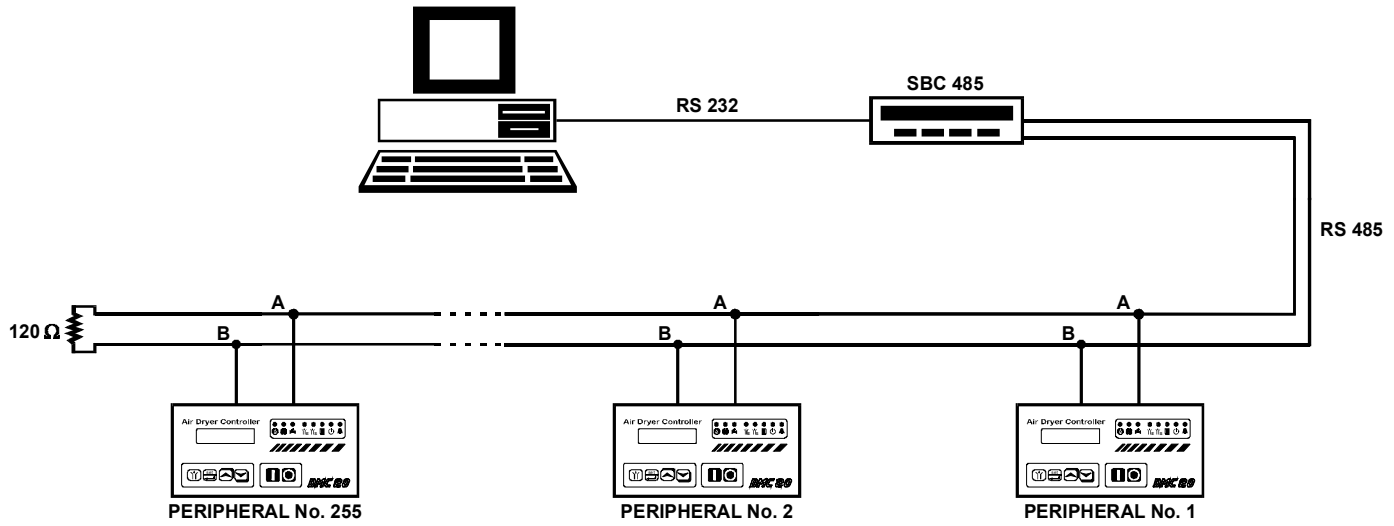
A serviceman's code is required to access level 2.

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

The password is specified in the last page of this manual.
The password must be kept by qualified personnel.

5.23.7 SERIAL COMMUNICATION

The DMC20 features a RS485 serial port (see terminal A and B on DMC20 back side) allowing the connection to a network managed by a PC or PLC controller.
A maximum of 255 DMC20 units can be connected to the same network.
If a PC is used, the connection between the PC and one or more DMC20 requires usage of an SBC485 interface adaptor (can be purchased as accessory - see spare parts list) to be interposed between RS232 serial port and the RS485 bus consisting of two polarized wires. The line can cover 2180yd (2000m) maximum; for long distance (exceeding 109yd - 100m) , it is advisable to use a shielded twisted pair polyethylene cable.
For good data transmission, it is imperative that at the cable end a 120 ohm resistor is placed in order to adapt line impedance, as shown in figure.



CONNECTIONS

COM # PC 25 pin RS232	SBC485 25 pin RS232
Shield - pin 1	n.c.
Tx - pin 2	Pin 2
Rx - pin 3	Pin 3
RTS - pin 4	Pin 4
CTS - pin 5	Pin 5
GND - pin 7	Pin 7

SBC485 9 pin RS485	DMC20 DATA connector
A - pin 1	A terminal
B - pin 2	B terminal
Shield - pin 4	n.c.

PROTOCOL

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

Baud rate : 9600 Data bit : 7 Stop bit : 1 Parity : even

DATABASE

Here below are listed parameter description, type and address of dates on DMC20 :

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

Note : 1) Language selection : 00=Italian - 01=English - 02=German - 03=French

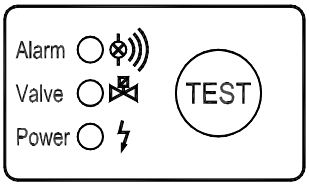
Note : R=Read - W=Write

5.24 ELECTRONIC LEVEL DRAIN PLH 50-550 (Optional)

Instead of the usual drain system (a solenoid valve controlled by means of electronic instrument), an electronic level controlled drain can be installed as option. This drain consists of a condensate accumulator where a capacitive sensor continuously checks the level of the liquid: 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 to avoid wasting air. No Y-shaped strainer is installed and no adjusting is required. A service valve is installed before the electronic drain in order to make check and maintenance operation easy.

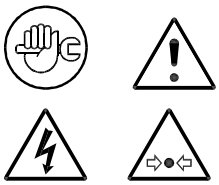
AT DRYER START-UP VERIFY THAT THIS VALVE IS OPEN.

CONTROL PANEL



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

TROUBLESHOOTING



The troubleshooting and resultant service work should be carried out by qualified personnel. Before any intervention, ensure that:

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

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

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

6.1 CONTROLS AND MAINTENANCE

The maintenance operations must be worked out by qualified personnel.
Before any intervention, ensure that:

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

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

DAILY

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

EVERY 200 HOURS OR MONTHLY

- With an air jet (Max. 30psi - 2 bar) blowing from inside towards outside, clean the condenser; repeat this operation blowing in the opposite way; be careful not to damage the aluminium blades of the cooling package.
- Close the manual condensate drain valve, unscrew the mechanical strainer and clean it with compressed air and a brush. Reinstall the strainer properly tight, and then open the manual valve.
- At the end, check the operation of the machine.

EVERY 1000 HOURS OR YEARLY

- Verify for tightness all the screws of the electric system and that all the “Faston” type connections are in their proper position.
- Check the conditions of the condensate drain flexible hoses, and replace if necessary.
- At the end, check the operation of the machine.

6.2 TROUBLESHOOTING

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

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ The dryer doesn't start.	⇨ Verify that the system is powered. ⇨ Verify the electric wiring. ⇨ **PLH 550-3000 -** Intervention of the electric protection (see Q3 on the electric diagram) of the auxiliary circuit - restore it and check the proper operation of the dryer. ⇨ **PLH 2300-3000/AC-** The back panel of the dryer is open (SD door interlock safety-switch has been activated) - make sure the back panel is correctly closed and the SD switch restored. ⇨ **DMC20-** The “alarm in progress” led is ON - see specific point. ⇨ **PLH 550-3000 DMC14-** The “alarm” led is ON - see specific point.
◆ The compressor doesn’t work.	⇨ Activation of the compressor internal thermal protection - wait for 30 minutes, then retry. ⇨ Verify the electric wiring. ⇨ **Where installed**- Replace the internal thermal protection and/or the start-up relay and/or the start-up capacitor and/or the working capacitor. ⇨ The high pressure switch P_A has been activated - see specific point. ⇨ **Where installed-** The P_B pressure switch has been activated - see specific point. ⇨ **Where installed-** The T_S safety thermo-switch has been activated - see specific point. ⇨ **PLH 550-3000 DMC14-** The “alarm” led is ON - see specific point. ⇨ **DMC20-** Internal delay device - wait at least 2 min from last shut-off. ⇨ **DMC20-** The “alarm in progress” led is ON - see specific point. ⇨ If the compressor still doesn’t work, replace it.

- ◆ The fan of the condenser doesn't work (Air-Cooled).
  - ⇨ Verify the electric wiring.
  - ⇨ PV pressure switch is faulty - replace it.
  - ⇨ **PLH 2300-3000-** PV1-PV2 pressure switches are faulty - contact a refrigeration engineer.
  - ⇨ **PLH 550-3000-** The fan power contactor (see V on the electric diagram) is faulty - replace it.
  - ⇨ **PLH 550-3000 DMC14-** The "alarm" led is ON - see specific point.
  - ⇨ **DMC20-** The "alarm in progress" led is ON - see specific point.
  - ⇨ If the fan still doesn't work, replace it.
- ◆ DewPoint too high.
  - ⇨ The dryer doesn't start - see specific point.
  - ⇨ The T1 DewPoint probe doesn't correctly detect the temperature - ensure the sensor is pushed into the bottom of copper tube immersion well.
  - ⇨ The refrigerating compressor doesn't work - see specific point.
  - ⇨ The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation (Air-Cooled).
  - ⇨ The inlet air is too hot - restore the nominal conditions.
  - ⇨ The inlet air pressure is too low - restore the nominal conditions.
  - ⇨ The inlet air flow rate is higher than the rate of the dryer - reduce the flow rate - restore the normal conditions.
  - ⇨ The condenser is dirty - clean it (Air-Cooled).
  - ⇨ The condenser fan doesn't work - see specific point (Air-Cooled).
  - ⇨ The cooling water is too hot - restore the nominal condition (Water-Cooled).
  - ⇨ The cooling water flow is insufficient - restore the nominal condition (Water-Cooled).
  - ⇨ The dryer doesn't drain the condensate - see specific point.
  - ⇨ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore the nominal setting.
  - ⇨ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer.
- ◆ DewPoint too low.
  - ⇨ The fan is always ON - P_V pressure switch is faulty - replace it (Air-Cooled).
  - ⇨ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore the nominal setting.
- ◆ 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.
  - ⇨ The condensate drain strainer is clogged - remove and clean it.
  - ⇨ The drain solenoid valve is jammed - remove and clean it.
  - ⇨ Verify the electric wiring.
  - ⇨ The coil of the condensate drain solenoid valve burned out - replace it.
  - ⇨ The DewPoint is too low - the condensate is frozen - see specific point.
  - ⇨ **DMC20-** Drain time on DMC20 is set at zero seconds. - see DMC20 "Set-Up" section.
- ◆ The dryer continuously drains condensate.
  - ⇨ The drain solenoid valve is jammed - remove and clean it.
  - ⇨ Try to remove the electric connector on the solenoid valve - if drain stops verify the electric wiring or the electronic instrument is faulty - replace it.
- ◆ Water within the line.
  - ⇨ The dryer doesn't start - see specific point.
  - ⇨ **Where installed -** Untreated air flows through the by-pass unit - close the by-pass.
  - ⇨ The dryer doesn't drain the condensate - see specific point.
  - ⇨ DewPoint too high - see specific point.
- ◆ **Where installed-** The P_B low-pressure switch has been activated.
  - ⇨ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer.
  - ⇨ The pressure switch restores automatically when normal conditions are restored - check the proper operation of the dryer.

◆ The P_A high-pressure switch has been activated.

⇨ Check which of the following has caused the activation :
1. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation (Air-Cooled).
2. The condenser is dirty - clean it (Air-Cooled).
3. The condenser fan doesn't work - see specific point (Air-Cooled).
4. The cooling water is too hot - restore the nominal condition (Water-Cooled).
5. The cooling water flow is insufficient - restore the nominal condition (Water-Cooled).

⇨ Reset the pressure-switch pressing the button on the controller itself - verify the dryer for correct operation.

⇨ The P_A pressure switch is faulty - contact a refrigeration engineer to replace it.

◆ **Where installed -** The T_S safety thermo-switch has been activated.

⇨ Check which of the following has caused the activation :
1. Excessive thermal load - restore the standard operating conditions.
2. The inlet air is too hot - restore the nominal conditions.
3. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation.
4. The condenser unit is dirty - clean it.
5. The fan doesn't work - see specific point.
6. There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer.

⇨ Reset the thermo-switch by pressing the button on the thermo-switch itself - verify the correct operation of the dryer (also see par. 5.18).

⇨ The T_S thermo-switch is faulty - replace it.

◆ **DMC14-** The LED  of the instrument is on or flashes to indicate alarm situations.

⇨ The LED  flashes because the DewPoint is too high - see specific point.

⇨ The LED  flashes because the DewPoint is too low - see specific point.

⇨ The LED  flashes because the probe is faulty or interrupted, the instrument displays the message "PF" (Probe Failure) - replace the probe.

◆ **DMC20-** The "alarm in progress" led is on.

⇨ One of the following appears on the upper line of the DMC20 display :
1. "Protection Comp." The electric protection (see Q1 on the electric diagram) of the compressor is activated - restore it and retry.
2. "Protection Fan": (Air-Cooled) Intervention of the electric protection (see Q2 on the electric diagram) of the fan - restore it and check the proper operation of the dryer or Intervention of the thermal protection (see TV on the electric diagram) inside the fan - wait 30 minutes and retry.
3. "STOP Compr. LP" : The PB low pressure-switch is activated - see specific point.
4. "STOP Compr. HP" : The PA high pressure-switch is activated - see specific point.
5. "Condens. HIGH" : condensing temperature is too high - see specific point.
6. "LOW DewPoint" : The DewPoint is too low - see specific point.
7. "HIGH DewPoint" : The DewPoint is too high - see specific point.
8. "Probe Fault" : one of the probes is faulty - see specific point.

◆ **DMC20-** The condensing temperature is too high.

⇨ Check which of the following has caused the alarm :
1. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation (Air-Cooled).
2. The condenser is dirty - clean it (Air-Cooled).
3. The condenser fan doesn't work - see specific point (Air-Cooled).
4. The cooling water is too hot - restore the nominal condition (Water-Cooled).
5. The cooling water flow is insufficient - restore the nominal condition (Water-Cooled).

◆ **DMC20-** DMC20 display "Probe Fault" message.

⇨ One of the temperature probes is faulty - display in sequence all the temperatures - the parameter indicated with "?" corresponds to faulty probe.

⇨ Verify that the probe-extension connector of faulty probe is correctly inserted in DMC20.

⇨ Check the probe-extension connection between DMC20 and terminal board.

⇨ Check electric connection between probe and terminal board.

⇨ If the fault persists, replace probe and/or probe-extension.

NOTE: If any probe is faulty the dryer will run correctly even if there is an alarm condition.

6.3 SUGGESTED SPARE PARTS

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

			PLH										
No.	**DESCRIPTION OF THE SPARE PARTS**	**CODE**	**15**	**30**	**40**	**50**	**80**	**100**	**140**	**180**	**260**	**350**	**450**
2	Refrigerant gas pressure switch P_B	5655NNN085											1
3	T_S safety thermo-switch	56141NN005									1	1	1
4	Refrigerant gas pressure switch P_A	5655NNN087	1	1	1	1	1	1	1	1	1	1	1
5	Refrigerant gas pressure switch P_V	5655NNN160				1	1	1	1	1	1	1	1
6	Refrig. compressor (-1) 115/1/60	5015135101	1										
6	Refrig. compressor (-1) 115/1/60	5015135103		1									
6	Refrig. compressor (-1) 115/1/60	5015135105			1								
6	Refrig. compressor (-1) 115/1/60	5015135009				1							
6	Refrig. compressor (-1) 115/1/60	5015135011					1	1					
6	Refrig. compressor (-1) 115/1/60	5030135005							1	1			
6	Refrig. compressor (-2) 230/1/60	5015110101	1										
6	Refrig. compressor (-2) 230/1/60	5015110107		1	1								
6	Refrig. compressor (-2) 230/1/60	5015110113				1							
6	Refrig. compressor (-2) 230/1/60	5015115011					1	1					
6	Refrig. compressor (-2) 230/1/60	5030115005							1	1			
6	Refrig. compressor (-2) 230/1/60	5030116015									1		
6	Refrig. compressor (-2) 230/1/60	5030116020										1	
6	Refrig. compressor (-2) 230/1/60	5030116025											1
7	Hot gas by-pass valve	64140SS150	1	1	1	1	1	1					
7	Hot gas by-pass valve	64140SS155							1	1	1	1	1
9	Complete fan	5250110100									1		
9	Complete fan	5250115005										1	
9	Complete fan	5250110110											1
9.1	Fan motor (-1) 115/1/60	5210135010	1	1	1	1	1						
9.1	Fan motor (-1) 115/1/60	5210135020						1	1				
9.1	Fan motor (-1) 115/1/60	5210135021								1			
9.1	Fan motor (-2) 230/1/60	5210110005	1										
9.1	Fan motor (-2) 230/1/60	5210110011		1	1	1	1						
9.1	Fan motor (-2) 230/1/60	5210110017						1	1				
9.1	Fan motor (-2) 230/1/60	5210110022								1			
9.2	Fan blade	5215000010	1			1	1						
9.2	Fan blade	5215000019		1	1								
9.2	Fan blade	5215000025						1	1				
9.2	Fan blade	5215000035								1			
9.3	Fan grid	5225000010		1	1	1	1						
9.3	Fan grid	5225000027						1	1				
9.3	Fan grid	5225000030								1			
10	Dehydration filter	6650SSS007	1	1	1	1	1						
10	Dehydration filter	6650SSN150						1	1				
10	Dehydration filter	6650SSN160								1	1	1	1
12	DMC6 Temperature probe (T1)	5625NNN005	1♦	1♦	1♦								
12	DMC14 Temperature probe (T1)	5625NNN035				1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
13+14	Condensate drain valve/strainer	64355MM005	1	1	1	1	1	1	1	1	1	1	1
15	Condensate drain solenoid valve	64320FF050	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
16	Coil for cond. drain sol.valve 115V	64N22MM071	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
16	Coil for cond. drain sol.valve 230V	64N22MM070	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
17	DMC6 Electronic instrument 115V	5620130106	1♦	1♦	1♦								
17	DMC6 Electronic instrument 230V	5620110106	1♦	1♦	1♦								
17.1	TAN03 Analog thermometer	5610000005	1♦	1♦	1♦								
17	DMC14 Electronic Instrument 115V	5620130103				1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
17	DMC14 Electronic Instrument 230V	5620110103				1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
21	Electronic drain (-1) 115/1/60	2210BEK016P				1	1	1	1	1	1	1	1
21	Electronic drain (-2) 230/1/60	2210BEK016A				1	1	1	1	1	1	1	1
22	Main switch 2P 0/1	5450SZN010	1	1	1	1	1	1	1	1			
22	Main switch	5450SZN117									1	1	1
26	Refrigerant relief valve	64150MN100	1	1	1	1	1	1	1	1	1	1	
26	Refrigerant relief valve	64150MN102											1

			PLH							
			DMC14 - Electronic Instrument				DMC20 - Electronic Instrument			
No.	**DESCRIPTION OF THE SPARE PARTS**	**CODE**	**550**	**700**	**900**	**1100**	**550**	**700**	**900**	**1100**
2	Refrigerant gas pressure switch P_B	5655NNN085	1	1	1	1	1	1	1	1
3	T_S safety thermo-switch	56141NN005	1	1	1	1	1	1	1	1
4	Refrigerant gas pressure switch P_A	5655NNN087	1	1	1	1	1	1	1	1
5	Refrigerant gas pressure switch P_V	5655NNN160	1	1	1	1	1	1	1	1
6	Refrigerating compressor	5015340002	1				1			
6	Refrigerating compressor	5015340006		1				1		
6	Refrigerating compressor	5015340011			1				1	
6	Refrigerating compressor	5015340007				1				1
7	Hot gas by-pass valve	64140SS155	1	1	1	1	1	1	1	1
9	Complete fan	5250120005	1	2	2	2	1	2	2	2
10	Dehydration filter	6650SSN165	1	1	1	1	1	1	1	1
12	Temp. probe L=1200mm (T1-T4)	5625NNN035	1♦	1♦	1♦	1♦	2♦	2♦	2♦	2♦
12.1	Temp. probe L=600mm (T7)	5625NNN033					1♦	1♦	1♦	1♦
12.1	Temp. probe L=1800mm (T2-T3-T5-T6-T8)	5625NNN037					5♦	5♦	5♦	5♦
12.2	Extension for probe L=1200mm	5625NNN030	1♦	1♦	1♦	1♦				
12.2	Extension for probe L=1800mm	5625NNN029						8♦	8♦	8♦
13+14	Y-type condensate drain strainer	64355MM005	1	1	1	1	1	1	1	1
15	Condensate drain solenoid valve	64320FF050	1♦	1♦	1♦	1♦	1♦	1♦	1♦	1♦
16	Coil for cond. drain solenoid valve	64N22MM070	1♦	1♦	1♦	1♦				
16	Coil for cond. drain solenoid valve	64N22MM072					1♦	1♦	1♦	1♦
17	DMC14 Electronic Instrument	5620110103	1♦	1♦	1♦	1♦				
17.1	Display module DMC20	5620100005					1♦	1♦	1♦	1♦
17.2	Power module DMC20	5620100006					1♦	1♦	1♦	1♦
17.3	Flat cable 16P L=1200mm	5625NNN100					1♦	1♦	1♦	1♦
21	Electronic drain	2210BEK016A	1				1			
22	Main switch	5450SZN120	1				1			
22	Main switch	5450SZN100		1	1	1		1	1	1
26	Refrigerant relief valve	64150MN102	1	1			1	1		
26	Refrigerant relief valve	64150MN104			1	1			1	1
60.1	Q1 - Circuit breaker	54443SM145	1				1			
60.1	Q1 - Circuit breaker	54443SM152		1	1	1		1	1	1
60.2	Q2 - Circuit breaker	54443SM130	1				1			
60.2	Q2 - Circuit breaker	54443SM135		1	1	1		1	1	1
60.3	Q3 - Circuit breaker	54443C6011	1				1			
60.3	Q3 - Circuit breaker	54443ST020		1	1	1		1	1	1
60.4	Q1-Q2 - Auxiliary contact x circuit breaker Autom.	5490CAX060	1	2	2	2	1	2	2	2
60.4	K - Auxiliary contact	5490CAX011		1	1	1				
60.5	K - Power contact	5454TLT116		1	1	1				
60.5	K - Power contact	5454TLT016						1	1	1
60.5	K -V Power contact	5454TLT110	2							
60.5	V - Power contact	5454TLT111		1	1	1				
60.5	K -V Power contact	5454TLT010					2			
60.5	V - Power contact	5454TLT011						1	1	1
60.6	A - Auxiliary relay - 2 contacts	5456REL110	1	1	1	1				
60.7	A - Relay socket - 2 contacts	5456REL015	1	1	1	1				
60.8	P - Double ON/OFF button with light	5452PLS020	1	1	1	1				
60.9	P - Neon lamp for the double button	5480NEN010	1	1	1	1				
60.10	X - Rectangular red indicator 18x24	5452IND005	1	1	1	1				
60.11	X - Neon lamp for red indicator	5480NEN005	1	1	1	1				
60.12	TF - Transformer	5440TFM056	1							
60.12	TF - Transformer	5440TFM054					1			
60.12	TF - Transformer	5440TFM025		1	1	1				
60.12	TF - Transformer	5440TFM021						1	1	1
60.16	Q4 - Automatic breaker	54441C6005		1	1	1				
60.16	Q4 - Automatic breaker	54442C6015						1	1	1

