Refrigerated air dryer

- EN -
User’s maintenance manual

Targhetta dati

PS 6.A – 168.A
PS 190.1 – 240.1

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FSN S.p.A. – Via Einaudi 6 – 10070 Robassomero – ITALY

IT - Dichiara sotto la sua esclusiva responsabilità,che il prodotto qui di seguito descritto è conforme alle prescrizioni di sicurezza delle direttive: **2006/42/CE, 2004/108/CEE, 2006/95/CEE**	**GR -** Δηλώνει με αποκλειστικά δική του ευθύνη ότι το προϊόν που περιγράφεται παρακάτω ανταποκρίνεται στις προδιαγραφές ασφαλείας των οδηγιών**:** **2006/42/EE, 2004/108/EEC, 2006/95/EEC**
EN - Declares under its sole responsibility that the product described below complies with the safety requirements of directives: **2006/42/EC, 2004/108/EEC, 2006/95/EEC**	**PL** - oświadcza pod wyłączną własną odpowiedzialnością, że opisany poniżej wyrób odpowiada wymaganiom dotyczącym bezpieczeństwa zawartym w Dyrektywach **2006/42/EC, 2004/108/EC, 2006/95/EC**
FR - Déclare sous son entière responsabilité que le produit décrit ci-après est conforme aux prescriptions de sécurité des directives : **2006/42/CE, 2004/108/CEE, 2006/95/CEE**	**CZ** - prohlašuje s plnou odpovědností, že uvedený výrobek vyhovuje bezpečnostním požadavkům směrnic: **2006/42/ES, 2004/108/EHS, 2006/95/EHS**
DE - erklärt unter ihrer alleinigen Verantwortung, dass das in Folge beschriebene Produkt den Sicherheitsvorschriften der folgenden Richtlinien entspricht: **2006/42/EG, 2004/108/EWG, 2006/95/EWG**	**SK** - Zodpovedne vyhlásuje, že uvedený výrobok zodpovedá bezpečnostným požiadavkám smerníc: **2006/42/ES, 2004/108/EES, 2006/95/EES**
ES - Declara bajo su exclusiva responsabilidad que el producto descrito a continuación responde a las prescripciones de seguridad de las directivas : **2006/42/CE, 2004/108/CEE, 2006/95/CEE**	**H** - teljes felelősségének tudatában tanúsítja, hogy az alábbiakban jellemzett termék a **2006/42/EC, 2004/108/EƏC** és **2006/95/EƏC** sz. irányelvek biztonsági követelményeinek megfelel.
NL - Verklaart onder zijn eigen verantwoordelijkheid dat het hieronder beschreven product in overeenstemming is met de veiligheidsvoor schriften van de richtlijnen: **2006/42/EG, 2004/108/EEG, 2006/95/EEG**	**LT -** Su visa atsakomybe pareiškia, kad žemiau aprašytas gaminys atitinka direktyvų **2006/42/ES, 2004/108/EES ir 2006/95/EES** saugumo reikalavimams.
N - Erklærer under eget ansvar at produktet beskrevet nedenfor oppfyller sikkerhetskravene i direktivene: **2006/42/EF, 2004/108/EC, 2006/95/EC**	**LV** - Apliecina, uzņemoties pilnu atbildību, ka zemāk aprakstītais produkts atbilst direktīvu **2006/42/EC, 2004/108/EEC** un **2006/95/EEC** drošības noteikumiem.
SV - Försäkrar under eget ansvar att den produkt som beskrivs följande är i överensstämmelse med säkerhetsföreskrifterna i EU-direktiv: **2006/42/EG, 2004/108/EEG, 2006/95/EEG**	**EST** - Deklareerib omal vastutusel, et allpool kirjeldatud toode vastab direktiivide **2006/42/EÜ, 2004/108/EMÜ** ja **2006/95/EMÜ** ohutusnõuetele.
DK - Forsikrer på eget ansvar, at produktet, der beskrives nedenfor, er i overensstemmelse med sikkerhedsforskrifterne i direktiverne: **2006/42/EC, 2004/108/EEC, 2006/95/EEC**	**SLO** - Izjavlja, na lastno odgovornost, da proizvod spodaj opisanih v skladu z varnostnimi zahtevami direktiv: **2006/42/ES, 2004/108/ES, 2006/95/ES**
P - Declara sob a sua exclusiva responsabilidade que o produto descrito a seguir está em conformidade com as prescrições de segurança das directivas: **2006/42/CE, 2004/108/CEE, 2006/95/CEE**	**RO** - Declară pe răspunderea sa exclusivă că produsul descris mai jos în conformitate cu cerinţele de siguranţă a directivelor: **2006/42/CE, 2004/108/CE, 2006/95/CE**
FI - vakuuttaa, että seuraavassa esitelty tuote vastaa alla lueteltujen direktiivien turvallisuusvaatimuksia: **2006/42/EC, 2004/108/EEC, 2006/95/EEC**	**RU** - Заявляет под свою ответственность, что изделие, описанное ниже соответствует требованиям безопасности директивы: **2006/42/EC, 2004/108/EC, 2006/95/EC**

IT -	Nome e indirizzo della persona autorizzata a costituire il fascicolo tecnico:
EN -	Name and address of the person authorised to compile the technical file:
FR -	Le nom et l'adresse de la personne autorisée à constituer le dossier technique:
DE -	Name und Anschrift der Person, die bevollmächtigt ist, die technischen Unterlagen zusammenzustellen:
ES -	Nombre y dirección de la persona facultada para elaborar el expediente técnico:
NL -	naam en adres van degene die gemachtigd is het technisch dossier samen te stellen; deze persoon moet in de Gemeenschap gevestigd zijn
N	navn og adresse på den personen som er autorisert til å kompilere den tekniske arkiv
SV -	Namn på och adress till den person som är behörig att ställa samman den tekniska dokumentationen och som skall vara etablerad i gemenskapen
DA -	navn og adresse på den person, der har bemyndigelse til at udarbejde det tekniske dossier, og som skal være etableret i Fællesskabet
PT -	Nome e endereço da pessoa autorizada a compilar o processo técnico, a qual está obrigatoriamente estabelecida na Comunidade
FI -	sen henkilön nimi ja osoite, joka on valtuutettu kokoamaan teknisen eritelmän. Henkilön on oltava sijoittautunut yhteisöön
EL -	το όνομα και τη διεύθυνση του προσώπου του εξουσιοδοτημένου να καταρτίσει τον τεχνικό φάκελο· το πρόσωπο αυτό πρέπει να είναι εγκατεστημένο στην Κοινότητα
PL -	nazwisko i adres osoby mającej miejsce zamieszkania lub siedzibę we Wspólnocie, upoważnionej do przygotowania dokumentacji technicznej
CS -	jméno a adresu osoby pověřené sestavením technické dokumentace, přičemž tato osoba musí být usazena ve Společenství
SK –	meno a adresu osoby oprávnenej na zostavenie súboru technickej dokumentácie, ktorá musí byť usadená v Spoločenstve
HU -	a műszaki dokumentáció összeállítására felhatalmazott személy, akinek a Közösségben letelepedettnek kell lennie
LT -	asmens, įgalioto sudaryti atitinkamą techninę bylą, kuris turi būti įsisteigęs Bendrijoje, pavadinimas ir adresas
LV -	tās personas vārds un adrese, kura pilnvarota sastādīt tehnisko lietu un kurai jābūt reģistrētai Kopienā
EST-	selle ühenduses registrisse kantud isiku nimi ja aadress, kellel on õigus koostada tehniline toimik
SLO-	ime in naslov osebe, pooblaščene za sestavljanje tehnične dokumentacije, ki mora biti ustanovljena v Skupnosti
RO -	Numele şi adresa persoanei autorizate pentru întocmirea cărţii tehnice
RU -	Название и адрес лица, уполномоченного на компиляции технической документации

Amante Gaetano - via Einaudi 6 – 10070 Robassomero – ITALY

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Gaetano Amante

Via Einaudi 6 – 10070 Robassomero – ITALY 06/10/2011

Dear Customer,

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

To avoid incorrect operation of the equipment and possible physical risk to the operator, please read and strictly follow the instructions contained in this manual.

Note, these instructions are in addition to the safety rules that apply in the country where the dryer is installed.

Before packing for shipment each **PS.A and PS.1** series refrigerated air dryer undergoes a rigorous test to ensure the absence of any manufacturing faults and to demonstrate that the device can perform all the functions for which it has been designed.

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

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

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

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

Contents

1 Identification plate

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

2 Warranty conditions

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

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

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

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

3 Safety rules

3.1 Definition of the conventional signs used in this manual

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

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

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

Danger hazard. Part or system under pressure.

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

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

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

Danger hazard. Do not operate equipment with panels removed.

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

Compressed air inlet connection point

Compressed air outlet connection point

Condensate drain connection point

Operations which can be performed by the operator of the machine, if qualified [1].

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

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

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

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

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

3.2 Warnings

Compressed air is a highly hazardous energy source.
Never work on the dryer with pressure in the system.
Never point the compressed air or the condensate drain outlet hoses towards anybody.

The user is responsible for the proper installation of the dryer. Failure to follow instructions given in the “Installation” chapter will void the warranty. Improper installation can create dangerous situations for personnel and/or damages to the machine could occur.

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

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

These refrigerating air dryers contain R134a or R407C HFC type refrigerant fluid. Refer to the specific paragraph - maintenance operation on the refrigerating circuit.

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

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

3.3 Proper use of the dryer

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

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

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

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

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

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

The dried air cannot be used for breathing purposes or for operations leading to direct contact with foodstuff.
This dryer is not suitable for the treatment of dirty air or of air containing solid particles.

3.4 Instructions for the use of pressure equipment according to PED directive 97/23/EC

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

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

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

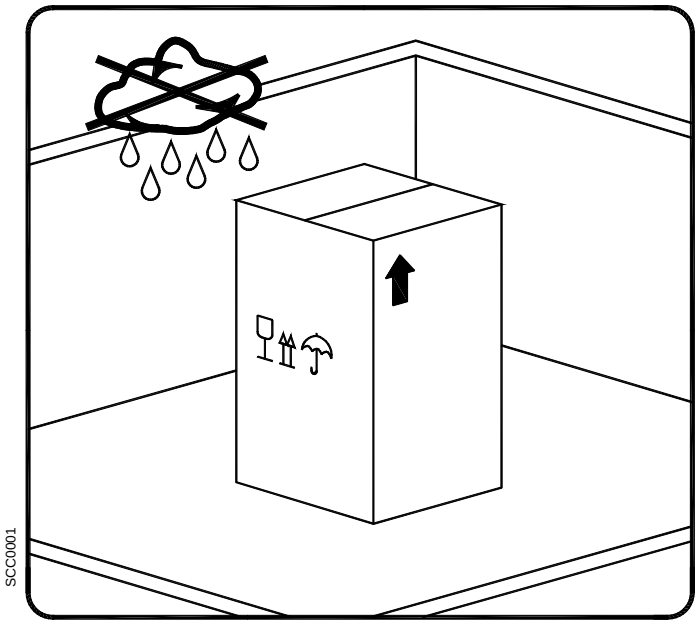
4 Installation

4.1 Transport

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

- To move the packaged unit we recommend using a suitable trolley or forklift truck. Hand carrying is not recommended.
- Always keep the dryer in the upright vertical position. Damage to components could result if unit is laid on its side or if placed upside down.
- Handle with care. Heavy blows could cause irreparable damage.

4.2 Storage



Even when packaged, keep the machine protected from severity of the weather.
Keep the dryer in vertical position, also when stored. Turning it upside down some parts could be irreparably damaged.
If not in use, the dryer can be stored in its packaging in a dust free and protected site at a maximum temperature of 50 °C, and a specific humidity not exceeding 90%. Should the stocking time exceed 12 months, please contact the manufacturer.

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

4.3 Installation site

Failure to install dryer in the proper ambient conditions will affect the dryer's ability to condense refrigerant gas. This can cause higher loads on the compressor, loss of dryer efficiency and performance, overheated condenser fan motors, electrical component failure and dryer failure due to the following: compressor loss, fan motor failure and electrical component failure. Failures of this type will affect warranty considerations.

Do not install dryer in an environment of corrosive chemicals, explosive gasses, poisonous gasses; steam heat, areas of high ambient conditions or extreme dust and dirt.

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

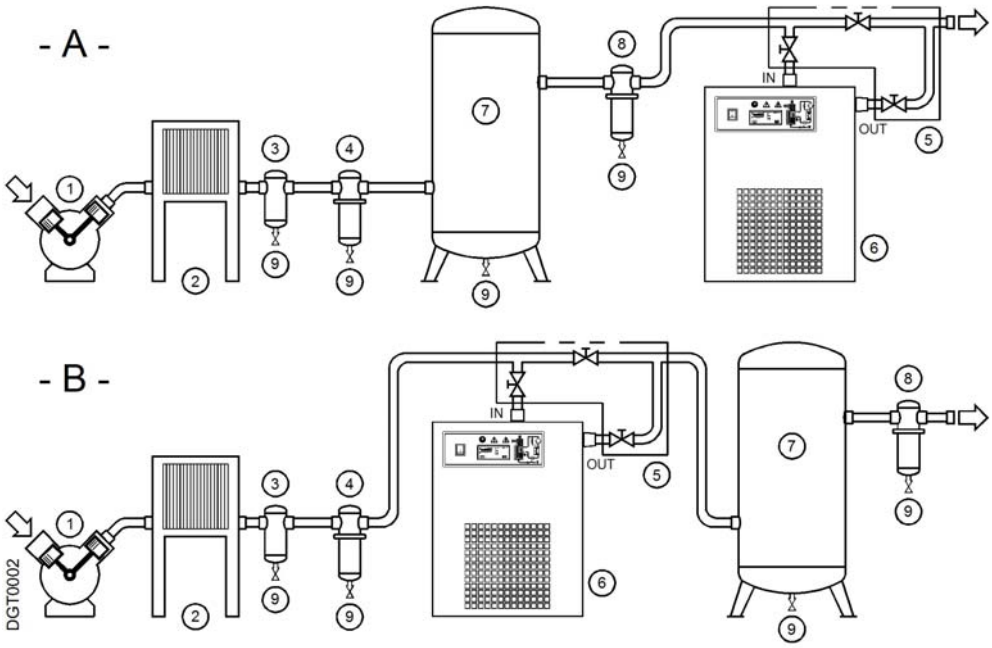
Minimum installation requirements:

- Select a clean dry area, free from dust, and protected from atmospheric disturbances.
- The supporting area must be smooth, horizontal and able to hold the weight of the dryer.
- Minimum ambient temperature +1°C.
- Maximum ambient temperature +45°C.
- Ensure a proper cooling air replacement.
- Allow a sufficient clearance on each side of the dryer for proper ventilation and to facilitate maintenance operations.

The dryer does not require attachment to the floor surface.

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

4.4 Installation layout



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

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

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

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

4.5 Correction factors

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

Correction factor for ambient temperature changes:					
Ambient temperature ºC	≤ 25	30	35	40	45
Factor (F2)	1.00	0.95	0.88	0.79	0.68

Correction factor for inlet air temperature changes:						
Air temperature ºC	≤ 30	35	40	45	50	55
Factor (F3)	1.11	1.00	0.81	0.67	0.55	0.45

Correction factor for DewPoint changes:				
DewPoint ºC	3	5	7	10
Factor (F4)	1.00	1.11	1.19	1.38

How to find the air flow capacity:

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

Example:
An **PS 18.A** has a nominal duty of 108 m³/h. What is the maximum allowable flow through the dryer under the following operating conditions:

Inlet air pressure = 8 barg — Factor (F1) = 1.05
Ambient temperature = 40°C — Factor (F2) = 0.79
Inlet air temperature = 50°C — Factor (F3) = 0.55
Pressure DewPoint = 10°C — Factor (F4) = 1.38

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

Air flow capacity = 108 x 1.05 x 0.79 x 0.55 x 1.38 = 68 m³/h

68 m³/h This is the maximum flow rate that the dryer can accept under these operating conditions.

How to select a suitable dryer for a given duty:

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

Example:
With the following operating parameters:

Design air flow = 100 m^3/h
Inlet air pressure = 8 barg — Factor (F1) = 1.05
Ambient temperature = 40°C — Factor (F2) = 0.79
Inlet air temperature = 50°C — Factor (F3) = 0.55
Pressure DewPoint = 10°C — Factor (F4) = 1.38

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

$$\textbf{Minimum std. air flow rate} = \frac{\textbf{100}}{\textbf{1.05 x 0.79 x 0.55 x 1.38}} = \textbf{159 m³/h}$$

Therefore the model suitable for the conditions above is **PS 32.A** (**192 m³/h** - nominal duty).

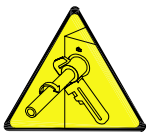
4.6 Connection to the compressed air system

Operations to be performed by qualified personnel only.
Never work on system under pressure.
The user is responsible to ensure that the dryer will never be operated with pressure exceeding the maximum pressure rating on the unit data tag.
Over-pressurizing the dryer could be dangerous for both the operator and the unit.

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

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

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



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

4.7 Electrical connections

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

Before connecting the unit to the electrical supply, verify the data nameplate for the proper electrical information. Voltage tolerance is +/- 10%.
Dryer are supplied with power cord and plug (two poles and ground) or with a junction box.
Be sure to provide the proper fuses or breakers based on the data information located on the nameplate.
A residual-current device (RCD) with IΔn =0.03A is suggested. The cross section of the power supply cables must comply with the consumption of the dryer, while keeping into account also the ambient temperature, the conditions of the mains installation, the length of the cables, and the requirements enforced by the local Power Provider.

Dryers PS 190.1 – 240.1

CAUTION:

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

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

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

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

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

4.8 Condensate drain

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

Never point the condensate drain line towards anybody.

