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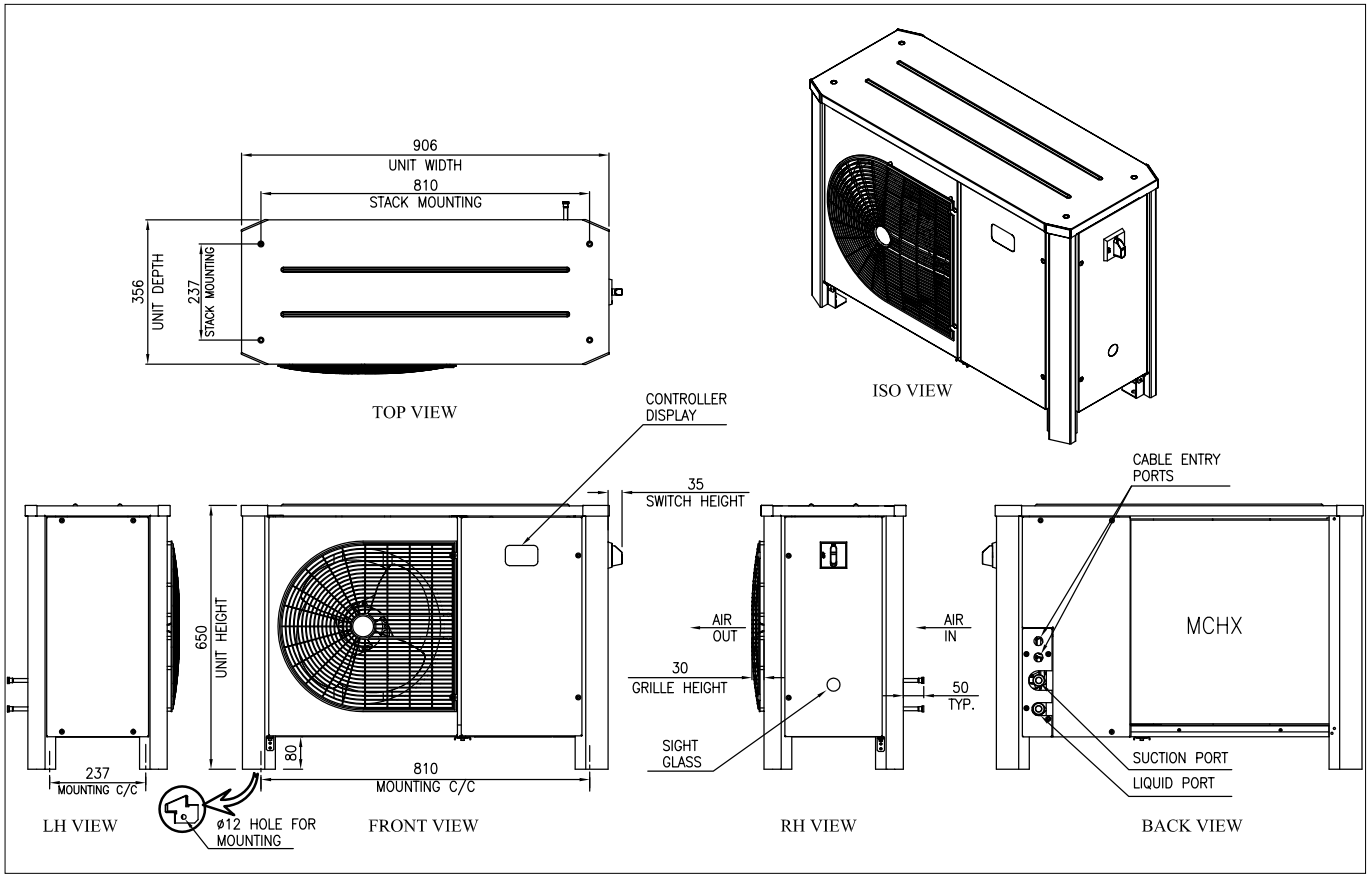

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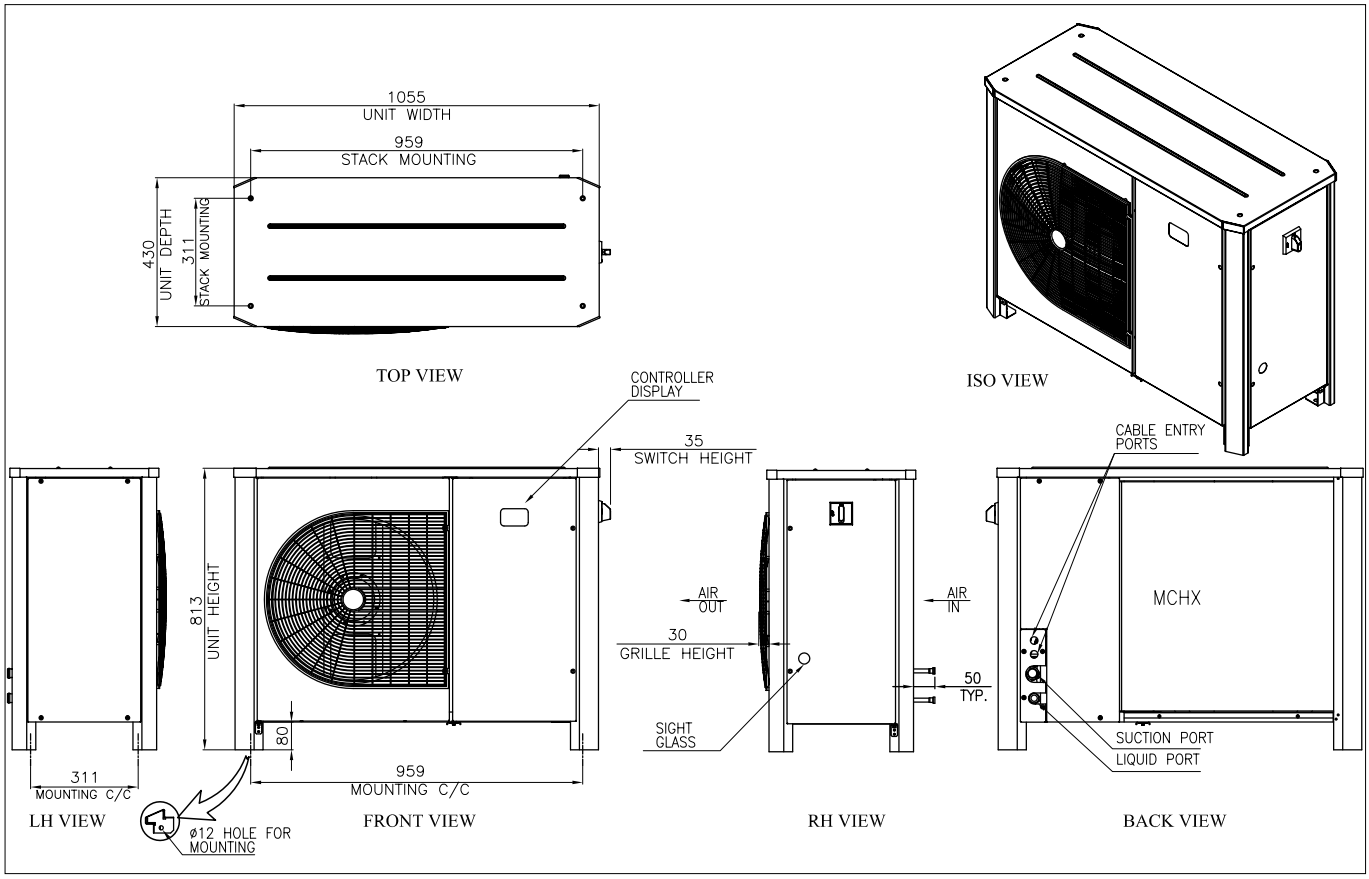