			PLH			
			DMC14 - Electronic Instrument		DMC20 - Electronic Instrument	
No.	**DESCRIPTION OF THE SPARE PARTS**	**CODE**	**2300**	**3000**	**2300**	**3000**
2	Refrigerant gas pressure switch P_B	5655NNN085	1	1	1	1
4	Refrigerant gas pressure switch P_A	5655NNN087	1	1	1	1
5	Refrigerant gas pressure switch P_V	5655NNN160	2	2	2	2
6	Refrigerating compressor	5015340016	1		1	
6	Refrigerating compressor	5015340018		1		1
7	Hot gas by-pass valve	64140SS102	1	1	1	1
9	Complete fan	5250355105	1	1	1	1
10	Dehydration filter	6650SSN175	1	1	1	1
12	Temp. probe L=1800mm (T1-T2-T3)	5625NNN037	1♦	1♦	3♦	3♦
12.1	Temp. probe L=600mm (T7)	5625NNN033			1♦	1♦
12.1	Temp. probe L=360mm (T4-T5-T6-T8)	5625NNN039			4♦	4♦
12.2	Extension for probe L=1200mm	5625NNN030	1♦	1♦		
12.2	Extension for probe L=1800mm	5625NNN029			8♦	8♦
13+14	Y-type condensate drain strainer	64355MM005	1	1	1	1
15	Condensate drain solenoid valve	64320FF050	1♦	1♦	1♦	1♦
16	Coil for cond. drain solenoid valve	64N22MM070	1♦	1♦		
16	Coil for cond. drain solenoid valve	64N22MM072			1♦	1♦
17	DMC14 Electronic Instrument	5620110103	1♦	1♦		
17.1	Display module DMC20	5620100005			1♦	1♦
17.2	Power module DMC20	5620100006			1♦	1♦
17.3	Flat cable 16P L=1200mm	5625NNN100			1♦	1♦
22	Main switch	5450SZN105	1	1	1	1
26	Refrigerant relief valve	64150MN104	1		1	
26	Refrigerant relief valve	64150MN106		1		1
60.1	Q1 - Circuit breaker	54443SM160	1	1	1	1
60.2	Q2 - Circuit breaker	54443SM145	1	1	1	1
60.3	Q3 - Circuit breaker	54443ST020	1	1	1	1
60.4	Q1-Q2 - Auxiliary contact for circuit breaker Autom.	5490CAX060	2	2	2	2
60.5	K - Power contact	5454TLT125	1	1		
60.5	K - Power contact	5454TLT025			1	1
60.6	A - Auxiliary relay - 2 contacts	5456REL110	1	1		
60.7	A - Relay socket - 2 contacts	5456REL015	1	1		
60.8	P - Double ON/OFF button with light	5452PLS020	1	1		
60.9	P - Neon lamp for the double button	5480NEN010	1	1		
60.10	X - Rectangular red indicator 18x24	5452IND005	1	1		
60.11	X - Neon lamp for red indicator	5480NEN005	1	1		
60.12	TF - Transformer	5440TFM025	1	1	1	1
60.13	K - Auxiliary contact	5490CAX010	1	1	1	1
60.13	K - Auxiliary contact	5490CAX011	1	1		
60.14	V1-V2 - Power contact	5454TLT111	2	2		
60.14	V1-V2 - Power contact	5454TLT011			2	2
60.15	V1-V2 - Interlock for power contact	5490INM010	1	1	1	1
60.16	Q4 - Automatic breaker	54441C6005	1	1		
60.16	Q4 - Automatic breaker	54442C6005			1	1

♦ Suggested spare part.

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

6.4 DISMANTLING OF THE DRYER

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

Part	Material
Refrigerant fluid	R404A – HFC, R134.a – HFC, Oil
Canopy and Supports	Carbon steel, Epoxy paint
Refrigerating compressor	Steel, Copper, Aluminium, Oil
Combined heat exchanger	Carbon steel, AISI 316L Stainless steel, Copper
Condensate separator	Copper or Carbon steel, Stainless steel
Condenser Unit	Aluminium, Copper, Carbon steel
Pipe	Copper
Fan	Aluminium, Copper, Steel
Valve	Brass, Steel
Electronic Level Drain (optional)	PVC, Aluminium, Steel
Insulation Material	Synthetic rubber without CFC
Electric cables	Copper, PVC
Electric Parts	PVC, Copper, Brass

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

7.1 DRYERS DIMENSIONS

7.2 EXPLODED VIEW

Exploded view table of components - Dryers PLH 15-3000

① Combined heat exchanger
1.1 Insulation Material
② Refrigerant pressure-switch P_B (PLH 550-3000)
③ T_S safety thermo-switch (PLH 260-3000)
④ Refrigerant gas pressure switch P_A
⑤ Refrigerant pressure-switch (fan) P_V
(PLH 50-1100) → P_{V1} - P_{V2} (PLH 2300-3000)
⑥ Refrigerating compressor
⑦ Hot gas by-pass valve
⑧ Condenser (Air-Cooled)
⑨ Condenser fan
⑩ Dehydration filter
⑪ Capillary tube
⑫ T1 Temperature probe (DewPoint)
12.1 Temp. Probes T2-T8 → DMC20 (if installed)
⑬ Condensate drain service valve
⑭ Y-shaped condensate drain strainer
⑮ Condensate drain solenoid valve
⑯ Coil for cond. drain solenoid valve
⑰ Electronic control instrument
⑱ Condenser (Water-Cooled)
⑲ Condenser water regulating valve (Water-Cooled)
⑳ Liquid receiver (water-cooled)
㉑ Electronic level drain
㉒ Main switch
㉓ HP Refrigerant gauge (high-pressure)
㉔ LP Refrigerant gauge (low-pressure)
㉕ Compressor crankcase heater (PLH 900-3000)
㉖ Refrigerant relief valve
...
㊶ Front panel
㊷ Back panel
㊸ Right lateral panel
㊹ Left lateral panel
㊺ Cover
㊻ Base plate
㊼ Upper plate
㊽ Support beam
㊾ Support bracket
㊿ Control panel
(61) Electric connector
(62) Electric box
(63) SD Door interlock safety-switch
(64) Internal panel

7.3 ELECTRIC DIAGRAMS

Electrical Diagram table of components - Dryers PLH 15-3000

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

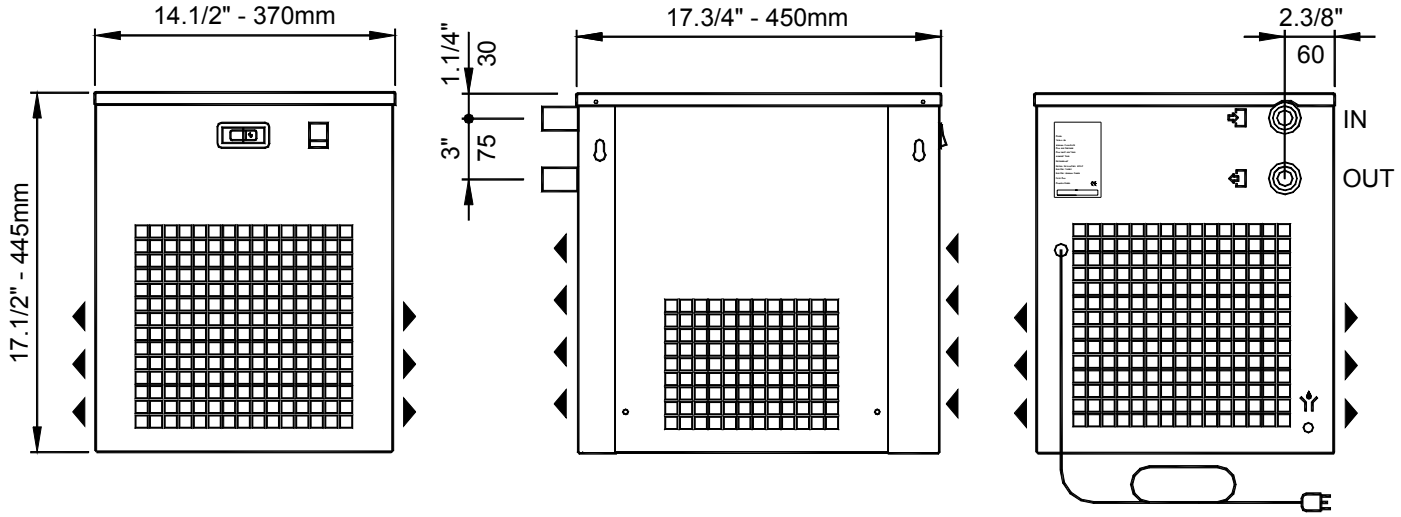
V : Condenser fan
- **CV** : Fan starting capacitor (if installed)
- **TV** : Fan thermal protection (PLH 2300-3000)

DMC14 : DMC14 Electronic Instrument - Air Dryer Controller
DMC20 : DMC20 Display Module - Air Dryer Controller
DMC20RI : DMC20 Power Module - Air Dryer Controller
PR : Temperature probe (DewPoint)
PV : Pressure switch - Fan control (PLH 50-1100)
PV1 - PV2 : Pressure switch - Fan control (PLH 2300-3000)
PA : Pressure switch - Compressor discharge side - (HIGH-pressure)
PB : Pressure switch - Compressor suction side (low-pressure - Optional PLH 15-450)
TS : Safety thermo-switch (PLH 260-3000)
BOX : Electric box
EVD : Condensate drain solenoid valve
ELD : Electronic level drain
SEZ : Main switch with door block
P : Start-Stop button - Power on light
X : Alarm on light
R : Compressor crankcase heater (PLH 900-3000)
SD : Door interlock safety-switch
CP : Control panel

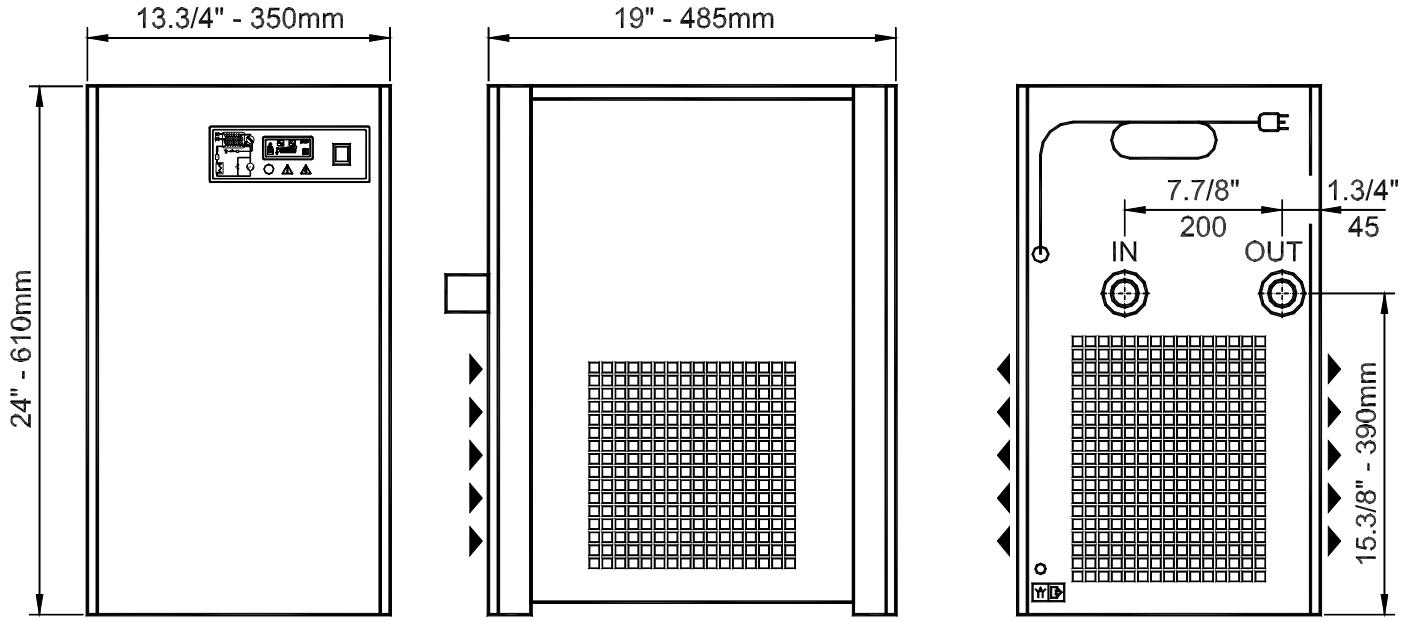
BN = BROWN
BU = BLUE
BK = BLACK
YG = YELLOW/GREEN

GB ATTACHMENTS GB

7.1.1 PLH 15-40



7.1.2 PLH 50-80



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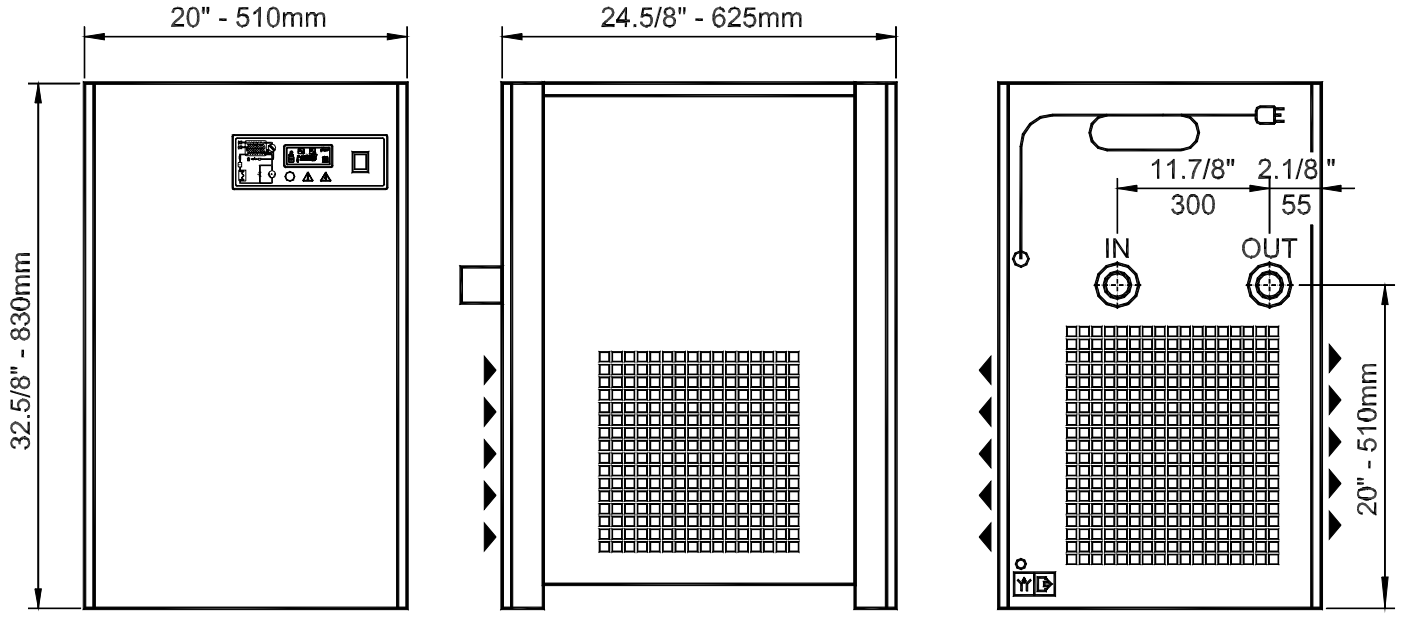
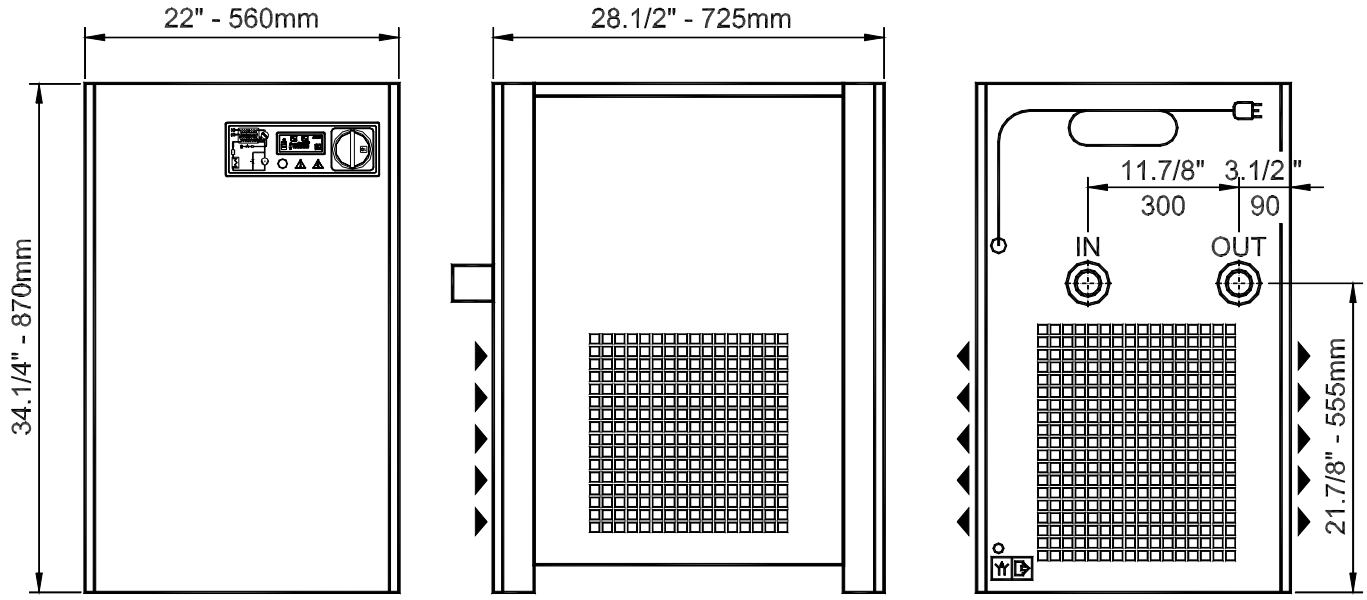
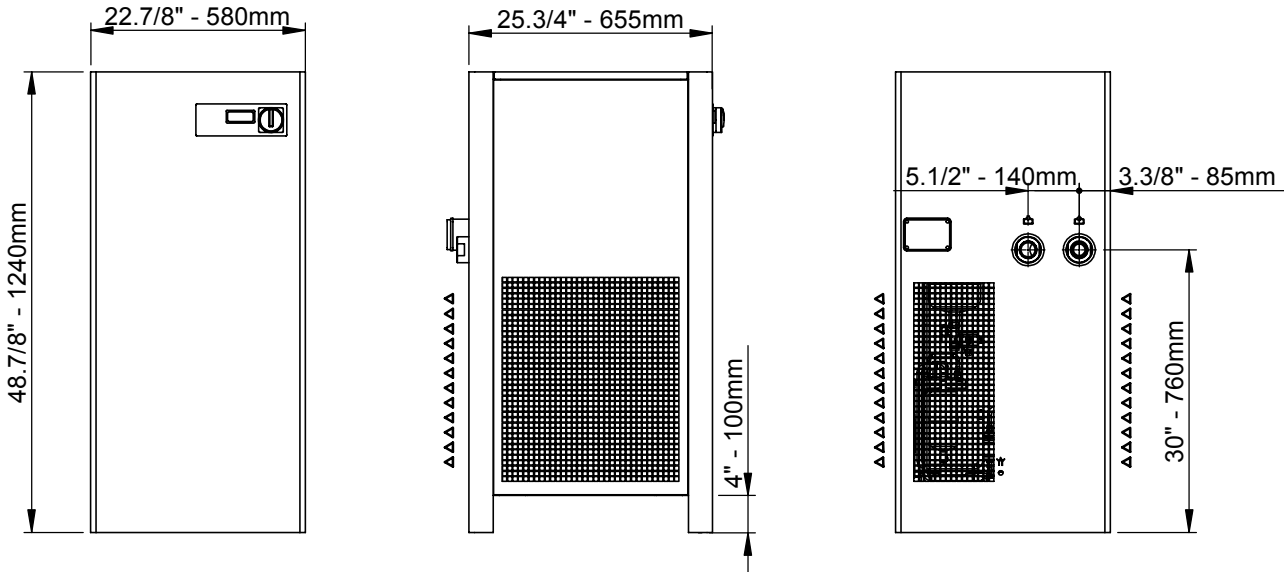