The dryer comes already fitted with a timed condensate drainer (solenoid valve controlled by electronic instrument) or with an electronic condensate drainer (optional).
Connect and properly fasten the condensate drain to a collecting plant or container.
The drain cannot be connected to pressurized systems.

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

5 Start-up

5.1 Preliminary operation

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

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


Qualified personnel must perform the first start-up.
When installing and operating this equipment, comply with all National Electrical Code and any applicable federal, state and local codes.
Who is operating the unit is responsible for the proper and safe operation of the dryer.
Never operate equipment with panels removed.

5.2 First start-up

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

Sequence of operations (refer to paragraph 7.1 Control Panel).

- Ensure that all the steps of the “Installation” chapter have been observed.
- Ensure that the connection to the compressed air system is correct and that the piping is suitably fixed and supported.
- Ensure that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Ensure that the by-pass system (if installed) is closed and the dryer is isolated.
- Ensure that the manual valve of the condensate drain circuit is open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Activate the mains switch.
- **PS 190.1 – 240.1** - Turn on the main switch - pos. A on the control panel
- **PS 190.1 – 240.1** - Wait at least two hours before starting the dryer (compressor crankcase heater must heat the oil of the compressor).
- Turn ON the switch - pos. 1 on the control panel.
- Ensure that electronic instrument is ON.
- **PS 190.1 – 240.1** - If the compressor does not run, the rotating direction must be changed by swapping two phases. These changes have to be done only by a qualified electrician
- Ensure the consumption matches with the values of the data plate.
- **PS 190.1 – 240.1** - Check the rotation direction of the fan – wait for its first interventions.
- 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.

Dryers PS 190.1 – 240.1

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

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

5.3 Start-up and shut down

PS 190.1 – 240.1 - For short periods of inactivity, (max 2-3 days) we recommend that power is maintained to the dryer and the control panel. Otherwise, before re-starting the dryer, it is necessary to wait at least 2 hours for the compressor crankcase heater to heat the oil of the compressor.

Start-up (refer to paragraph 7.1 Control Panel)

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

Shut down (refer to paragraph 7.1 Control Panel)

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

PS 190.1 – 240.1 - Dryer remote control ON-OFF

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

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

CAUTION :
AUTO-RESTART / REMOTE ON-OFF.
THE DRYER MAY POWER UP WITHOUT BEING ACTED UPON.
THE USER WILL BE RESPONSIBLE FOR THE INSTALLATION OF PROPER PROTECTIONS FOR POSSIBLE SUDDEN POWER RESTORATION TO THE DRYER.

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

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

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

6 Technical data

6.1 Technical data PS 6.A – 25.A 1/230/50-60

MODEL PS			6.A	9.A	12.A	18.A	25.A
Air flow rate at nominal condition (1)		[m3/h]	36	57	72	108	150
		[l/min]	600	950	1200	1800	2500
		[scfm]	21	34	42	64	88
Pressure DewPoint at nominal condition (1)		[°C]	3				
Nominal ambient temperature		[°C]	25				
Min...Max ambient temperature		[°C]	1...45				
Nominal inlet air temperature (max.)		[°C]	35 (55)				
Nominal inlet air pressure		[barg]	7				
Max. inlet air pressure		[barg]	16				14
Air pressure drop - Δp		[bar]	0.04	0.09	0.14	0.32	0.24
Inlet - Outlet connections		[BSP-F]	G 1/2"				G 1"
Refrigerant type			R134.a				
Refrigerant quantity (2)		[kg]	0.20	0.22	0.25	0.30	0.33
Cooling air fan flow		[m3/h]	200			300	
Heat Rejection		[kW]	0.45	0.57	0.68	0.87	1.00
Standard Power Supply (2)		[Ph/V/Hz]	1/230/50-60				
Nominal electric consumption	@50Hz	[kW]	0.16	0.19	0.21	0.29	0.39
		[A]	1.1	1.3	1.4	1.9	2.4
Nominal electric consumption	@60Hz	[kW]	0.19	0.21	0.25	0.33	0.46
		[A]	1.2	1.3	1.5	2.0	2.5
Full Load Amperage FLA		[A]	1.4	1.5	1.7	2.4	3.1
Max. noise level at 1 m		[dbA]	< 70				
Weight		[kg]	28	29	31	34	35

(1) The nominal condition refers to an ambient temperature of +25°C with inlet air at 7 barg and +35 °C.
(2) Check the data shown on the identification plate.

6.2 Technical data PS 32.A – 168.A 1/230/50

MODEL PS		32.A	43.A	52.A	63.A	80.A	105.A	135.A	168.A
Air flow rate at nominal condition (1)	[m3/h]	192	258	312	378	480	630	810	1008
	[l/min]	3200	4300	5200	6300	8000	10500	13500	16800
	[scfm]	113	152	184	222	283	371	477	594
Pressure DewPoint at nominal condition (1)	[°C]	3							
Nominal ambient temperature	[°C]	25							
Min...Max ambient temperature	[°C]	1...45							
Nominal inlet air temperature (max.)	[°C]	35 (55)							
Nominal inlet air pressure	[barg]	7							
Max. inlet air pressure	[barg]	14							
Air pressure drop - Δp	[bar]	0.16	0.24	0.34	0.20	0.28	0.14	0.22	0.15
Inlet - Outlet connections	[BSP-F]	G 1.1/4"			G 1.1/2"			G 2"	
Refrigerant type		R134.a	R407C						
Refrigerant quantity (2)	[kg]	0.44	0.35	0.47	0.50	0.70	0.80	1.00	2.20
Cooling air fan flow	[m3/h]	350	380	400		450	1900		2500
Heat Rejection	[kW]	1.70	2.36	2.64		3.43	4.11	6.61	
Standard Power Supply (2)	[Ph/V/Hz]	1/230/50							
Nominal electric consumption	[kW]	0.48	0.71	0.72	0.82	0.71	0.92	1.40	1.50
	[A]	2.9	3.3		4.2	3.4	4.3	6.7	7.0
Full Load Amperage FLA	[A]	3.6	4.5	5.2		8.9		11.2	
Max. noise level at 1 m	[dbA]	< 70							
Weight	[kg]	40	43	44	54	56	94	96	144

(1) The nominal condition refers to an ambient temperature of +25°C with inlet air at 7 barg and +35 °C.
(2) Check the data shown on the identification plate.

MODEL PS		6.A -P	9.A -P	12.A -P	18.A -P	25.A -P	32.A -P	43.A -P	52.A -P	63.A -P
Air flow rate at nominal condition (1)	[m3/h]	36	57	72	108	150	192	258	312	378
	[l/min]	600	950	1200	1800	2500	3200	4300	5200	6300
	[scfm]	21	34	42	64	88	113	152	184	222
Pressure DewPoint at nominal condition (1)	[°C]	3								
Nominal ambient temperature	[°C]	25								
Min...Max ambient temperature	[°C]	1...45								
Nominal inlet air temperature (max.)	[°C]	35 (55)								
Nominal inlet air pressure	[barg]	7								
Max. inlet air pressure	[barg]	16				14				
Air pressure drop - Δp	[bar]	0.04	0.09	0.14	0.32	0.24	0.16	0.24	0.34	0.20
Inlet - Outlet connections	[BSP-F]	G 1/2"				G 1"	G 1.1/4"			G 1.1/2"
Refrigerant type		R134.a						R407C		
Refrigerant quantity (2)	[kg]	0.21	0.22	0.25	0.30	0.33	0.44	0.41	0.43	0.62
Cooling air fan flow	[m3/h]	200		300			350	380	600	
Heat Rejection	[kW]	0.54	0.56	0.79	1.20	1.45	2.00	3.95	4.00	4.05
Standard Power Supply (2)	[Ph/V/Hz]	1/115/60								
Nominal electric consumption	[kW]	0.19	0.22	0.28	0.42	0.49	0.63	0.86	0.89	0.93
	[A]	2.4	2.6	3.0	3.5	5.1	6.5	7.1	7.2	
Full Load Amperage FLA	[A]	2.9		4.1	4.5	6.8	8.9	12.5		
Max. noise level at 1 m	[dbA]	< 70								
Weight	[kg]	28	29	31	34	35	40	43	44	54

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

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

6.4 Technical data PS 32.A – 168.A 1/230/60

MODEL	PS	32.A -E	43.A -E	52.A -E	63.A -E	80.A -E	105.A -E	135.A -E	168.A -E
Air flow rate at nominal condition (1)	[m3/h]	192	258	312	378	480	630	810	1008
	[l/min]	3200	4300	5200	6300	8000	10500	13500	16800
	[scfm]	113	152	184	222	283	371	477	594
Pressure DewPoint at nominal condition (1)	[°C]	3							
Nominal ambient temperature	[°C]	25							
Min...Max ambient temperature	[°C]	1...45							
Nominal inlet air temperature (max.)	[°C]	35 (55)							
Nominal inlet air pressure	[barg]	7							
Max. inlet air pressure	[barg]	14							
Air pressure drop - Δp	[bar]	0.16	0.24	0.34	0.20	0.28	0.14	0.22	0.15
Inlet - Outlet connections	[BSP-F]	G 1.1/4"			G 1.1/2"			G 2"	
Refrigerant type		R134.a	R407C						
Refrigerant quantity (2)	[kg]	0.44	0.41		0.55	0.70	0.72	1.30	1.90
Cooling air fan flow	[m3/h]	350	380	600		900	1900		2500
Heat Rejection	[kW]	1.95	3.80	3.85	3.90	5.05	5.10	7.80	7.90
Standard Power Supply (2)	[Ph/V/Hz]	1/230/60							
Nominal electric consumption	[kW]	0.63	0.88	0.96	0.98	1.05	1.25	1.85	1.95
	[A]	3.8	4.1	4.2	4.6	4.9	5.5	8.5	8.8
Full Load Amperage FLA	[A]	4.0	7.4	7.5		8.3	8.8	12.8	
Max. noise level at 1 m	[dbA]	< 70							
Weight	[kg]	40	43	44	54	56	94	96	144

(1) The nominal condition refers to an ambient temperature of +25°C with inlet air at 7 barg and +35 °C.
(2) Check the data shown on the identification plate.

6.5 Technical data PS 190.1 – 240.1 3/400/50 3/460/60 3/380/60

MODEL PS		190.1	240.1	190.1 -R	240.1 -R	190.1 -F	240.1 -F
Air flow rate at nominal condition (1)	[m3/h]	1110	1500	1110	1500	1110	1500
	[l/min]	19000	24000	19000	24000	19000	24000
	[scfm]	653	883	653	883	653	883
Pressure DewPoint at nominal condition (1)	[°C]	3					
Nominal ambient temperature	[°C]	25					
Min...Max ambient temperature	[°C]	1...45					
Nominal inlet air temperature (max.)	[°C]	35 (55)					
Nominal inlet air pressure	[barg]	7					
Max. inlet air pressure	[barg]	14					
Air pressure drop - Δp	[bar]	0.21	0.33	0.21	0.33	0.21	0.33
Inlet - Outlet connections	[BSP-F]	G 2.1/2"					
Refrigerant type		R407C					
Refrigerant quantity (2)	[kg]	2.20	2.50	2.30	2.60	2.30	2.60
Cooling air fan flow	[m3/h]	5300		5900			
Heat Rejection	[kW]	7.90	9.40	9.90	11.50	9.90	11.50
Standard Power Supply (2)	[Ph/V/Hz]	3/400/50		3/460/60		3/380/60	
Nominal electric consumption	[kW]	2.00	2.20	2.50	2.70	2.60	2.90
	[A]	4.0	4.3	4.6	4.9	5.6	5.9
Full Load Amperage FLA	[A]	6.0	7.0		8.2	8.5	9.9
Max. noise level at 1 m	[dbA]	< 75					
Weight	[kg]	189	212	189	212	189	212

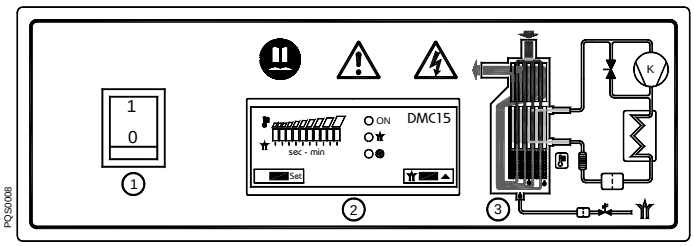
(1) The nominal condition refers to an ambient temperature of +25°C with inlet air at 7 barg and +35 °C.
(2) Check the data shown on the identification plate.

7 Technical description

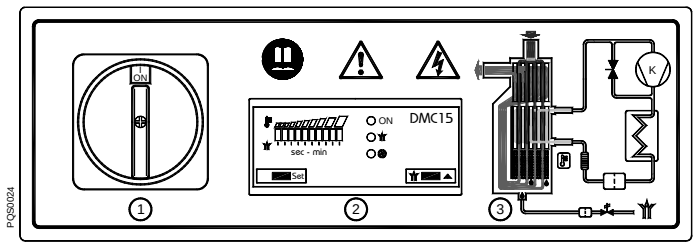
7.1 Control panel

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

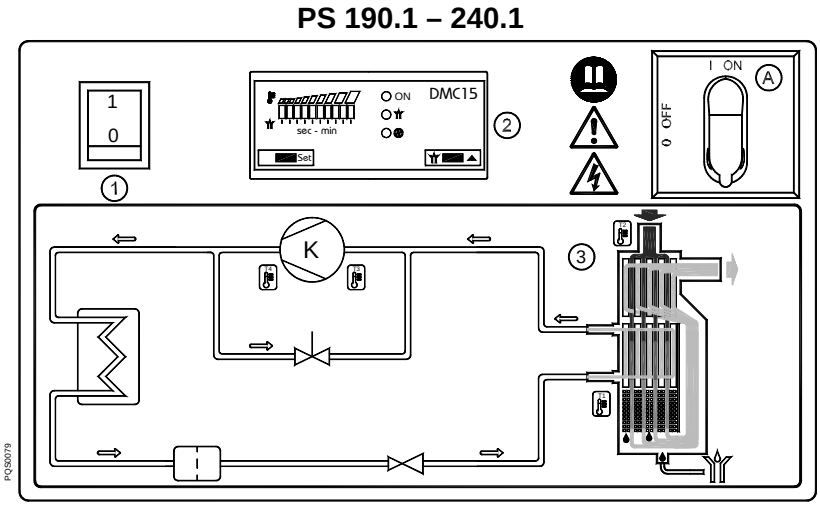
PS 6.A – 80.A



PS 105.A – 168.A



PS 190.1 – 240.1



A Main switch

1 ON-OFF Switch

2 Electronic instrument

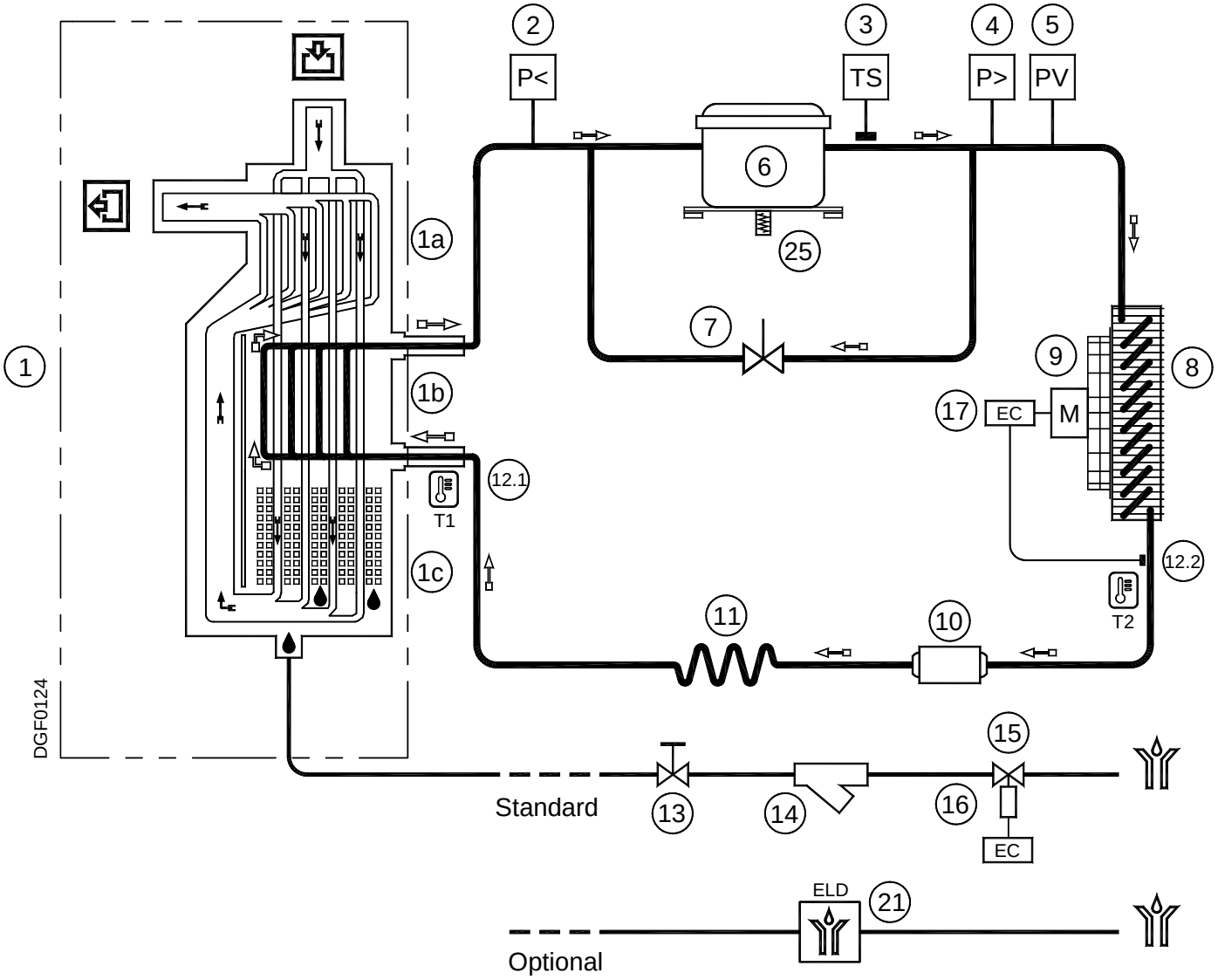
3 Air and refrigerant flow diagram

7.2 Operation

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

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

7.3 Flow diagram



1 Alu-Dry module
1a Air-to-air heat exchanger
1b Air-to-refrigerant heat exchanger
1c Condensate separator
2 Refrigerant pressure switch LPS (PS 168.A & PS 190.1-240.1)
3 Safety thermo switch TS (PS 80.A-168.A & PS 190.1-240.1)
4 Refrigerant press. switch HPS (PS 105.A-168.A & PS 190.1-240.1)
5 Refrigerant pressure switch PV (PS 43.A-168.A & PS 190.1-240.1)
6 Compressor
7 Hot gas by-pass valve
8 Condenser
9 Condenser fan
10 Filter dryer
11 Capillary tube
12.1 Temperature probe T1 – DewPoint
12.2 Temperature probe T2 – Fan control (PS 6.A-32.A)
13 Condensate drain service valve
14 Condensate drain strainer
15 Condensate drain solenoid valve
16 Coil for condensate drain solenoid valve
17 Electronic instrument
21 Electronic drainer
25 Compressor crankcase heater (PS 190.1-240.1)

Compressed air flow direction

Refrigerant gas flow direction

7.4 Refrigerating compressor

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

7.5 Condenser

The condenser is the component in which the gas coming from the compressor is cooled down and condensed becoming a liquid. Mechanically, a serpentine copper tubing circuit (with the gas flowing inside) is encapsulated in an aluminum fin package.
The cooling operation occurs via a high efficiency fan, creating airflow within the dryer, moving air through the fin package. It’s mandatory that the ambient air temperature does not exceed the nominal values. It is also important to keep the condenser unit free from dust and other impurities.