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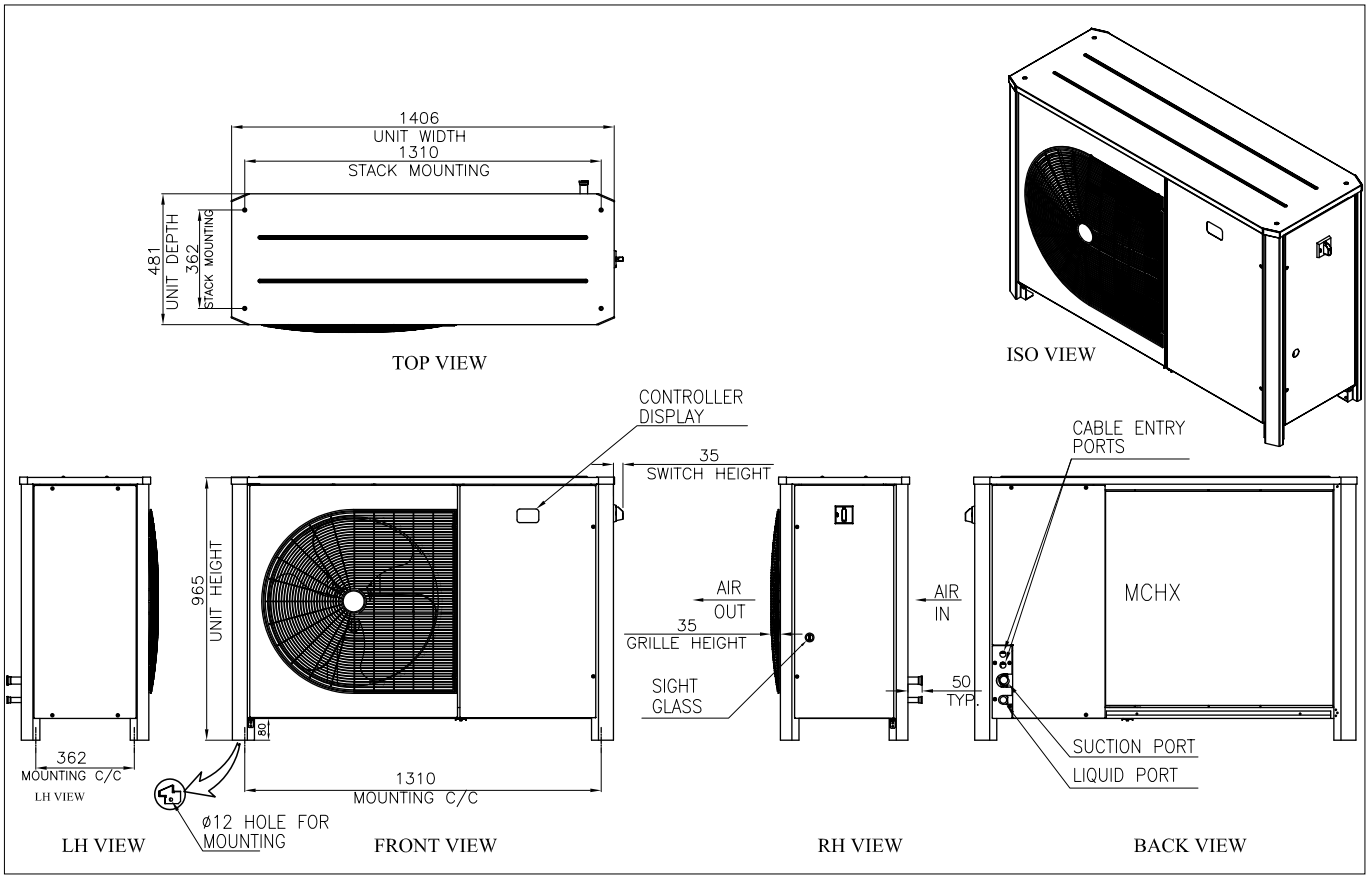