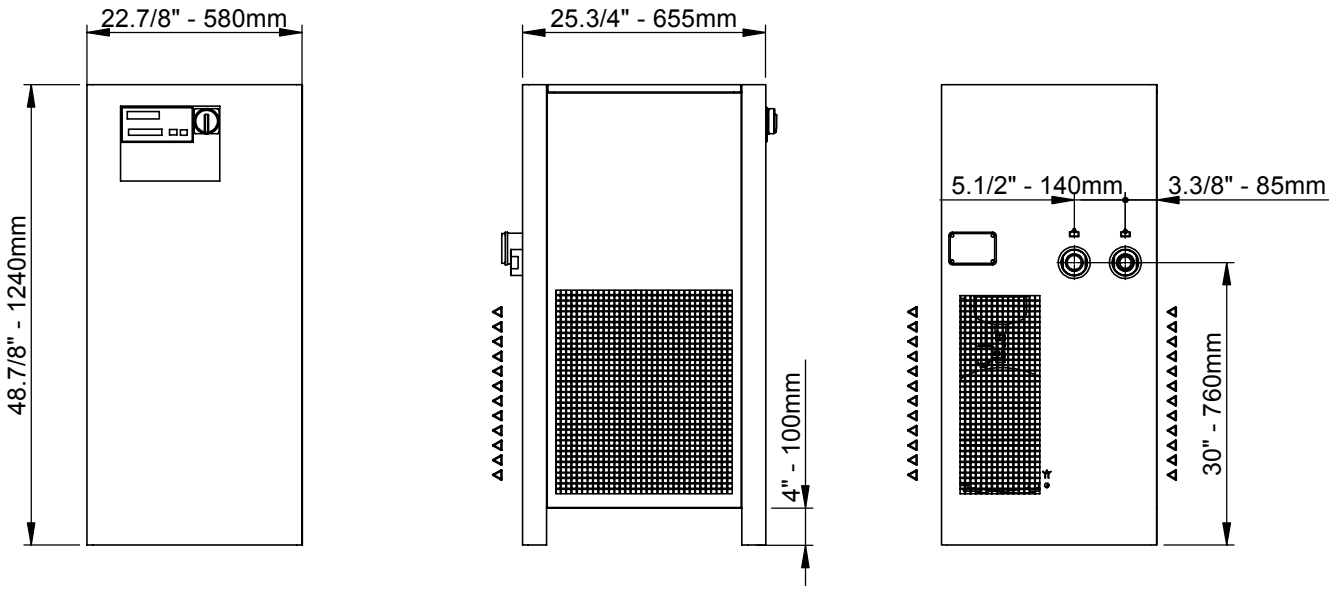
7.1.4 PLH 260-350



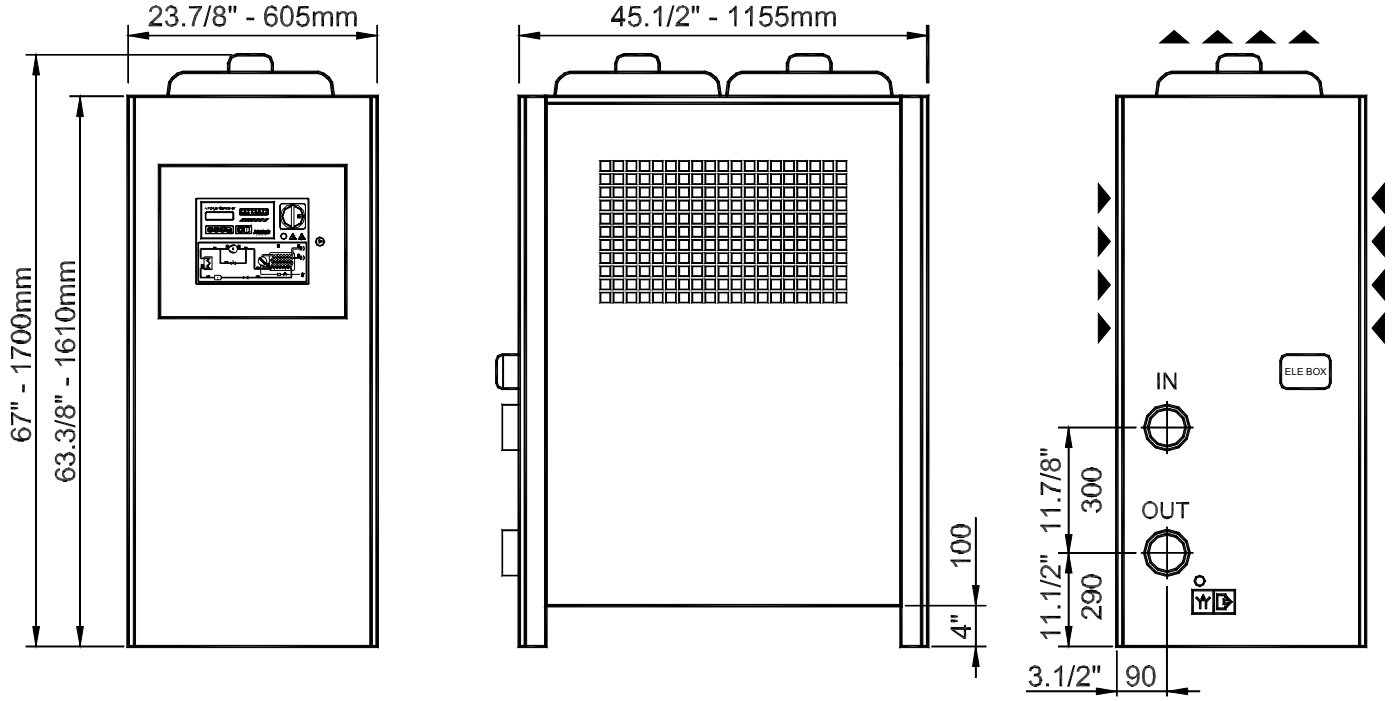
7.1.5 PLH 450



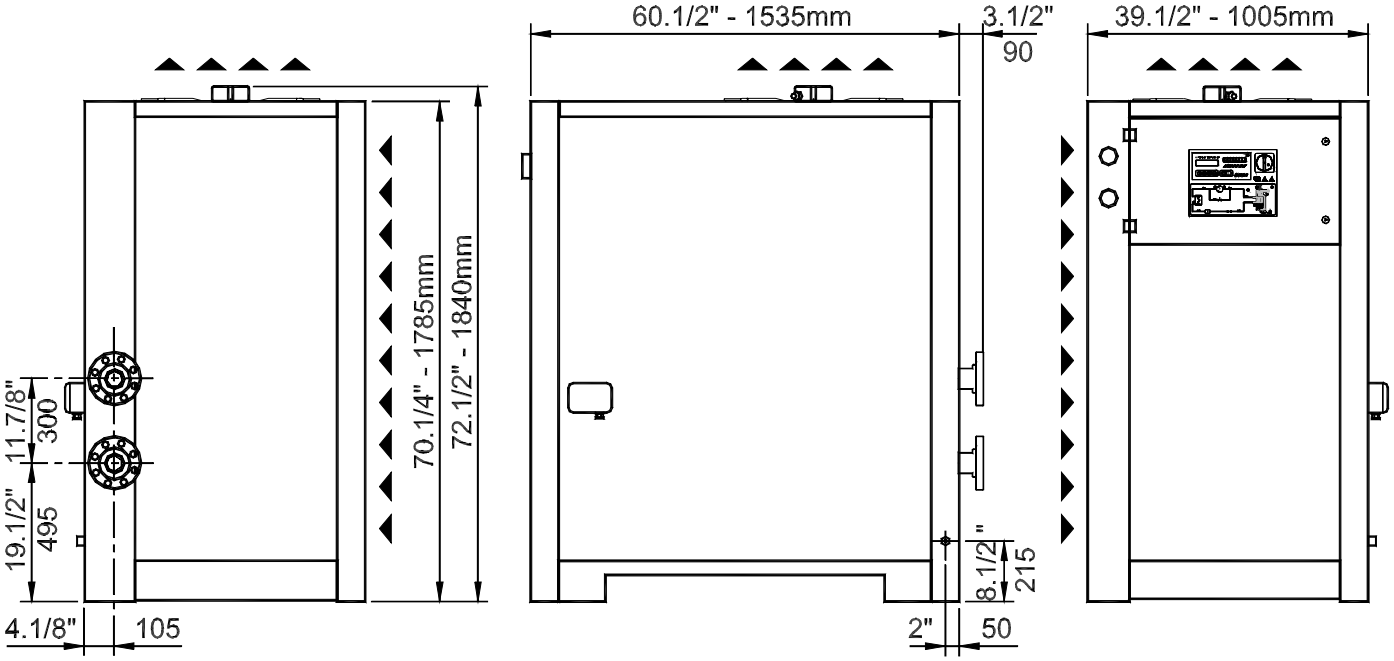
7.1.6 PLH 550



7.1.7 PLH 700-1100



7.1.8 PLH 2300-3000



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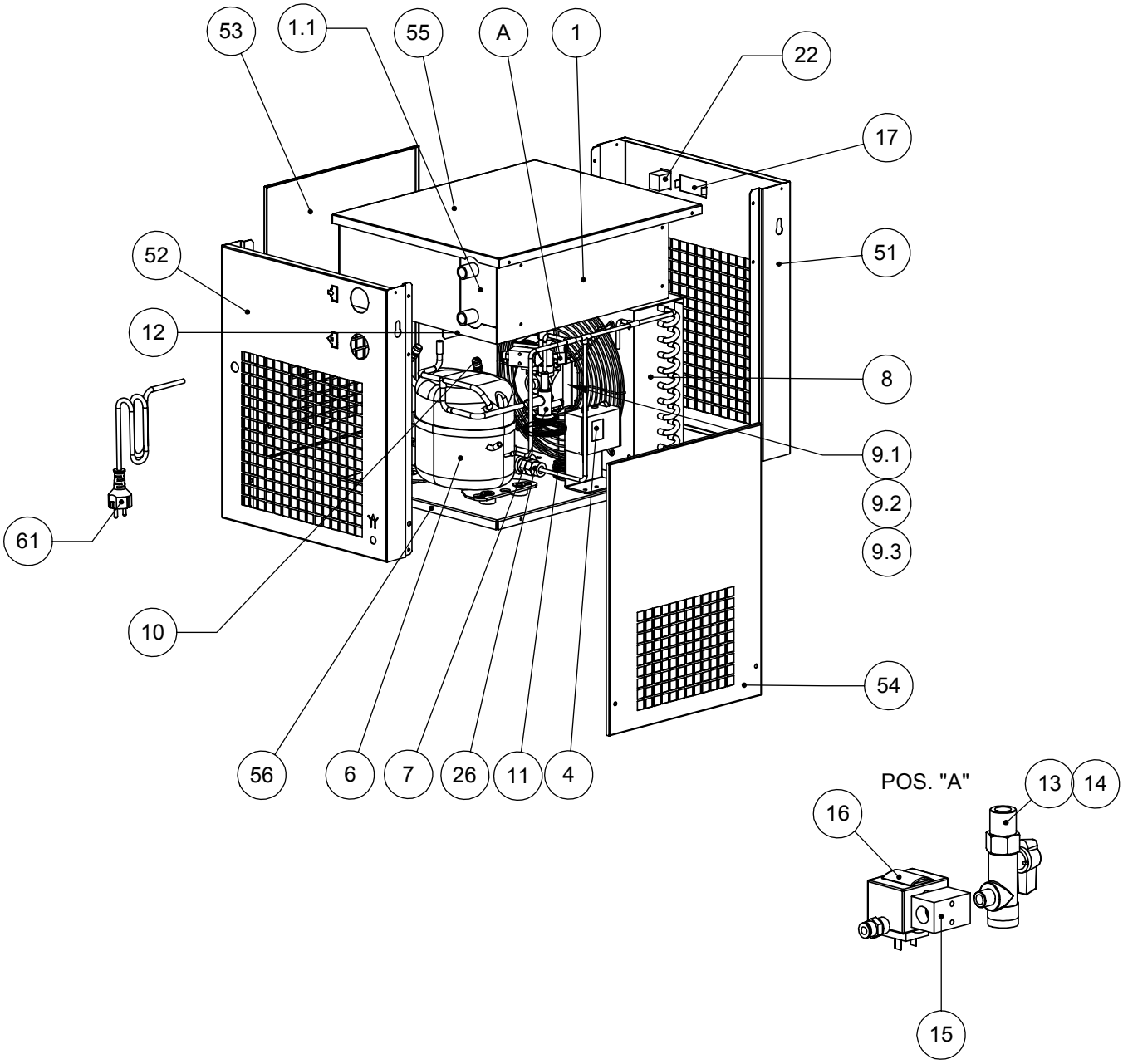
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9.1
9.2
9.3
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4
POS. "A"
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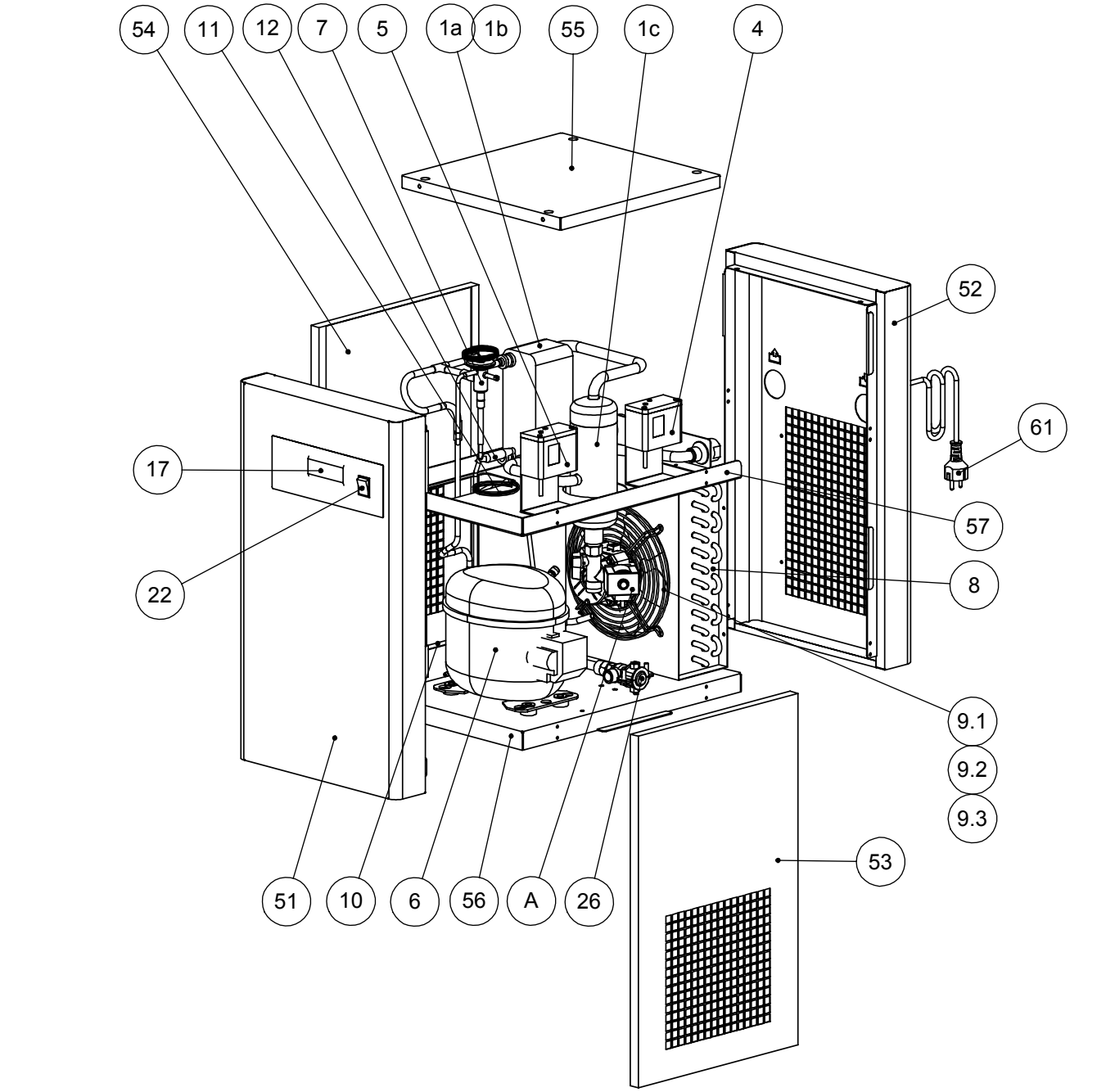
7.2.2 PLH 50-180



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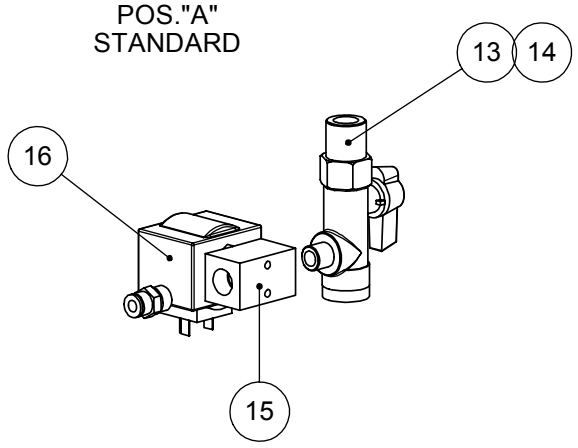

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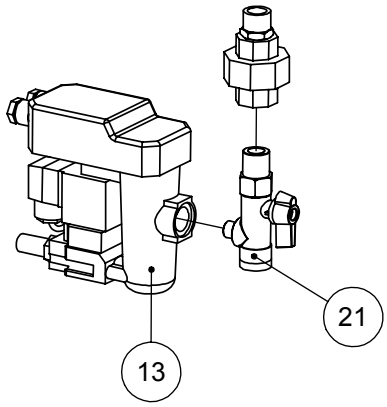