7.6 Filter dryer

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

7.7 Capillary tube

It consists of a piece of reduced cross section copper tubing located between the condenser and the evaporator, acting as a metering device to reduce the pressure of the refrigerant. Reduction of pressure is a design function to achieve optimum temperature reached within the evaporator: the smaller the capillary tube outlet pressure, the lower the evaporation temperature.
The length and interior diameter of the capillary tubing is accurately sized to establish the performance of the dryer; no maintenance or adjustment is necessary.

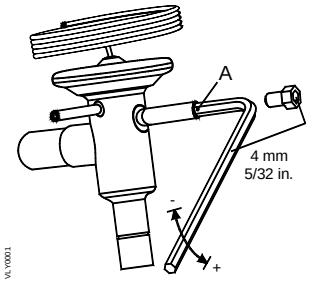
7.8 Alu-Dry module

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

7.9 Hot gas by-pass valve

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

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



WARNING
the use of ¼" Schrader service valves must be justified by a real malfunction of the refrigerating system. Each time a pressure gauge is connected, a part of refrigerant is exhausted.
Without compressed air flow through the dryer, rotate the adjusting screw (position A on the drawing) until the following value is reached:

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

7.10 Refrigerant pressure switches LPS – HPS – PV

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

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

Calibrated pressure :	R 134.a	Stop 0.7 barg - Restart 1.7 barg
	R 407 C	Stop 1.7 barg - Restart 3.7 barg

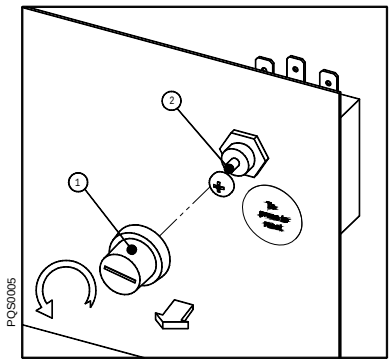
HPS : This high-pressure controller device, located on the discharge side on the compressor, is activated when the pressure exceeds the pre-set value. It features a manual-resetting button mounted on the controller itself.

Calibrated pressure :	R 134.a	Stop 20 barg - Manual reset (P<14 bar)
	R 407 C	Stop 30 barg - Manual reset (P<23 bar)

PV : Fan control pressure switch located at the discharge side of compressor. It keeps the condensing temperature/pressure constant within preset limits.

Calibrated pressure :	R 134.a	Start 11 barg (+0.5 / -0 bar) – Stop 8 barg (+0 / -0.5 bar)
	R 407 C	Start 18 barg (+0.5 / -0 bar) – Stop 14 barg (+0 / -0.5 bar)

7.11 Safety thermo switch TS



To protect the operating safety and the integrity of the dryer, a thermo switch (TS) is installed on the refrigerant gas circuit. The thermo switch sensor, in case of unusual discharge temperatures, stops the refrigerating compressor before it is permanently damaged.
Manually reset the thermo switch only after the nominal operating conditions have been restored. Unscrew the relative cap (see pos.1 in the figure) and press the reset button (see pos.2 in the figure).

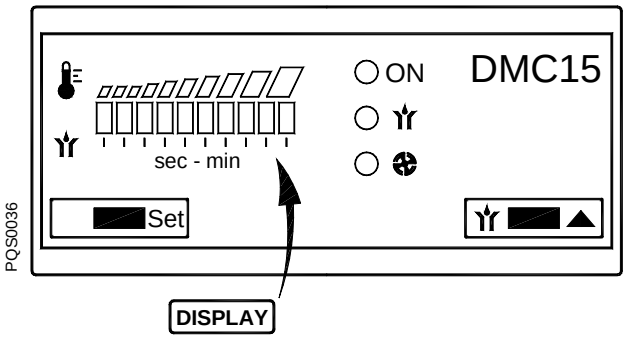
TS setting : temperature 113 °C (+0 / -6 °K)

7.12 Compressor crankcase heater

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

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

7.13 Electronic instrument DMC15



ON Led – Power ON

Led - Drain ON

Led – Condenser fan ON (PS 6.A-32.A)

Set Button – Setup menu access

Button – Increase / Drain test

The DMC15 displays DewPoint temperature, controls the condenser fan activation and the timed drainer.

7.13.1 How to switch on the dryer

Power the dryer and switch it on using the ON-OFF switch (pos.1 paragraph 7.1).

During normal operation led ON is ON and the display shows the DewPoint temperature by means of two coloured areas (green and red) above a 10 Led display :

- Green area - operating conditions ensuring an optimal DewPoint;
- Red area - DewPoint too high, the dryer is operating with high thermal load (high inlet air temperature, high ambient temperature, etc.). Compressed air treatment may be improper.

Led shows that condensate drain solenoid valve is ON.

Led shows that condenser fan is ON (PS 6.A-32.A).

The condensate drain test is always active using the button .

7.13.2 How to switch off the dryer

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

7.13.3 How a service warning / alarm is displayed

A service warning / alarm is an unusual event that must recall the attention of the operators / maintenance technicians. It does not stop the dryer.

Service warnings / alarms are automatically reset as soon as the problem is solved.

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

Service Warning / Alarm	Description
Display 1st (left) and 10th (right) led are flashing	Failure T1 (DewPoint) temperature probe.
Led is flashing	(PS 6.A-32.A) Failure T2 (fan control) temperature probe. NOTE : fan is forced always ON.
Display 10th (right) led is flashing	DewPoint too high
Display 1st (left) led is flashing	DewPoint too low (lower than -1°C / 30°F).

7.13.4 How is controlled the condenser fan (PS 6.A-32.A)

A temperature probe T2 is located on the discharge side of the condenser. The condenser fan is activated (ON) when the T2 temperature is higher than FANon setting (standard 35°C / 96°F) and led ○ is ON.
Condenser fan stops at T2 temperatures 5°C / 10°F lower than FANon setting (standard 30°C / 86°F).

7.13.5 How is controlled the drain solenoid valve

Drain solenoid valve is activated (ON) for Ton seconds (standard 2 seconds) every Toff minutes (standard 1 minute). Led ○ shows that condensate drain solenoid valve is ON.
The condensate drain test is always active using the button .

7.13.6 How to change the operating parameters – SETUP menu

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

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

With dryer ON press button Set for at least 3 seconds to enter the setup menu.
Access to the menu is confirmed by led ○ ON and ○ flashing (first parameter of menu).
Keep Set pressed and use arrows to change the value. Release the button Set to confirm the value. Press shortly Set to skip to following parameter.
Press to exit setup menu (if no button is pressed after 2 minutes the menu is exited automatically).

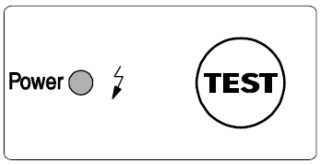
Display	Description	Limits	Resolution	Standard setup
Synchronous flashing led ○ ON + led ○	(PS 6.A-32.A) FANon : condenser fan activation (ON) temperature	31 … 40 °C or 88 … 104 °F	1 °C or 2 °F	35 or 96
Synchronous flashing led ○ ON + led ○	Ton – drain time ON : time ON condensate drain valve	1 … 10 sec	1 sec	2
Non-Synchronous flashing led ○ ON + led ○	ToF - drain time OFF : pause time for condensate drain valve	1 … 20 min	1 min	1

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

7.14 Electronic drainer (optional)

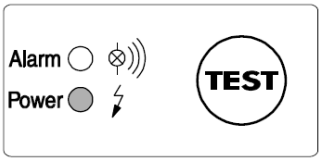
Instead of the usual drain system (a solenoid valve controlled by means of electronic instrument); an electronic level controlled drainer can be installed as option. This drainer consists of a condensate accumulator where a capacitive sensor continuously checking liquid level is placed: as soon as the accumulator is filled, the sensor passes a signal to the electronic control and a diaphragm solenoid valve will open to discharge the condensate. For a complete condensate discharge the valve opening time will be adjusted exactly for each single drain operation. No condensate strainers are installed. No adjusting is required. A service valve is installed before the electronic drain in order to make check and maintenance easily. **At dryer start-up verify that this valve is open.**

Control panel for dryers PS 6.A – 105.A



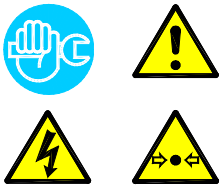
Power Led	On - drainer ready to work / supplied
TEST Button	Discharge test (keep pushed for 2 seconds)

Control panel for dryers PS 135.A – 168.A & PS 190.1 – 240.1



Power Led	On - drainer ready to work / supplied
Alarm Led	Blinking - drainer in alarm condition
TEST Button	Discharge test (keep pushed for 2 seconds)

Troubleshooting



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

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

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.

8 Maintenance, troubleshooting and dismantling

8.1 Checks and maintenance


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


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


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

Daily

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

Every 200 hours or monthly


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

- Close the manual condensate drain valve, unscrew the strainer (if installed) and clean it with compressed air and brush. Reinstall the strainer properly tight, and then open the manual valve.
- At the end, check the operation of the machine

Every 1000 hours or yearly

- Verify for tightness all the screws of the electric system and that all the “Disconnects-Tabs” type connections are in their proper position inspect unit for broken, cracked or bare wires.
- Inspect refrigerating circuit for signs of oil and refrigerant leakage.
- Measure and record amperage. Verify that readings are within acceptable parameters as listed in specification table.
- Inspect flexible hoses, and replace if necessary.
- At the end, check the operation of the machine.

Every 8000 hours

- Replace Electronic drainer service unit

8.2 Troubleshooting




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

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


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

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ The dryer doesn't start.	⇨ Verify that the system is powered. ⇨ Verify the electric wiring. ⇨ **PS 190.1-240.1** - Blow of fuse (FU2 on the electric diagram) of the auxiliary circuit - replace it and check the proper operation of the dryer
◆ The compressor doesn't work.	⇨ Activation of the compressor internal thermal protection - wait for 30 minutes, then retry. ⇨ Verify the electric wiring. ⇨ **If installed** - Replace the internal thermal protection and/or the start-up relay and/or the start-up capacitor and/or the working capacitor. ⇨ **If installed** - The pressure switch HPS has been activated - see specific point. ⇨ **If installed** - The pressure switch LPS has been activated - see specific point. ⇨ **If installed** - The safety thermo switch TS has been activated - see specific point ⇨ **PS 190.1-240.1** - **during first startup** – power phases of compressor are not connected properly (see RPP on the electric diagram) – Change rotating direction swapping two phases of the power supply of dryer. These changes have to be done only by a qualified electrician. **DO NOT BY PASS RPP PROTECTION: BY OPERATING THE MACHINE IN WRONG ROTATING DIRECTION, THE COMPRESSOR WILL FAIL IMMEDIATELY AND THE WARRANTY WILL BE VOIDED** ⇨ **PS 190.1-240.1** – one phase of power supply is missing (see RPP on the electric diagram) – restore the missing phase. ⇨ If the compressor still doesn't work, replace it.
◆ Condenser's fan doesn't work.	⇨ Verify the electric wiring. ⇨ **PS 6.A-32.A** - The DMC15 electronic instrument is faulty – replace it. ⇨ **PS 43.A-168.A & PS 190.1-240.1** - PV pressure switch is faulty – replace it ⇨ **PS 190.1-240.1** - Blow of fuse (FU1-FU2 on the electric diagram) - replace it and check the proper operation of the dryer ⇨ There is a leak in the refrigerant circuit - contact a refrigeration engineer. ⇨ If the fan still doesn't work, replace it.

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ DewPoint too high.	⇨ The dryer doesn't start - see specific point. ⇨ The DewPoint probe T1 doesn't correctly detect the temperature - ensure the sensor is pushed into the bottom of probe well. ⇨ The Compressor doesn't work - see specific point. ⇨ The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation. ⇨ The inlet air is too hot - restore nominal conditions. ⇨ The inlet air pressure is too low - restore nominal conditions. ⇨ The inlet air flow rate is higher than the rate of the dryer - reduce the flow rate - restore nominal conditions. ⇨ The condenser is dirty - clean it. ⇨ The condenser fan doesn't work - see specific point. ⇨ The dryer doesn't drain the condensate - see specific point. ⇨ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore nominal setting. ⇨ There is a leak in the refrigerant circuit - contact a refrigeration engineer.
◆ Dew Point too low	⇨ **PS 6.A-32.A** - The fan is always ON - the ○ yellow LED of DMC15 electronic instrument is flashing - see specific point. ⇨ **PS 43.A-168.A & PS 190.1-240.1** - The fan is always on – PV pressure switch is faulty – replace it. ⇨ Ambient temperature is too low - restore nominal conditions. ⇨ The hot gas by-pass valve is out of setting - contact a refrigeration engineer to restore nominal setting.
◆ Excessive pressure drop within the dryer.	⇨ The dryer doesn't drain the condensate - see specific point. ⇨ The DewPoint is too low - the condensate is frost and blocks the air - see specific point. ⇨ Check for throttling the flexible connection hoses.
◆ The dryer doesn't drain the condensate	⇨ The condensate drain service valve is closed - open it. ⇨ Condensate strainer is clogged – remove and clean it. ⇨ The drain solenoid valve is jammed – remove and clean it. ⇨ Verify the electric wiring. ⇨ The coil of the drain solenoid valve is failed – replace it. ⇨ Electronic instrument is faulty – repace it. ⇨ The DewPoint is too low - the condensate is frost and blocks the air - see specific point. ⇨ Inlet compressed air pressure is too low and condensate is not drained – restore nominal conditions. ⇨ Electronic drainer is not operating correctly (see paragraph 7.14).
◆ 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 ⇨ Electronic drainer is dirty (see paragraph 7.14).
◆ Water within the line.	⇨ The dryer doesn't start - see specific point. ⇨ **If installed** - Untreated air flows through the by-pass unit - close the by-pass. ⇨ The dryer doesn't drain the condensate - see specific point. ⇨ DewPoint too high - see specific point.

SYMPTOM	POSSIBLE CAUSE - SUGGESTED ACTION
◆ **If installed** – HPS high pressure switch has been activated.	⇨ Check which of the following has caused the activation : 1. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation. 2. The condenser is dirty - clean it. 3. The condenser fan doesn't work - see specific point. ⇨ Reset the pressure switch pressing the button on the controller itself - verify the dryer for correct operation. ⇨ HPS pressure switch is faulty - contact a refrigeration engineer to replace it.
◆ **If installed** – LPS low pressure switch has been activated.	⇨ There is a leak in the refrigerating fluid circuit - contact a refrigeration engineer. ⇨ The pressure switch reset automatically when normal conditions are restored - check the proper operation of the dryer.
◆ **If installed –** TS safety thermo switch has been activated.	⇨ Check which of the following has caused the activation : 1. Eccessive thermal load – restore the standard operating conditions. 2. The inlet air is too hot - restore the nominal conditions. 3. The ambient temperature is too high or the room aeration is insufficient - provide proper ventilation. 4. The condenser unit is dirty - clean it. 5. The fan doesn't work - see specific point. 6. The hot gas by-pass valve requires re-adjusting – contact a specialized technician to restore nominal setting. 7. Refrigerant gas leak - contact a refrigeration engineer. ⇨ Reset the thermo switch by pressing the button on the thermo switch itself – verify the correct operation of the dryer. ⇨ TS thermo switch is faulty - replace it.
◆ Electronic instrument DMC15 The first and the last led of display are flashing syncronous.	⇨ Verify the electric wiring of T1 DewPoint probe. ⇨ The T1 DewPoint probe is faulty - replace it. ⇨ The electronic instrument is faulty - replace it.
◆ Electronic instrument DMC15 The ○ yellow led is flashing	⇨ **PS 6.A-32.A** - Verify the electric wiring of T2 fan control probe. ⇨ **PS 6.A-32.A** - The T2 fan control probe is faulty - replace it. ⇨ **PS 43.A-168.A & PS 190.1-240.1** - Verify the electric wiring of resistance on terminal 1 and 2 ⇨ The electronic instrument is faulty - replace it.
◆ Electronic instrument DMC15 The first led of the display is flashing	⇨ DewPoint too low - see specific point. ⇨ The T1 DewPoint probe is faulty - replace it. ⇨ The electronic instrument is faulty - replace it.
◆ Electronic instrument DMC15 The last led of the display is flashing	⇨ DewPoint too high - see specific point. ⇨ The T1 DewPoint probe is faulty - replace it. ⇨ The electronic instrument is faulty - replace it.

