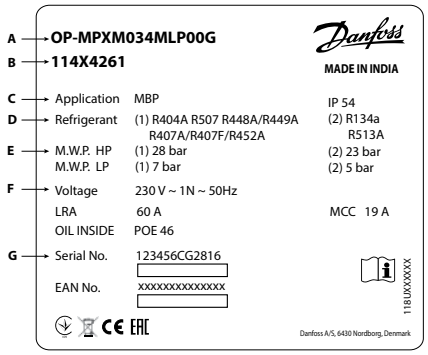
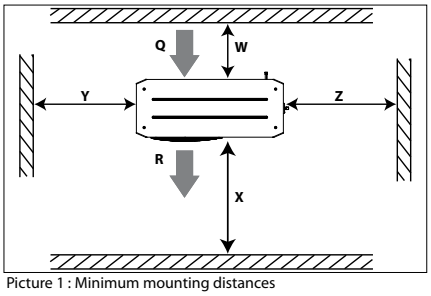
ENGINEERING
TOMORROW

Optyma™ Plus
OP-LPQM, OP-MPXM

Name plate



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



Picture 1 : Minimum mounting distances

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

Unit	W [mm]	X [mm]	Y [mm]	Z [mm]
Housing 4 (Code n° 114X34-- or 114X44--)	250	900	700	700

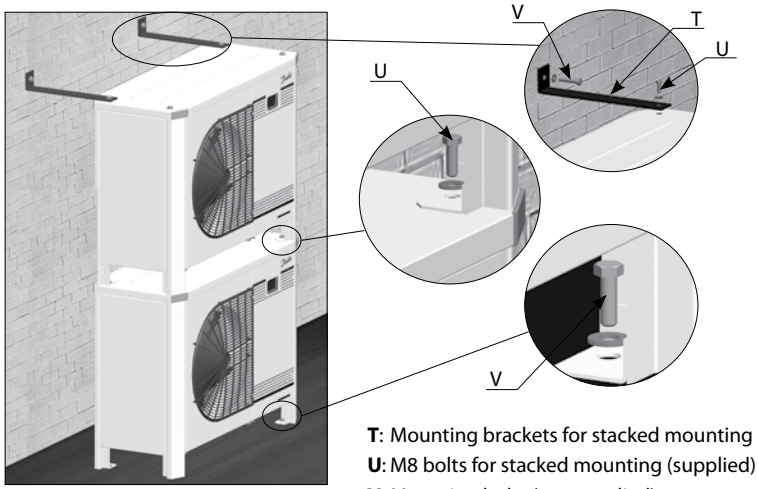
⚠ The condensing unit must only be used for its designed purpose(s) and within its scope of application.

⚠ 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.

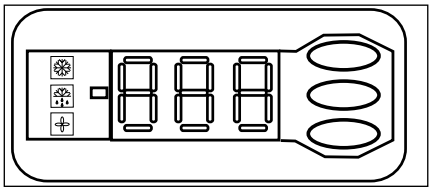
The condensing unit must be handled with caution in the vertical position (maximum offset from the vertical : 15°)

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 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