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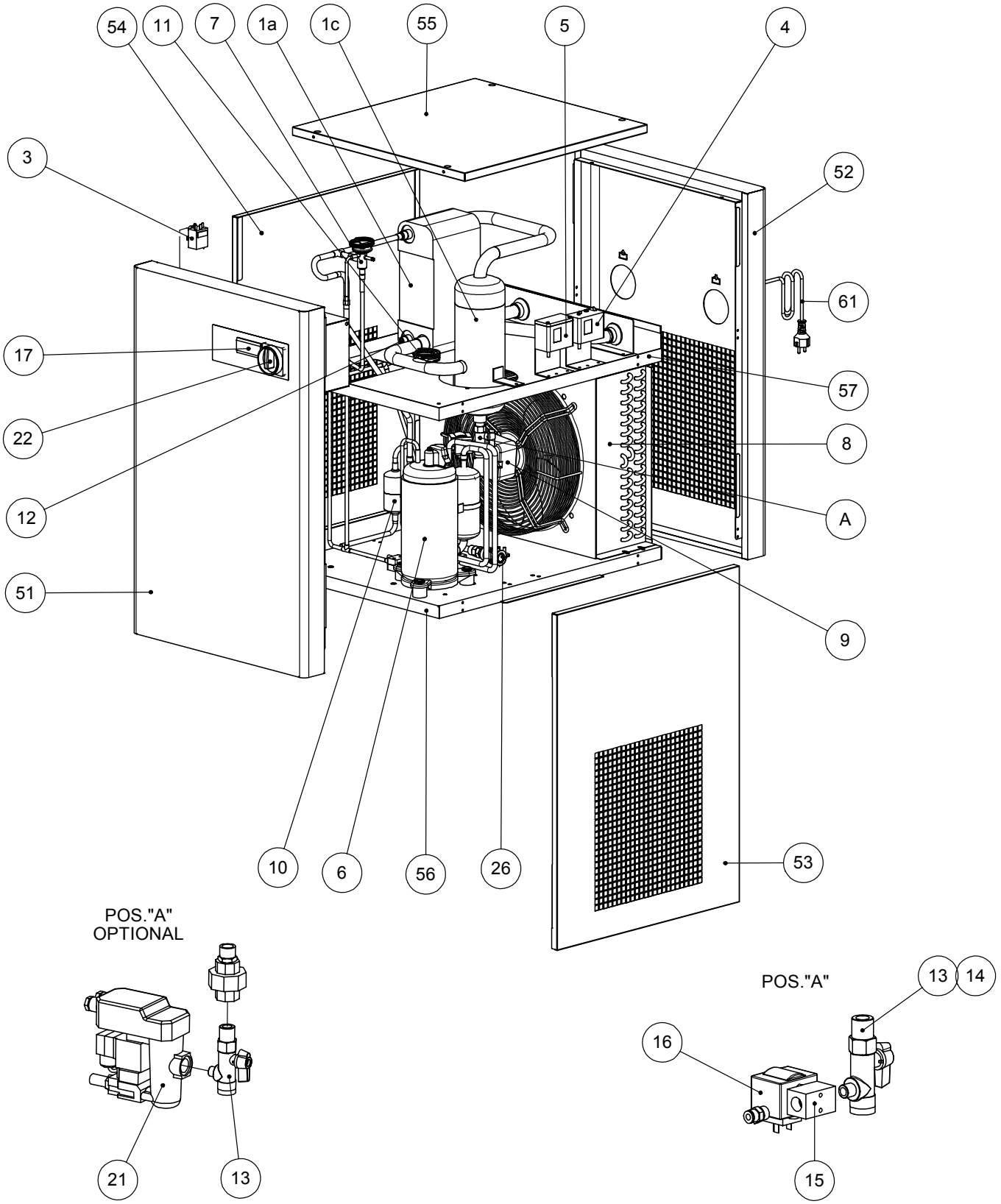
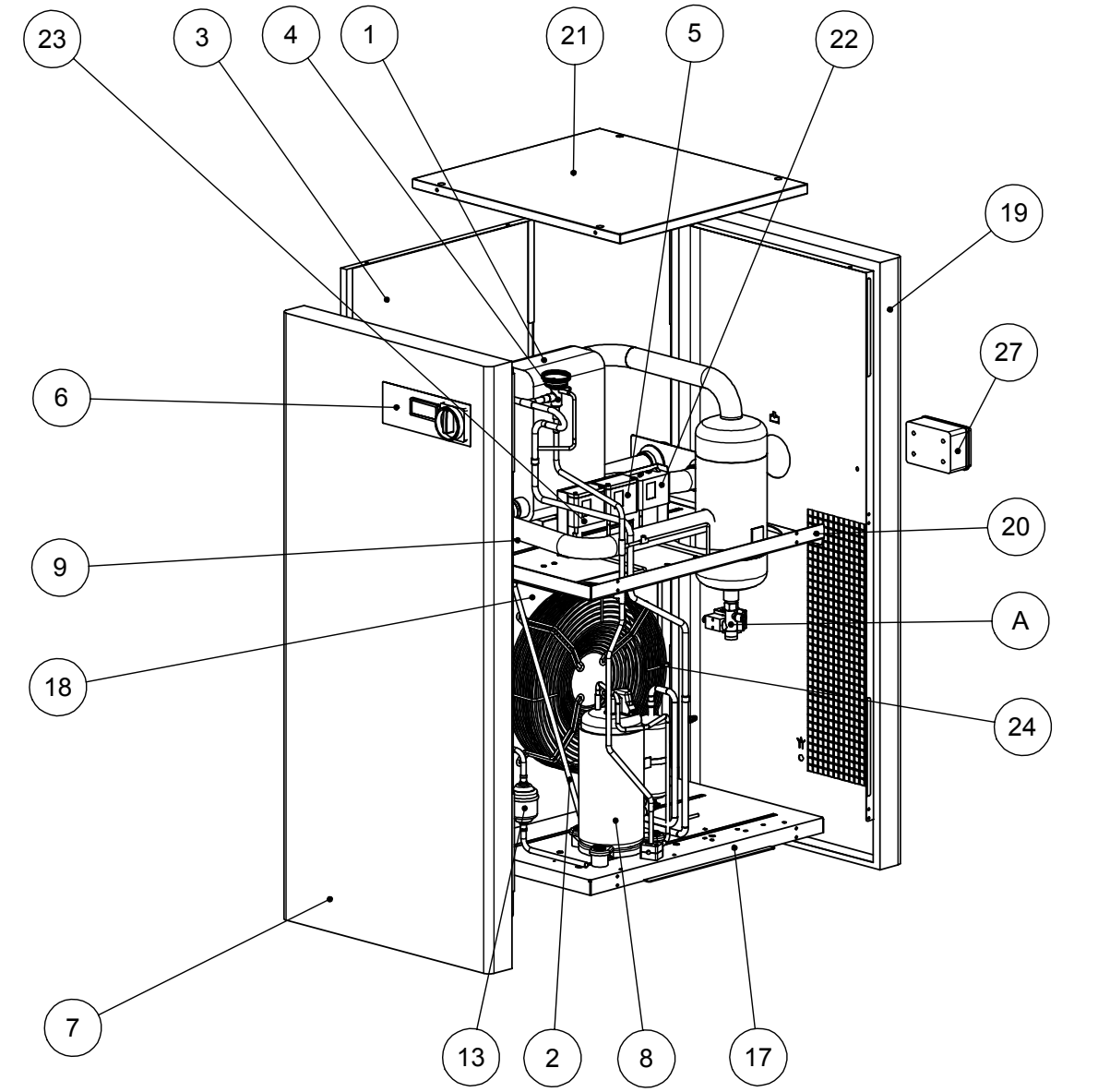


7.2.4 PLH 450



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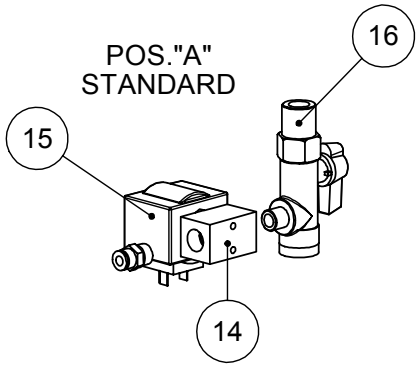

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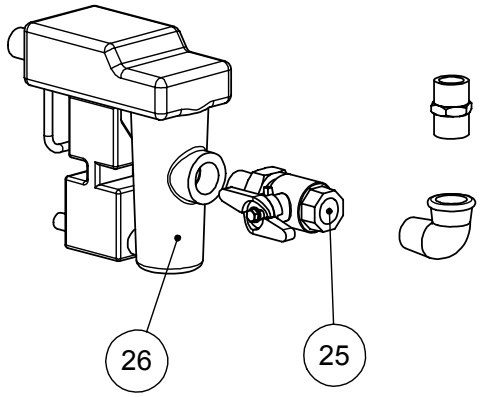
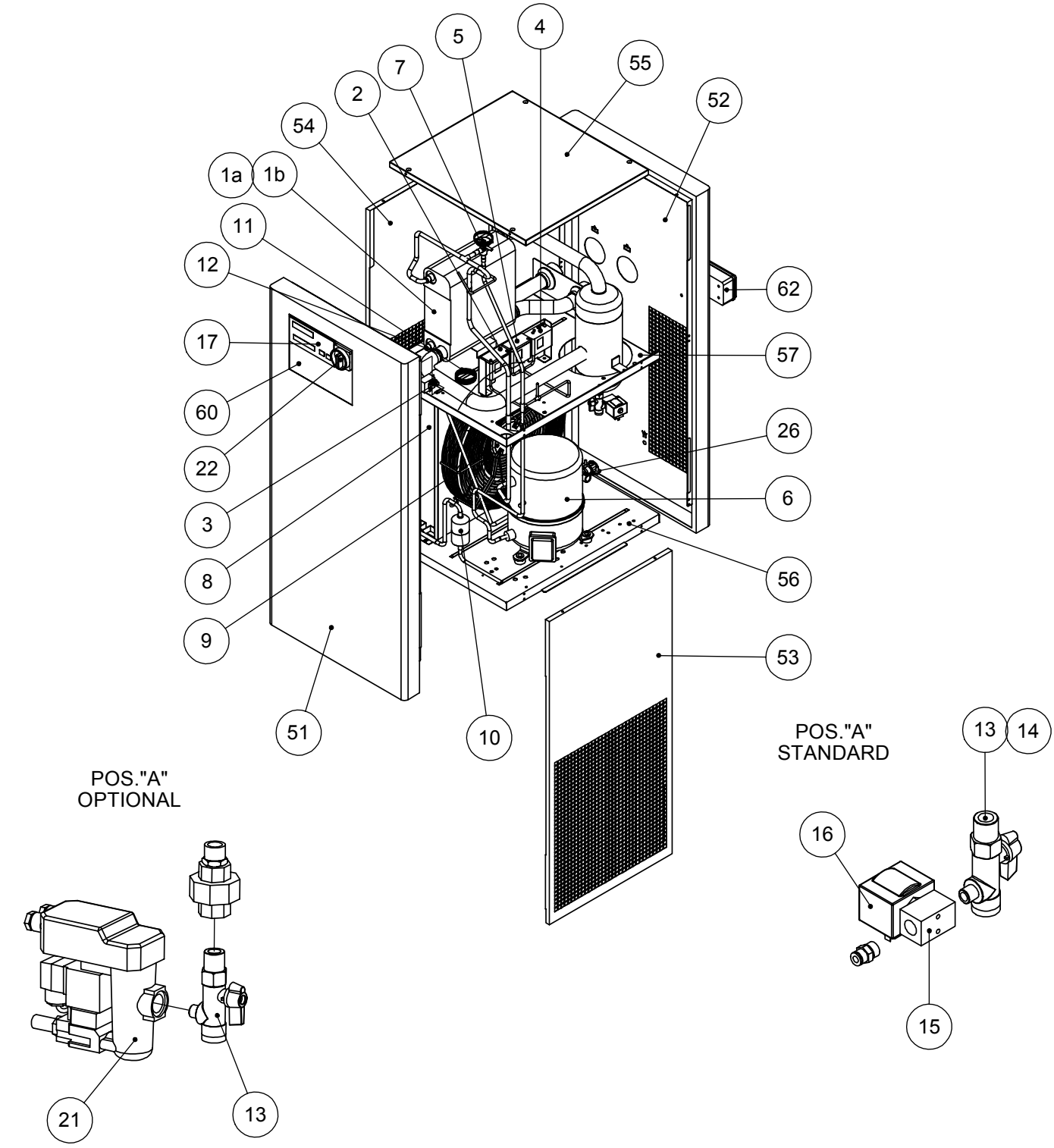


7.2.5 PLH 550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OPTIONAL
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13
POS."A"
STANDARD
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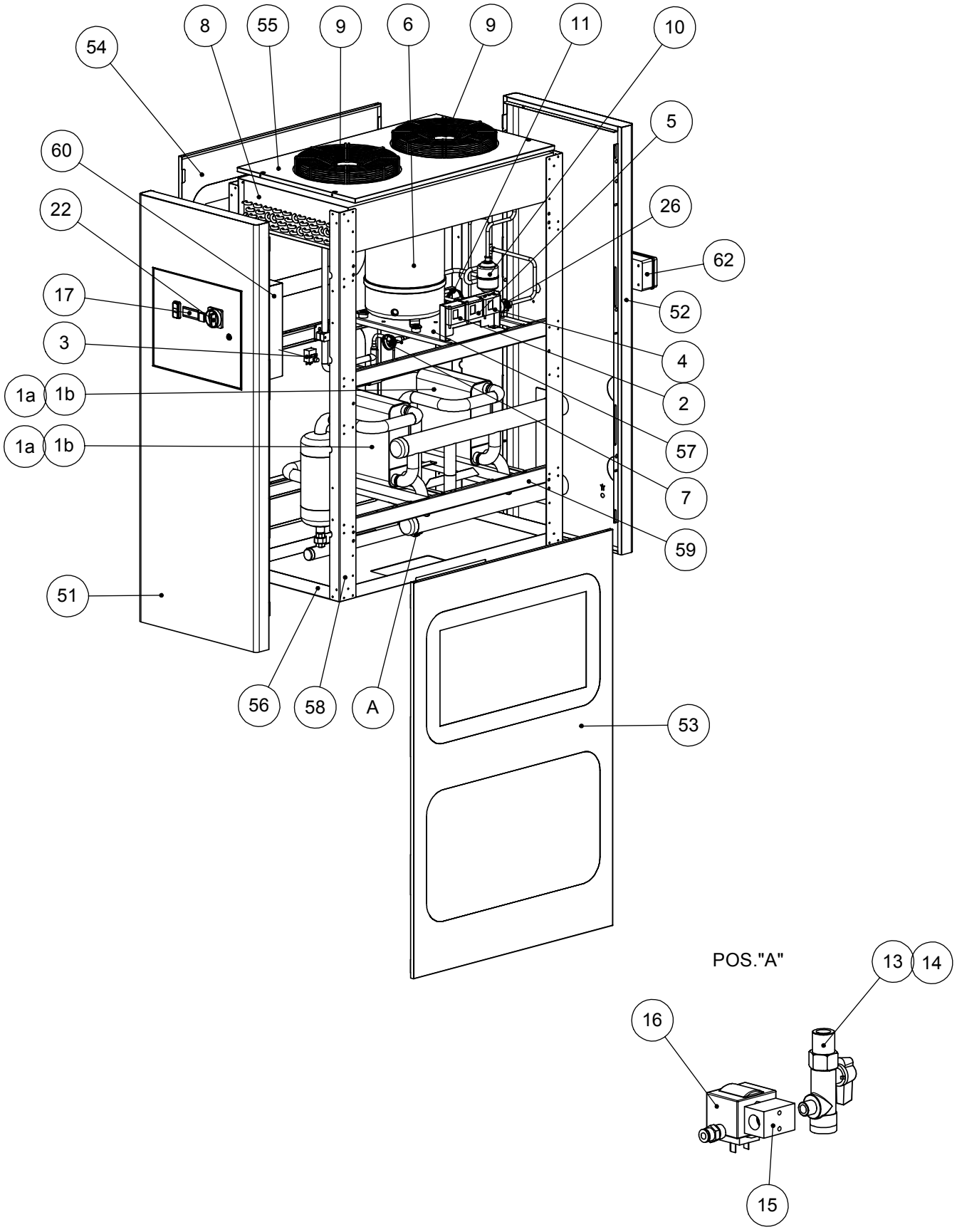
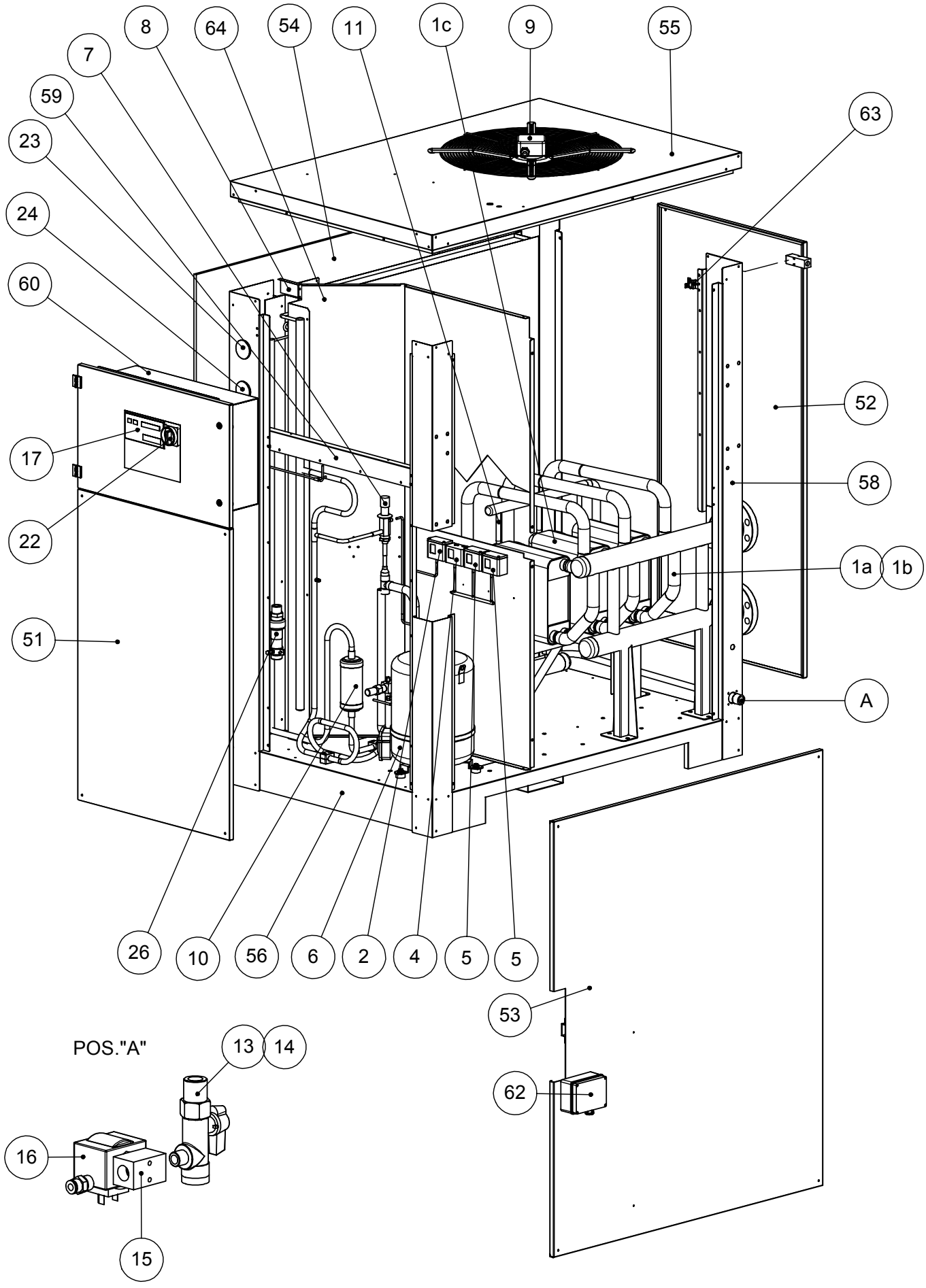
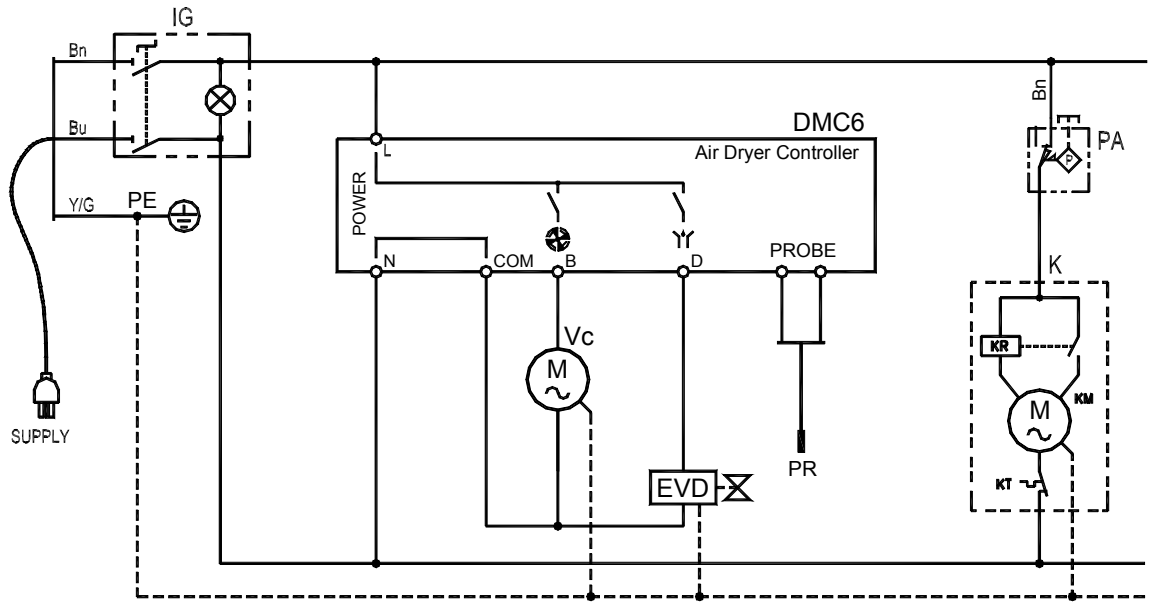
7.2.6 PLH 700-1100



