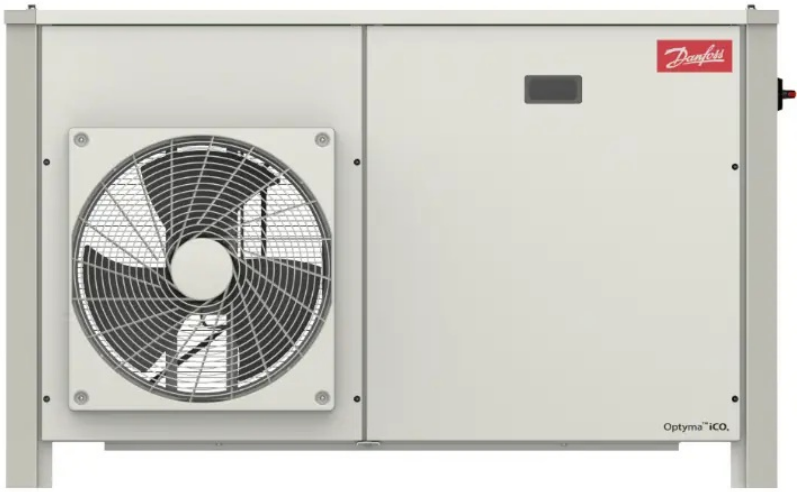
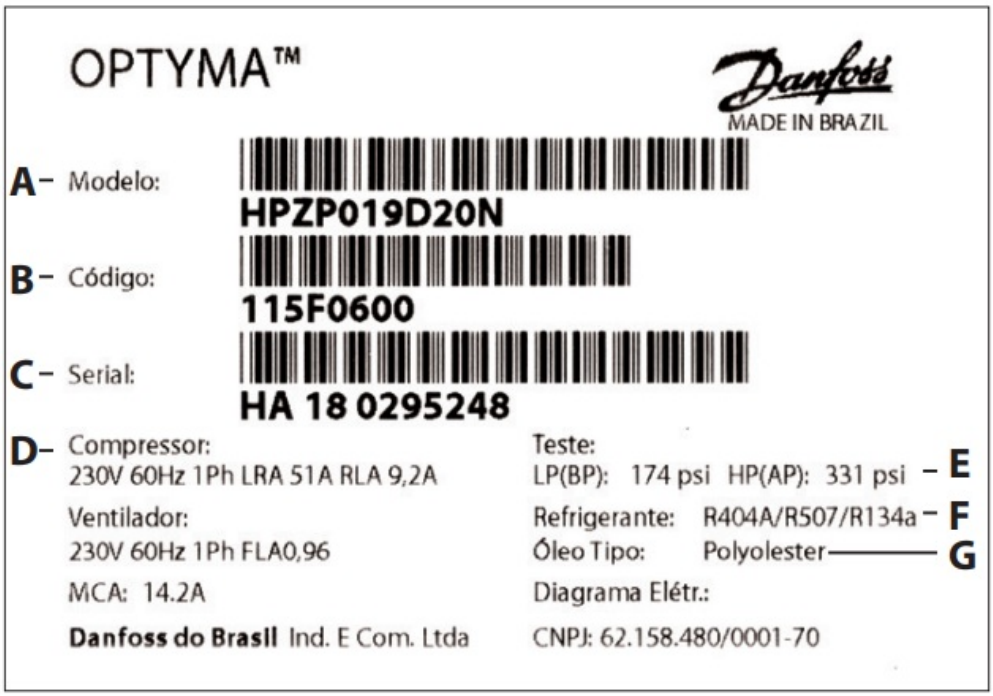
Contents [hide]

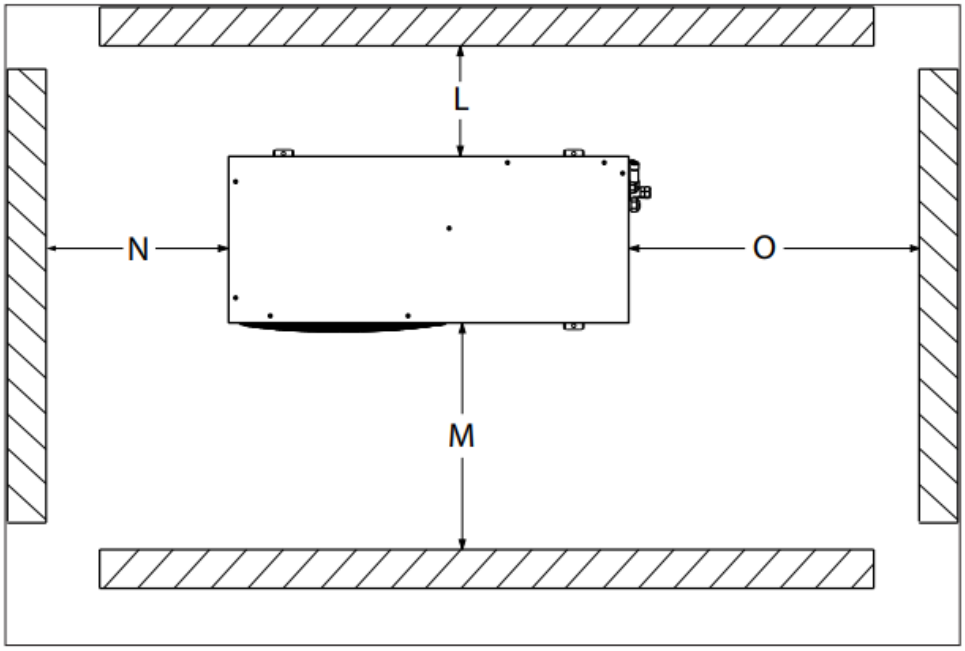
Danfoss OP-FPZP Optyma Inverter



Information



- A: Model
- B: Code number
- C: Serial Number and bar code
- D: Supply voltage, Locked Rotor Ampere
- E: Housing Service Pressure
- F: Refrigerant
- G: Oil



Picture 1 : Minimum mounting distances

L [mm]	M [mm]	N [mm]	O [mm]
250	650	550	550

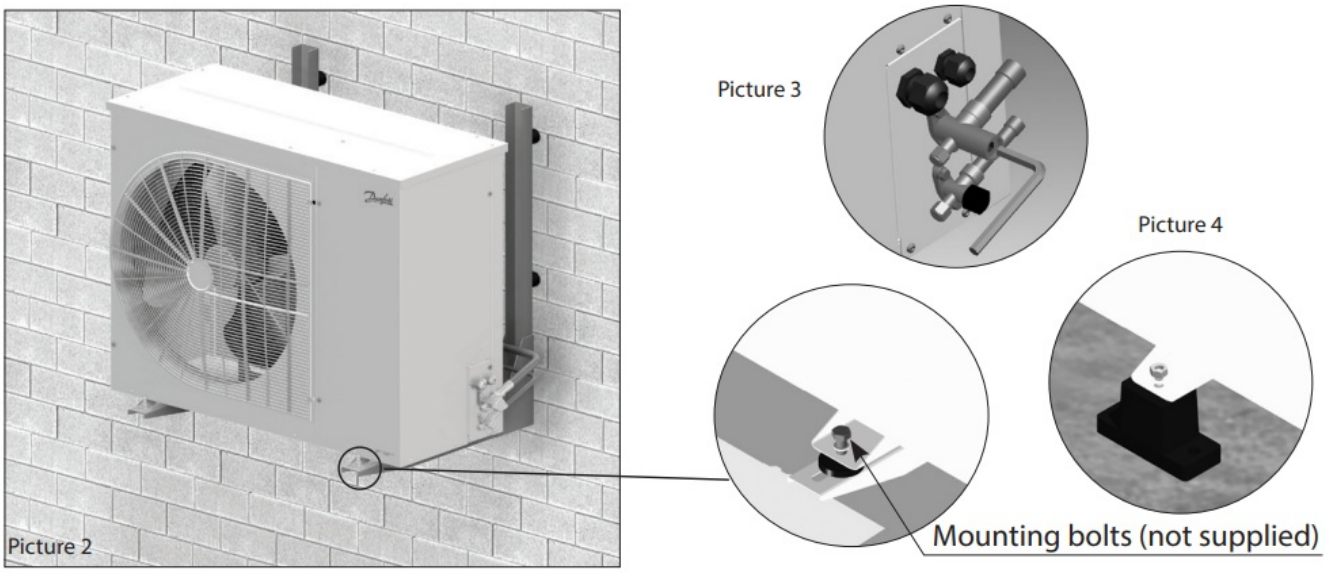
Installation and servicing of the condensing units by qualified personnel only. Follow these instructions and sound refrigeration engineering practice relating to installation, commissioning, maintenance and service.

The condensing unit must only be used for its designed purpose(s) and within its scope of application.

Under all circumstances, the EN378 (or other applicable local safety regulation) requirements must be fulfilled.