8.3 Maintenance operation on the refrigeration circuit

Maintenance and service on refrigerating systems must be carried out only by certified refrigerating engineers only, according to local rules.
All the refrigerant of the system must be recovered for its recycling, reclamation or destruction.
Do not dispose the refrigerant fluid in the environment.

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

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

Characteristics of refrigerants used:

Refrigerant	Chemical formula	TLV	GWP
R134a - HFC	CH2FCF3	1000 ppm	1300
R407C - HFC	R32/125/134a (23/25/52) CHF2CF3/CH2F2/CH2FCF3	1000 ppm	1653

8.4 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	R407C, R134a, Oil
Canopy and Supports	Carbon steel, Epoxy paint
Refrigerating compressor	Steel, Copper, Aluminium, Oil
Alu-Dry Module	Aluminium
Condenser Unit	Aluminium, Copper, Carbon steel
Pipe	Copper
Fan	Aluminium, Copper, Steel
Valve	Brass, Steel
Electronic Level Drain	PVC, Aluminium, Steel
Insulation Material	Synthetic rubber without CFC, Polystyrene, Polyurethane
Electric cable	Copper, PVC
Electric Parts	PVC, Copper, Brass

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

9 Attachments

Exploded views – List of components

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

Electric diagrams – List of components

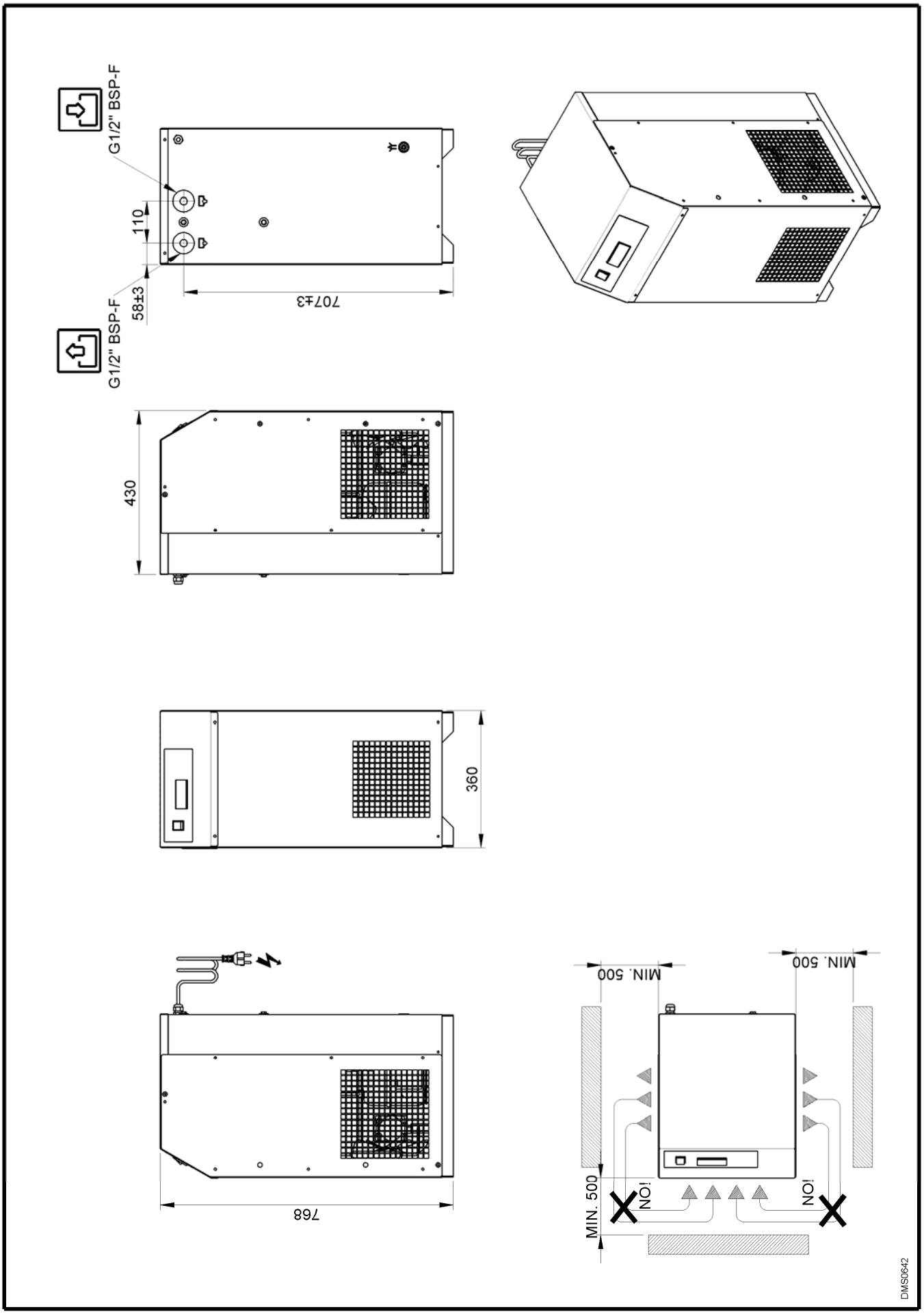
MC1	Compressor
KT	Compressor thermal protection
KR	Compressor starting relay
CS	Compressor starting capacitor
CR	Compressor operating capacitor
MV1	Condenser fan
KV	Fan thermal protection
CV	Fan starting capacitor
DMC15	Electronic instrument
BT1-2	Temperature probes
LPS	Low pressure switch
HPS	High pressure switch
PV	Pressure switch – fan control
TS	Safety thermo switch
EVD	Timed condensate drain solenoid valve
ELD	Electronic drainer
S1	ON-OFF switch
QS	Main switch with door block
RC	Compressor crankcase heater
BOX	Electrical box

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

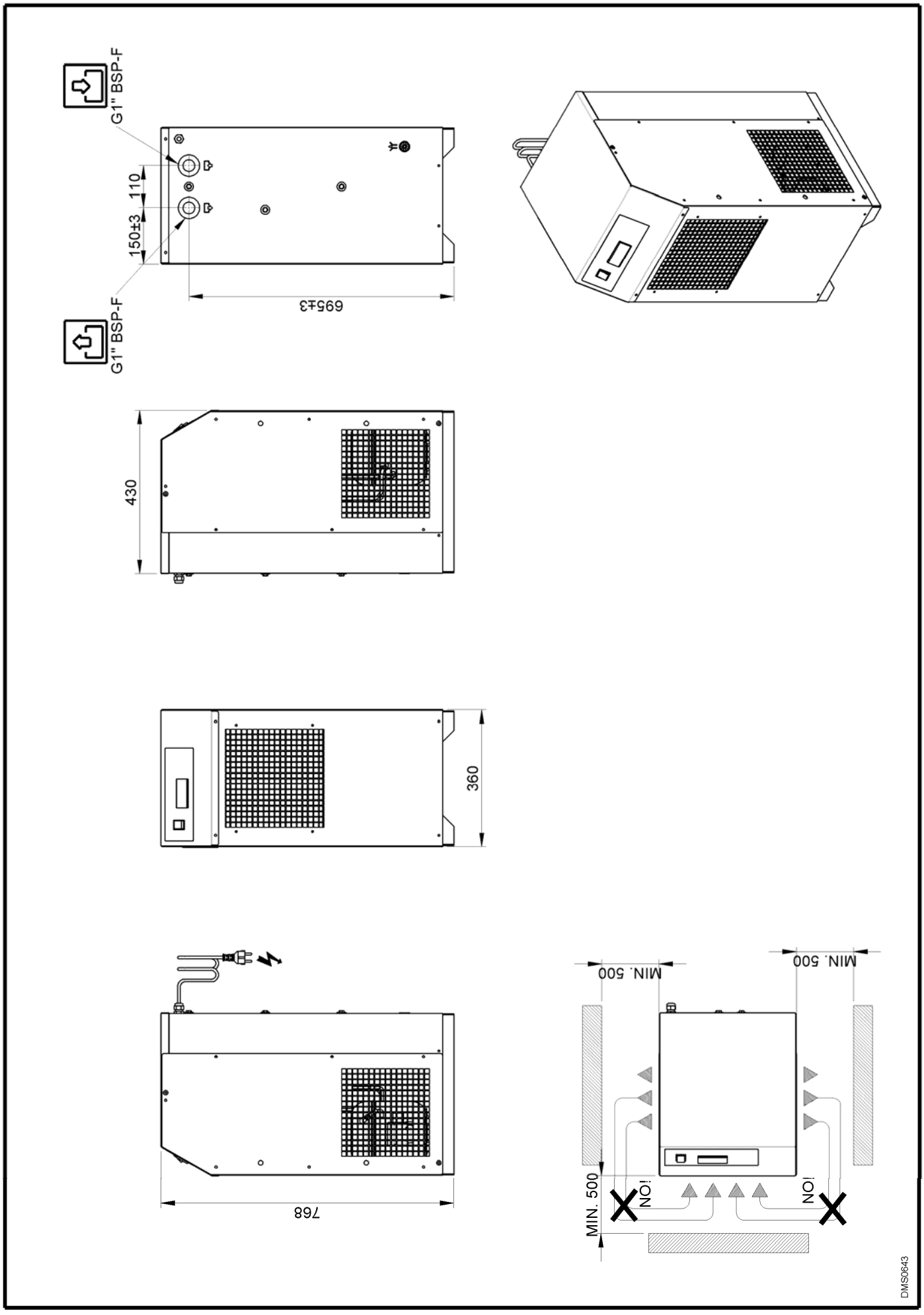
BN	Brown
BU	Blue
BK	Black
YG	Yellow / Green
OR	Orange
RD	Red
WH	White
WH/BK	White / Black