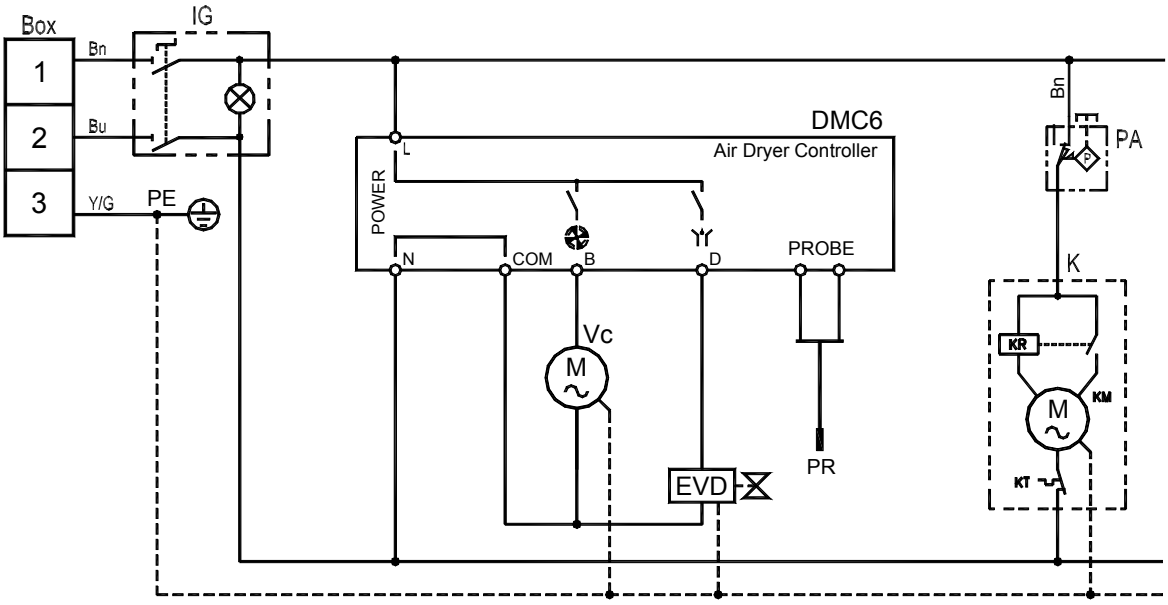
7.2.7 PLH 2300-3000



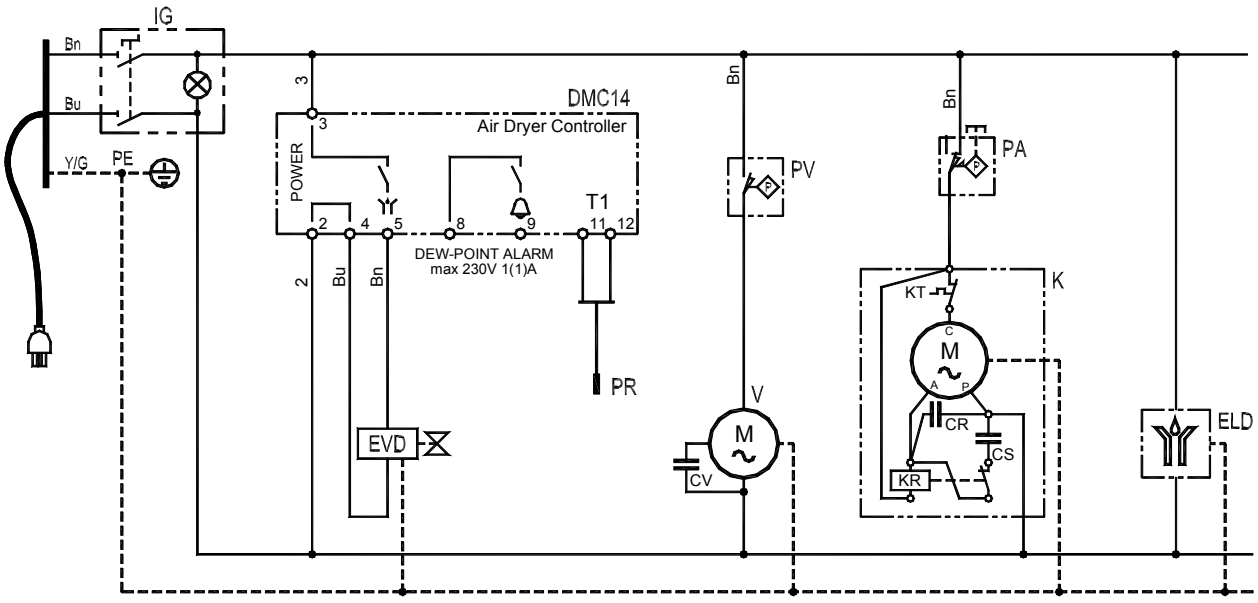
7.3.1 PLH 15-40 - DMC6 (-1) 115/1/60



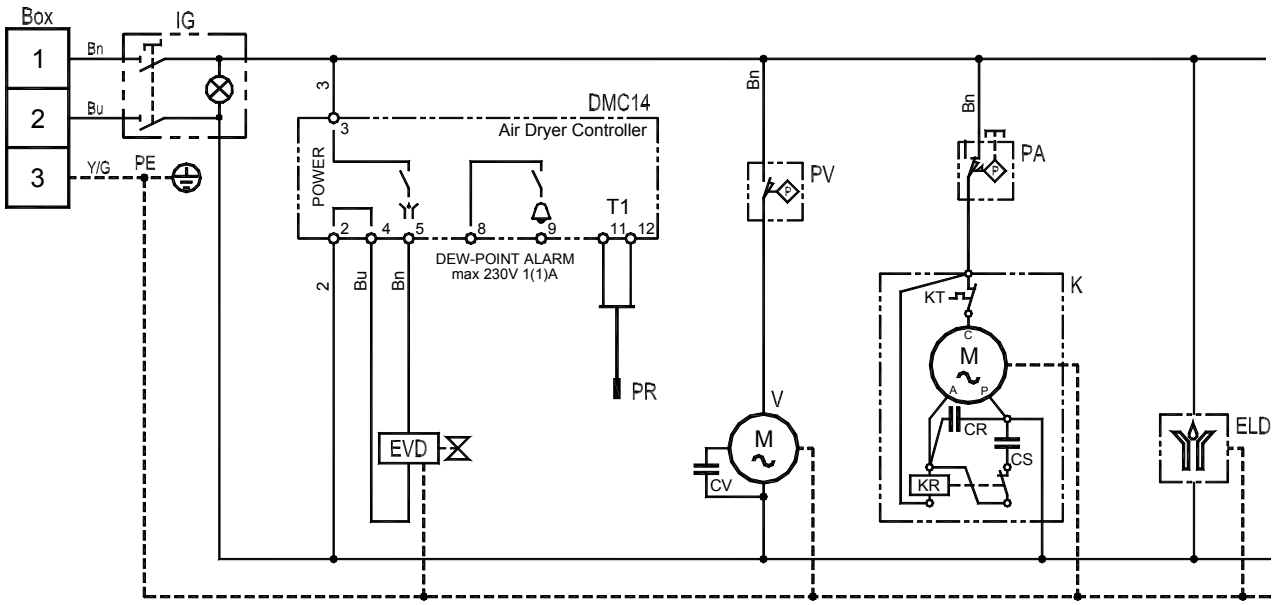
7.3.2 PLH 15-40 - DMC6 (-2) 230/1/60



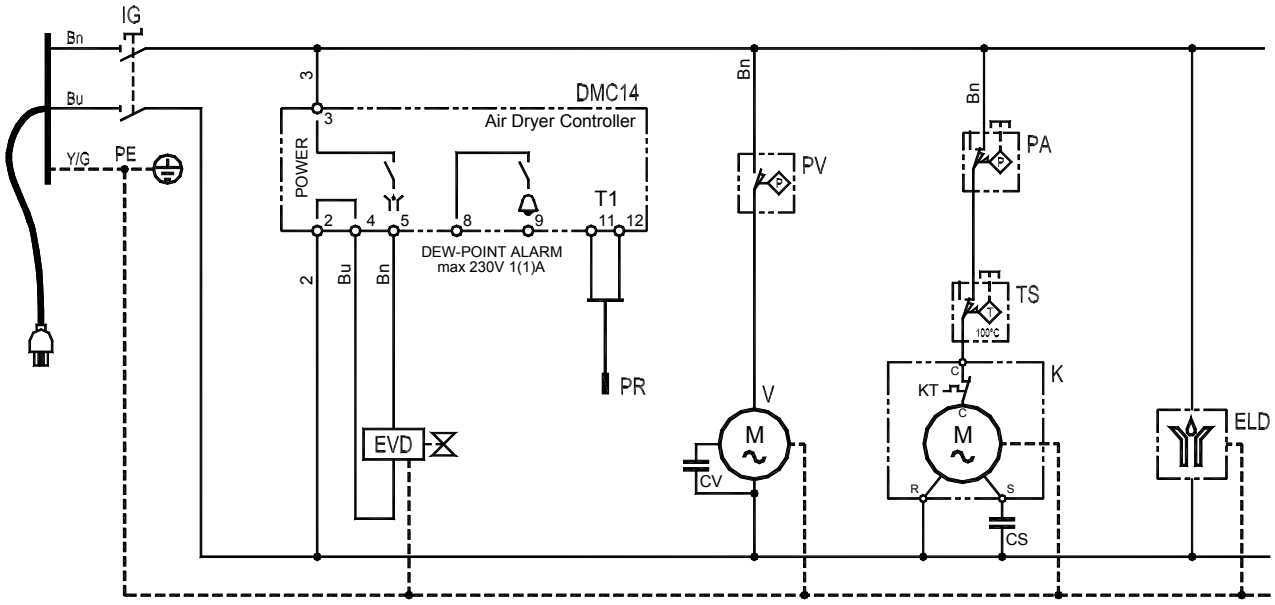
7.3.3 PLH 50-100 - DMC14 (-1) 115/1/60



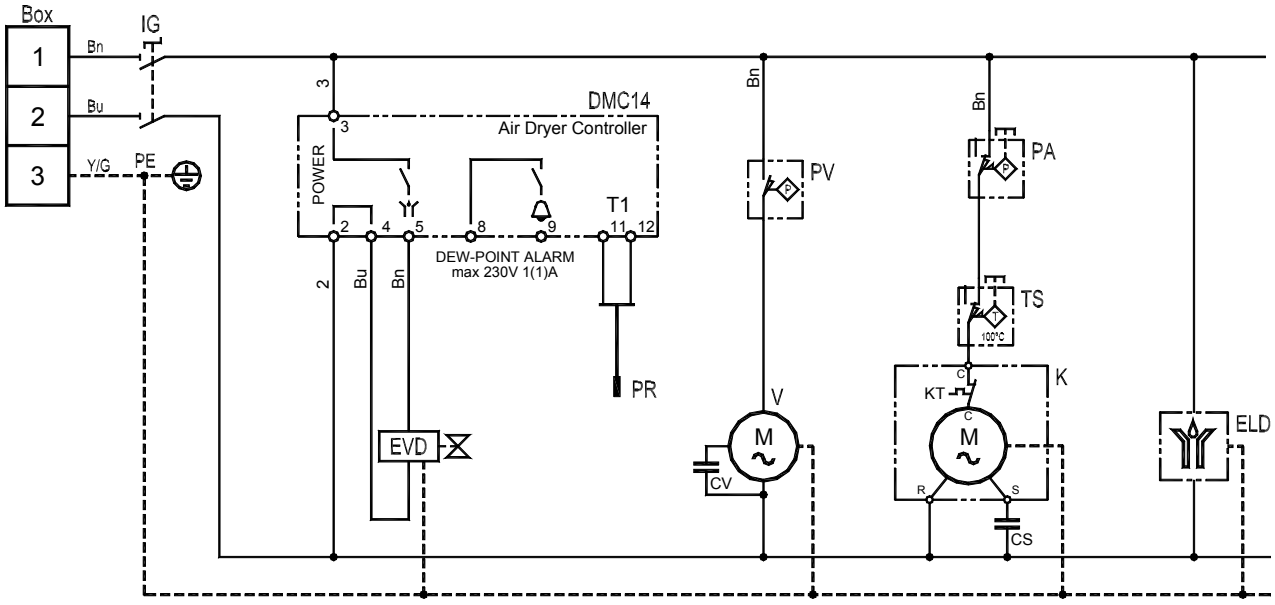
7.3.4 PLH 50-100 - DMC14 (-2) 230/1/60



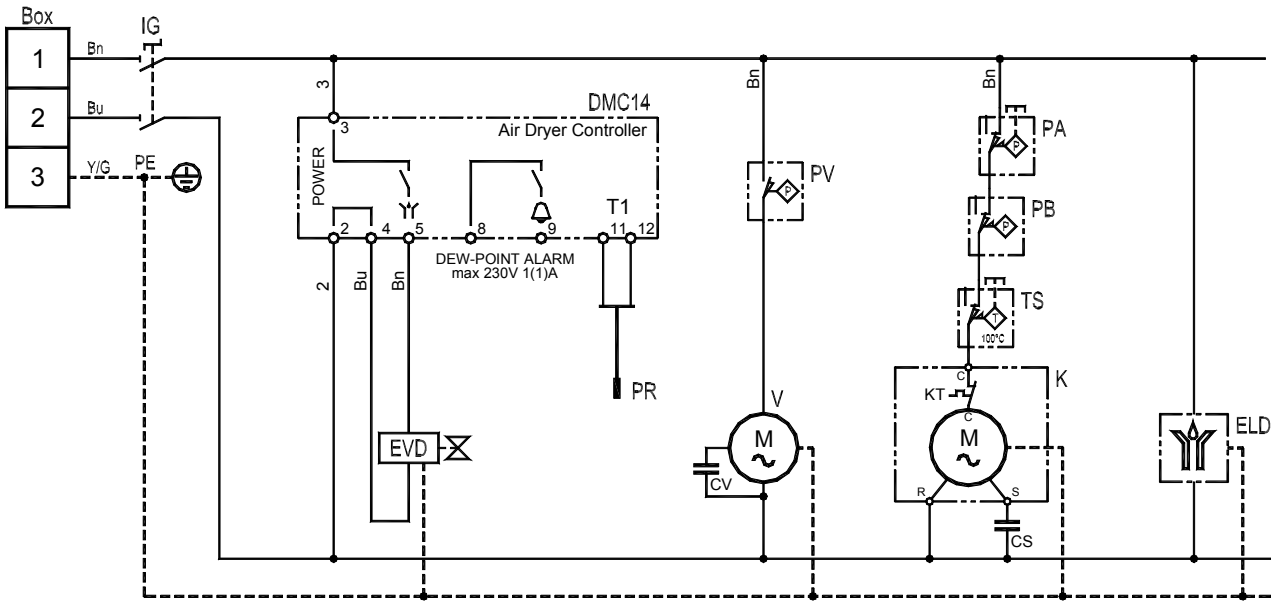
7.3.5 PLH 140-180 - DMC14 (-1) 115/1/60



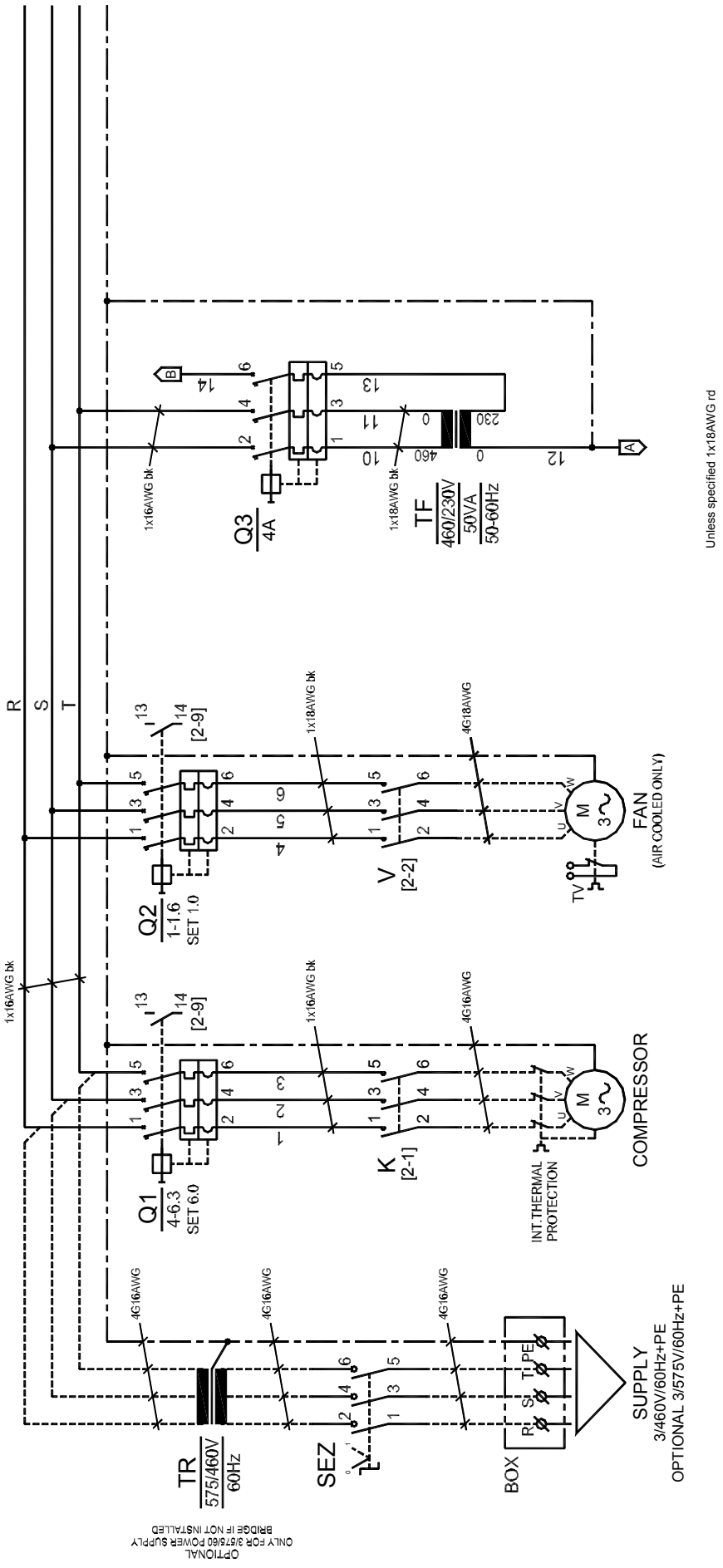
7.3.6 PLH 140-350 - DMC14 (-2) 230/1/60



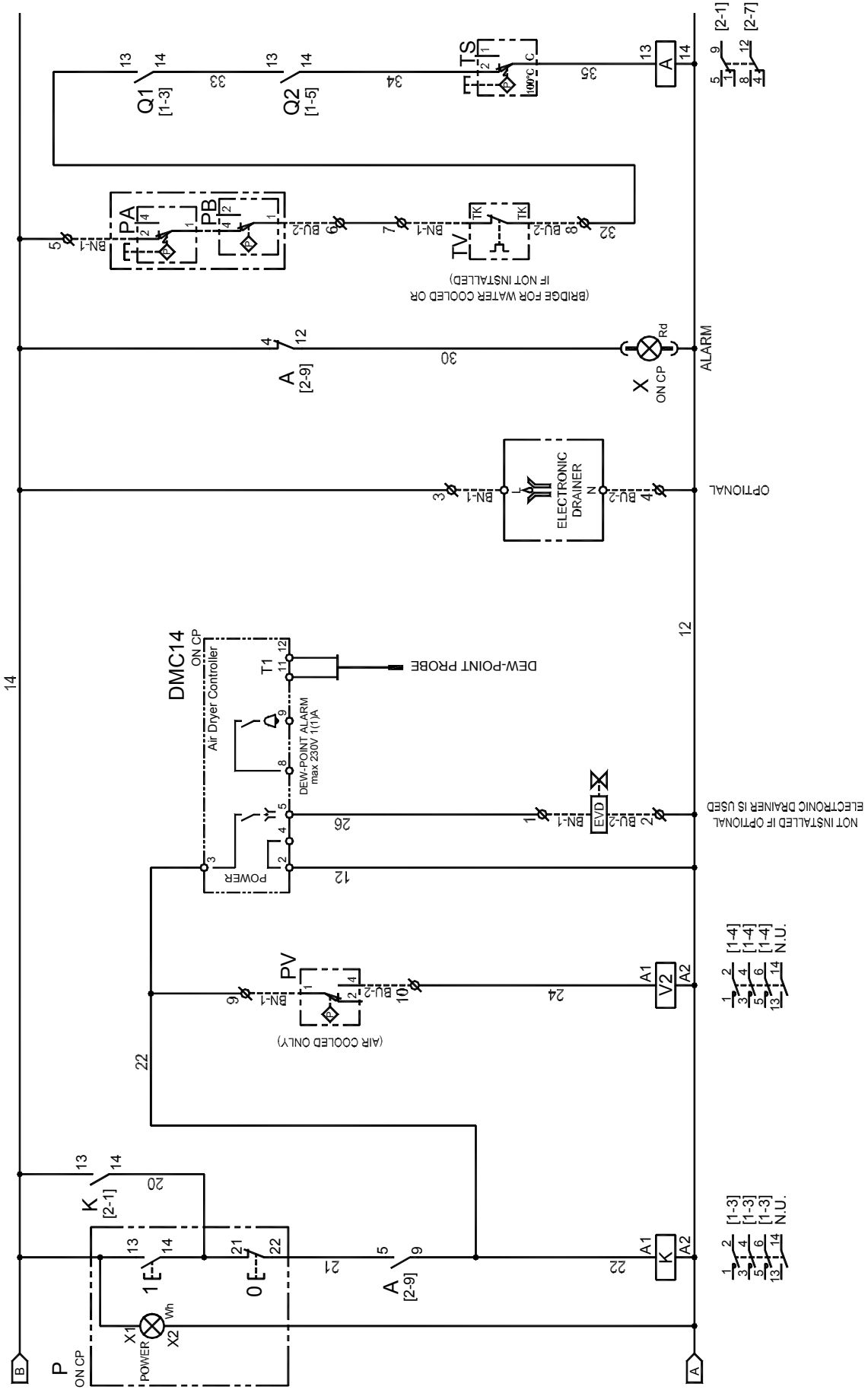
7.3.7 PLH 450 - DMC14 (-2) 230/1/60