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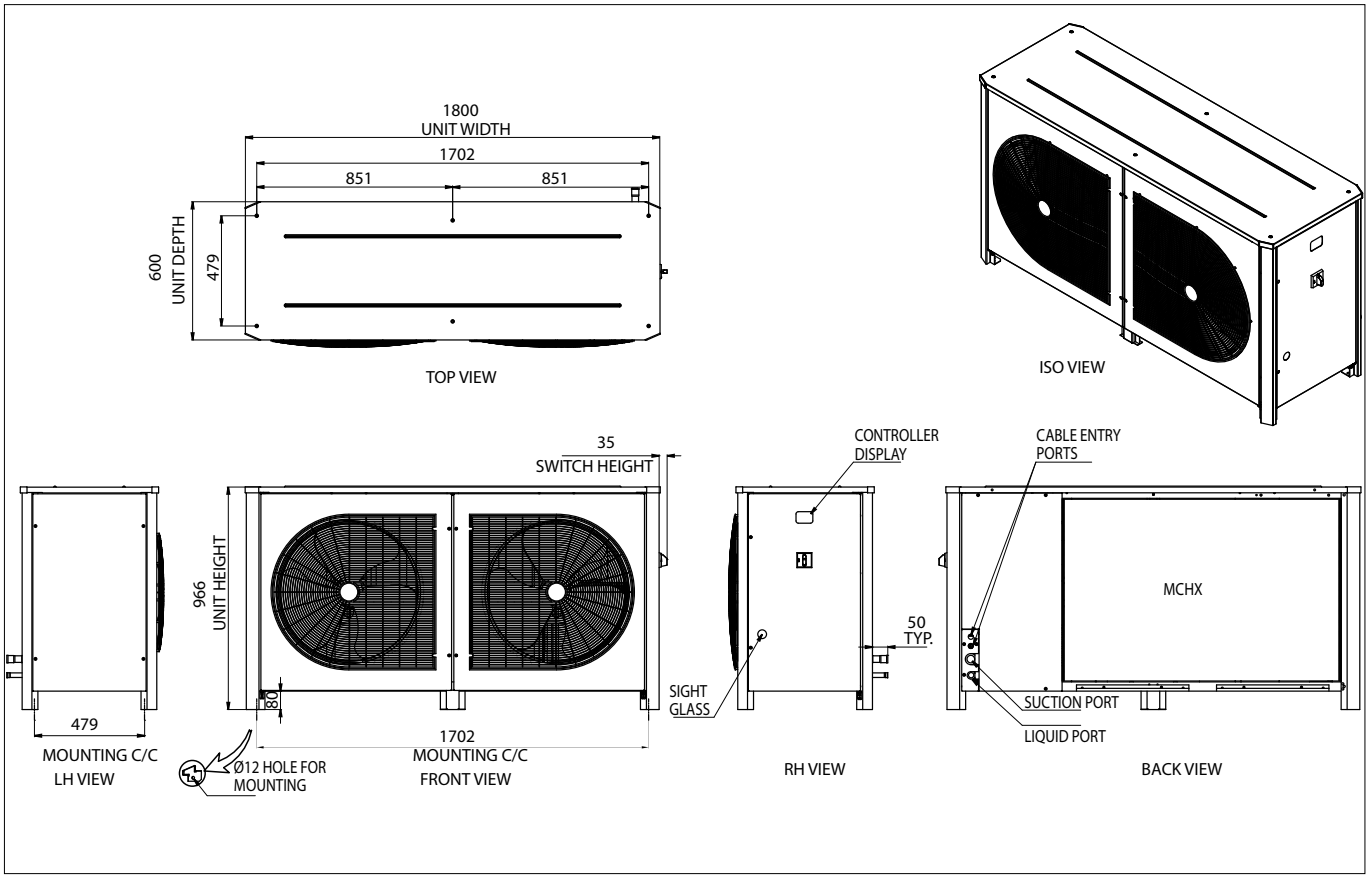
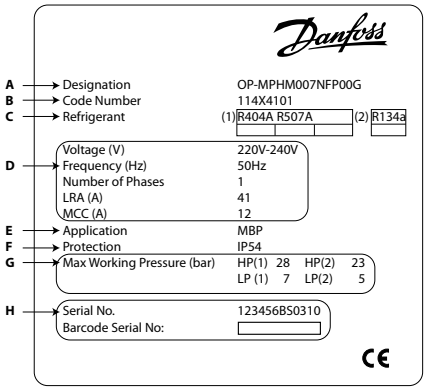
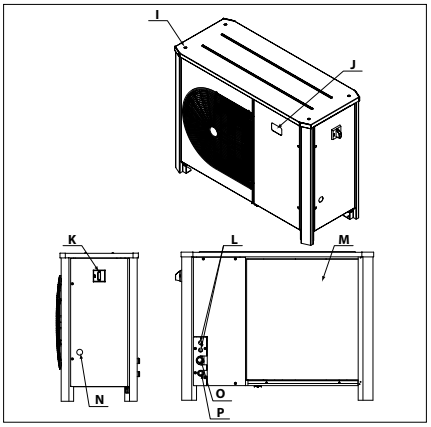


INSTRUCTIONS
OPTYMA PLUS CONDENSING UNITS
OP-LPHM, OP-MPHM, OP-MPUM, OP-MPGM



A: Model
B: Code number
C: Refrigerant
D: Supply voltage, Locked Rotor Ampere, Maximum Current Consumption
E: Application
F: Protection
G: Housing Service Pressure
H: Serial Number and bar code



I: Mounting holes for stack mounting
J: Electronic controller display
K: Main switch
L: Cable entry ports
M: Microchannel heat exchanger
N: Sight glass
O: Suction port
P: Liquid port

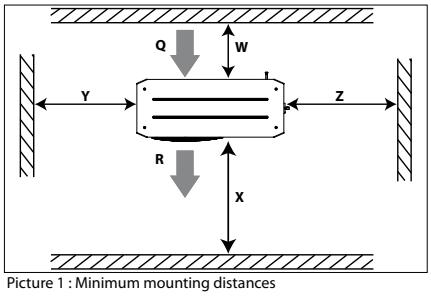
⚠ The condensing unit must only be used for its designed purpose(s) and within its scope of application.