9.1 Dryers dimensions

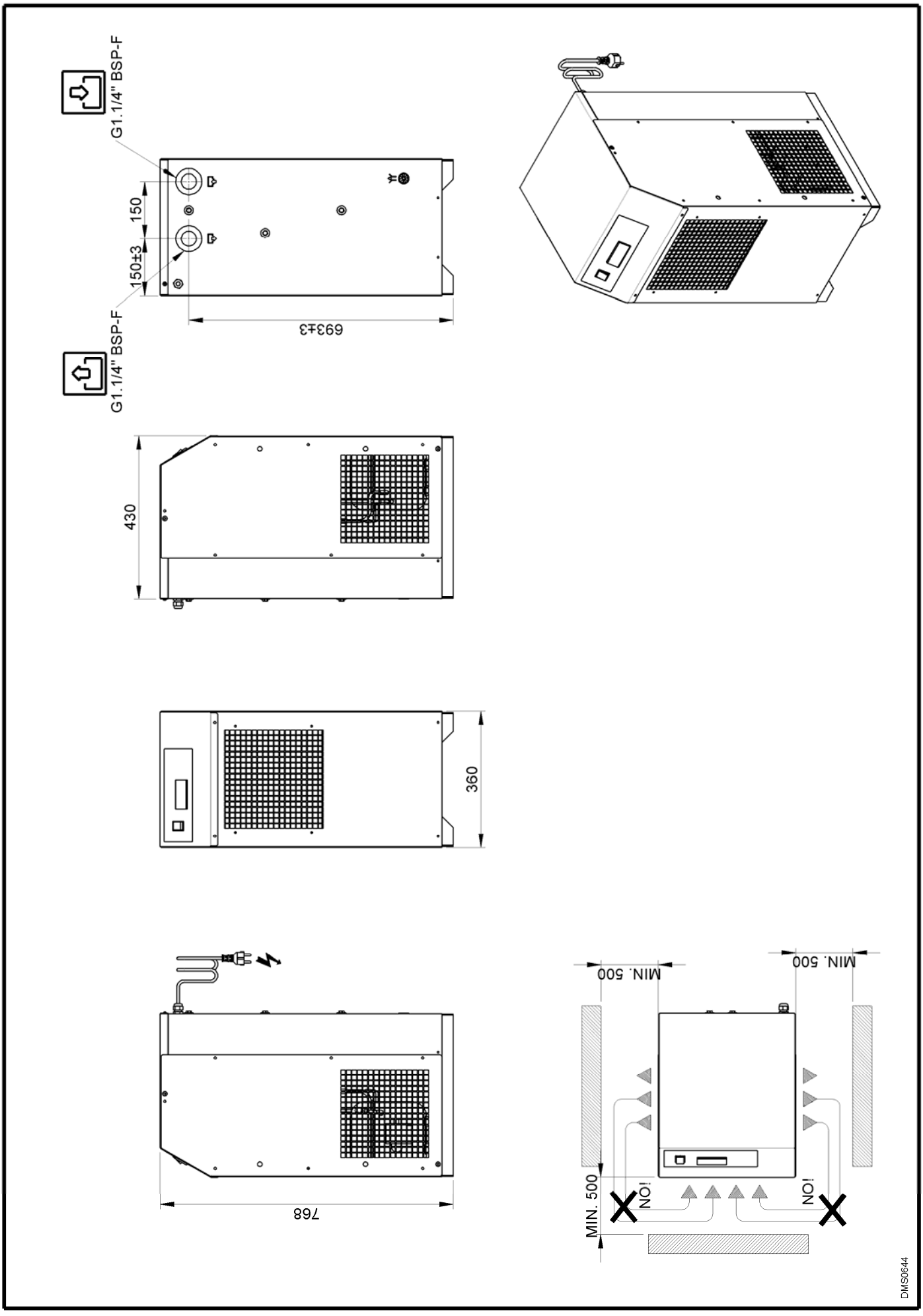
9.1.1 PS 6.A – 18.A



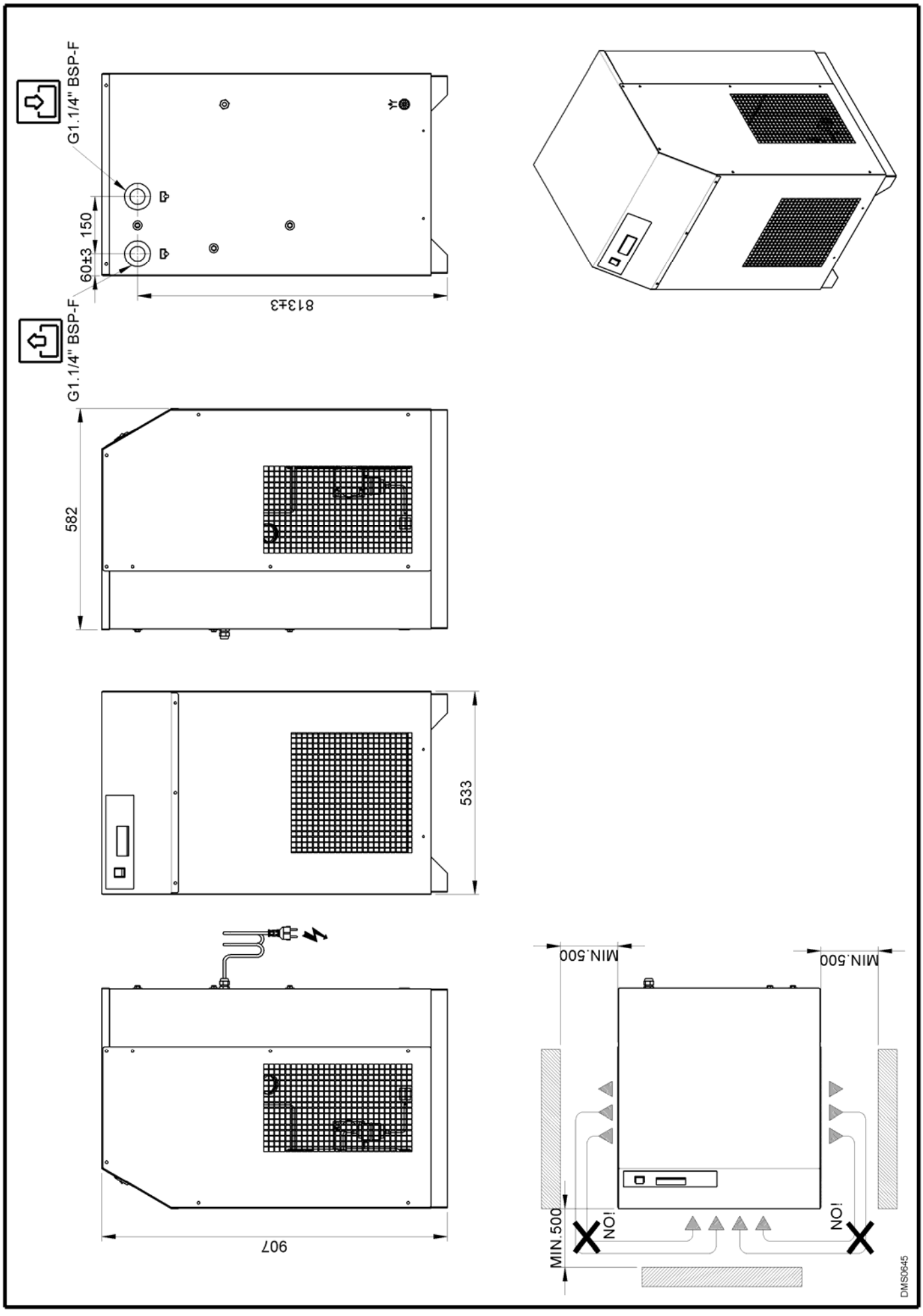
9.1.2 PS 25.A


G1" BSP-F
110
150±3
G1" BSP-F
430
360
768
MIN. 500
MIN. 500
MIN. 500
NO!
NO!
DMS0643

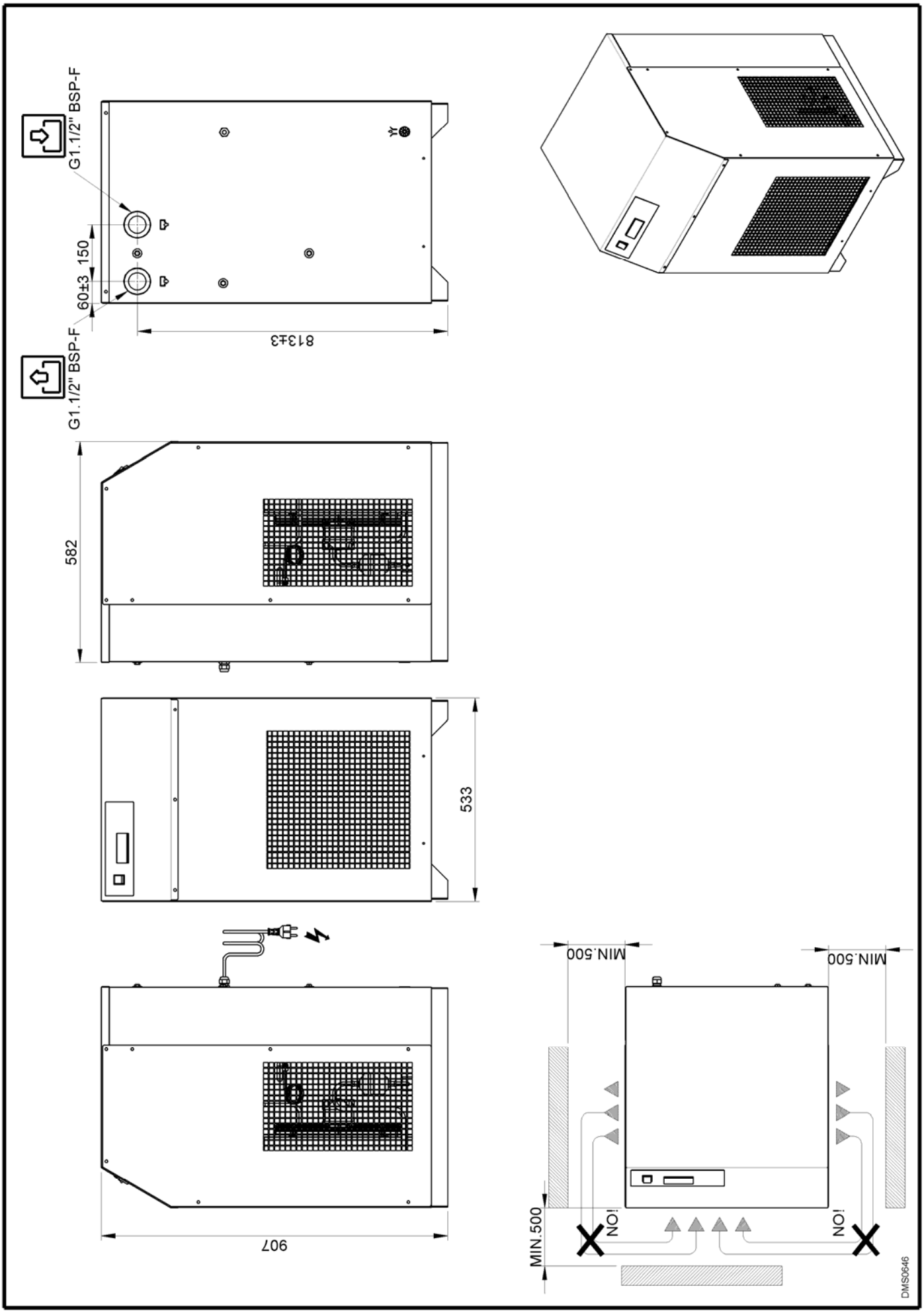
9.1.3 PS 32.A


G1.1/4" BSP-F
150
150±3
693±3
G1.1/4" BSP-F
430
360
768
MIN. 500
MIN. 500
MIN. 500
NO!
NO!
DMS0644

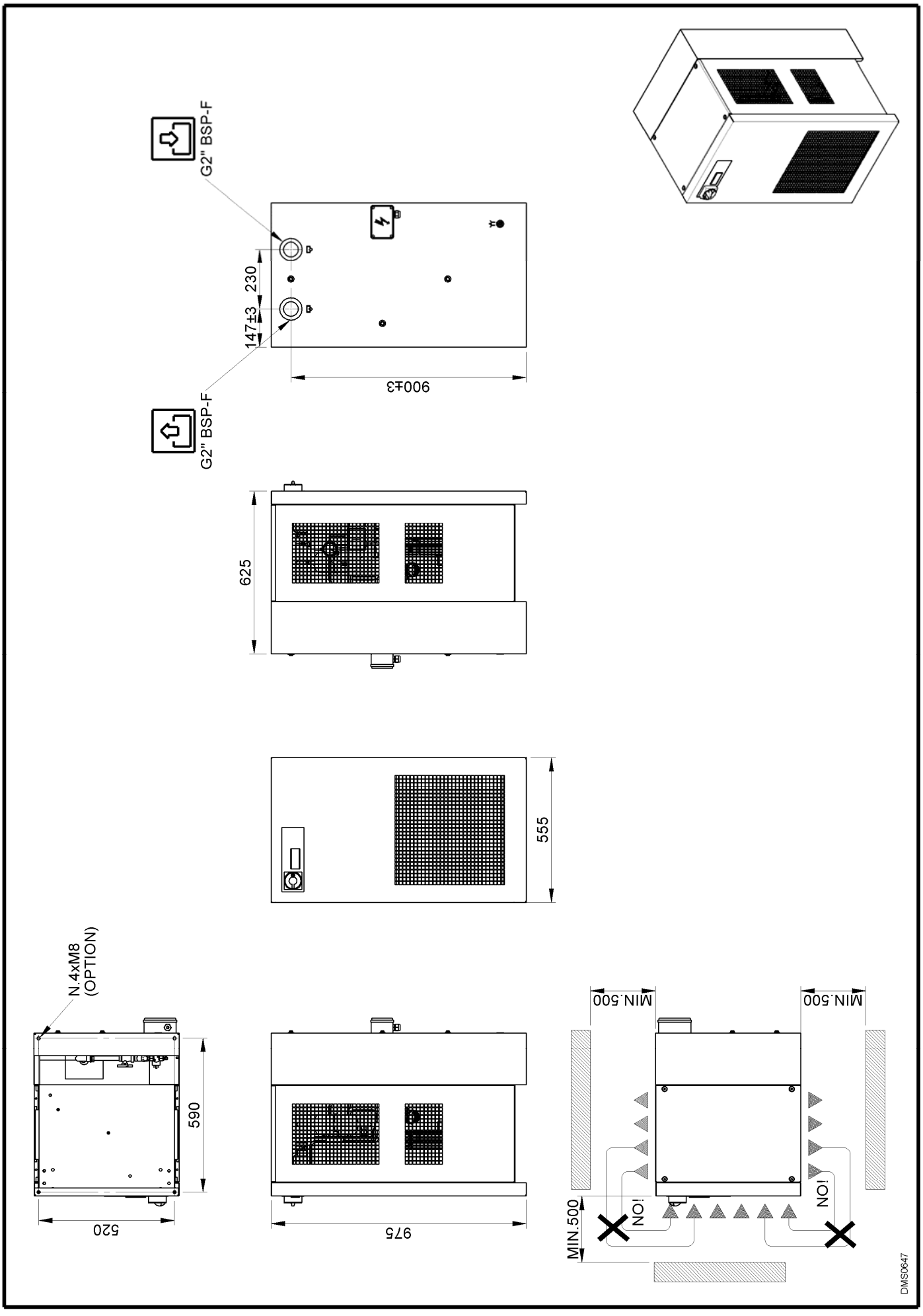
9.1.4 PS 43.A – 52.A



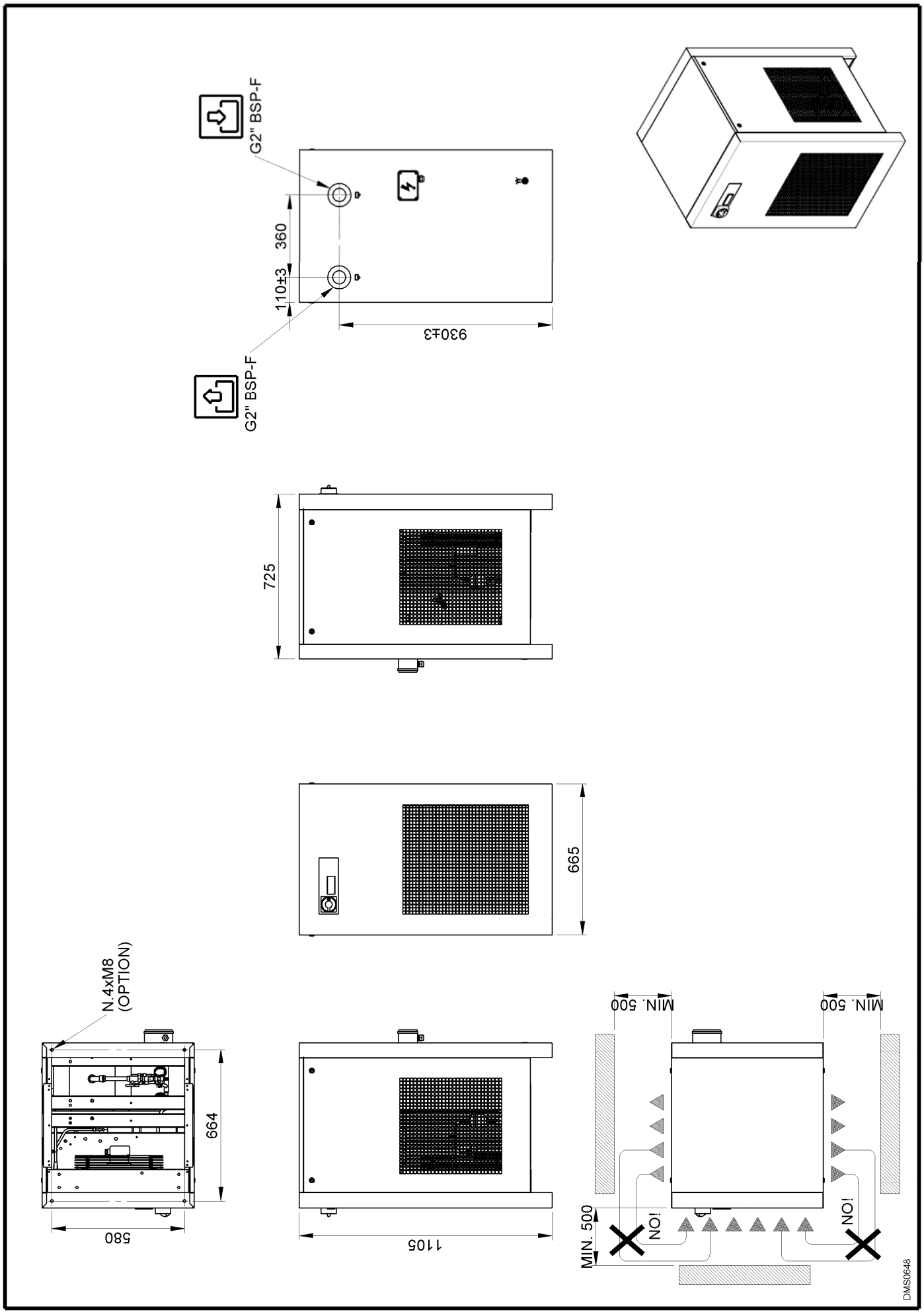
9.1.5 PS 63.A – 80.A



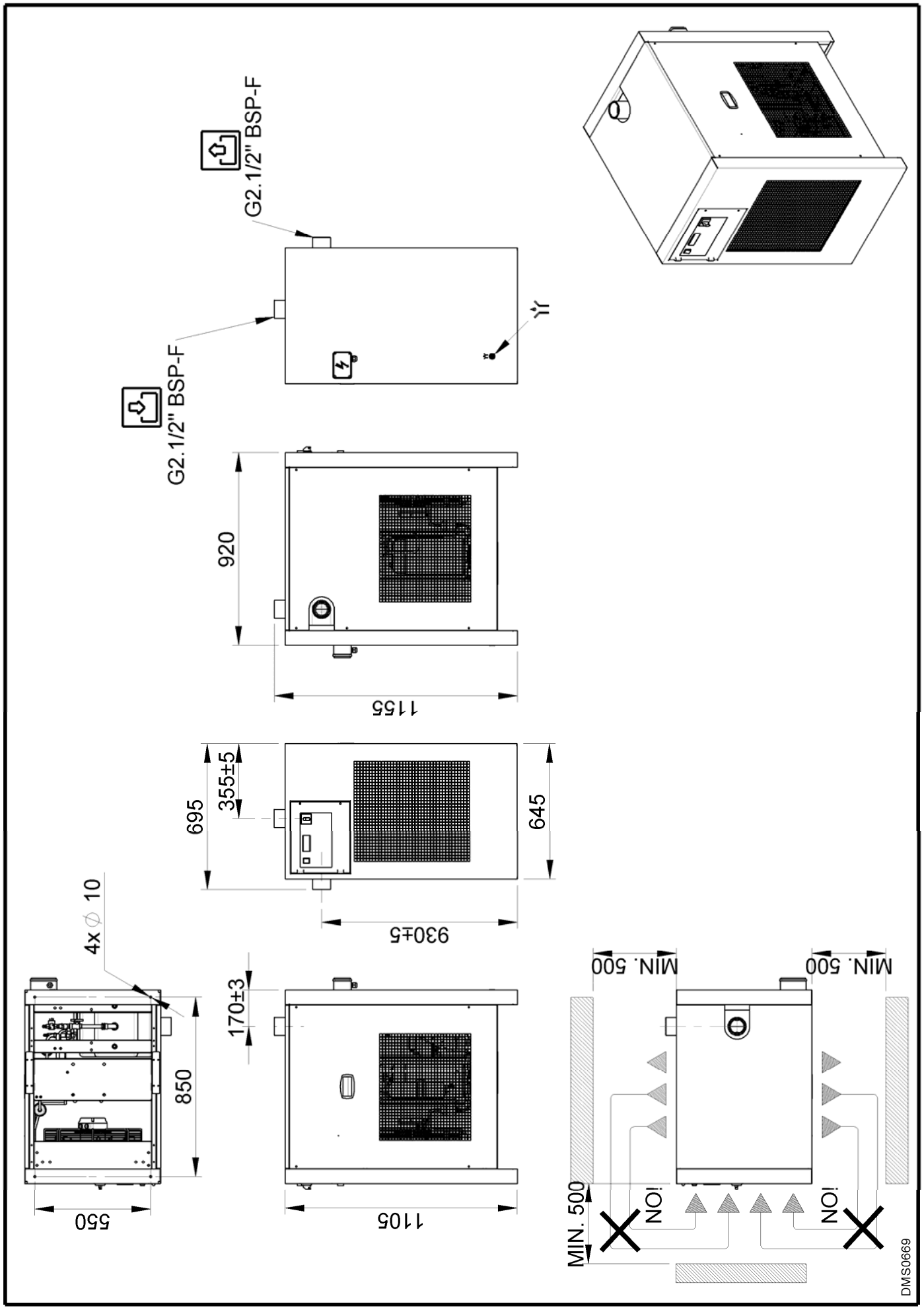
9.1.6 PS 105.A – 135.A



9.1.7 PS 168.A

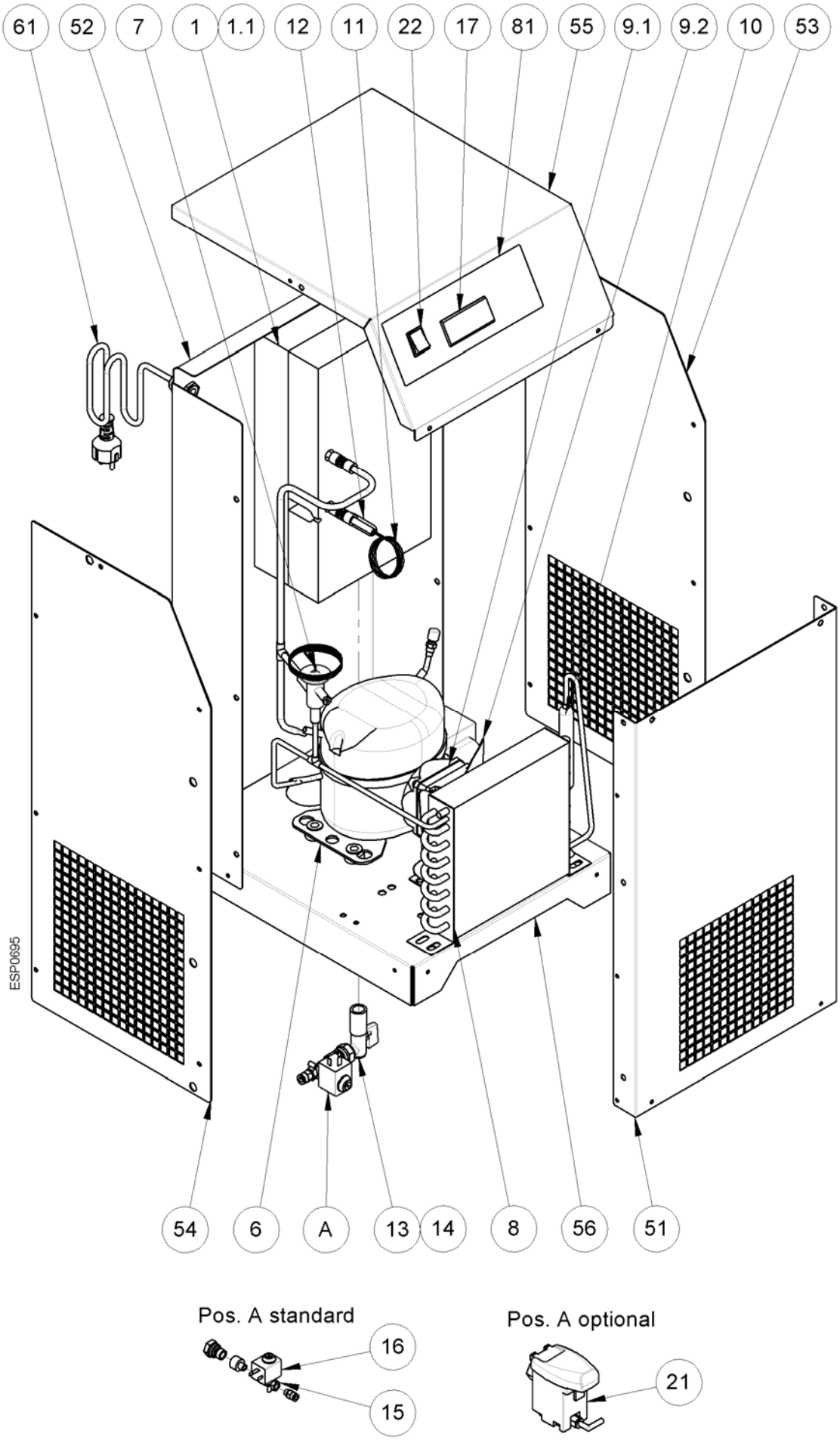