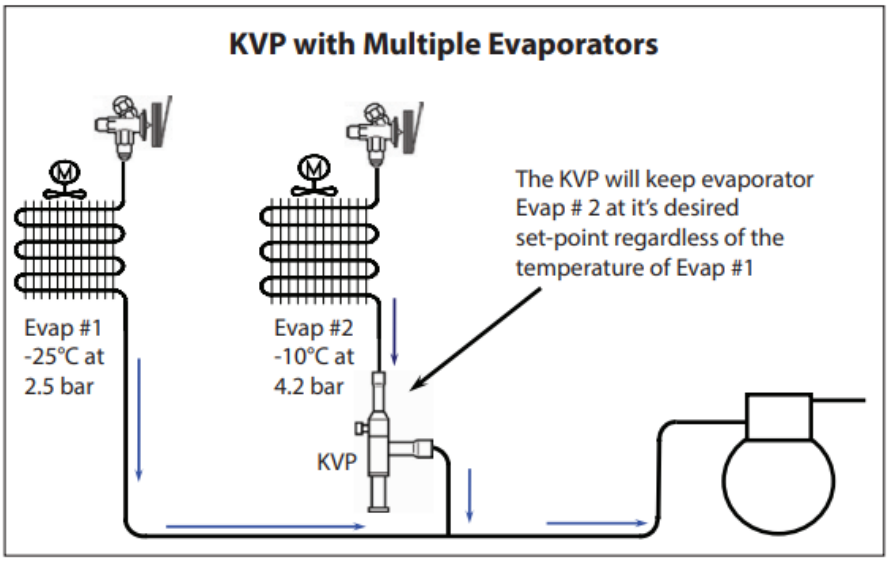
The condensing unit is delivered under nitrogen gas pressure (1 bar), and hence it cannot be connected as it is; refer to the «installation» section for further details.

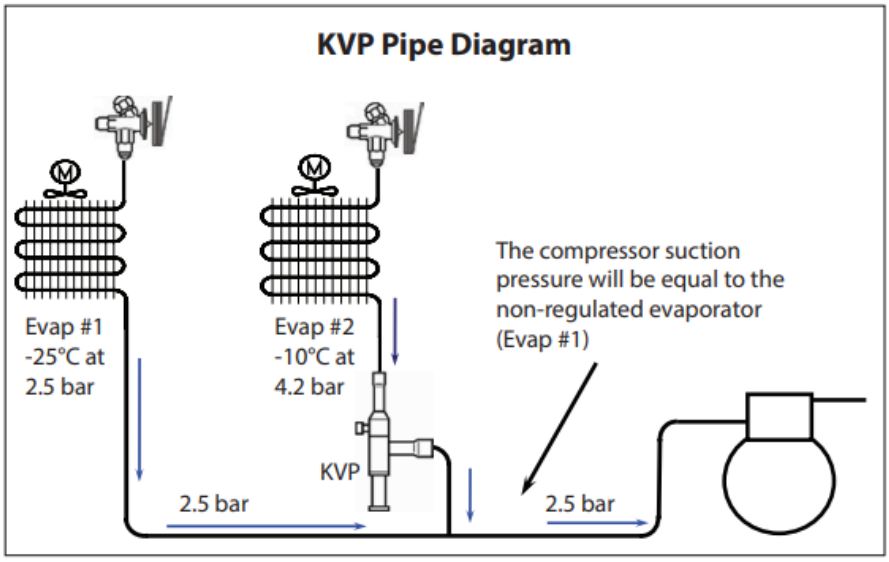
The condensing unit must be handled with caution in the vertical position (maximum offset from the vertical: 15°)



Danfoss Optyma™ INVERTER can work with more than one cold room, once these conditions are met:

- If the chambers have different operating setpoints (different evaporation temperatures, such as, for example, a cooling chamber and a freezing chamber), it is mandatory to use a KVP valve according to the diagram below. In case of any doubts, please refer to KVP application guide available in the Danfoss Product Store.
- The maximum value of the sum of the volumes of the evaporators operating with the same INVERTER condensing unit must not exceed 25 liters to obtain the maximum cooling capacity mentioned in the catalogue.
- Total refrigerant charge must not exceed 9.0 kg due to system pump down. The unit was designed to guarantee 40 meters of line for a total evaporator volume of 16.5 liters when operating at an evaporation temperature of -10°C.
- To obtain the maximum performance of the unit in relation to energy consumption, it is recommended to use electronic expansion valves in the refrigeration system.





Introduction

These instructions pertain to Optyma™ INVERTER condensing units OP-FPZP (R507A, R404A) used for refrigeration systems. They provide necessary information regarding safety and proper usage of This product.

The condensing unit includes following:

- Reciprocating compressor
- Microchannel heat exchanger
- Adjustable low- and High-Pressure switch
- Frequency INVERTER for Danfoss compressor
- Rotolock Valve Suction / Discharge
- Service valves Suction/ liquid
- Oil Separator

- AC Fan motor
- Weatherproof housing
- Filter drier
- Crankcase heater for the compressor
- Receiver with stop valve
- Sight glass
- Fully pre-wired electrical panel (Contactor)

Handling and storage

- It is recommended not to open the packaging before the unit is at its final place for installation.
- Handle the unit with care. The packaging allows for the use of a forklift or pallet jack. Use appropriate and safe lifting equipment.
- Store and transport the unit in an upright position.
- Store the unit between -35°C and 50°C.
- Don’t expose the packaging to rain or a corrosive atmosphere.
- After unpacking, check that the unit is complete and undamaged.

Installation precautions

- Do not braze as long as the condensing unit is under pressure.
- Never place the unit in a flammable atmosphere
- Place the unit in such a way that it is not blocking or hindering walking areas, doors, windows or similar.
- Ensure adequate space around the unit for air circulation and to open doors. Refer to picture 1 for the minimal values of distance to walls.
- Avoid installing the unit in aggressive and dusty environments.
- Ensure a foundation with a horizontal surface (less than 3° slope), strong and stable enough to carry the entire unit weight and to eliminate vibrations and interference.
- The unit ambient temperature may not exceed 50°C during off-cycle.
- Ensure that the power supply corresponds to the unit characteristics (see nameplate).
- When installing units for HFC refrigerants, use equipment specifically reserved for HFC refrigerants which was never been used for CFC or HCFC refrigerants.
- Use clean and dehydrated refrigeration-grade copper tubes and silver alloy brazing

material.
- Use clean and dehydrated system components.
- The suction piping connected to the condensing unit must be flexible in 3 dimensions to dampen vibrations. Furthermore, piping has to be done in such a way that oil return for the compressor is ensured and the risk of liquid slug over in the compressor is eliminated.

Installation

- The unit must be securely installed on a stable and rigid support and fixed from the beginning. See picture 2.
- It is recommended to install the unit on rubber grommets or vibration dampers (not supplied).
- Slowly release the nitrogen holding charge through the schrader port.
- Connect the unit to the system as soon as possible to avoid oil contamination from ambient moisture.
- Avoid material entering into the system while cutting tubes. Never drill holes where burrs cannot be removed.
- Braze with great care using state-of-the-art technique and vent piping with nitrogen gas flow.
- Connect the required safety and control devices. When the schrader port is used for this, remove the internal valve.
- It is recommended to insulate the suction pipe up to the compressor inlet minimum of 19 mm thick insulation.

Leak detection

- Never pressurize the circuit with oxygen or dry air. This could cause fire or explosion.
- Do not use dye for leak detection.
- Perform a leak detection test on the complete system.
- The maximum test pressure is 32 bar.
- When a leak is discovered, repair the leak and repeat the leak detection.

Vacuum dehydration

- Never use the compressor to evacuate the system.
- Connect a vacuum pump to both the LP & HP sides.
- Pull down the system under a minimum vacuum value of 500 µm Hg (0.67 mbar) absolute. • Do not use a megohmmeter nor apply power to the compressor while it is under vacuum, as this may cause internal damage.

Electrical connections

- Switch off and isolate the main power supply.
- Ensure that the power supply can not be switched on during installation.
- All electrical components must be selected as per local standards and unit requirements.
- Refer to the wiring diagram for electrical connection details.
- Ensure that the power supply corresponds to the unit characteristics and that the power supply is stable (nominal voltage ±10% and nominal frequency ±2,5 Hz).
- Dimension the power supply cables according to the unit data for voltage and current.
- Protect the power supply and ensure correct earthing.
- Make the power supply according to local standards and legal requirements.
- The unit is equipped with high and low pressure switches, which directly cut the power supply to the compressor in case of activation. Parameters for high and low pressure cut-outs should be set by installing, considering the compressor model, refrigerant and application.

Filling the system

- Wear protective stuff like goggles and protective gloves.
- Never start the compressor under vacuum. Keep the compressor switched off.
- Before charging the refrigerant, verify that the oil level is between ¼ and ¾ on the compressor oil sight glass. If additional oil is required please refer to the compressor’s label for the type of oil.
- Use only the refrigerant for which the unit is designed.
- Fill the refrigerant in the liquid phase into the condenser or liquid receiver. Ensure a total System

  The charge must not exceed 9,0 kg due to the pump-down capacity of the system.
- The system is designed to guarantee 40 40-meter line distance for a maximum sum of

evaporator volume of 16.5 liters at evaporating temperature = -10°C. The maximum sum of evaporator internal volume should not exceed 25 liters.

- Do not put liquid refrigerant through the suction line.
- It is not allowed to mix additives with the oil and/or refrigerant
- The remaining charge is done until the installation has reached a level of stable nominal condition during operation.
- Never leave the filling cylinder connected to the circuit.