⚠ 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°)

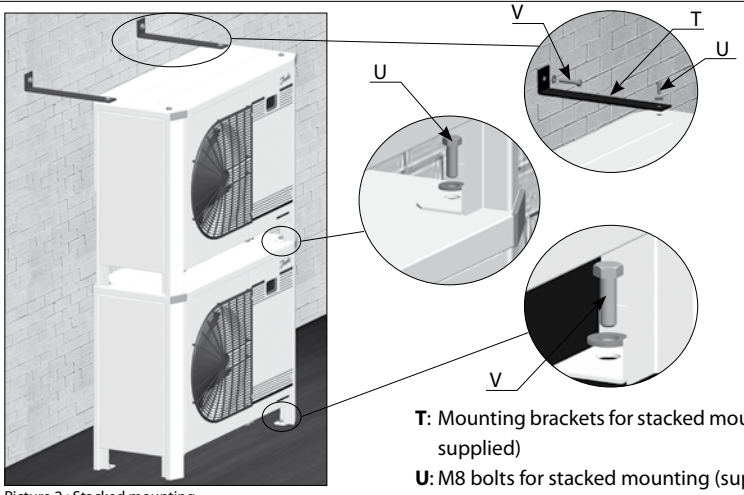
⚠ **Installation and servicing of the condensing units by qualified personnel only. Follow these instructions and sound refrigeration engineering practice relating to installation, commissioning, maintenance and service.**



Picture 1 : Minimum mounting distances

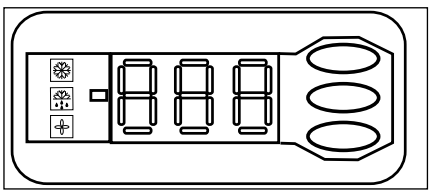
Q: Air in **R**: Air out

Unit	W [mm]	X [mm]	Y [mm]	Z [mm]
Housing 1 (Code n° 114X31-- or 114X41--)	250	550	456	456
Housing 2 (Code n° 114X32-- or 114X42--)	250	650	530	530
Housing 3 (Code n° 114X33-- or 114X43--)	250	760	581	581
Housing 4 (Code n° 114X34-- or 114X44--)	250	900	700	700



Picture 2 : Stacked mounting

T: Mounting brackets for stacked mounting (not supplied)
U: M8 bolts for stacked mounting (supplied)
V: Mounting bolts (not supplied)



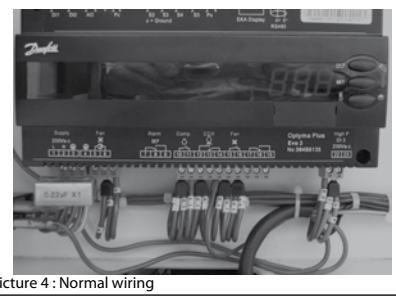
Picture 3 : Electronic controller display

Compressor running

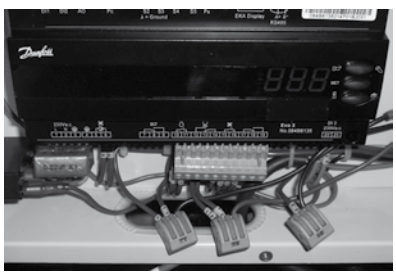
Crankcase heater on

Fan running

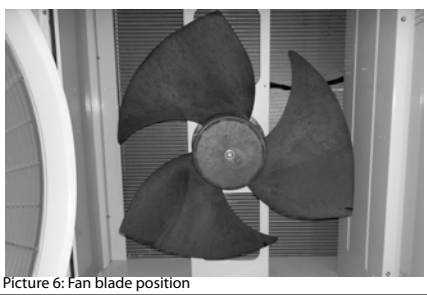
Temperature value for suction pressure. Push lower button to switch to temperature value for condensing pressure



Picture 4 : Normal wiring



Picture 5 : Temporary wiring



Picture 6: Fan blade position

1 – Introduction

These instructions pertain to Optyma Plus condensing units OP-LPHM, OP-MPHM, OP-MPUM and OP-MPGM used for refrigeration systems. They provide necessary information regarding safety and proper usage of this product.

The condensing unit includes following:

- Microchannel heat exchanger
- Reciprocating or scroll compressor
- Receiver with stop valve
- Ball valves
- Sight glass
- High & low pressure switches
- Filter drier
- Electronic controller
- Main circuit breaker (Main switch with overload protection)
- Fan and compressor capacitors
- Compressor contactor
- Robust weather proof housing

2 – Handling and storage

- It is recommended not to open the packaging before the unit is at the 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 corrosive atmosphere.
- After unpacking, check that the unit is complete and undamaged.

3 – Installation precautions

⚠ 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 minimal values of distance to walls.
- Avoid installing the unit in locations which are daily exposed to direct sunshine for longer periods.
- Avoid installing the unit in aggressive and dusty environments.
- Ensure a foundation with 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 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 compressor 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 compressor is eliminated.

4 – Installation

- The installation in which the condensing unit is installed must comply to EEC Pressure directive (PED) nr. 97/23/EC. The condensing unit itself is not a "unit" in the scope this directive.
- It is recommended to install the unit on rubber grommets or vibration dampers (not supplied).
- It is possible to stack units on top of each other.

Unit	Maximum stacking
Housing 1 (Code no. 114X31-- or 114X41--)	3
Housing 2 (Code no. 114X32-- or 114X42--)	2
Housing 3 (Code no. 114X33-- or 114X43--)	2
Housing 4 (Code no. 114X34-- or 114X44--)	

- When stacking, the topmost unit must be secured to the wall, as shown in picture 2.
- 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 with 19 mm thick insulation.

5 – 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.

6 – 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 vacuum 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.

7 – Electrical connections

- Switch off and isolate the main power supply.
- Ensure that power supply can not be switched on during installation.
- All electrical components must be selected as per local standards and unit requirements.
- Refer to wiring diagram for electrical connections 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 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 an electronic controller. Refer to Manual RS8GDxxx for details.
- The unit is equipped with a main switch with overload protection. The overload protection is factory preset but it is recommended to check the value before taking the unit in operation. The value for the overload protection can be found in the wiring diagram in the front door of the unit.
- 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 are preset in the controller, adapted to the compressor installed in the unit.

For units with a 3-phase scroll compressor (OP-MPUMxxxxxxxxE), correct phase sequence for compressor rotation direction shall be observed.

- Determine the phase sequence by using a phase meter in order to establish the phase orders of line phases L1, L2 and L3.
- Connect line phases L1, L2 and L3 to main switch terminals T1, T2 and T3 respectively.