G2" BSP-F
360
110±3
930±3
G2" BSP-F
725
665
N.4xM8
(OPTION)
664
580
1105
MIN. 500
MIN. 500
MIN. 500
NO!
NO!
DMS0648

9.1.8 PS 190.1 – 240.1

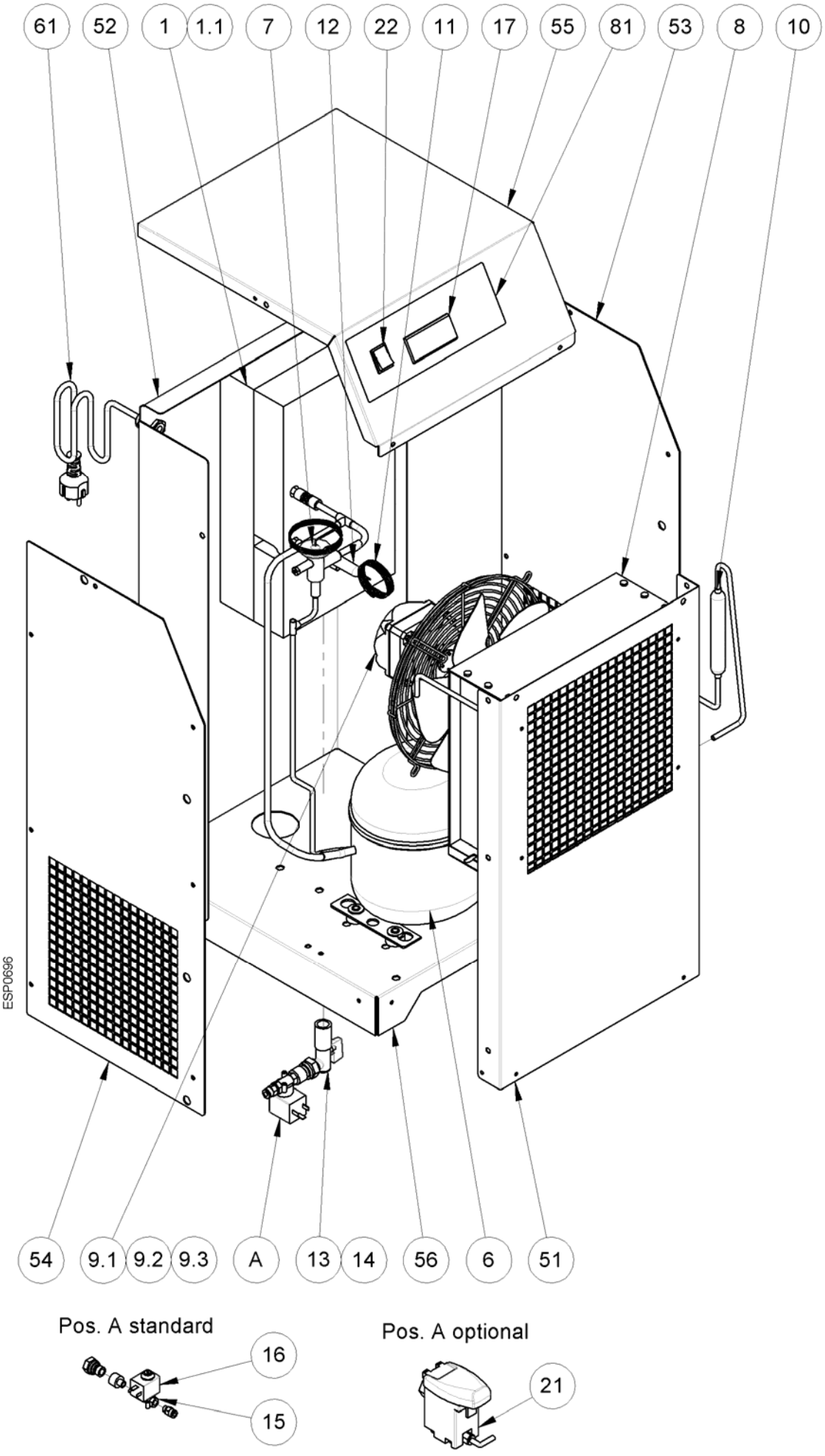


9.2 Exploded views

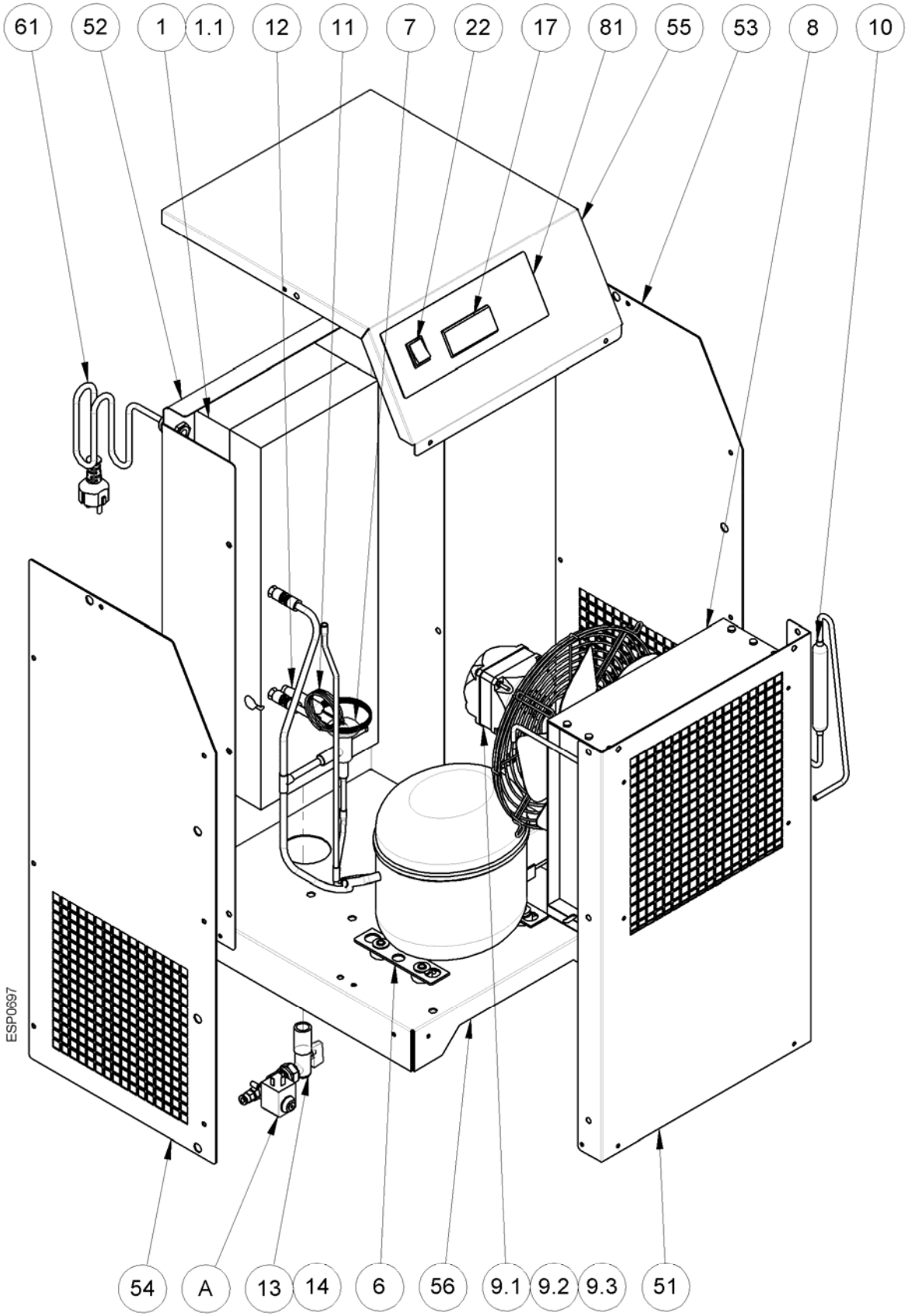
9.2.1 PS 6.A – 9.A



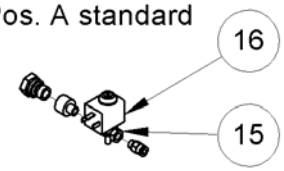
9.2.2 PS 12.A – 18.A



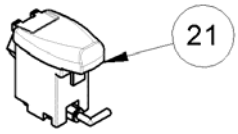
9.2.3 PS 25.A – 32.A



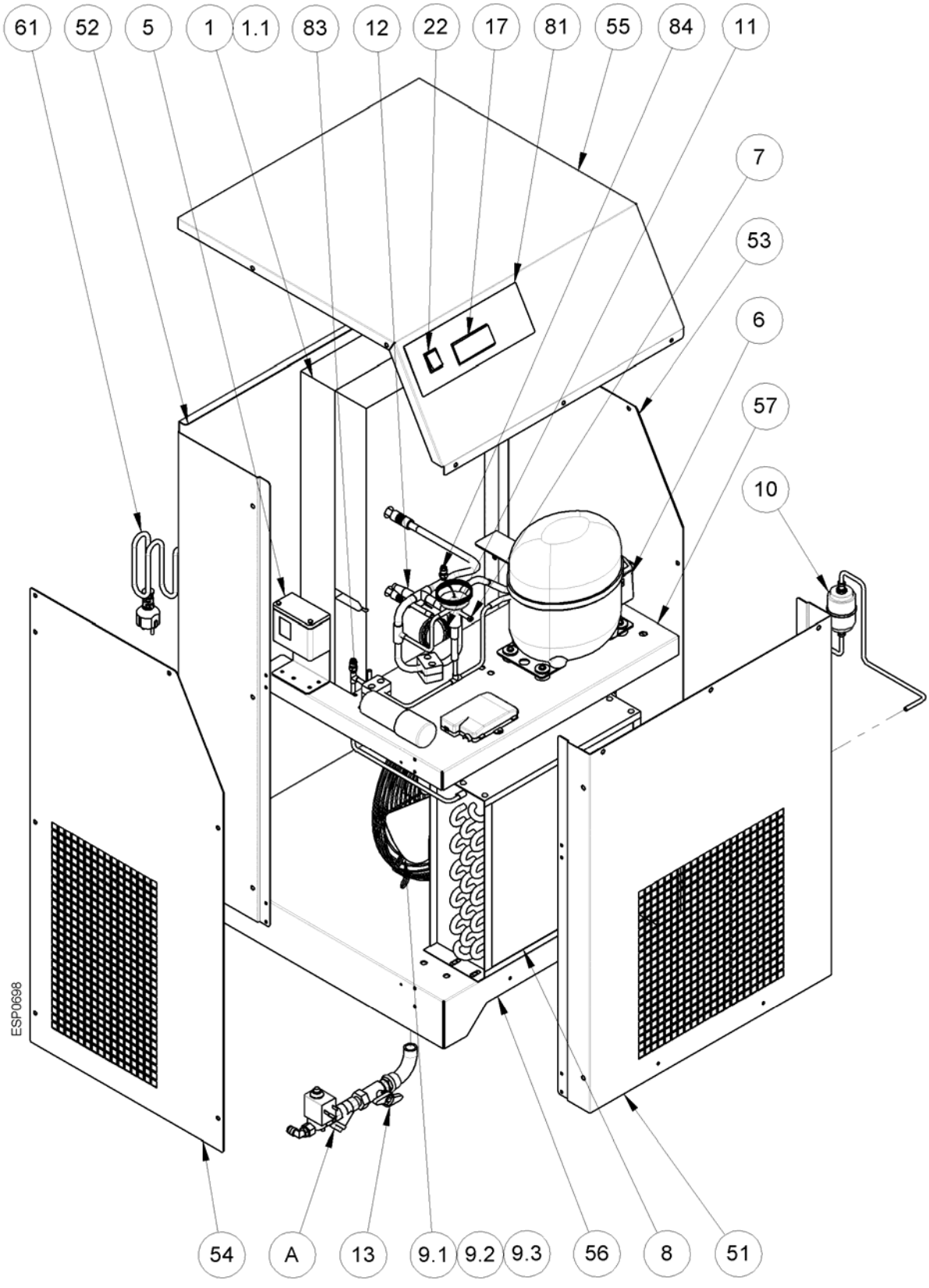
Pos. A standard



Pos. A optional



9.2.4 PS 43.A


61
52
5
1
1.1
83
12
22
17
81
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84
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57