Verification before commissioning

- Use safety devices such as a safety pressure switch and a mechanical relief valve in compliance with both generally and locally applicable regulations and safety standards. Ensure that they are operational and properly set.
- Check that the settings of high-pressure switches and relief valves don’t exceed the maximum service pressure of any system component.

• Verify that all electrical connections are properly fastened
and in compliance with local regulations.
• The condensing unit must be energized at least
12 hours before initial start-up and start-up after
prolonged shut-down period.

Start-up

- Never start the unit when no refrigerant is charged.
- All service valves must be in the open position.See picture 3.
- Check compliance between unit and the power supply.
- Check that the crankcase heater is working and was initiated 12 hours before.
- Check that the fan can rotate freely.
- Check that the cardboard protection sheet has been removed from the backside of the condenser.
- Respect the operating limits, high pressure can not be higher than 7 bar at a temperature of 5ºC, and low pressure can not be lower than 2 bar at a temperature of -30ºC
- Turn on the unit by connecting the cables coming from the electrical panel (customer)

to the available connectors,and turn the main switch from the OFF (0) position to the ON (1) position. Its operation should start immediately. If not, follow the steps below:

Check with the running unit

- Check the fan rotation direction. Air must flow from the condenser towards the fan.
- Check the current draw and voltage.
- Check suction superheat to reduce the risk of slugging.
- When a sight glass is provided, observe the oil level at start and during operation to confirm that the oil level remains visible.
- Respect the operational limits demonstrated in the envelopes of the condensing unit in Range (T. Evap: -30ºC to 5 ° C, T. AMB: 10 ° C to 43 ° C)
- Check all tubes for abnormal vibration. Movements in excess of 1.5 mm require corrective measures such as tube brackets.
- When needed, additional refrigerant in the liquid phase may be added in the low-pressure side as far away as possible from the compressor. The compressor must be operating during this process.
- Do not overcharge the system.
- Never release refrigerant to the atmosphere.
- Before leaving the installation site, carry out a general installation inspection regarding cleanliness, noise, and leak detection.
- Record type and amount of refrigerant charge as well as operating conditions, as a reference for future inspections.

Maintenance

Always switch off the unit at the main switch before removing the fan panel. Internal pressure and surface temperature are dangerous and may cause permanent injury. Maintenance operators and installers require appropriate skills and tools. Tubing temperature may exceed 100°C and can cause severe burns. Ensure that periodic service inspections to ensure system reliability, and as required by local regulations, are performed.
To prevent system-related problems, the following

Periodic maintenance is recommended:

- Verify that safety devices are operational and properly set.
- Ensure that the system is leak-tight.
- Check the compressor current draw.
- Confirm that the system is operating in a way consistent with previous maintenance records and ambient conditions.
- Check that all electrical connections are still adequately fastened.
- Keep the unit clean and verify the absence of rust and oxidation on the unit components, tubes, and electrical connections. Check the level and color of the oil to see if it is clean and sufficient to turn on the compressor, indicating a level of 3/4 of the total capacity.

The condenser must be checked at least once a year for clogging and be cleaned if deemed necessary. Access to the internal side of the condenser takes place through the fan panel. Microchannel coils tend to accumulate dirt on the surface rather than inside, which makes them easier to clean than fin-&-tube coils.

- Switch off the unit at the main switch before removing any panels from the condensing unit.
- Remove surface dirt, leaves, bres, etc., with a vacuum cleaner, equipped with a brush or other soft attachment. Alternatively, blow compressed air through the coil from the inside out, and brush with a soft bristle. Do not use a wire brush. Do not impact or scrape the coil with the vacuum tube or air nozzle. Do not use high high-pressure washer. If the refrigerant system has been opened, the system has to be flushed with dry air or nitrogen to remove moisture and a new filter-drier has to be installed. If evacuation of refrigerant must be done, it shall be done in such a way that no refrigerant can escape to the environment.

Warranty

Always transmit the model number and serial number with any claim filed regarding this product.

The product warranty may be void in the following cases:

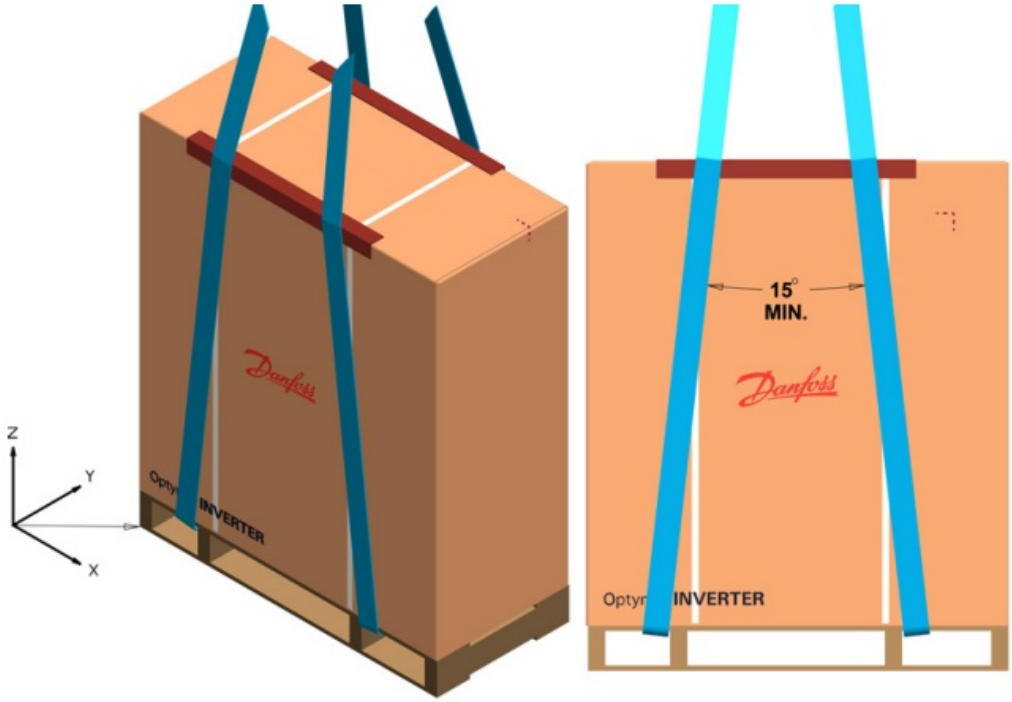
- Absence of nameplate.

- External modifications, in particular, drilling, welding, broken feet, and shock marks.
- Compressor opened or returned without seal of warranty or seal violated.
- Rust, water, or leak detection dye inside the compressor or any other fluid different of the recommended.
- Use of a refrigerant or lubricant not approved by Danfoss.
- Any deviation from recommended instructions pertaining to installation, application or maintenance.
- Use in mobile applications.
- Use in an explosive atmospheric environment.
- No model number or serial number was transmitted with the warranty claim.

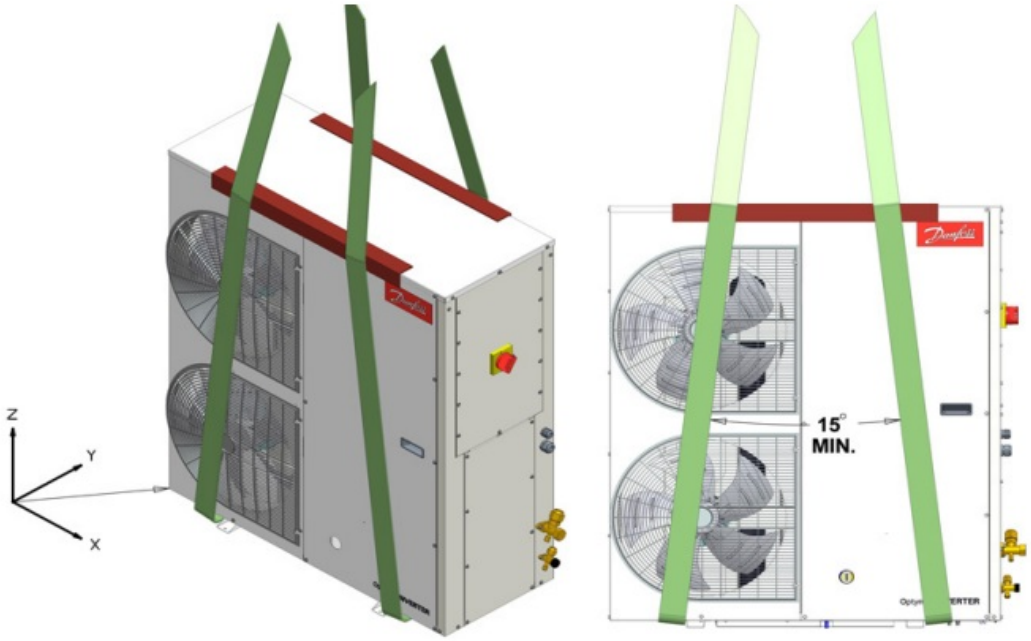
Delivery

When the condensing unit is hoisted with ropes for delivery, take care to maintain the center of gravity. It could drop off if the stability is lost.

- Determine the delivery route and deliver the unit to the installation place without removing the packing. When hoisting the unit, use a pair of ropes and cushioning material to protect sections chafed by ropes.