7.3.8 PLH 550 - DMC14 (-4) 460/3/60



7.3.9 PLH 550 - DMC14 (-4) 460/3/60



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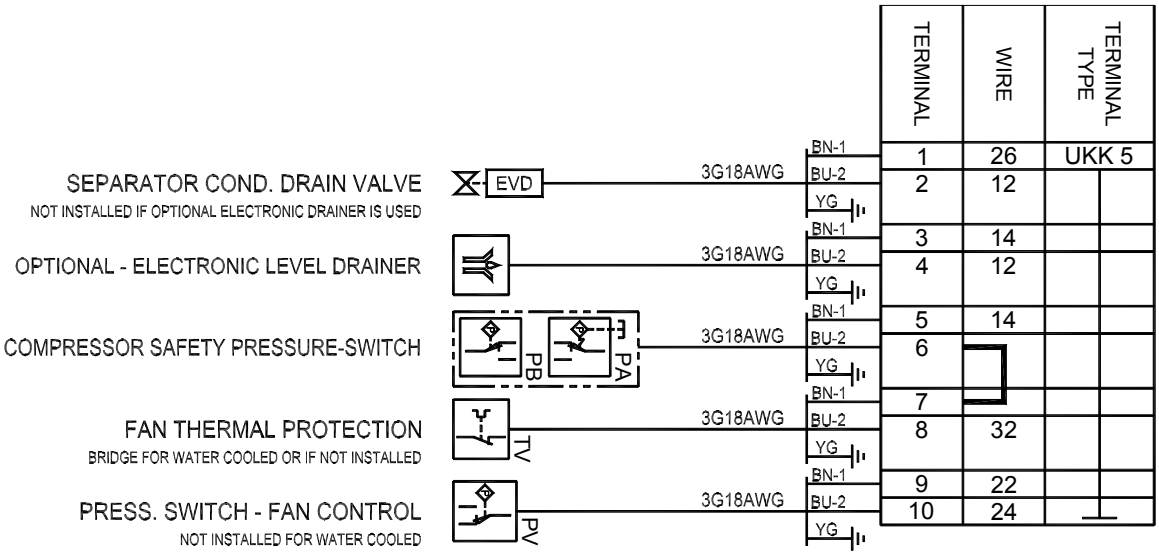
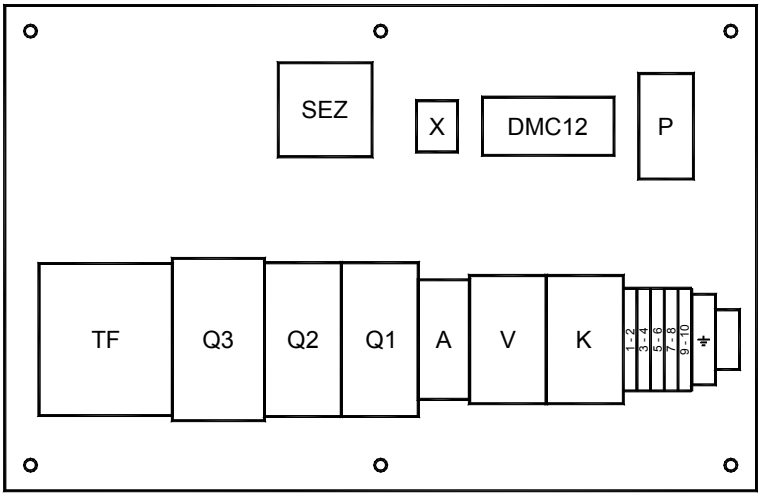
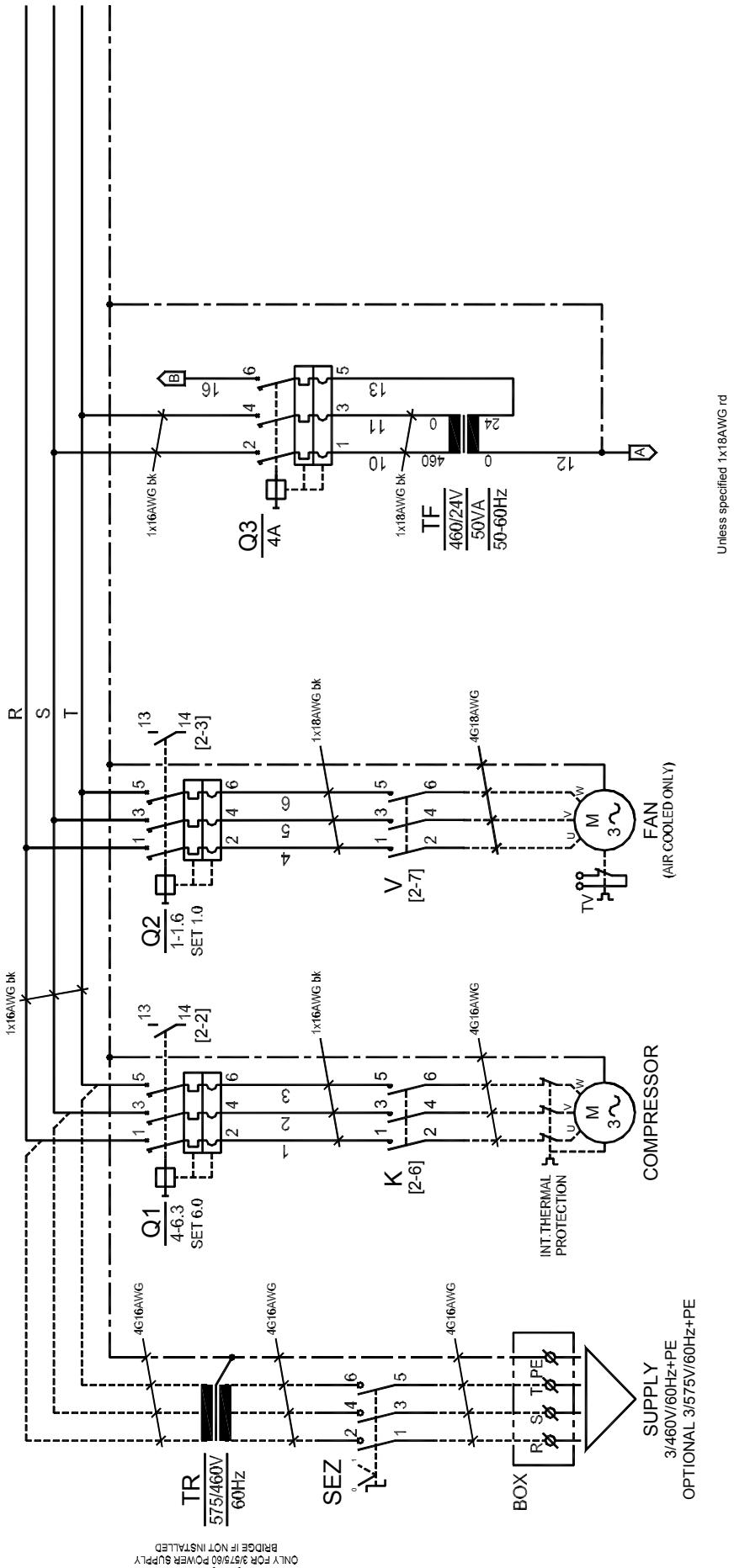


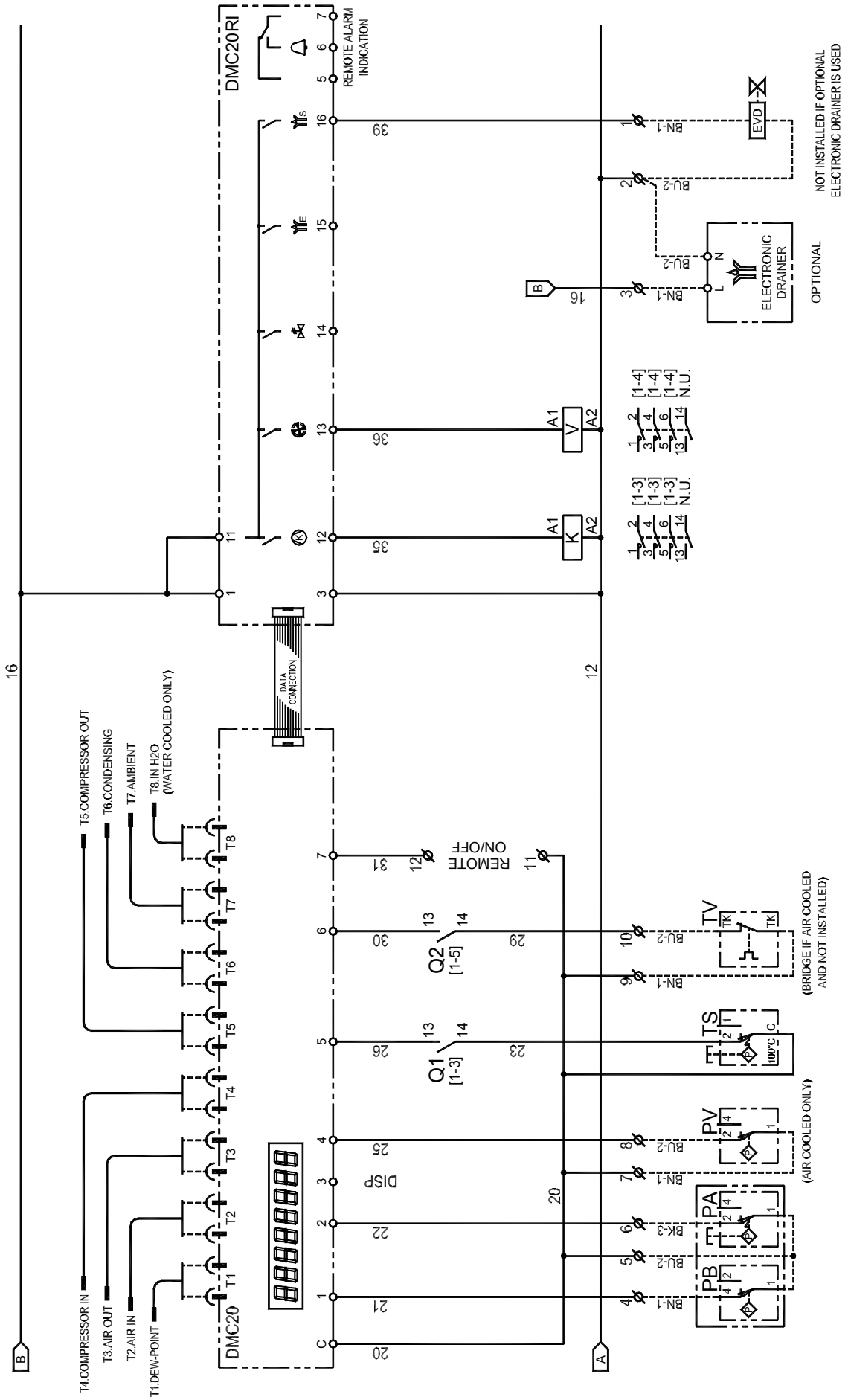


MOUNTING PLATE

7.3.11 PLH 550 - DMC20 (-4) 460/3/60



7.3.12 PLH 550 - DMC20 (-4) 460/3/60



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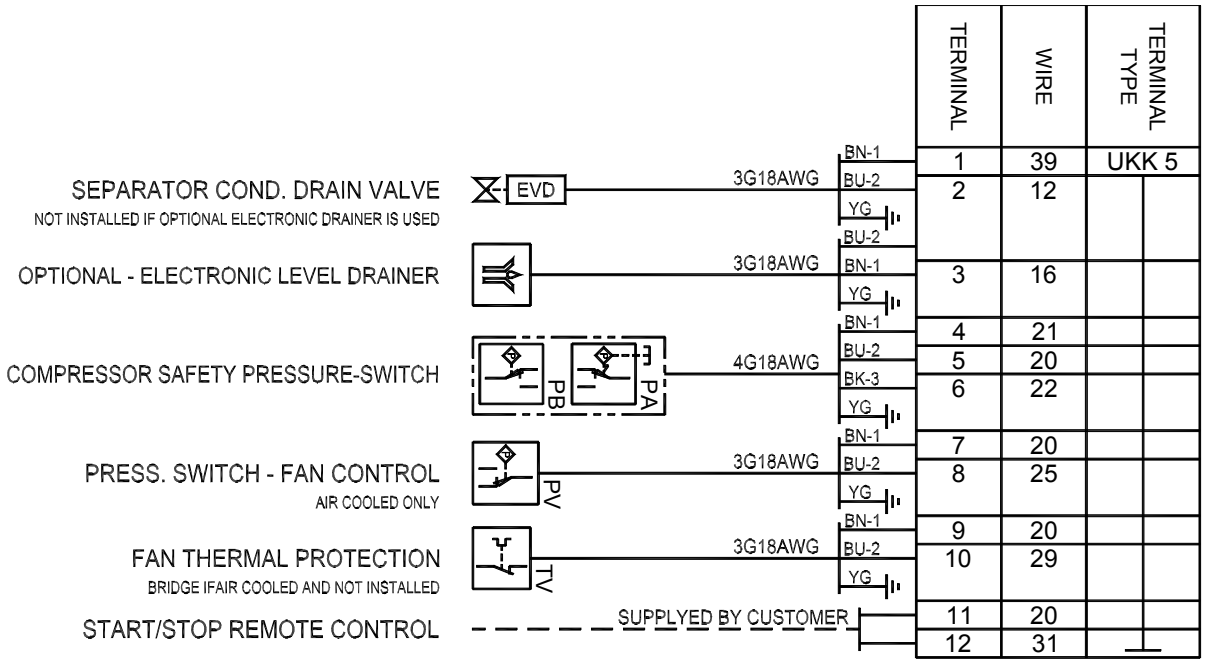

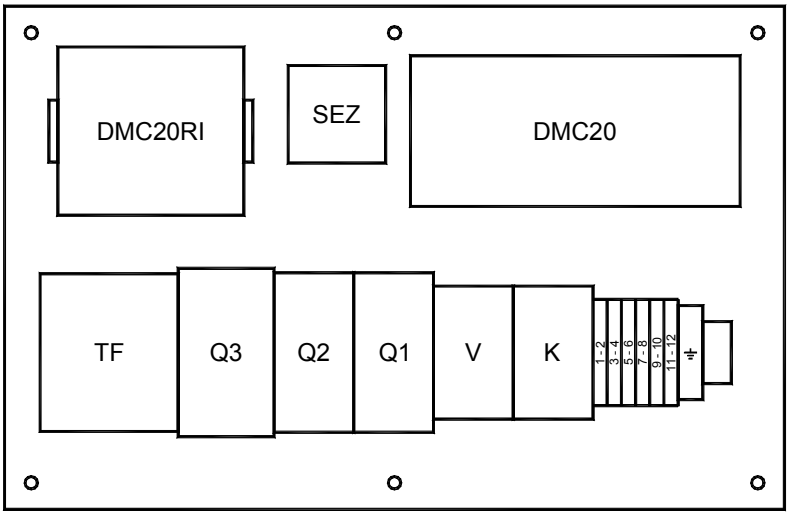

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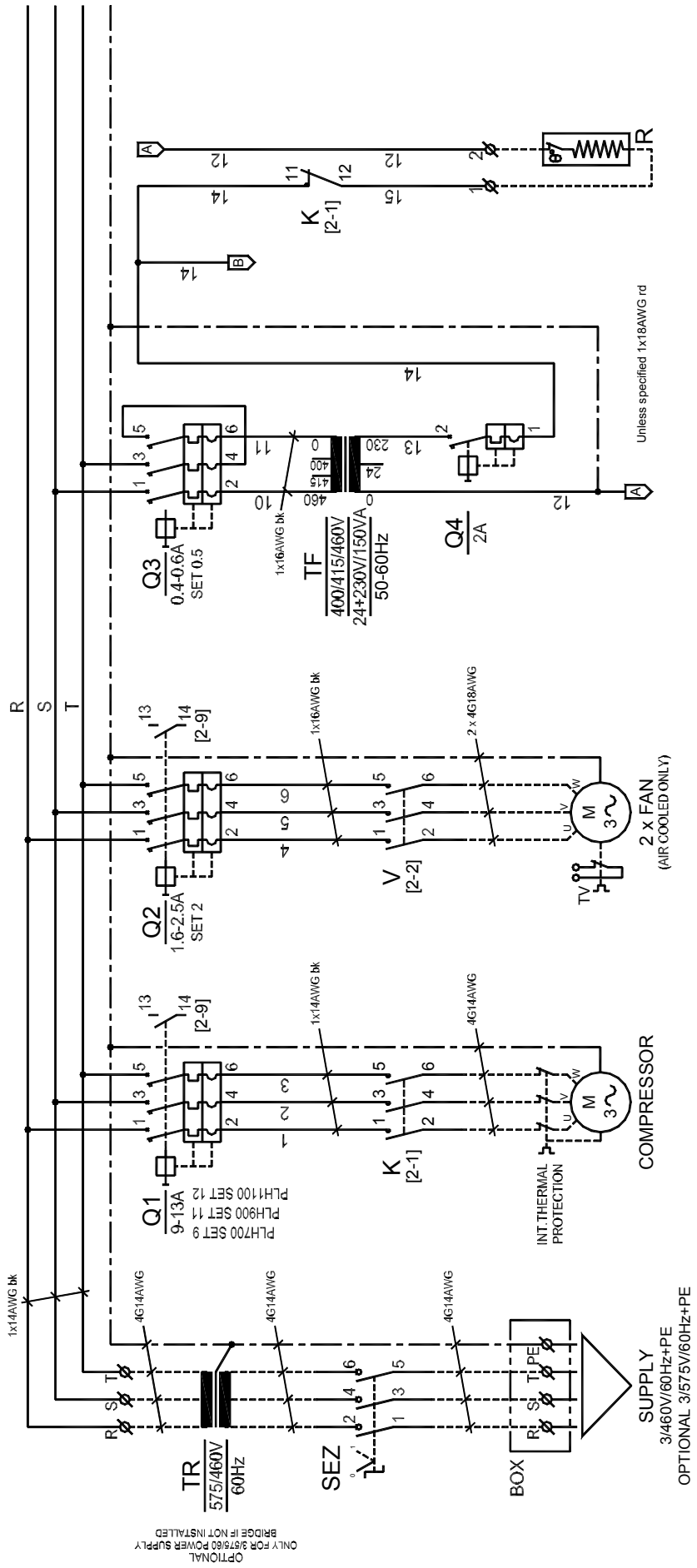
7.3.14 PLH 700-1100 - DMC14 (-4) 460/3/60