8 – Filling the system

- Never start the compressor under vacuum. Keep the compressor switched off.
- Use only the refrigerant for which the unit is designed for.
- Fill the refrigerant in liquid phase into the condenser or liquid receiver. Ensure a slow charging of the system to 4 – 5 bar for R404A and approx. 2 bar for R134a.
- 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.

9 – Setting the electronic controller

- The unit is equipped with an electronic controller which is factory programmed with parameters for use with the actual unit. Refer to Manual RS8GDxxx for details.
- By default, the electronic controller display shows the temperature value for the suction pressure in °C. To show the temperature value for the condensing pressure, push the lower button (picture 3).

The electronic controller is factory preset for operation with refrigerant R404A. If another refrigerant is used, the refrigerant setting must be changed. Parameter r12 must be set to 0 before (software main switch= off).
- Push the upper button for a couple of seconds. The column with parameter codes appears.
- Push the upper or lower button to find parameter code o30.
- Push the middle button until the value for this parameter is shown.
- Push the upper or lower button to select the new value: 2 = R22, 3 = R134a, 13 = User defined, 17 = R507, 19 = R404A, 20 = R407C.
- Push the middle button to confirm the selected value.

10 – Verification before commissioning

⚠ Use safety devices such as safety pressure switch and 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.
- When a crankcase heater is required, the unit must be energized at least 12 hours before initial start-up and start-up after prolonged shutdown for belt type crankcase heaters.
- The unit is equipped with a main switch with overload protection. Overload protection is preset from factory, but it is recommended to check the value before taking the unit in operation. The overload protection value can be found in the wiring diagram in the unit front door.

11 – Start-up

- Never start the unit when no refrigerant is charged.
- All service valves must be in the open position.
- Check compliance between unit and power supply.
- Check that the crankcase heater is working.
- Check that the fan can rotate freely.
- Check that the protection sheet has been removed from the backside of condenser.
- Balance the HP/LP pressure.
- Energize the unit. It must start promptly. If the compressor does not start, check wiring conformity and voltage on terminals.
- Eventual reverse rotation of a 3-phase compressor can be detected by following phenomena; the compressor doesn't build up pressure, it has abnormally high sound level and abnormally low power consumption. In such case, shut down the unit immediately and connect the phases to their proper terminals.
- If the rotation direction is correct the low pressure indication on the controller (or low pressure gauge) shall show a declining pressure and the high pressure indication (or high pressure gauge) shall show an increasing pressure.

12 – Check with running unit

- Check the fan rotation direction. Air must flow from the condenser towards the fan.
- Check current draw and voltage.
- Check suction superheat to reduce 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 operating limits.
- 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 liquid phase may be added in the low-pressure side as far as possible from the compressor. The compressor must be operating during this process.
- Do not overcharge the system.
- Never release refrigerant to 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.

13 – Emergency running without controller

In case of controller failure, the condensing unit can still be operated when the controller standard wiring (picture 4) is modified into a temporary wiring (picture 5) as described below.

⚠ This modification may be done by authorized electricians only. Country legislations have to be followed.

⚠ Disconnect the condensing unit from power supply (turn hardware main switch off)
- Contact of Room Thermostat must be possible to switch 250VAC.
- Remove wire 22 (safety input DI3) and wire 24 (room thermostat DI1) and put them together with an insulated 250 Vac 10mm² terminal bridge.
- Remove wire 25 (room thermostat DI1) and wire 11 (compressor supply) and put them together with an insulated 250VAC 10mm² terminal bridge.
- H1, H2, H3 : Remove wire 6 and connect it with terminal bridge for wire 11 and 25. A fan pressure switch or fan speed controller can be connected in series to wire 6.
- H4 : Remove wire U2 from fan speed controller and connect it with wire 11 and 25.
- Remove wire 14 (crankcase heater) and connect it to the compressor contactor terminal 22.
- Remove wire 12 (supply crankcase heater), extend this wire by using an 250 Vac 10mm² terminal bridge and 1,0mm² brown cable and connect it to compressor contactor terminal 21
- Remove the large terminal block from the controller terminals 10 to 19.
- Connect the condensing unit to power supply (turn hardware main switch on).

14 – Maintenance

⚠ Always switch off the unit at main switch before opening the fan door (s).

⚠ 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, 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.

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 door. 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 main switch before opening the fan door.
- Remove surface dirt, leaves, fibres, 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.

- Before closing the fan door, turn the fan blade in the position shown in picture 6, to avoid that the door hits the fan.

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 has to be done, it shall be done in such a way that no refrigerant can escape to the environment.