Centre of Gravity	
Weight (kg)	170
X (mm)	606
Y (mm)	267
Z (mm)	891



Centre of Gravity	
Weight (kg)	150
X (mm)	585
Y (mm)	215
Z (mm)	740

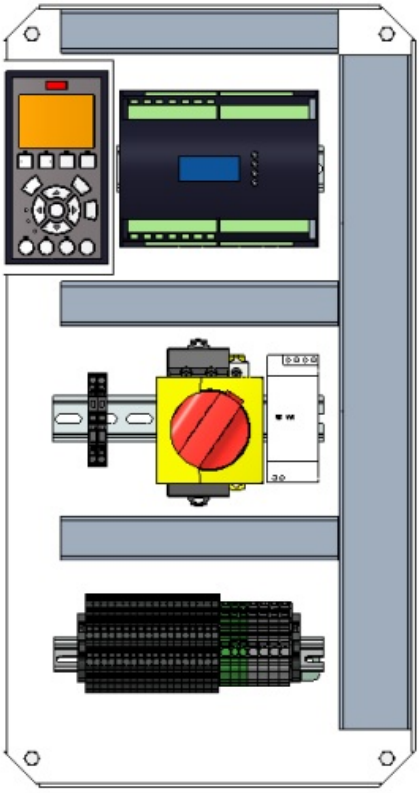
Disposal

Danfoss recommends that condensing units and oil be recycled by a suitable company at its site.

Frequency by-pass

If it is necessary to change the inverter, parameterize 4 frequency ranges in order to avoid resonance in the piping system in the specied range, according to the procedure below:

1. Access the Main Meu of your INVERTER display available on the electrical box (image 1 and image 2). Then select Limits / Warnings (image 3).



2. Using the arrow – select 4-6 Speed Bypass and click “OK” button – display will appear as image below (image 1). You have the possibility to skip 04 independent frequency path [0], [1], [2] and [3].

3. Click “OK” to define the first frequency range on the first available path [0]. With the arrow adjust frequency from: 30 Hz; Press button “Back” and then press the arrow to scroll down the cursor, and you will be able to adjust frequency to: 33 Hz.

4. Make the same procedure to:
   [1]: from 36Hz (2160rpm) to 39Hz (2340rpm).
   [2]: from 51Hz (3060rpm) to 55Hz (3300rpm).
   [3]: from 75Hz (4500rpm) to 77Hz (4620rpm).

Crankcase resistance connection.

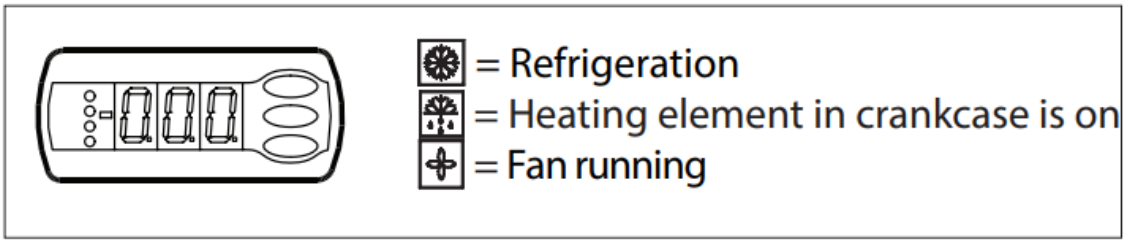
When the machine is energized, the Carter Resistor is on 100% of the time, to ensure that the oil is always at the correct temperature. However, before the first start, we must leave it running for 12 hours, so that the oil reaches the necessary viscosity so that there are no problems when starting. To do this, simply energize the machine and turn the On/O switch on the Panel door. Once this is done, the crankcase heater will be on, and after 12 hours, you will be able to start up your condensing unit Optyma™ INVERTER.

Setting the Electronic Controller

- The unit is equipped with an electronic controller that is factory-programmed with parameters for use with the specific unit. Refer to manual 158381 for details.
- By default, the electronic controller display shows the temperature corresponding to the suction pressure in °C. To display the temperature for the condensing pressure, press the lower button (see picture 2).
- The electronic controller is factory set to operate with refrigerant R404A/R507. The

use of any other refrigerant is not allowed with the LAM Inverter.

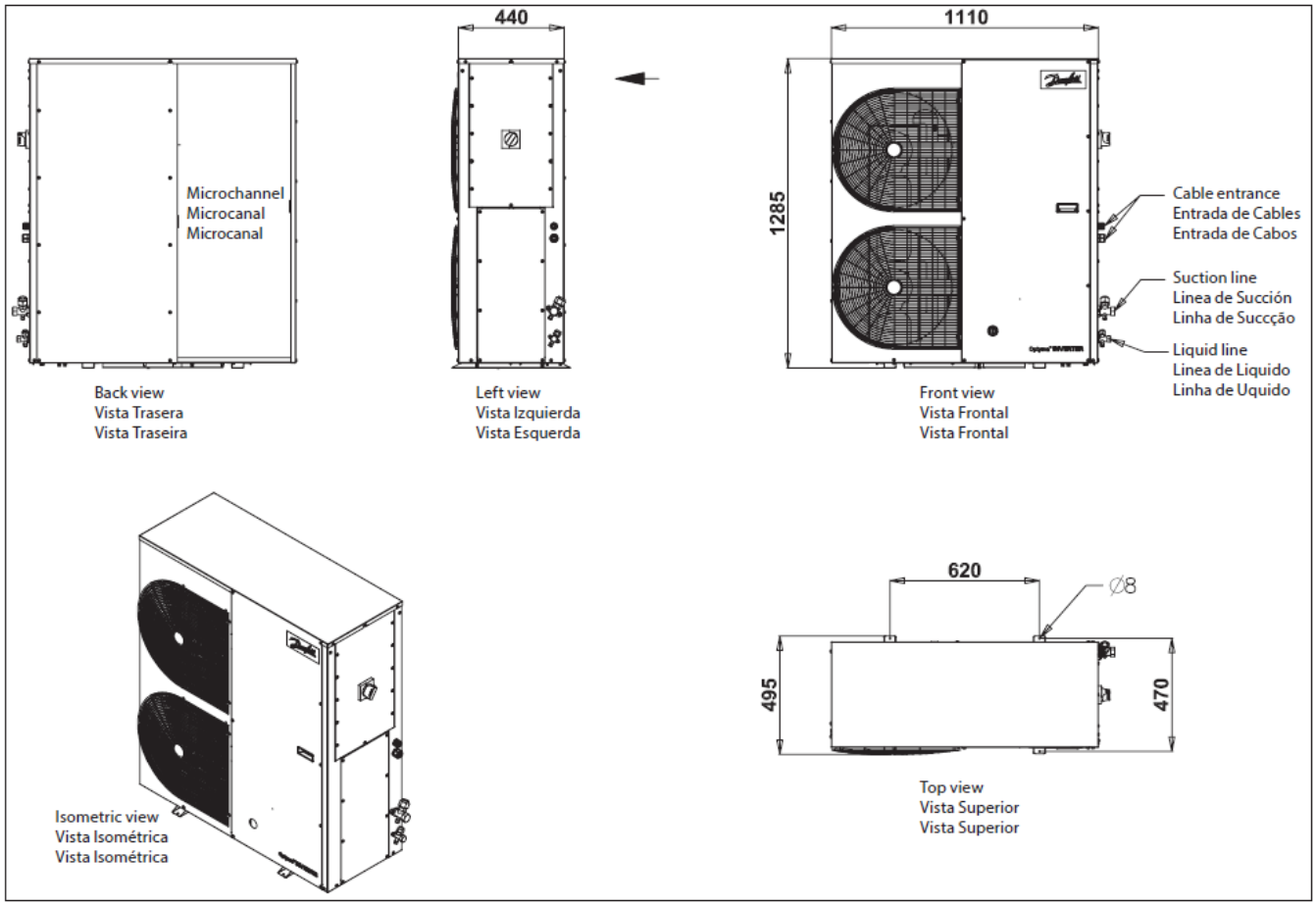
- If necessary, change parameter r23 to the desired suction pressure temperature (°C/°F).
- Adjust parameter c33 to set the pump-down value according to your needs.
- Press the middle button; the default maximum discharge temperature is 125°C.
- If the customer wants to increase this value, press the upper button to select the new value (e.g., 130°C), then press the middle button to confirm the selected value.
- The maximum allowable discharge temperature (r84) must not exceed 130°C.