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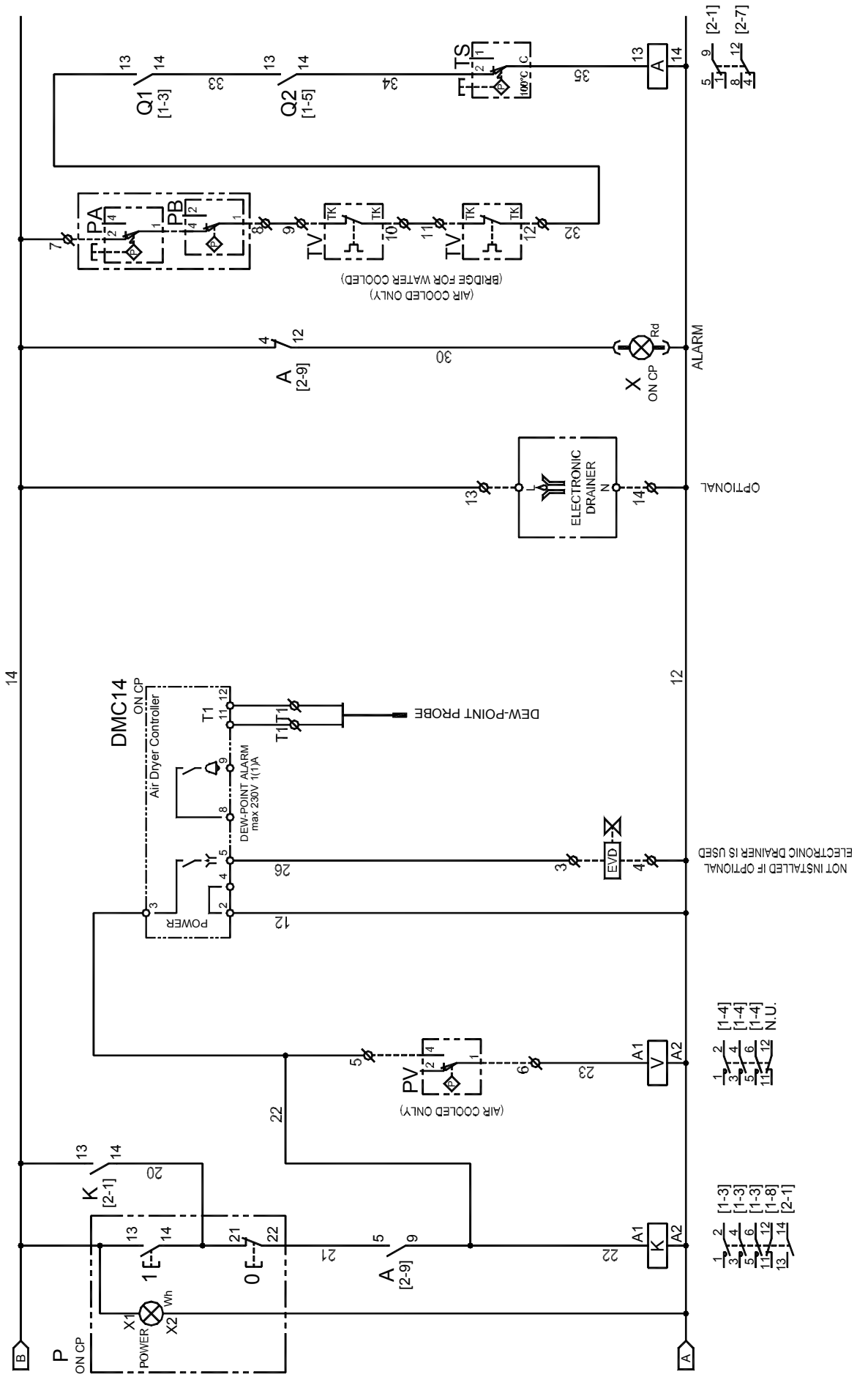

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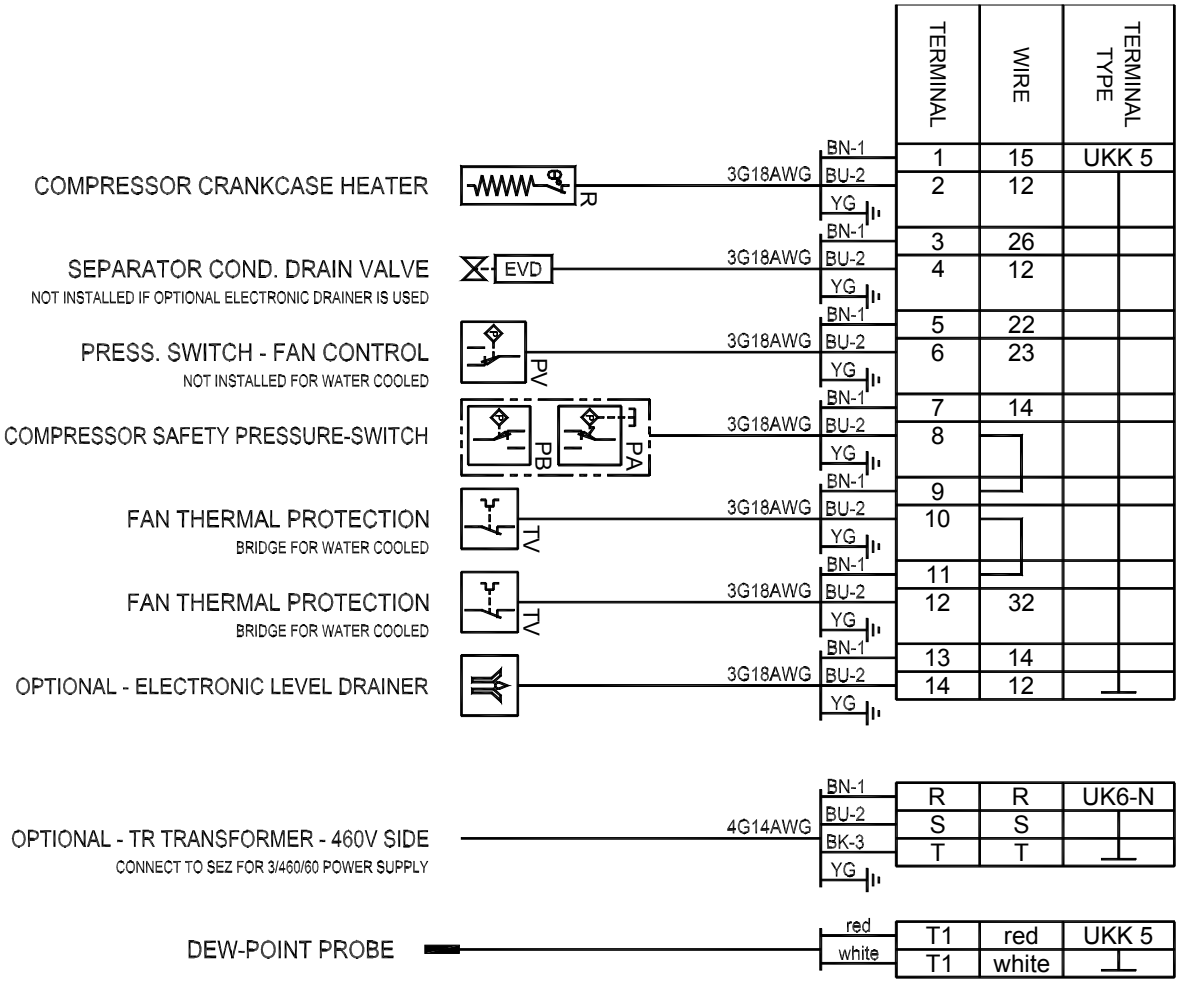

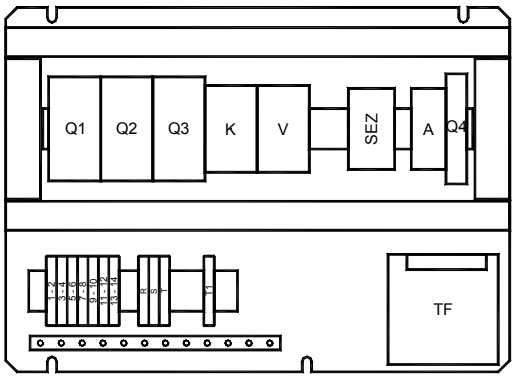

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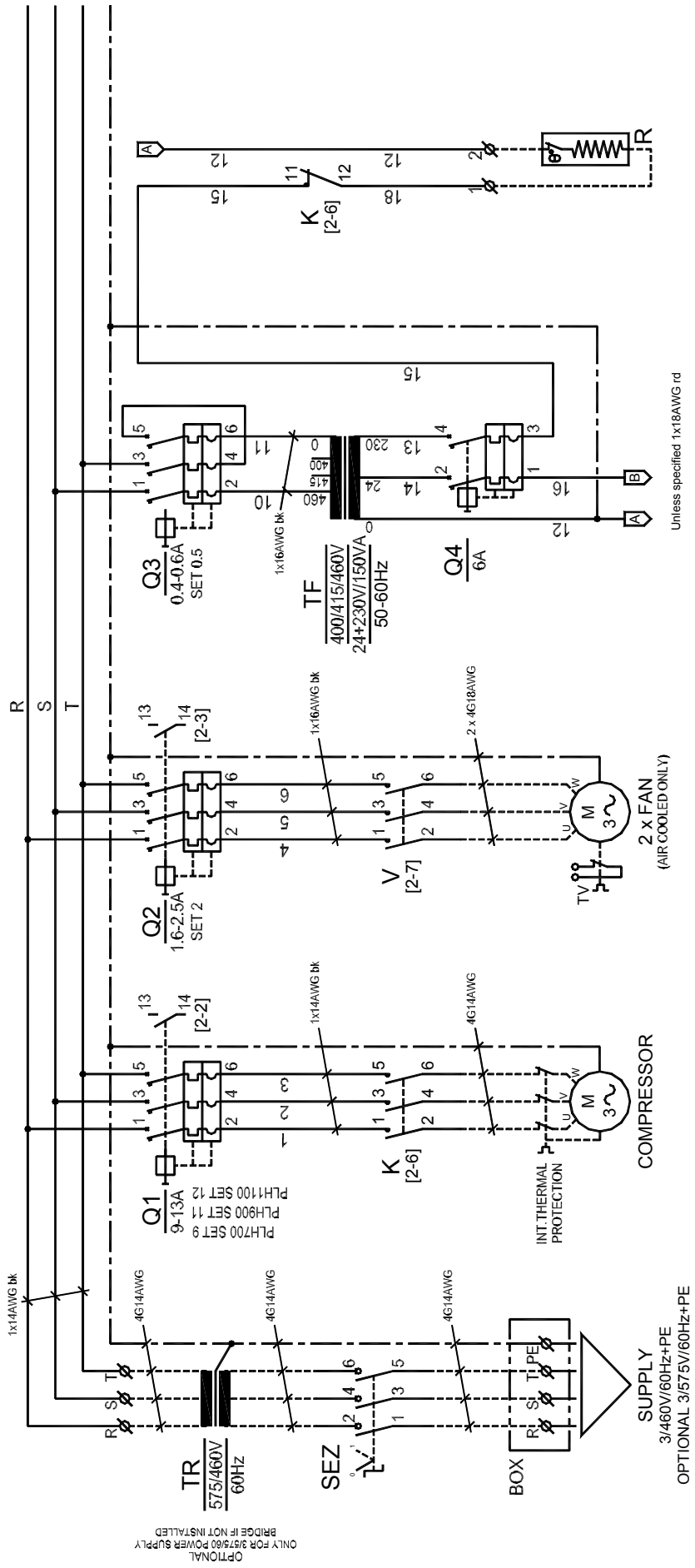
7.3.17 PLH 700-1100 - DMC20 (-4) 460/3/60



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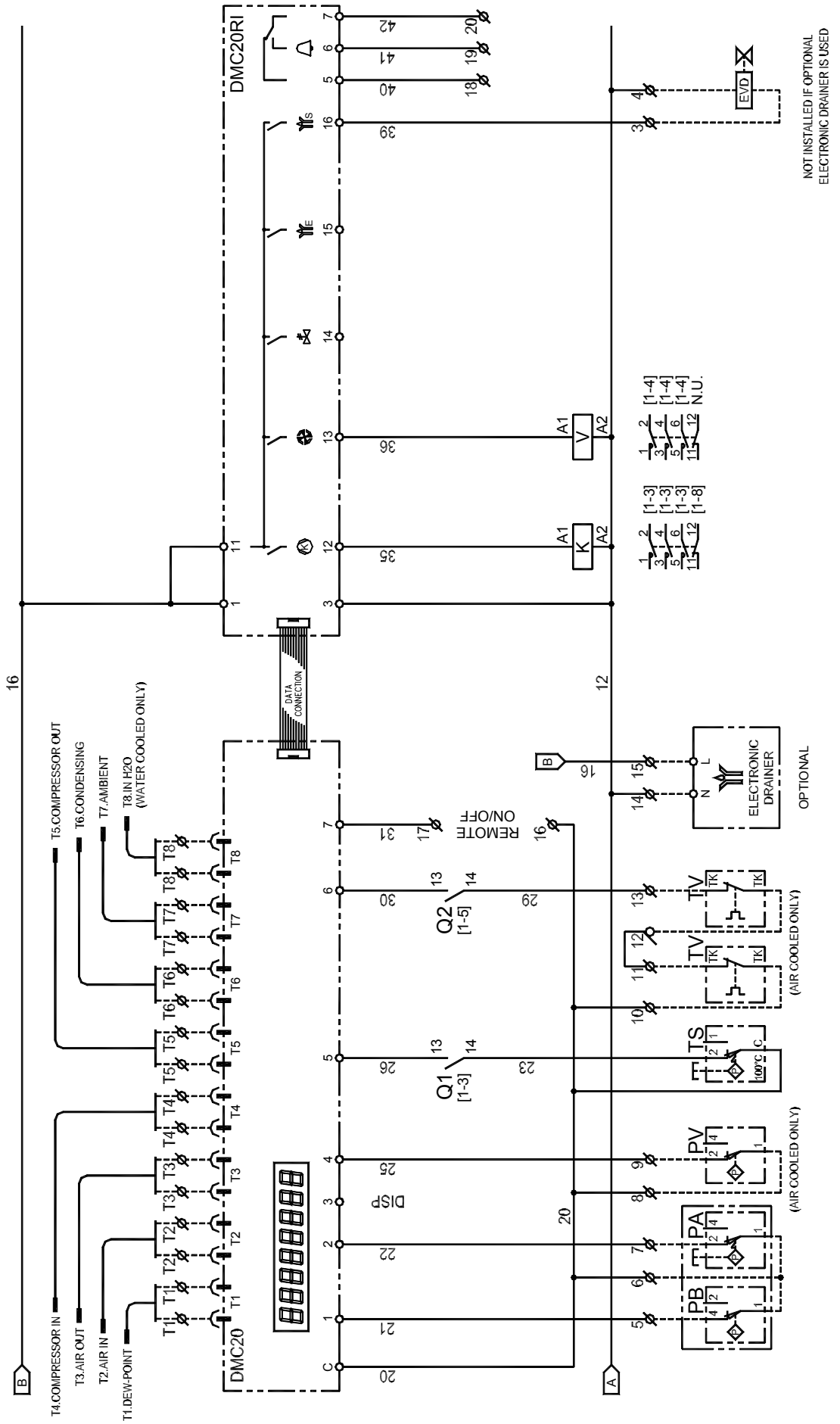
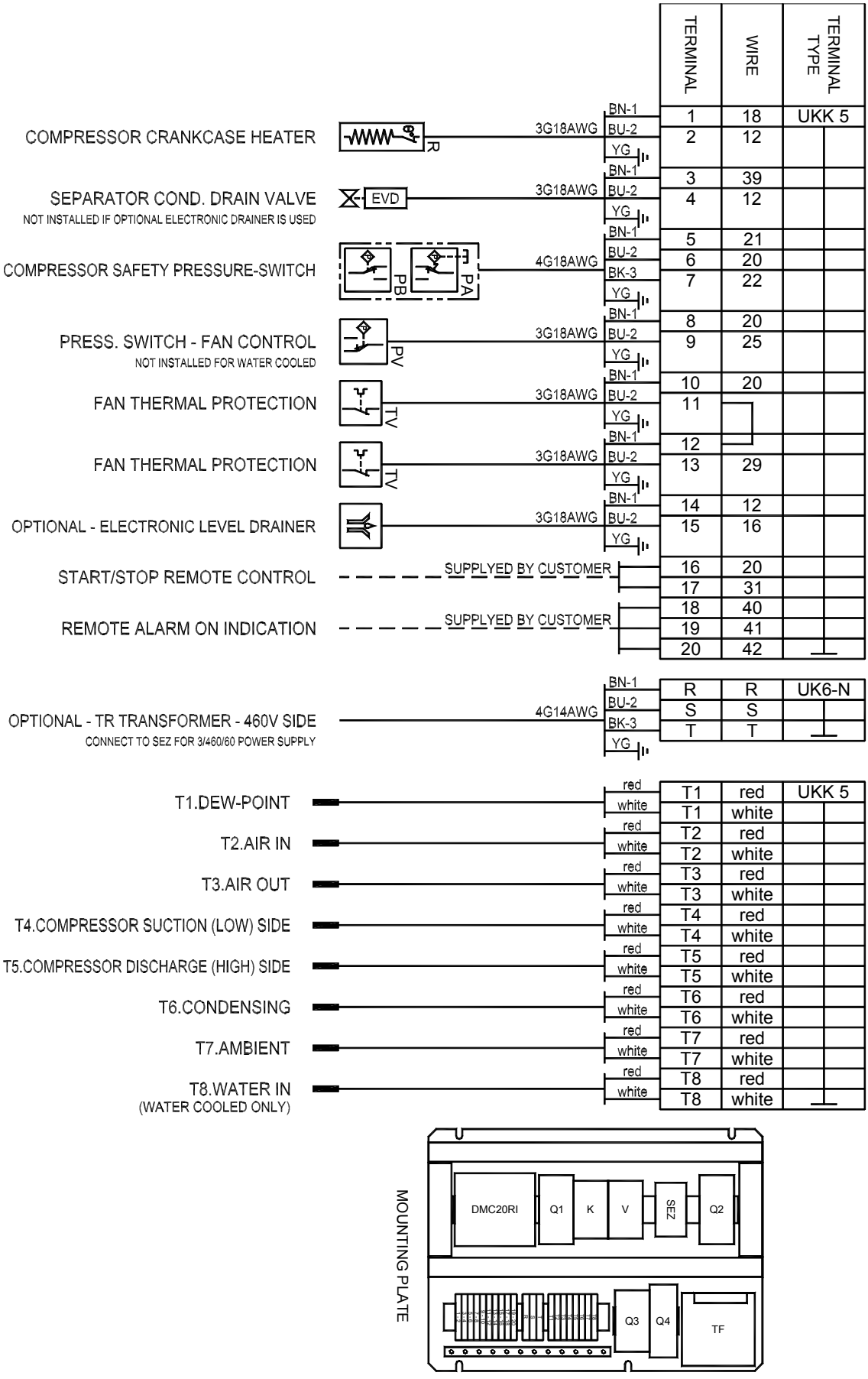
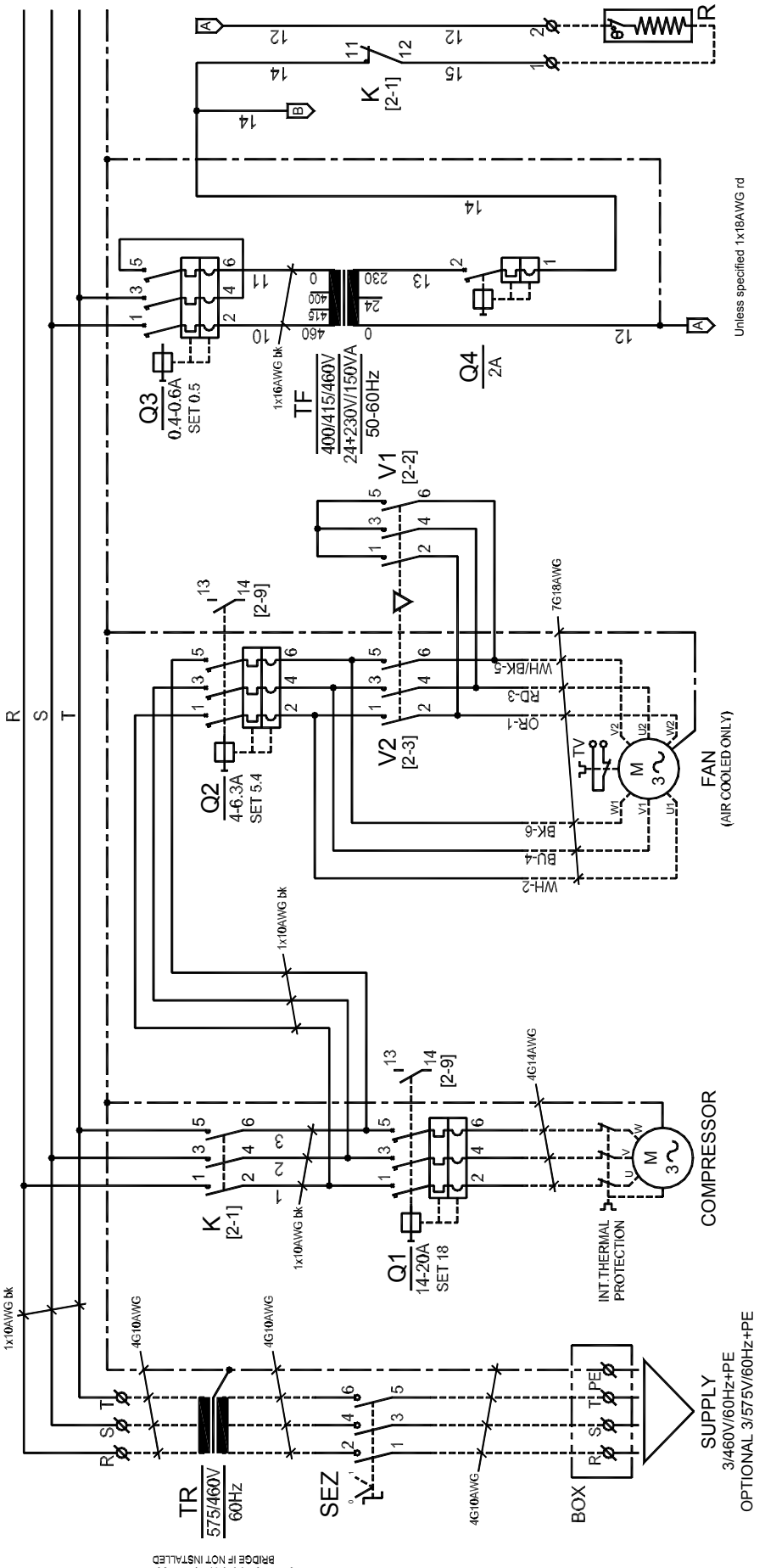