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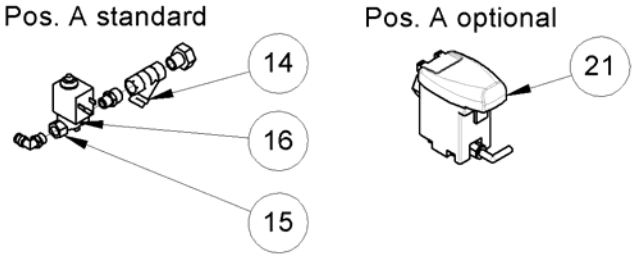
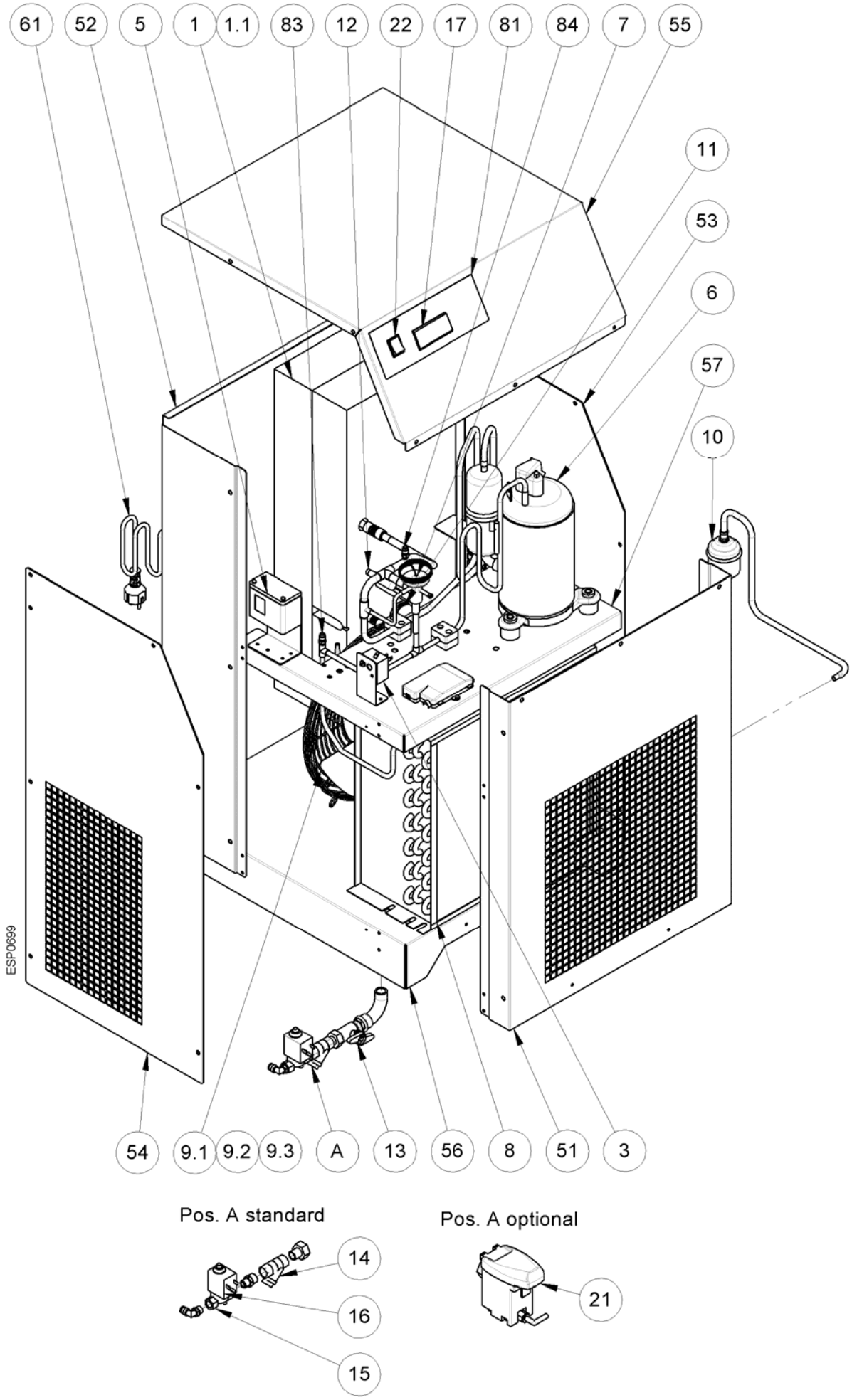
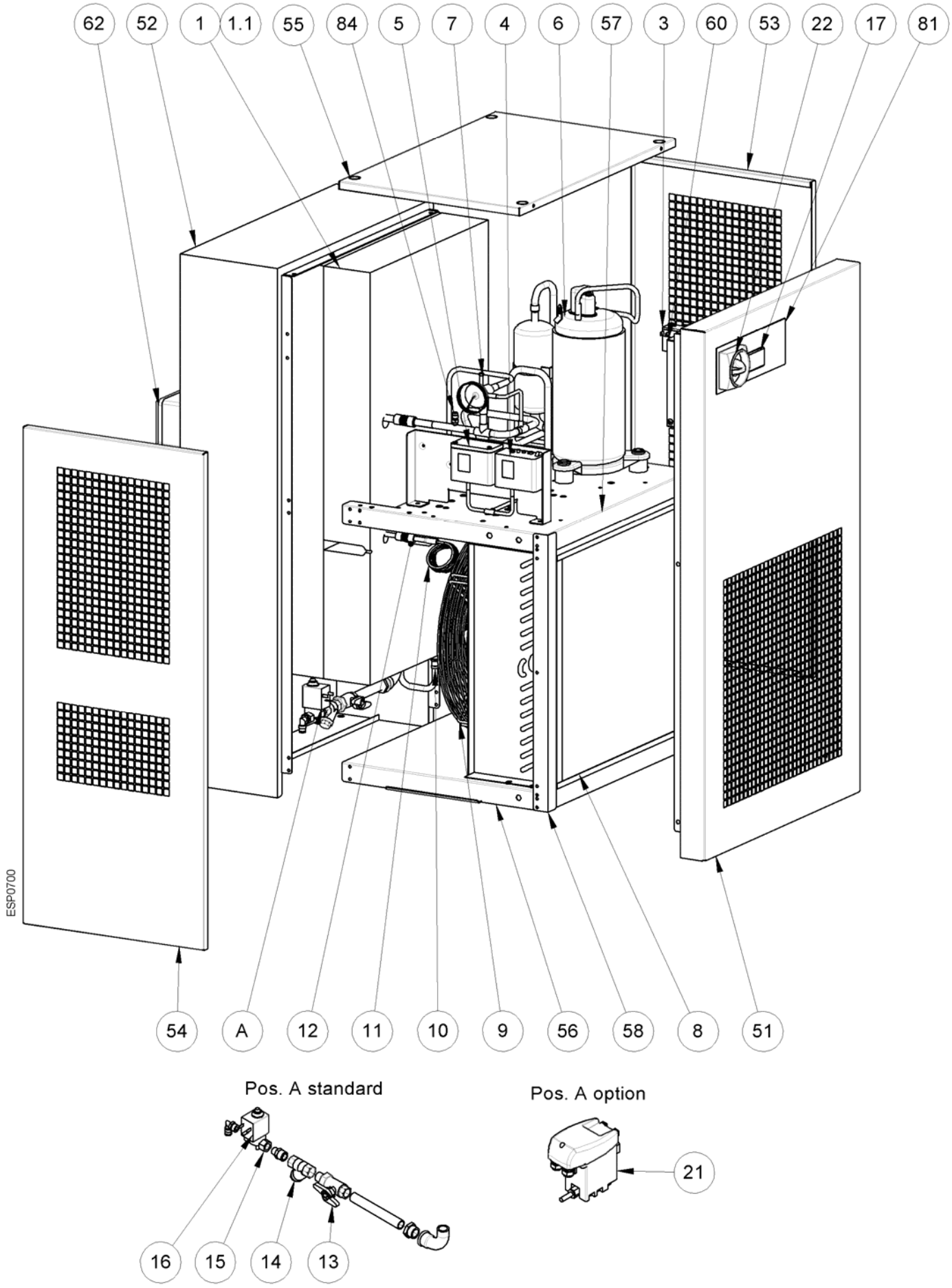
54
A
13
9.1
9.2
9.3
56
8
51


Pos. A standard
14
16
15
Pos. A optional
21

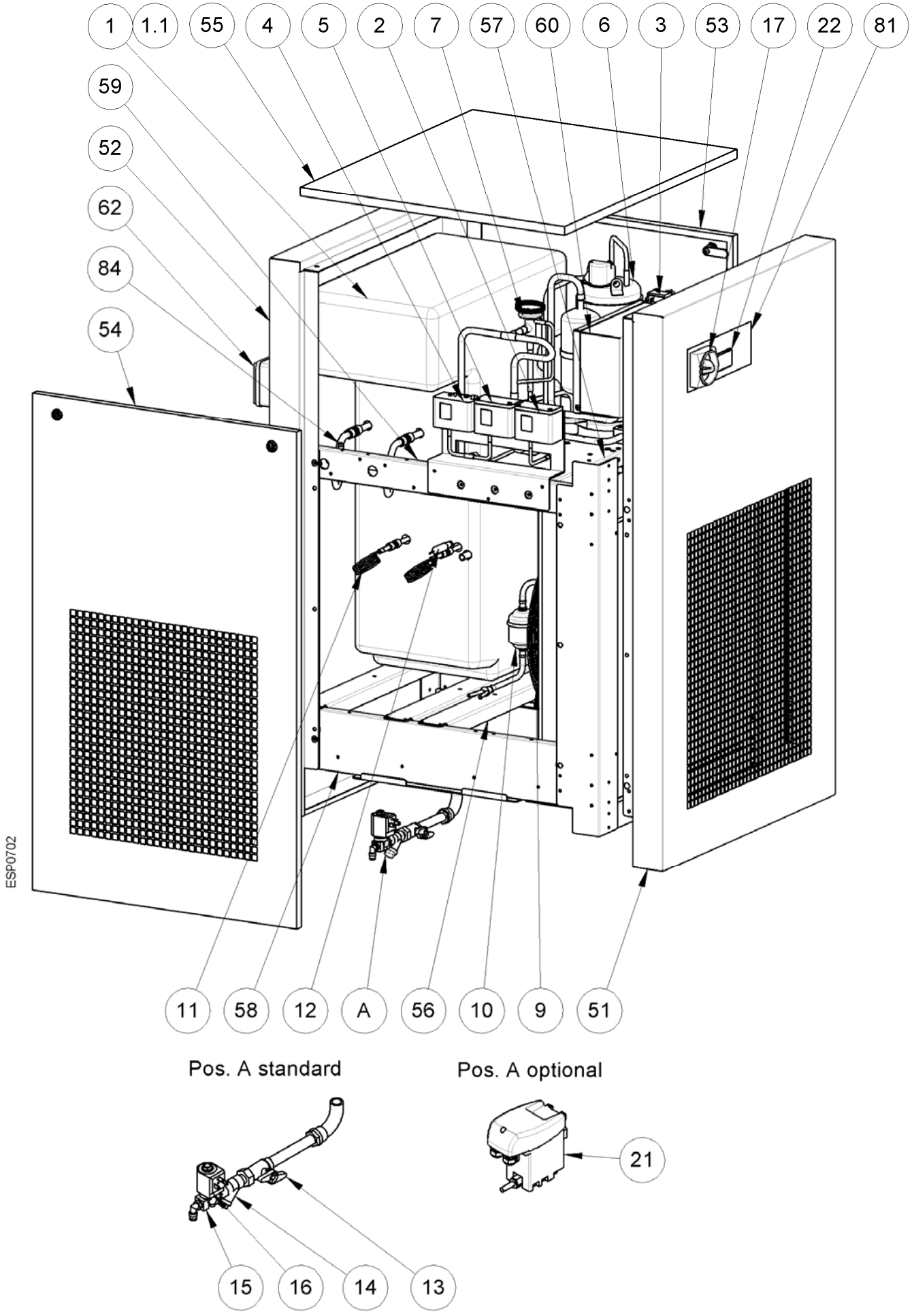
9.2.5 PS 52.A – 80.A



9.2.6 PS 105.A – 135.A



9.2.7 PS 168.A


1
1.1
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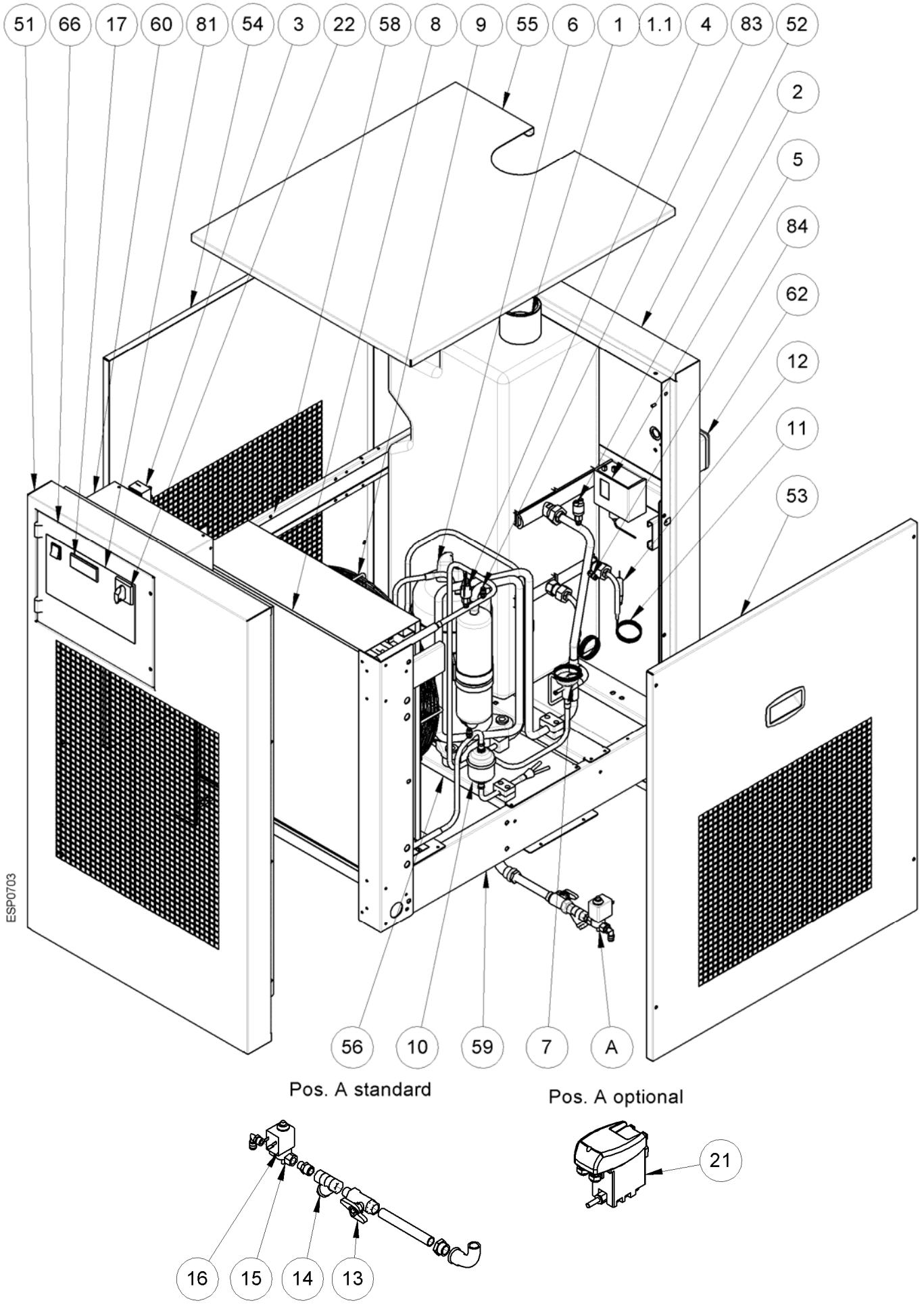
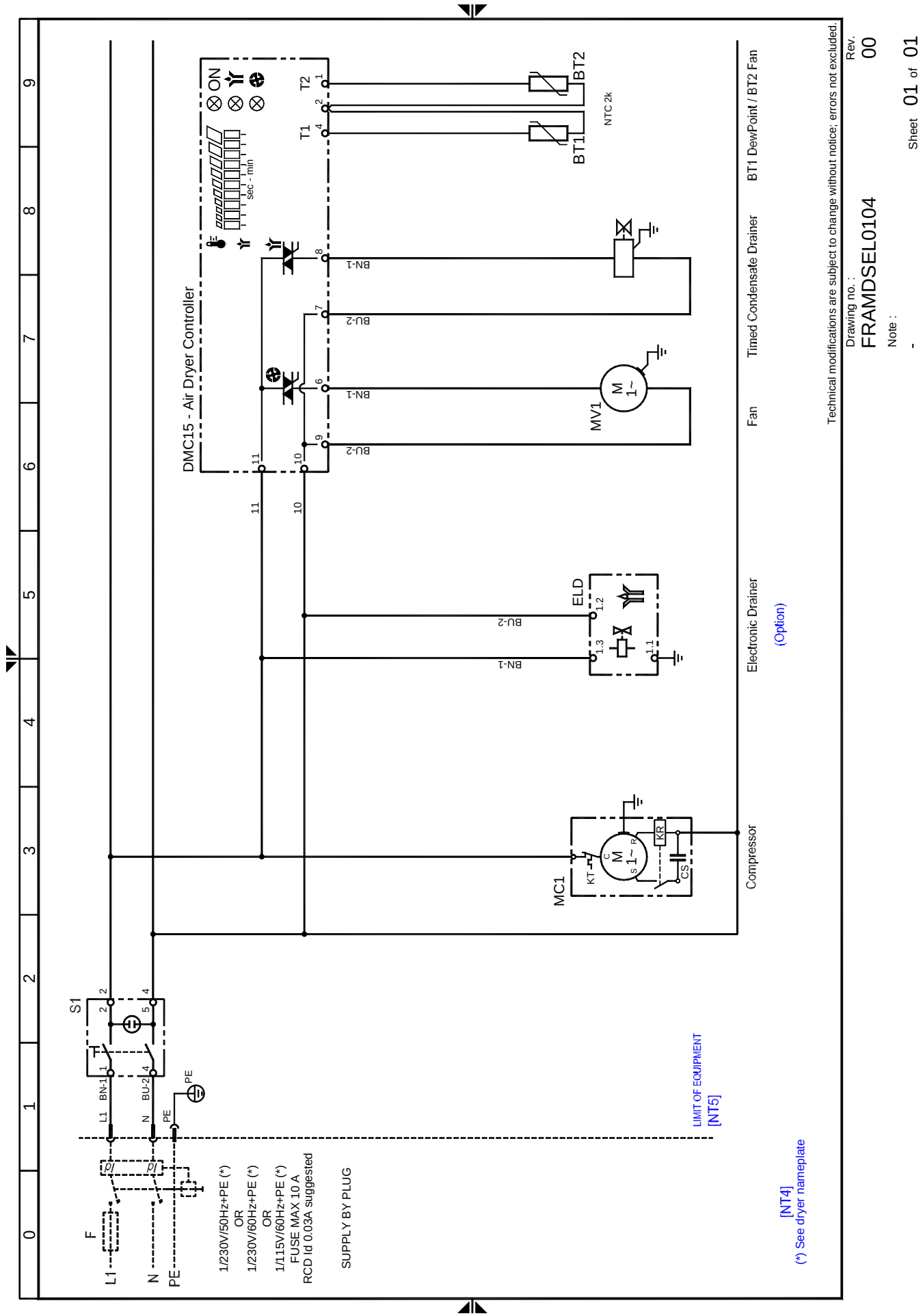
2
7
57
60
6
3
53
17
22
81
59
52
62
84
54
ESP0702
11
58
12
A
56
10
9
51
Pos. A standard
Pos. A optional
21
15
16
14
13