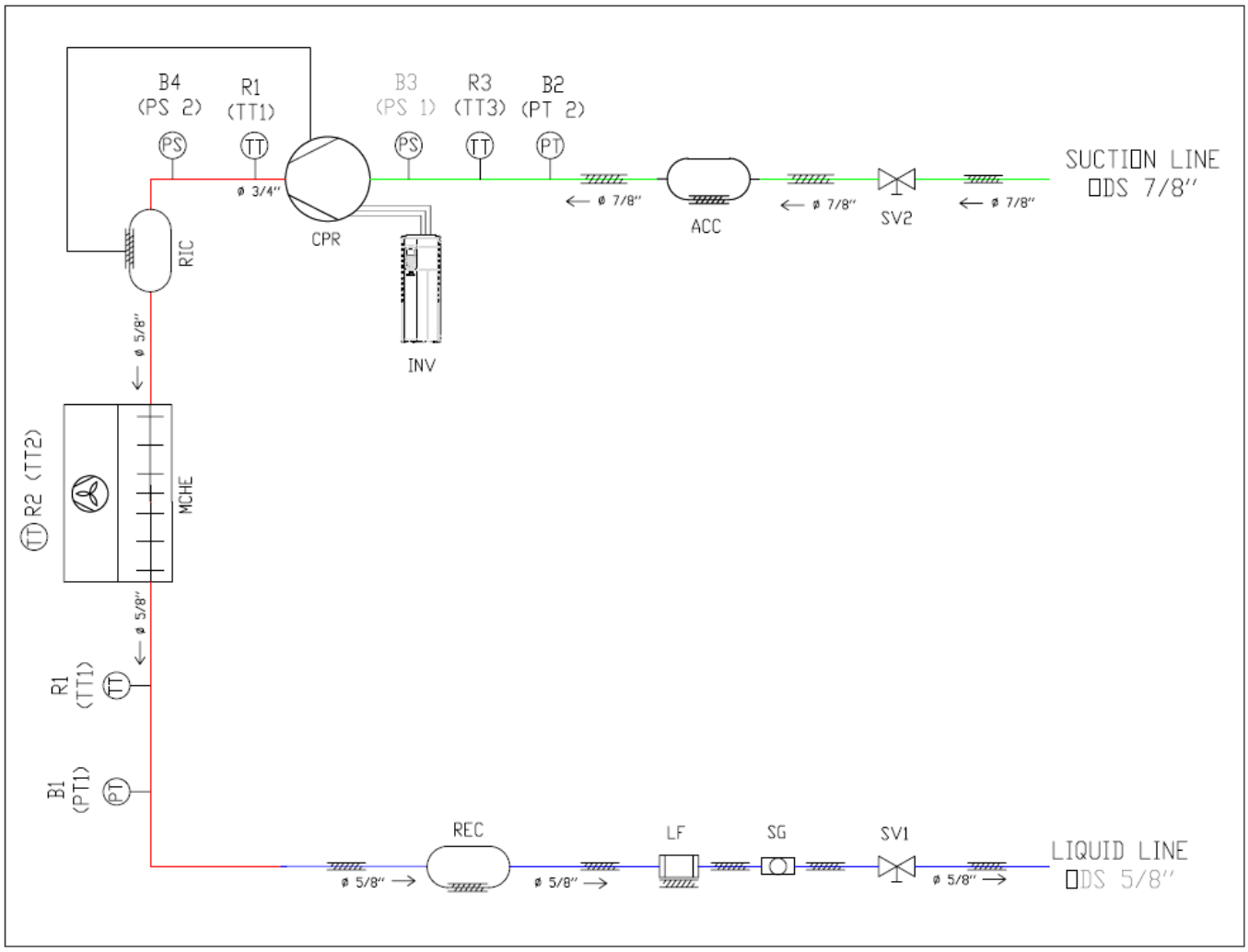
Annex – A

GA & PID Drawings

OP – FPZP086



OP – FPZP086



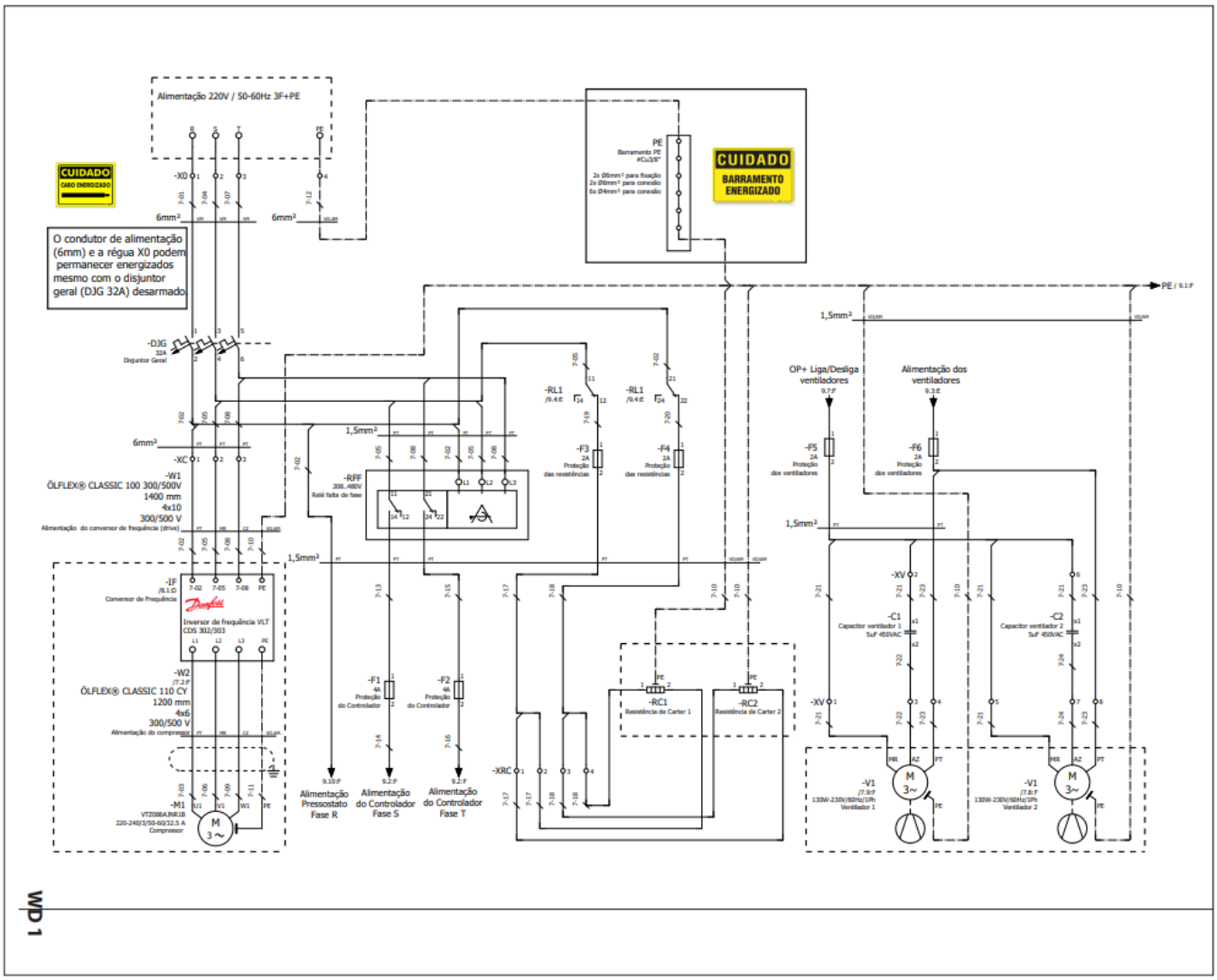
Legend	English
ACC	Suction Accumulator
B1	High Pressure Sensor
B2	Low Pressure Sensor
B3	Low Pressure Switch
B4	High Pressure Switch
CPR	Compressor VTZ086
INV	Frequence Inversor
LF	Liquid Filter with Drier
MCHE	Microchannel Condenser
R1	Discharge Temperature Sensor
R2	Ambient Temperature Sensor
R3	Suction Temperature Sensor
REC	Receiver
RIC	Oil Separator
SG	Sight Glass with Moisture Indicator
SV1	Liquid Line Service Valve
SV2	Suction Line Service Valve