15 - Warranty

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

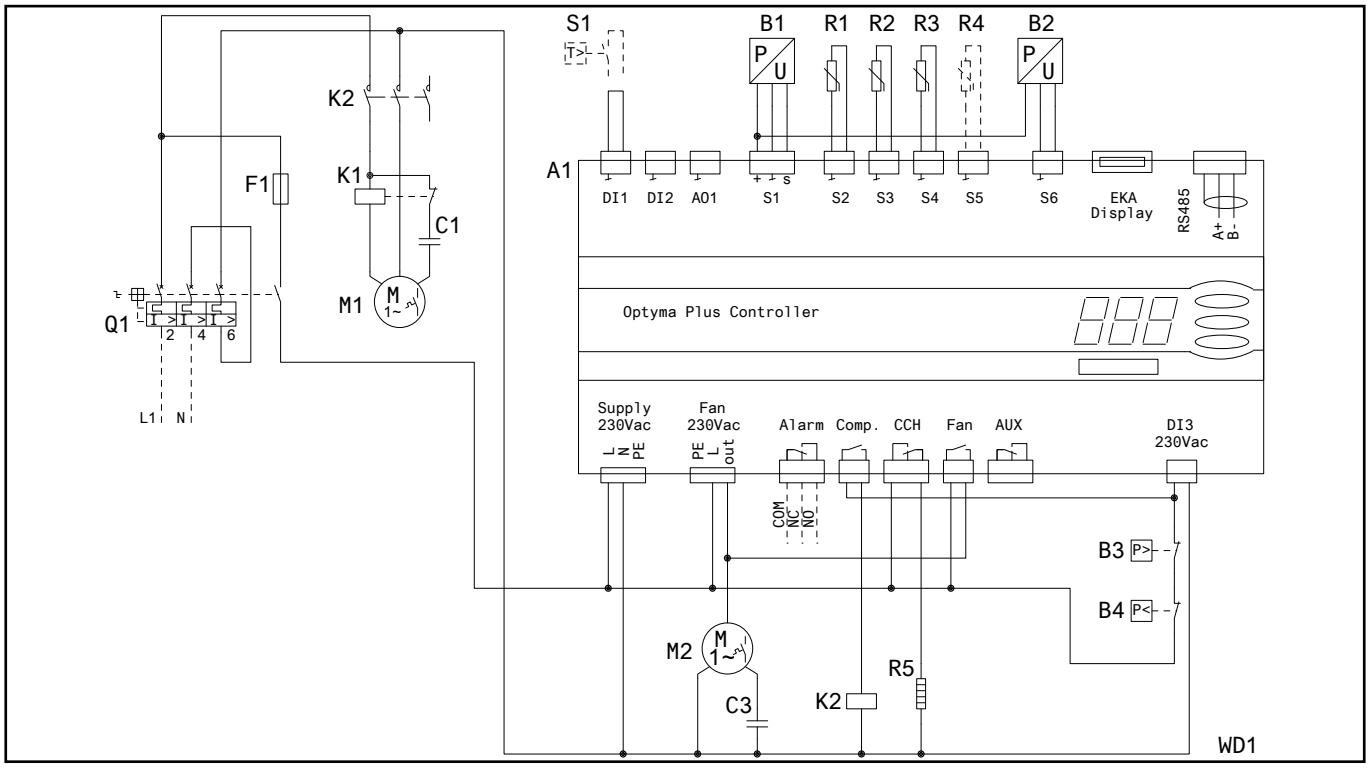
The product warranty may be void in following cases:

- Absence of nameplate.
- External modifications; in particular, drilling, welding, broken feet and shock marks.
- Compressor opened or returned unsealed.
- Rust, water or leak detection dye inside the compressor.
- 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 explosive atmospheric environment.
- No model number or serial number transmitted with the warranty claim.

16 – Disposal

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

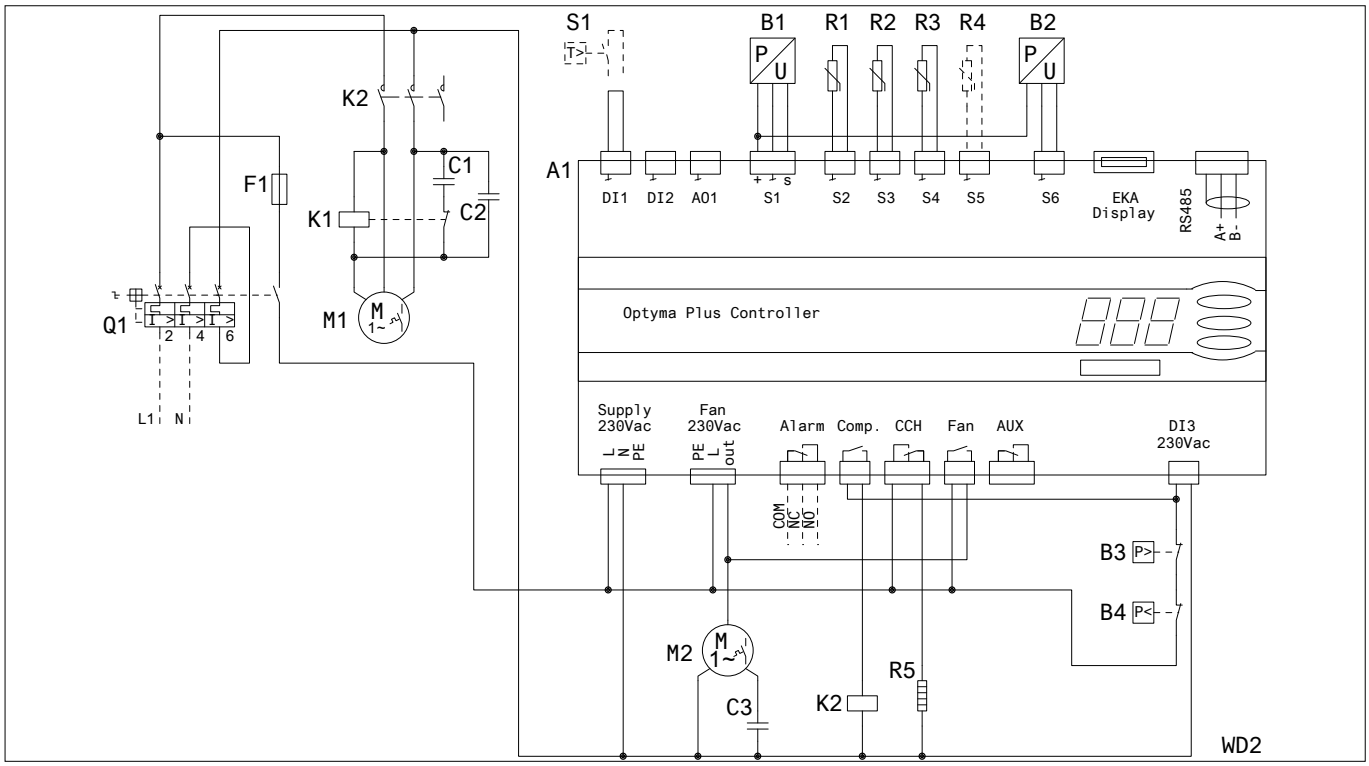
Code G : OP-LPHM018 & OP-MPHM007-010-012-015



A1 : Optyma Plus Controller
B1 : Condensing Pressure Transducer
B2 : Suction Pressure Transducer
B3 : High Pressure Switch
B4 : Low Pressure Switch
C1 : Start Capacitor (Compressor)
C3 : Run Capacitor (Fan)
F1 : Fuse (Control Circuit)
K1 : Start Relay
K2 : Contactor
M1 : Compressor
M2 : Fan Motor
Q1 : Main Switch
R1 : Ambient Temp. Sensor
R2 : Discharge Temp. Sensor
R3 : Suction Temp. Sensor
R4 : Auxiliary Temp. Sensor (optional)
R5 : Crankcase Heater
S1 : Room Thermostat (optional)