7.3.19 PLH 700-1100 - DMC20 (-4) 460/3/60



7.3.20 PLH 2300-3000 - DMC14 (-4) 460/3/60



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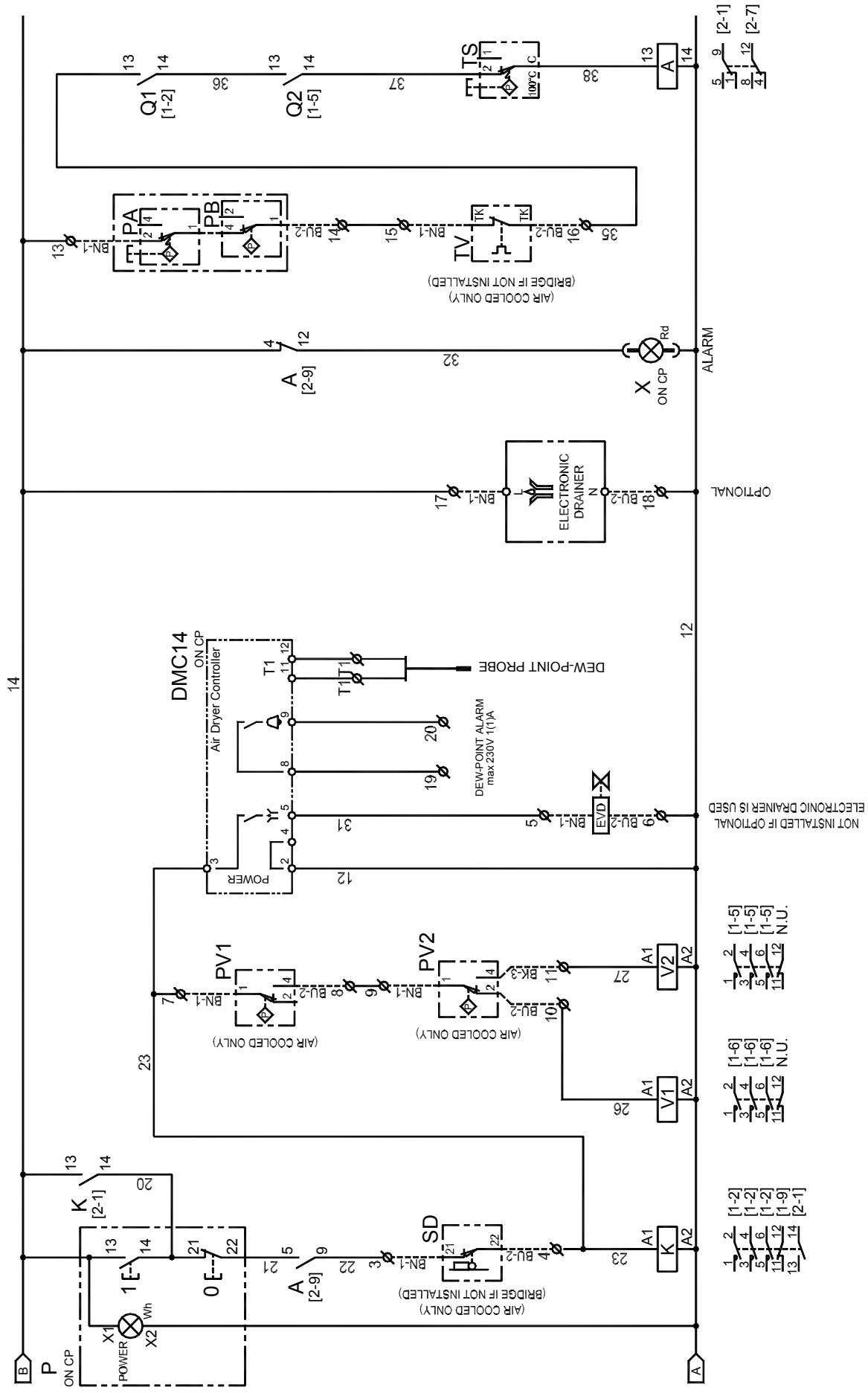
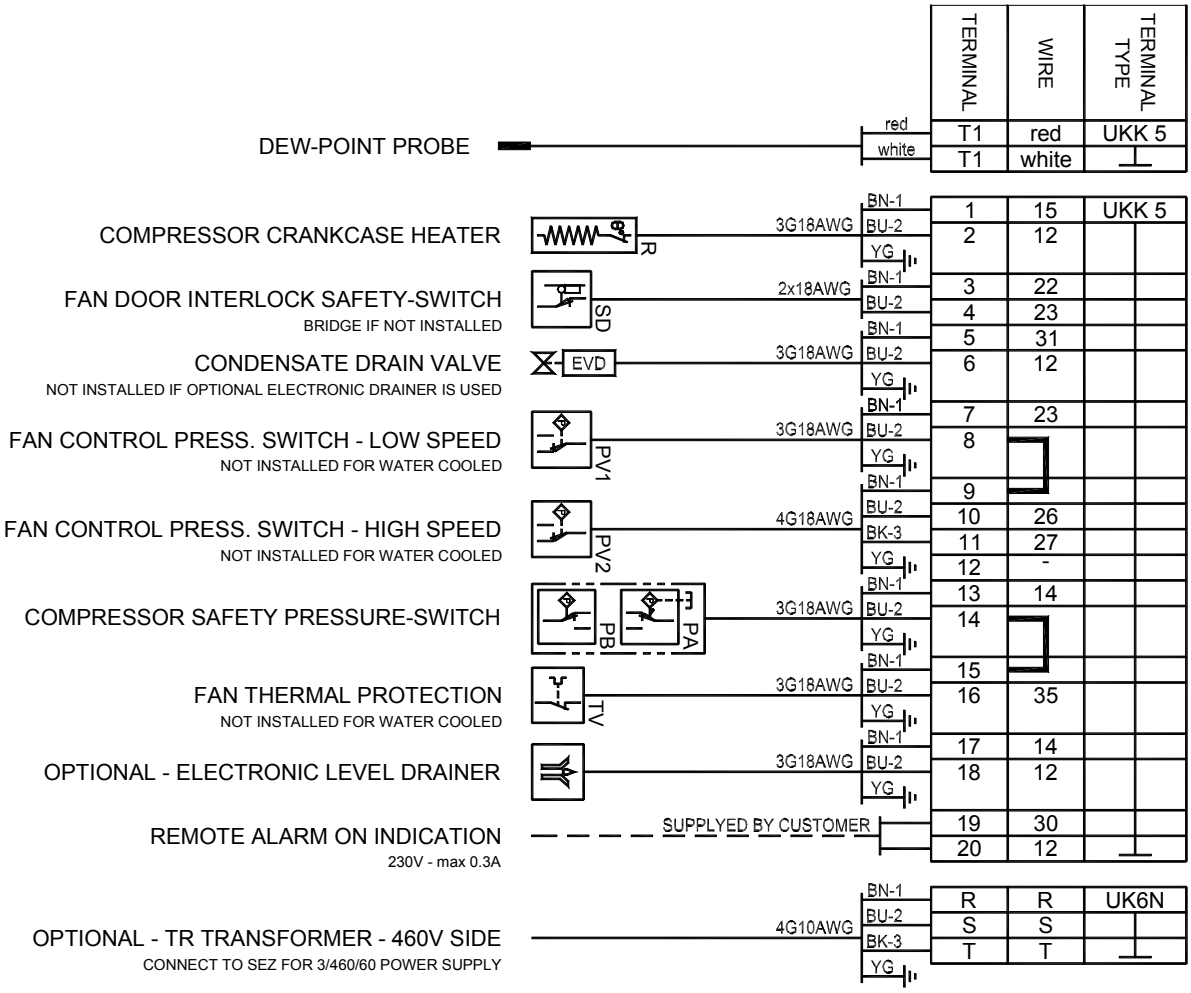
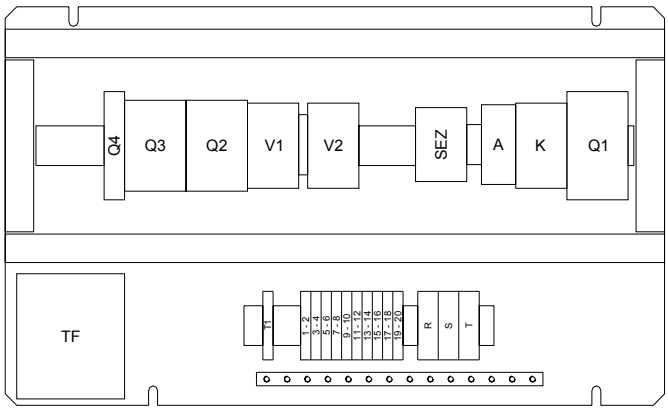


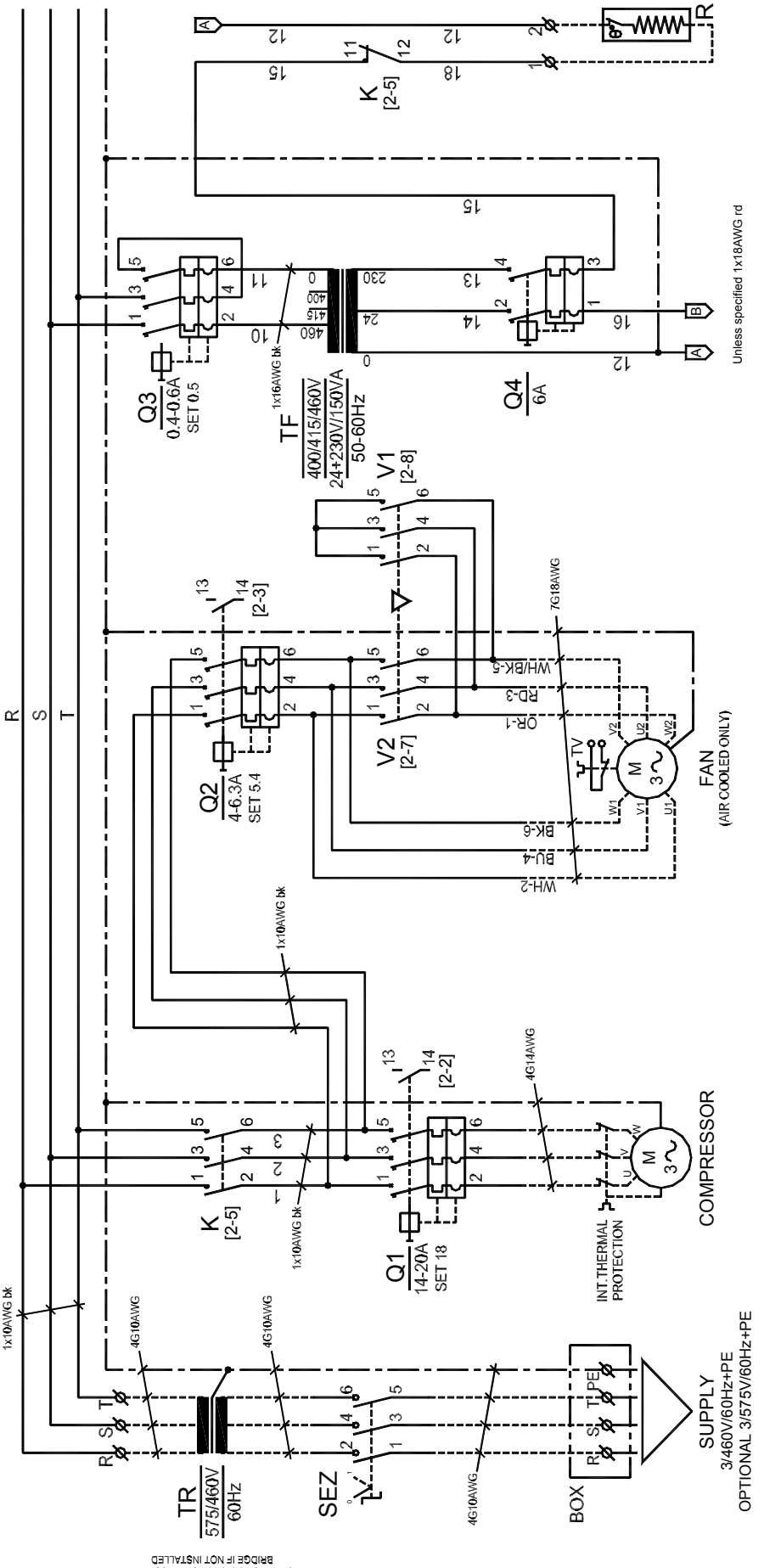
7.3.22 PLH 2300-3000 - DMC14 (-4) 460/3/60





MOUNTING PLATE

7.3.23 PLH 2300-3000 - DMC20 (-4) 460/3/60



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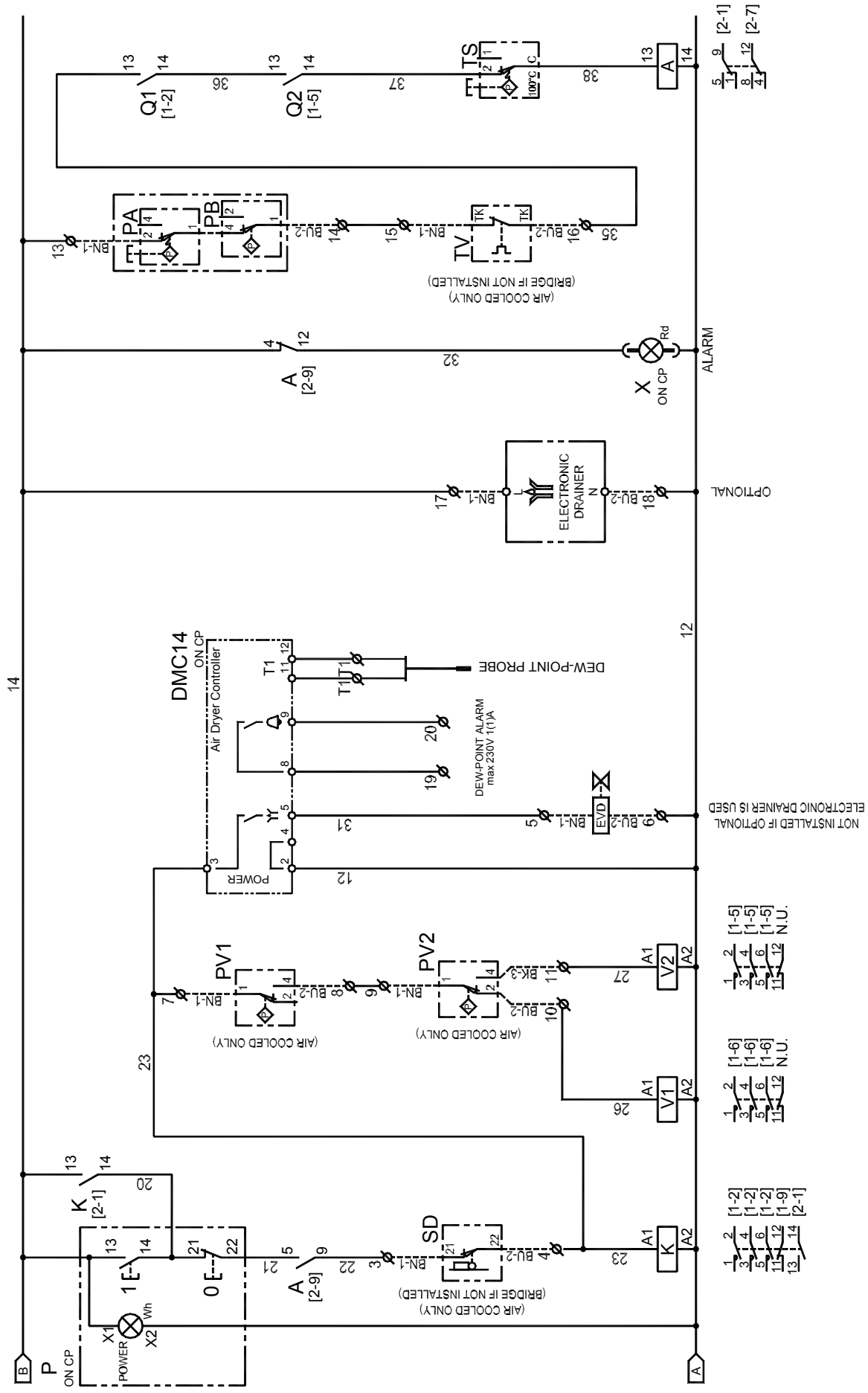

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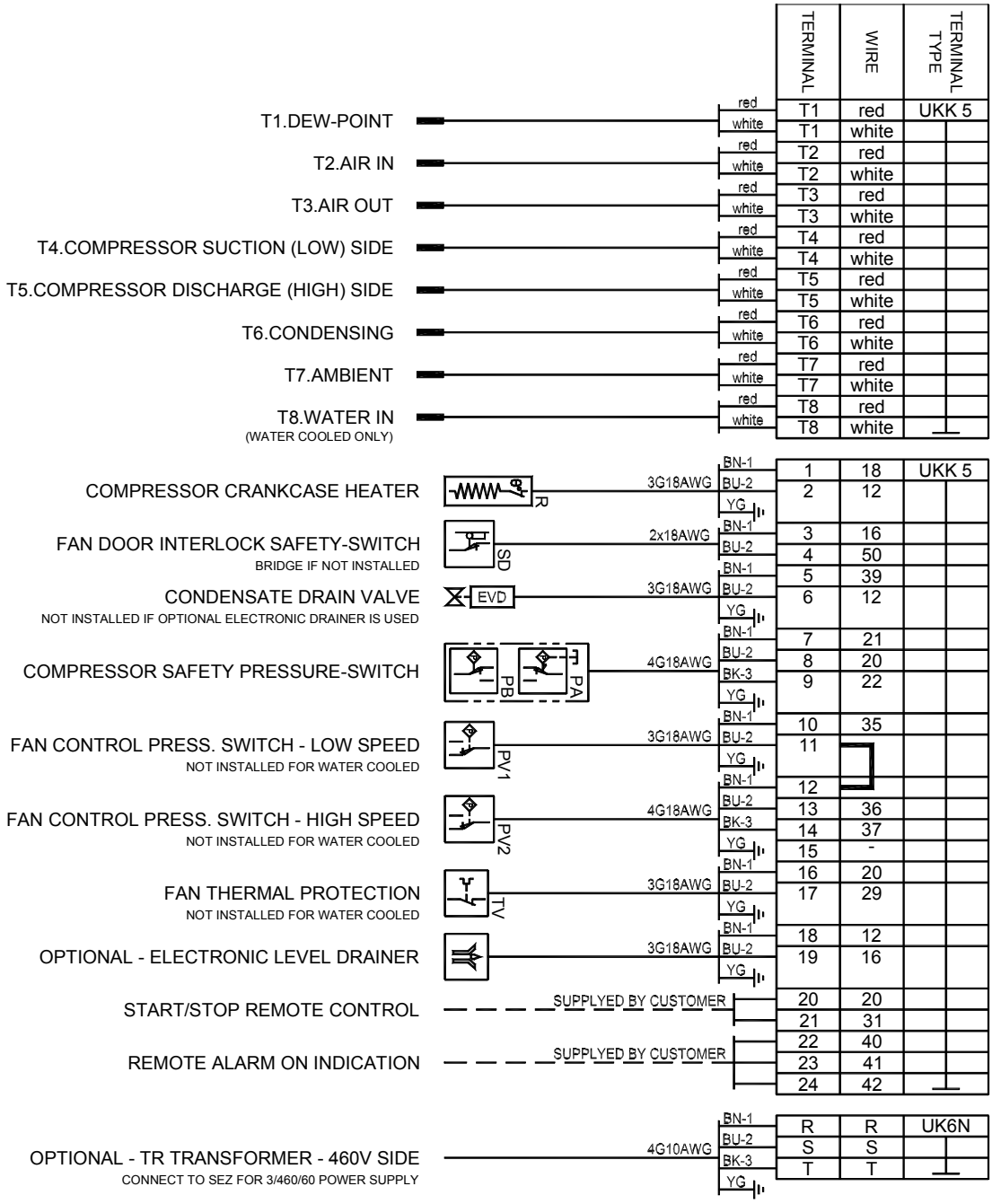

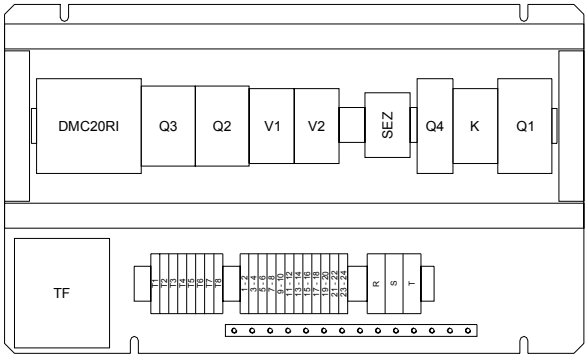

MOUNTING PLATE

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GB

The access code to the 2 level is :

20

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