Line Color Table

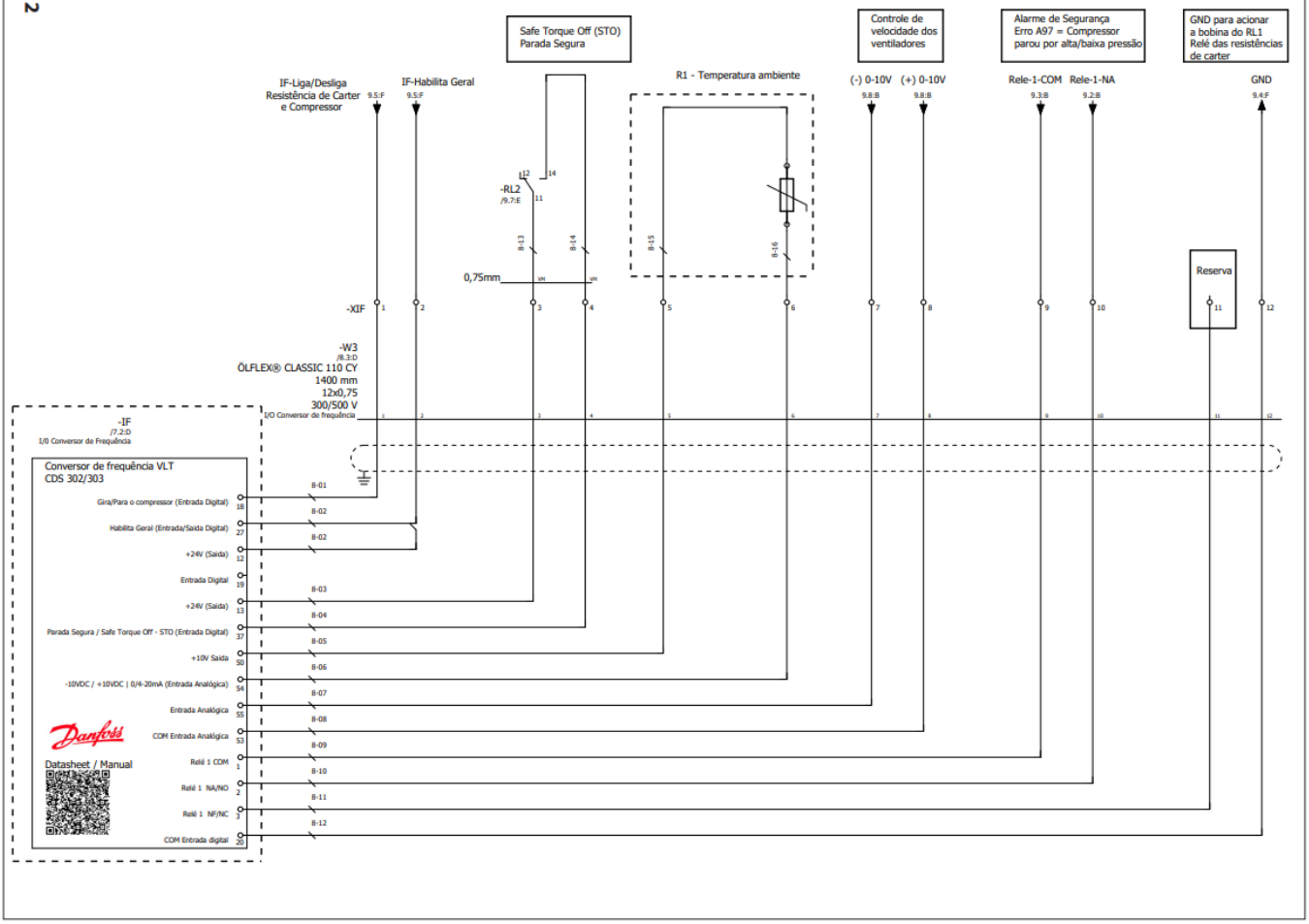
- Red Line – High Pressure Line
- Blue Line – Liquid Line
- Green Line – Suction Line
- Black Line – Oil Line

Annex – B

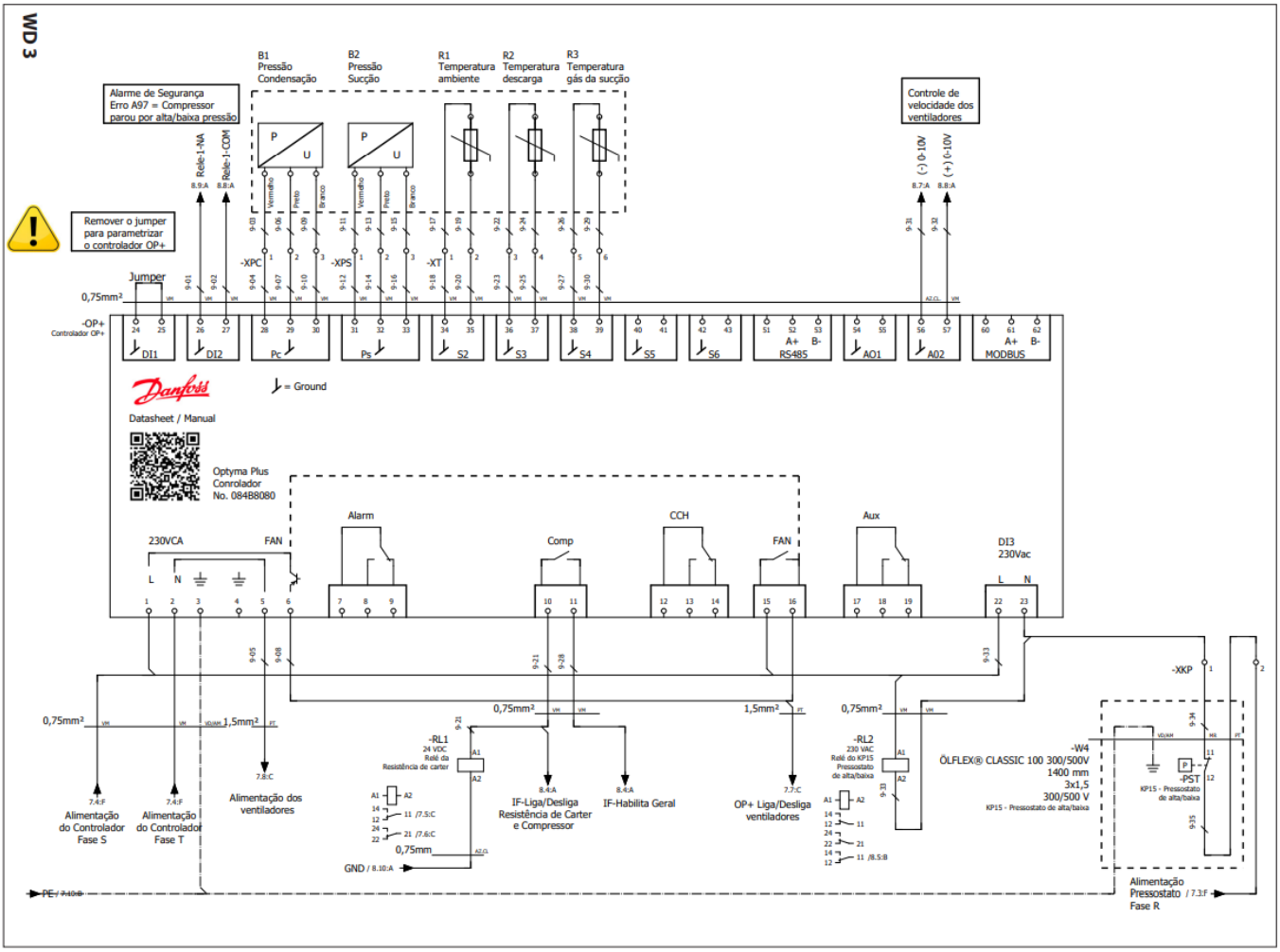
Wiring Diagram



WD 2


Safe Torque Off (STO)
Parada Segura
Controle de velocidade dos ventiladores
Alarme de Segurança Erro A97 = Compressor parou por alta/baixa pressão
GND para acionar a bobina do RL1 Relé das resistências de carter
IF-Liga/Desliga Resistência de Carter e Compressor
IF-Habilita Geral
R1 - Temperatura ambiente
(-) 0-10V
(+) 0-10V
Rele-1-COM
Rele-1-NA
GND
Reserva
-XIF
-W3
ÓLFLEX® CLASSIC 110 CY
1400 mm
12x0,75
300/500 V
-IF
I/0 Conversor de Frequência
Conversor de frequência VLT
CDS 302/303
Gira/Para o compressor (Entrada Digital)
Habilita Geral (Entrada/Saída Digital)
+24V (Saída)
Entrada Digital
+24V (Saída)
Parada Segura / Safe Torque Off - STO (Entrada Digital)
+10V Saída
-10VDC / +10VDC | 0/4-20mA (Entrada Analógica)
Entrada Analógica
COM Entrada Analógica
Relé 1 COM
Relé 1 NA/NO
Relé 1 NF/NC
COM Entrada digital
Datasheet / Manual