Supply : Supply
Fan : Fan
Alarm : Alarm
Comp. : Compressor
CCH : Crankcase Heater
Aux : Auxiliary

Code G : OP-LPHM026-048-068 & OP-MPHM018-026-034 & OP-MPGM034



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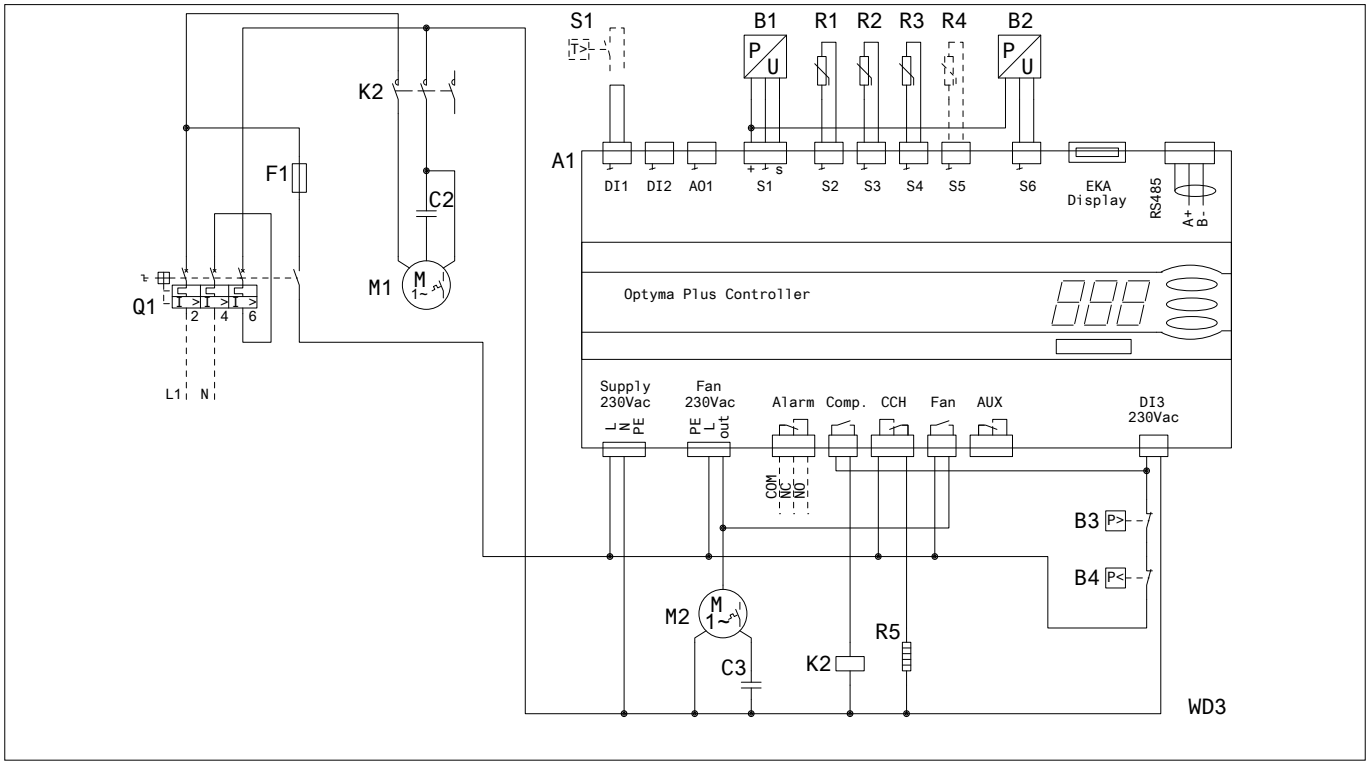

A1 : Optyma Plus Controller
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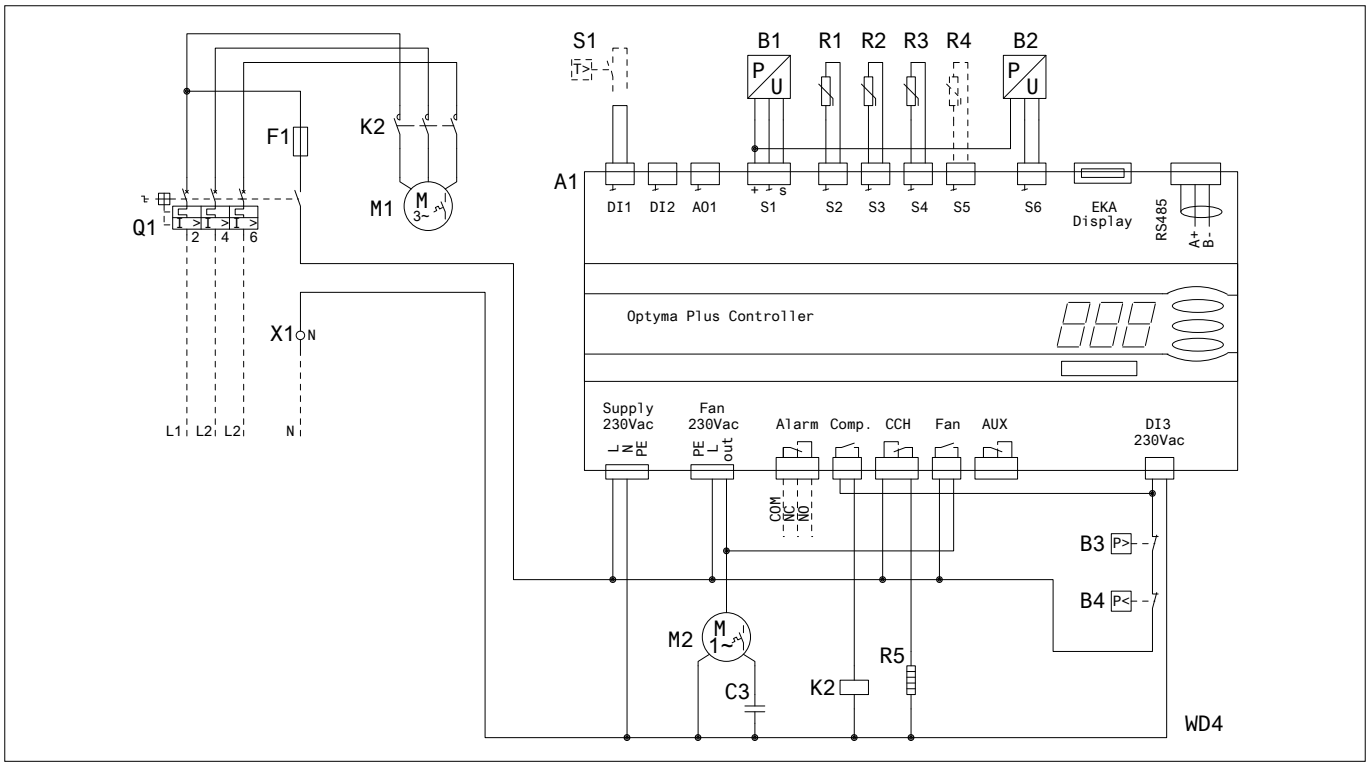
K1 : Start Relay
K2 : Contactor
M1 : Compressor
M2 : Fan Motor
Q1 : Main Switch
R1 : Ambient Temp. Sensor
R2 : Discharge Temp. Sensor
R3 : Suction Temp. Sensor
R4 : Auxiliary Temp. Sensor (optional)
R5 : Crankcase Heater
S1 : Room Thermostat (optional)
X1 : Terminal