9.2.8 PS 190.1 – 240.1

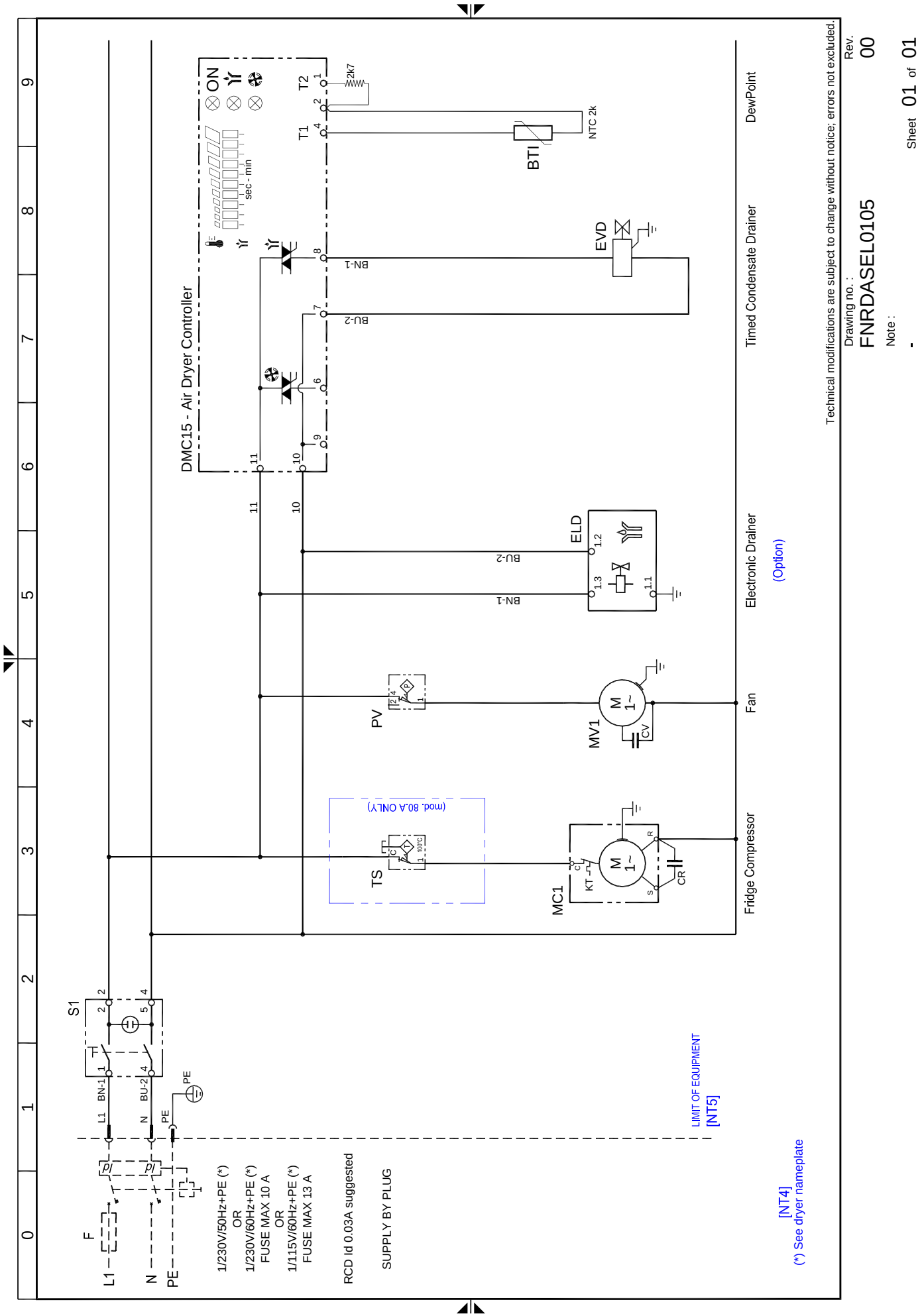


9.3 Electric diagrams

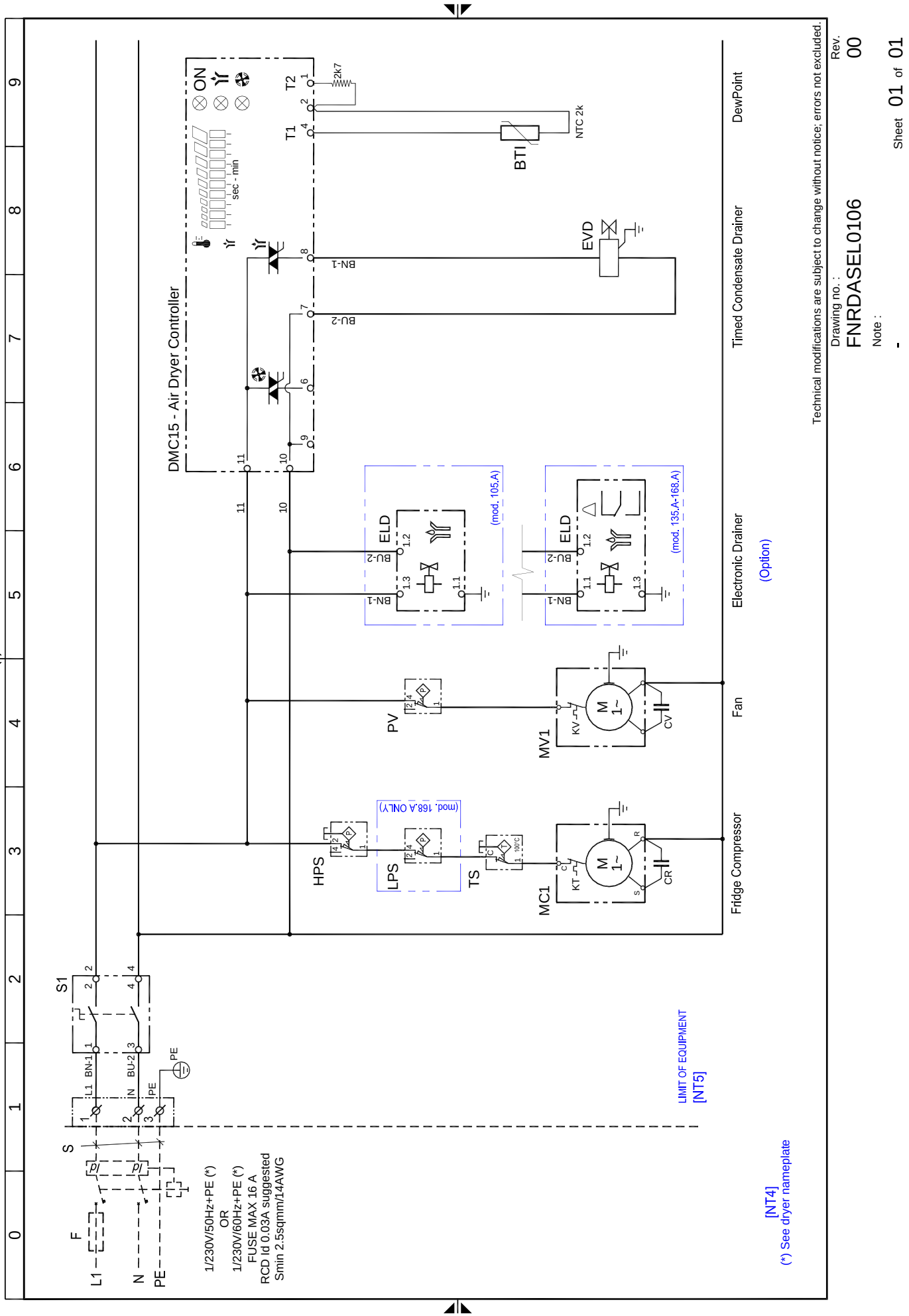
9.3.1 PS 6.A – 32.A



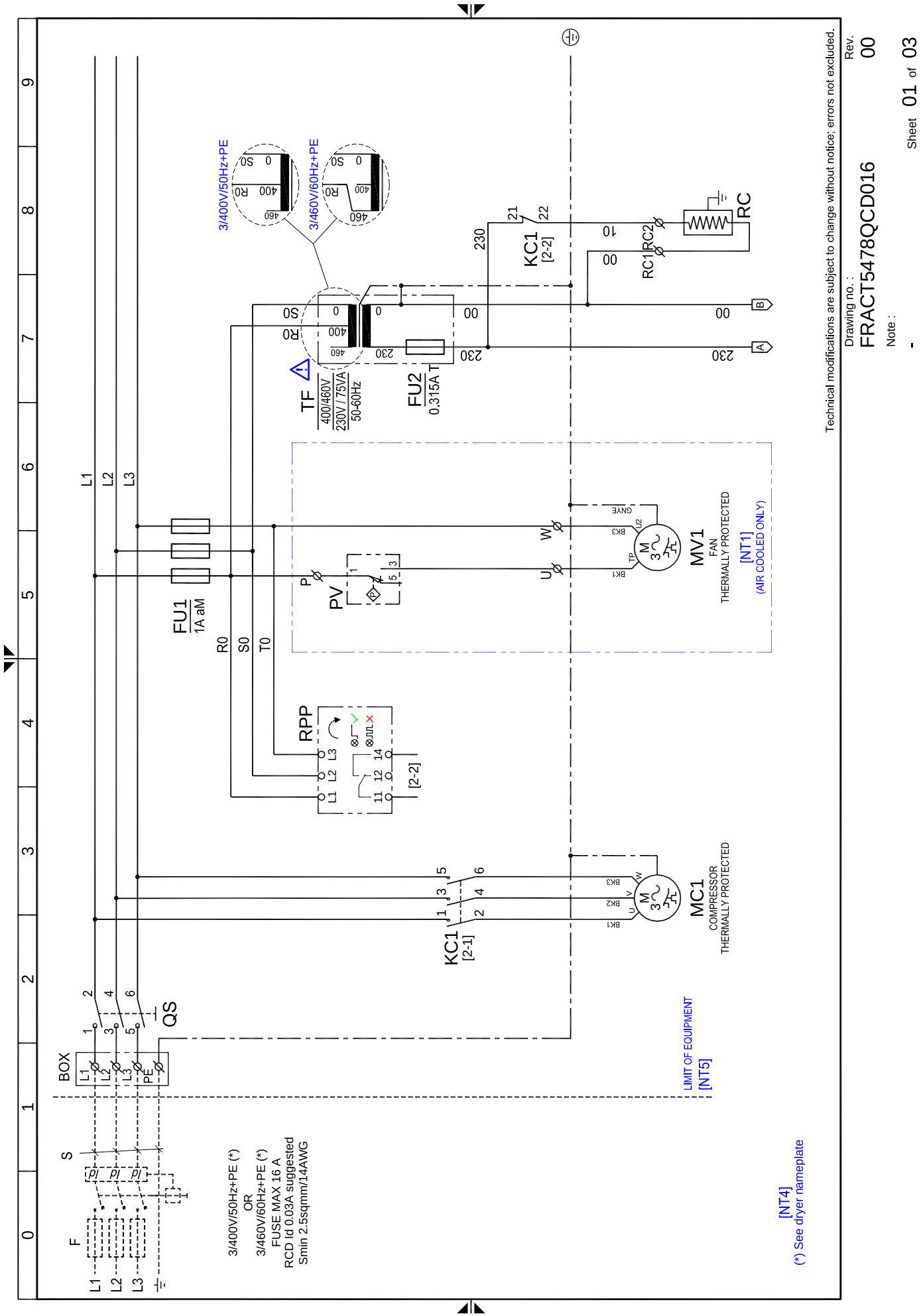
9.3.2 PS 43.A – 80.A



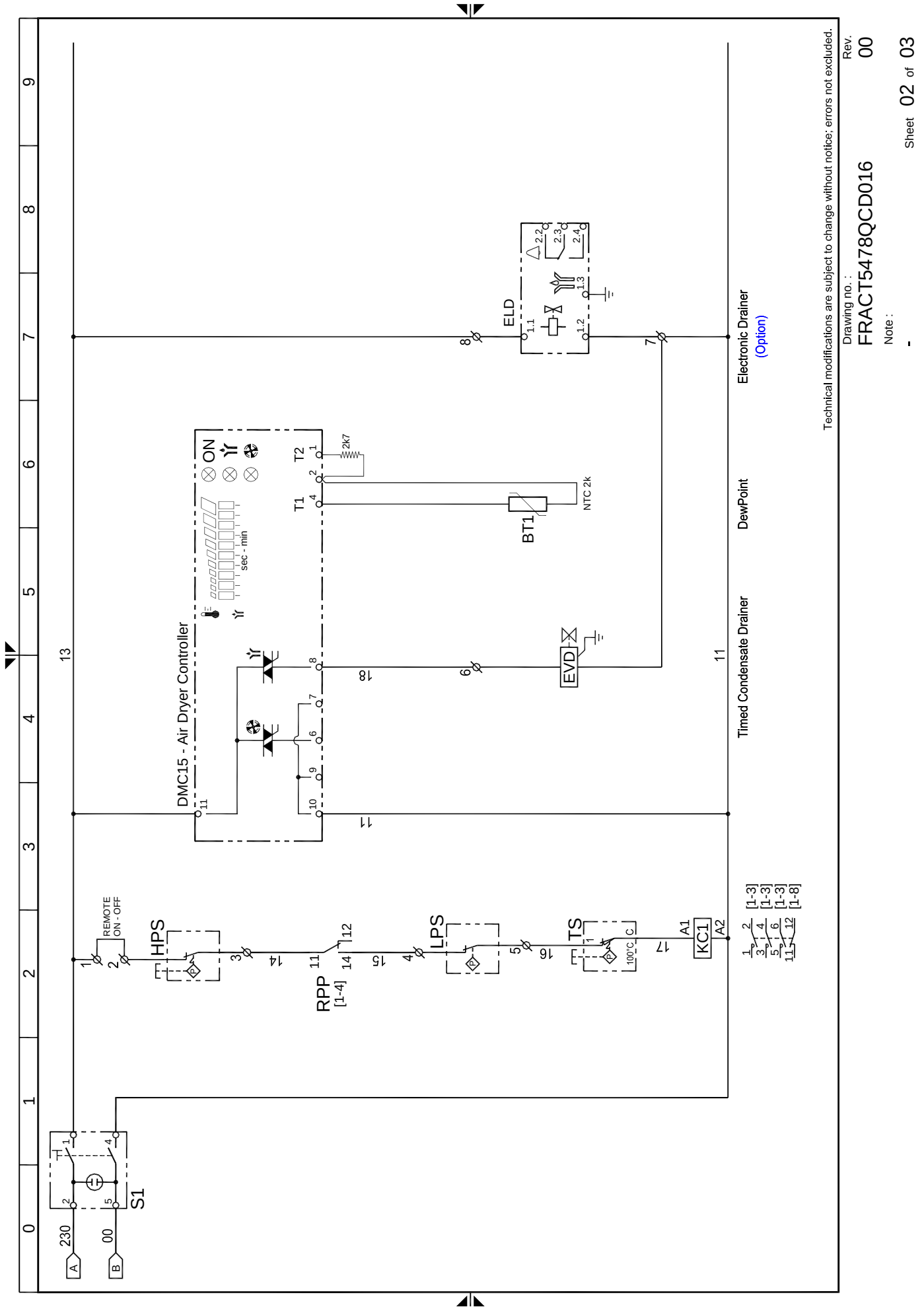
9.3.3 PS 105.A – 168.A



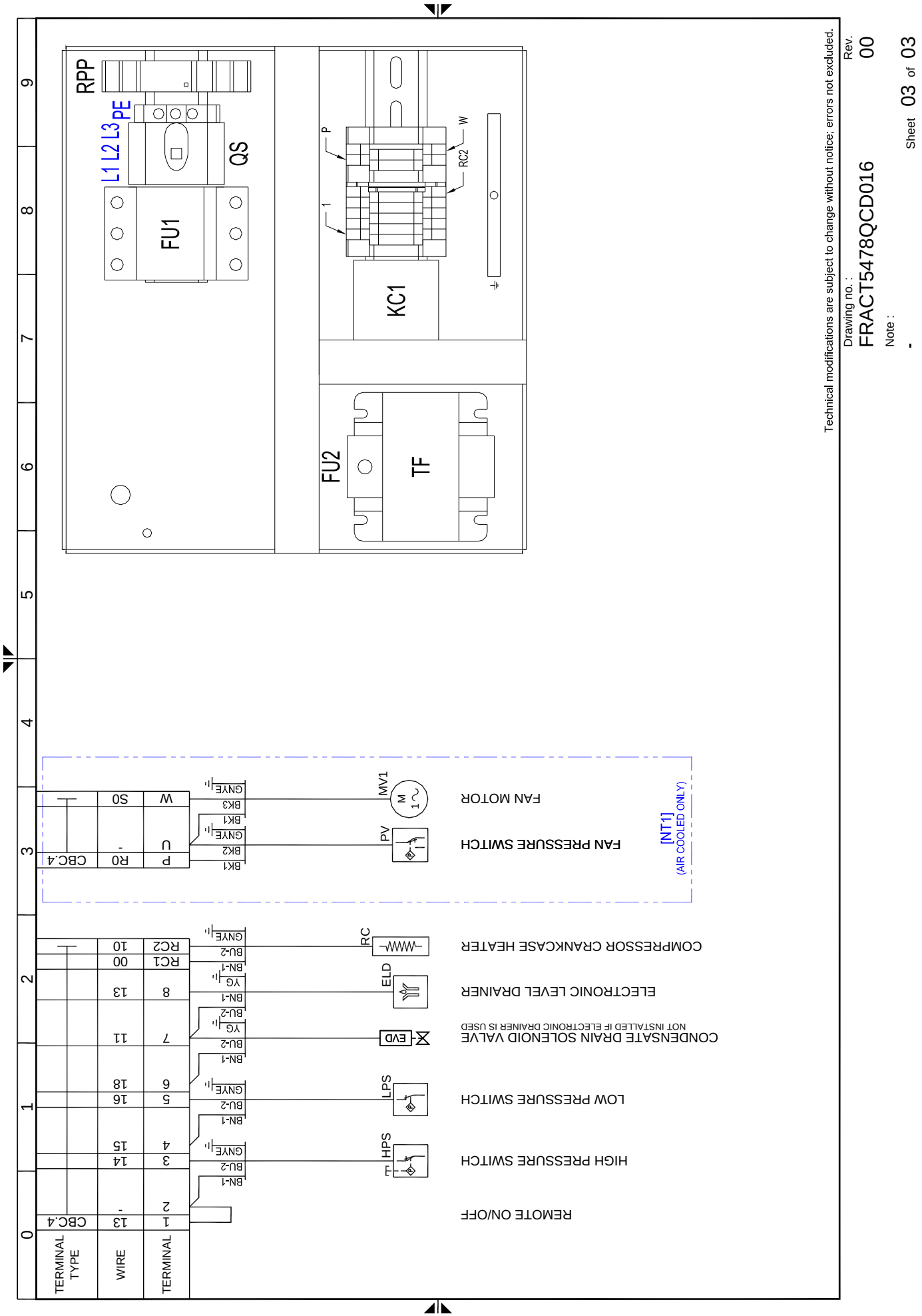
9.3.4 PS 190.1 – 240.1 sheet 1 of 3



9.3.5 PS 190.1 – 240.1 sheet 2 of 3



9.3.6 PS 190.1 – 240.1 sheet 3 of 3



10 Blank pages

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

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