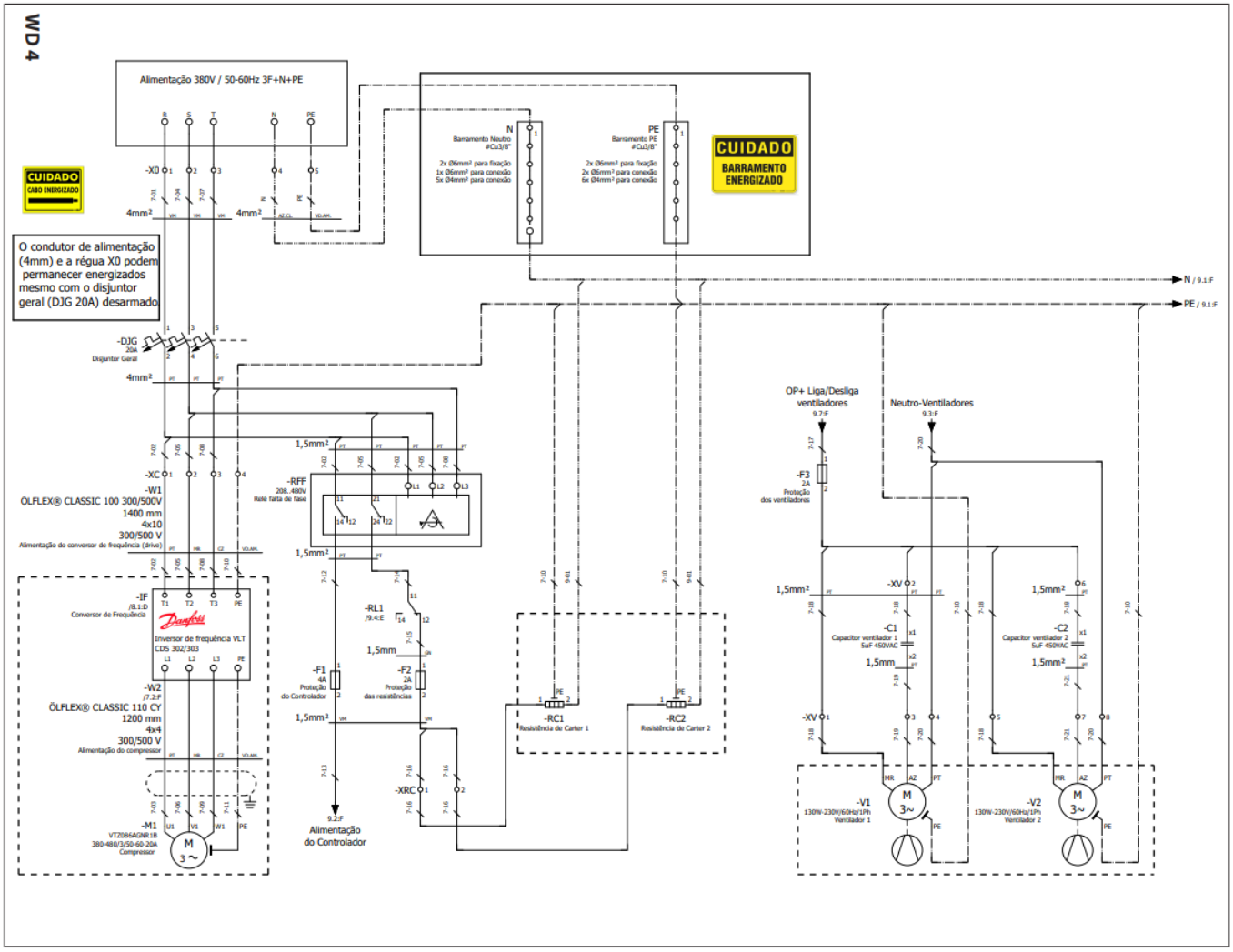
WD 3

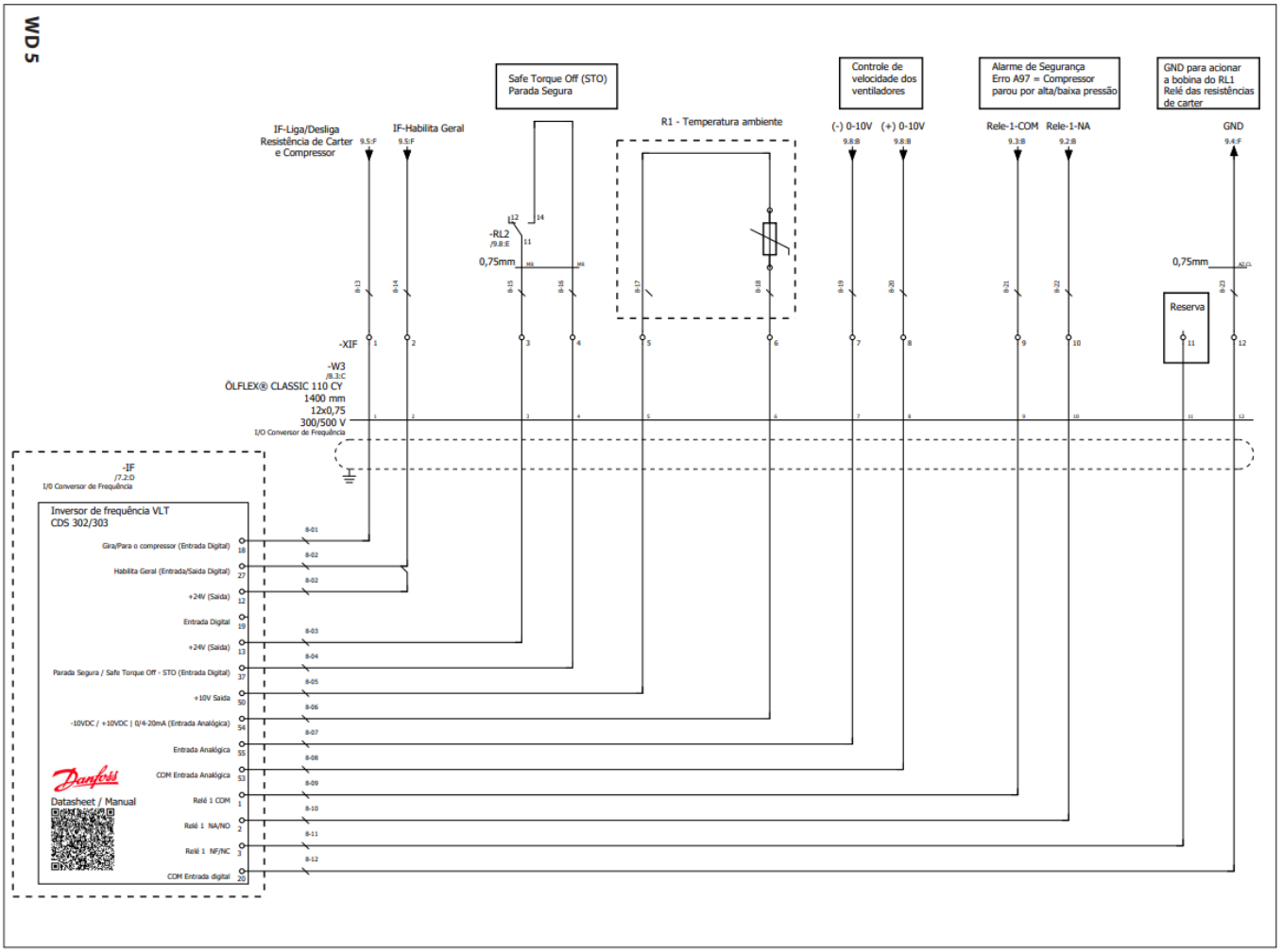

B1 Pressão Condensação
B2 Pressão Sucção
R1 Temperatura ambiente
R2 Temperatura descarga
R3 Temperatura gás da sucção
Alarme de Segurança Erro A97 = Compressor parou por alta/baixa pressão
Controle de velocidade dos ventiladores
Remover o jumper para parametrizar o controlador OP+
Jumper
-XPC
-XPS
-XT
-OP+
Controlador OP+
DI1
DI2
Pc
Ps
S2
S3
S4
S5
S6
RS485
AO1
A02
MODBUS
= Ground
Datasheet / Manual
Optyma Plus Conrolador No. 084B8080
230VCA
FAN
Alarm
Comp
CCH
Aux
DI3 230Vac
-XKP
-RL1
-RL2
-W4
ÓLFLEX® CLASSIC 100 300/500V
1400 mm
3x1,5
300/500 V
-PST
Alimentação do Controlador Fase S
Alimentação do Controlador Fase T
Alimentação dos ventiladores
IF-Liga/Desliga Resistência de Carter e Compressor
IF-Habilita Geral
OP+ Liga/Desliga ventiladores
Alimentação Pressostato Fase R