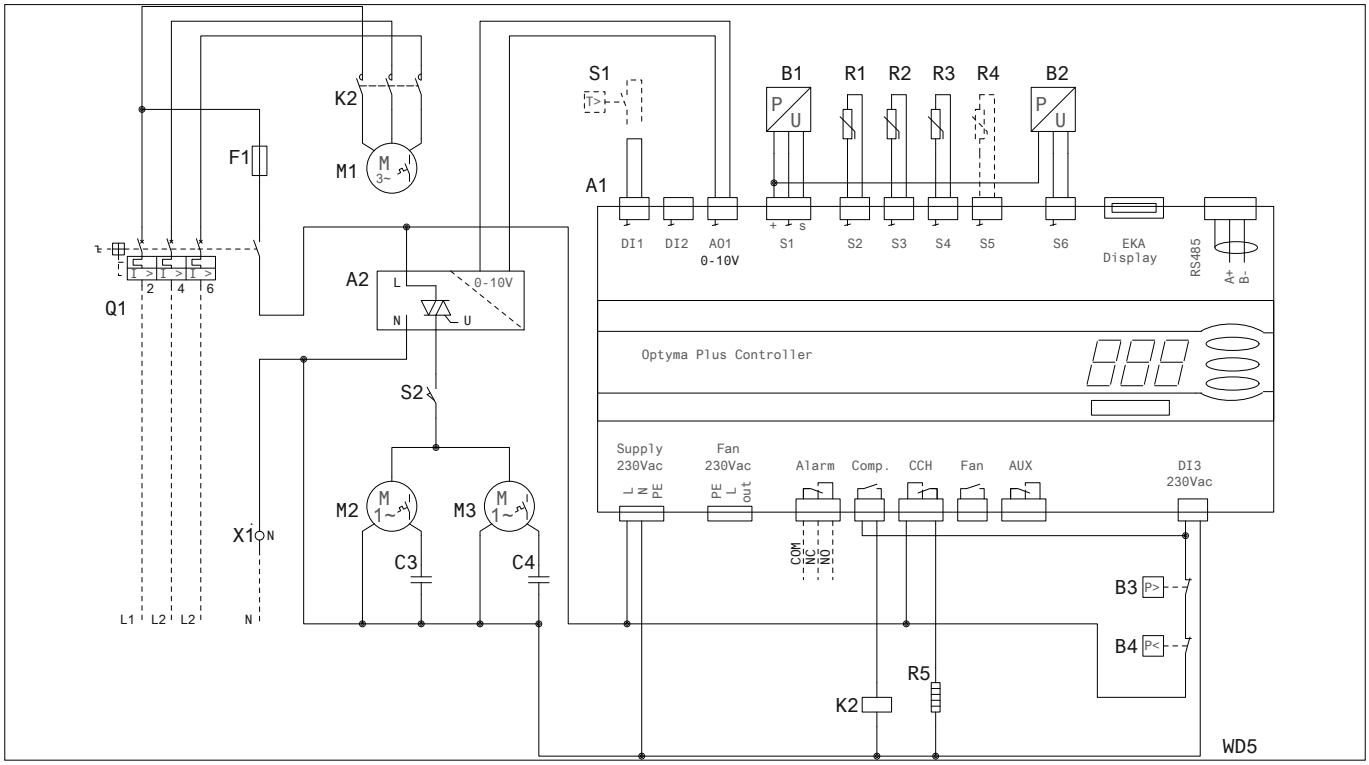
Supply : Supply
Fan : Fan
Alarm : Alarm
Comp. : Compressor
CCH : Crankcase Heater
Aux : Auxiliary

Instructions

Code E : OP-LPHM048-068-096-136 & OP-MPUM034-046-068-080-107



Code E : OP-LPHM215-271 & OP-MPUM125-162



A1 : Optyma Plus Controller
A2 : Fan Speed Controller
B1 : Condensing Pressure Transducer
B2 : Suction Pressure Transducer
B3 : High Pressure Switch
B4 : Low Pressure Switch
C3 : Run Capacitor (Fan 1)
C4 : Run Capacitor (Fan 2)
F1 : Fuse (Control Circuit)
K2 : Contactor
M1 : Compressor
M2 : Fan Motor 1
M3 : Fan Motor 2
Q1 : Main Switch
R1 : Ambient Temp. Sensor
R2 : Discharge Temp. Sensor
R3 : Suction Temp. Sensor
R4 : Auxiliary Temp. Sensor (optional)
R5 : Crankcase Heater
S1 : Room Thermostat (optional)
S2 : Door Limit Switch
X1 : Terminal
Supply : Supply
Fan : Fan
Alarm : Alarm
Comp. : Compressor
CCH : Crankcase Heater
Aux : Auxiliary