Legend

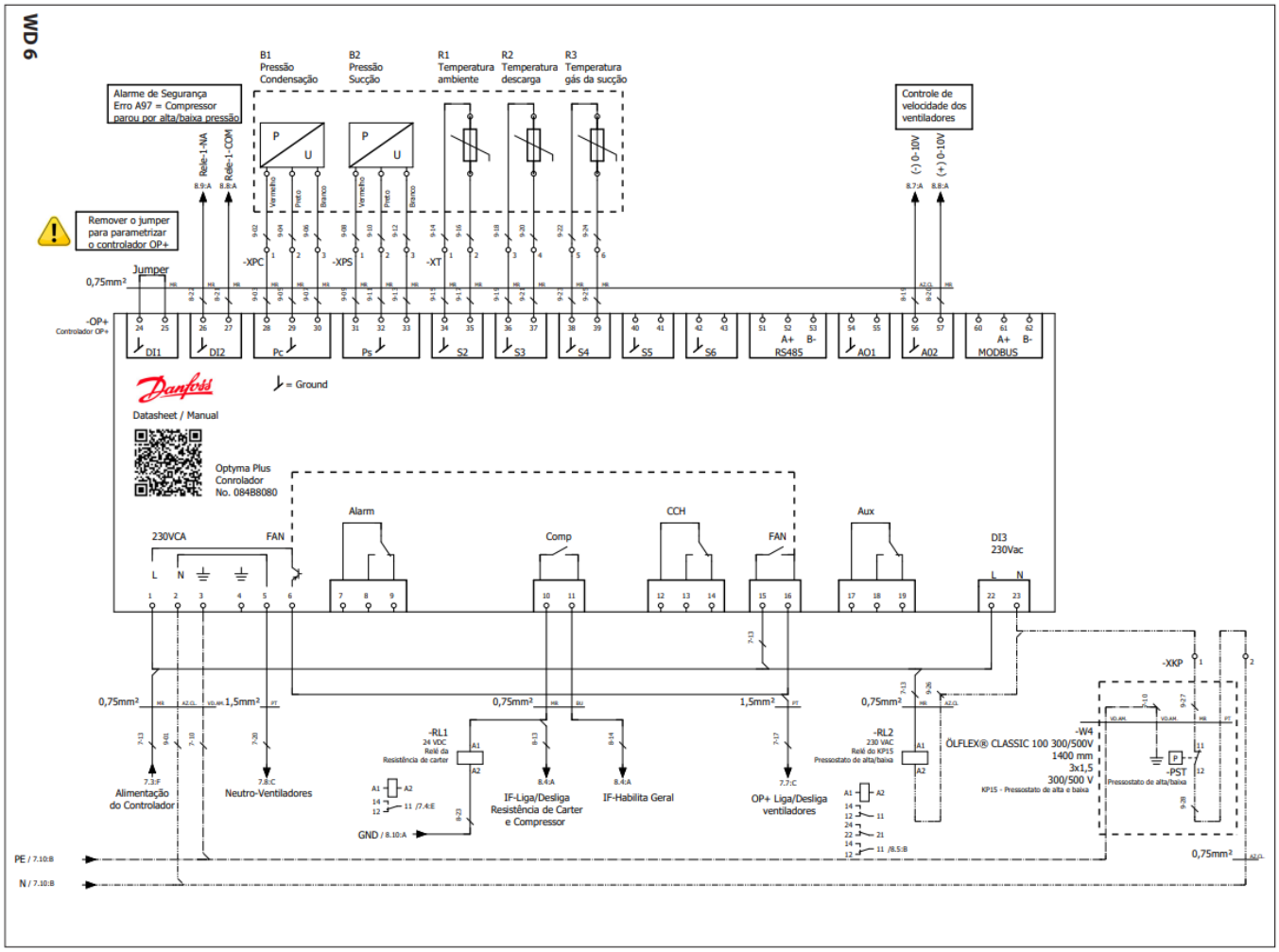
Label	Description (English)
OP+	Optyma Plus EVO3 Controller
C1 e C2	Capacitor 5µF 450VAC
F1, F2, F3, F4, F5 and F6	Fuse terminal block
DJG	3-pole Circuit Breaker, Type C, 32A
RFF	Phase failure relay, 208–480VAC, 8A, 2 NO/NC contacts
RL1	Relay 24 VDC 8 A
RL2	Relay 230 VAC 8 A
X0, XC, XRC, XV, XIF, XPC, XT and XKP	Terminal blocks
PE	Copper busbar #Cu 3/8"
B1	Pressure transducer DST P110, 0.00 bar – 32.00 bar
B2	Pressure transducer DST P110, -1.00 bar – 12.00 bar
IF	Frequency inverter CD302 11.0kW
PS	High and low pressure switch – KP15
M1	Reciprocating compressor VTZ086JANR1B
M2 and M3	Fan 130W, 6 poles, 230V/60Hz/1Ph
R1	Temperature sensor AKS 11, 3,500 mm, Pt, 1000 Ohm
R2	Temperature sensor AKS 21 2,500 mm
R3	Temperature sensor AKS 11, 3,500 mm, Pt, 1000 Ohm
RC1 and RC2	Crankcase heater 1200 mm

Code V: 380V / 3F / 50-60Hz


WD4
Alimentação 380V / 50-60Hz 3F+N+PE
CUIDADO
CABO ENERGIZADO
CUIDADO
BARRAMENTO ENERGIZADO
O condutor de alimentação (4mm) e a régua X0 podem permanecer energizados mesmo com o disjuntor geral (DJG 20A) desarmado
-X0
-DJG
20A
Disjuntor Geral
-XC
-W1
ÖLFLEX® CLASSIC 100 300/500V
1400 mm
4x10
300/500 V
-IF
Conversor de Frequência
Inversor de frequência VLT
CDS 302/303
-W2
ÖLFLEX® CLASSIC 110 CY
1200 mm
4x4
300/500 V
-M1
VTZ086AGNR1B
380-480/3/50-60-20A
Compressor
-RFF
208..480V
Relé falta de fase
-RL1
-F1
4A
Proteção do Controlador
-F2
2A
Proteção das resistências
-XRC
Alimentação do Controlador
-RC1
Resistência de Carter 1
-RC2
Resistência de Carter 2
OP+ Liga/Desliga ventiladores
Neutro-Ventiladores
-F3
2A
Proteção dos ventiladores
-XV
-C1
Capacitor ventilador 1
5uF 450VAC
-C2
Capacitor ventilador 2
5uF 450VAC
-V1
130W-230V/60Hz/1Ph
Ventilador 1
-V2
130W-230V/60Hz/1Ph
Ventilador 2


WD5
Safe Torque Off (STO)
Parada Segura
Controle de velocidade dos ventiladores
Alarme de Segurança
Erro A97 = Compressor parou por alta/baixa pressão
GND para acionar a bobina do RL1
Relé das resistências de carter
IF-Liga/Desliga Resistência de Carter e Compressor
IF-Habilita Geral
R1 - Temperatura ambiente
(-) 0-10V
(+) 0-10V
Rele-1-COM
Rele-1-NA
GND
Reserva
-RL2
-XIF
-W3
ÖLFLEX® CLASSIC 110 CY
1400 mm
12x0,75
300/500 V
I/O Conversor de Frequência
-IF
I/O Conversor de Frequência
Inversor de frequência VLT
CDS 302/303
Gira/Para o compressor (Entrada Digital)
Habilita Geral (Entrada/Saida Digital)
+24V (Saida)
Entrada Digital
+24V (Saida)
Parada Segura / Safe Torque Off - STO (Entrada Digital)
+10V Saida
-10VDC / +10VDC | 0/4-20mA (Entrada Analógica)
Entrada Analógica
COM Entrada Analógica
Relé 1 COM
Relé 1 NA/NO
Relé 1 NF/NC
COM Entrada digital
Datasheet / Manual

WD6


B1 Pressão Condensação
B2 Pressão Sucção
R1 Temperatura ambiente
R2 Temperatura descarga
R3 Temperatura gás da sucção
Alarme de Segurança Erro A97 = Compressor parou por alta/baixa pressão
Rele-1-NA
Rele-1-COM
Controle de velocidade dos ventiladores
(-) 0-10V
(+) 0-10V
Remover o jumper para parametrizar o controlador OP+
Jumper
0,75mm²
-XPC
-XPS
-XT
-OP+
Controlador OP+
DI1
DI2
Pc
Ps
S2
S3
S4
S5
S6
A+ B- RS485
AO1
A02
A+ B- MODBUS
= Ground
Datasheet / Manual
Optyma Plus Conrolador No. 084B8080
230VCA
FAN
Alarm
Comp
CCH
FAN
Aux
DI3 230Vac
L N
1,5mm²
-RL1
24 VDC Relé da Resistência do carter
-RL2
230 VAC Relé do KP15 Pressostato de alta/baixa
-W4
ÖLFLEX® CLASSIC 100 300/500V 1400 mm 3x1,5 300/500 V
-PST
Pressostato de alta/baixa
KP15 - Pressostato de alta e baixa
-XKP
Alimentação do Controlador
Neutro-Ventiladores
IF-Liga/Desliga Resistência de Carter e Compressor
IF-Habilita Geral
OP+ Liga/Desliga ventiladores
GND / 8.10:A
PE / 7.10:B
N / 7.10:B

Label	Description (English)
OP+	Optyma Plus EVO3 Controller
C1 e C2	Capacitor 5µF 450VAC
F1, F2, F3, F4, F5 and F6	Fuse terminal block
DJG	3-pole Circuit Breaker, Type C, 32A
RFF	Phase failure relay, 208–480VAC, 8A, 2 NO/ NC contacts
RL1	Relay 24 VDC 8 A
RL2	Relay 230 VAC 8 A
X0, XC, XRC, XV, XIF, XPC, XT and XKP	Terminal blocks
PE	Copper busbar #Cu 3/8"
B1	Pressure transducer DST P110, 0.00 bar – 32.00 bar
B2	Pressure transducer DST P110, -1.00 bar – 12.00 bar
IF	Frequency inverter CD302 11.0kW
PS	High and low pressure switch – KP15
M1	Reciprocating compressor VTZ086JANR1B
M2 and M3	Fan 130W, 6 poles, 230V/60Hz/1Ph
R1	Temperature sensor AKS 11, 3,500 mm, Pt, 1000 Ohm
R2	Temperature sensor AKS 21 2,500 mm
R3	Temperature sensor AKS 11, 3,500 mm, Pt, 1000 Ohm
RC1 and RC2	Crankcase heater 1200 mm

Contact

Danfoss do Brasil Ind. e Com. Ltda.

- Climate Solutions
- danfoss.com.br
- +55 0800 87 87 847
- sac.brasil@danfoss.com

Frequently Asked Questions

- **Q: Can I change the inverter frequency?**
  - A: If necessary, you can change the inverter frequency by parameterizing four

frequency ranges to avoid resonance in the piping system. Refer to the manual for detailed instructions on how to do this.

Documents / Resources

	Danfoss OP-FPZP Optyma Inverter [pdf] Instruction Manual OP-FPZP Optyma Inverter, OP-FPZP, Optyma Inverter, Inverter

References

- User Manual

Danfoss, Inverter, OP-FPZP, OP-FPZP Optyma Inverter, Optyma

Danfoss Inverter

Leave a comment

Your email address will not be published. Required fields are marked *

Comment *

Name

Email

Website

Save my name, email, and website in this browser for the next time I comment.

Post Comment

Search:

e.g. whirlpool wrf535swhz

Search