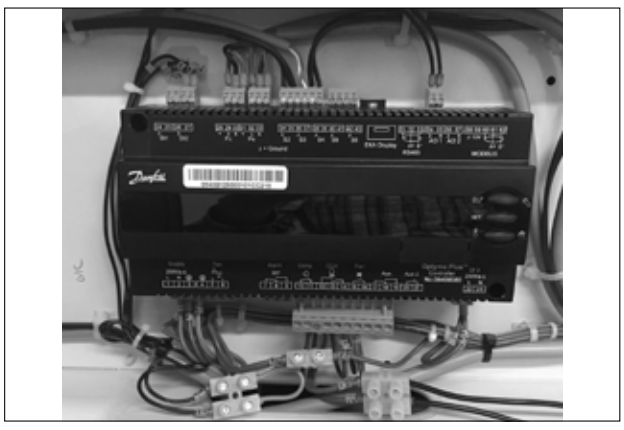
Compressor running

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

Designation system for the Optyma™ **Plus range**

OP - MPXM 034 ML P06 G

1 2 3 4 5 6 7 8

1	**Application** M = MBP L = LBP
2	**Package** Condensing unit family: P = Optyma™ Plus
3	**Refrigerant** Q = R452A, R404A/R507 X = R404A/R507, R134a, R407A, R407F, R448A, R513A R449A,R452A
4	**Condenser** M = Microchannel heat condenser
5	**Swept volume** Displacement in $cm^{3:}$ Example 034 = 34 cm^3
6	**Compressor platform** ML = Fixed speed scroll MLZ LL = Fixed speed scroll LLZ
7	**Version** P06: Optyma™ Plus with PRV
8	**Voltage code** E = 400V/3-phase/50Hz compressor & 230V/1-phase fan

Version control

Optyma™ **Plus**	**(P06)**
IP level	IP54
Compressor technology	Scroll/ Reciprocating
Control box (pre-wired E-panel)	yes
Microchannel condenser	yes
Fan speed controller*	yes
Main switch (circuit breaker)	yes
Supply monitoring relay	-
Filter drier (flare connections)	yes
Sight glass	yes
Crankcase heater	yes
HP/LP adjustable pressostat	Electronic
Fail safe mini-pressostat	Mechanical
Access door(s)	yes
Acoustic insulation	yes
Condensing unit electronic controller	yes
Network connectivity	yes
Stack mounting	yes
Discharge gas thermostat	yes
HP/LP Alarm	yes
Pressure relief valve	yes

** Inbuilt function within Condensing unit electronic controller*

1 – Introduction

These instructions pertain to Optyma™ Plus condensing units OP-LPOM, & OP-MPXM 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
- Replaceable 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 pressure Equipment Directive (PED) 2014/68/EU. 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 4 (Code no. 114X34-- or 114X44--)	2

- 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 31 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 118U3808 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.
- P05 models are also equipped with phase sequence relay to protect the unit against phase loss/sequence/ asymmetry and under-/ over-voltage.

For units with a 3-phase scroll compressor (OP-MPXMxxxxxxxxE), 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 – Safety

Fusible Plug is not installed in unit, it is replaced with adapter blanking plug.

Unit has liquid receiver with an Adapter Plug with 3/8" NPT connection. installer/end user can select various options as mentioned in EN378-2 : 2016 Article § 6.2.2.3
- Optyma Plus fitted with atmospheric pressure relief valve. Don't connect any tube at end of the pressure relief valve.
- Once the pressure relief valve opens, don't use dry air or oxygen to evacuate the refrigerants.
- Optyma Plus (P06 version only) factory fitted with pressure relief valve at 33 bar setting.
- Once pressure relief valve opens, Danfoss recommended to replace new pressure relief valve.

- The unit/installation into which the condensing unit is mounted/integrated, must be in accordance with the PED.
- Beware of extremely hot and cold components.
- Beware of moving components. Power supply should be disconnected while servicing.

9 – 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/ R448A/R449A/R407A/R407F/R452A and approx. 2 bar for R134a and R513A.
- 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.

10 – 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 118U3808 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 R404A or R449A or R452A or R134a depending on the model of compressor mounted and application (Refer Annexx in Optyma Controller installation manual). 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, 36 = R513A, 17 = R507, 19 = R404A, 20 = R407C , 21 = R407A, 37 = R407F, 40 = R448A, 41 = R449A, 42 = R452A.
- Push the middle button to confirm the selected value.
- Push the upper or lower button to find parameter code r84.
- Push the middle button until the value for this parameter is shown as 125
- Push the upper button to select the new value: 130.

11 – 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 inside the condensing unit are properly fastened as they could have worked loose during transportation.
- 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.
- Check if discharge temperature sensor is firm and has proper contact with discharge pipe.

12 – Start-up

- Never start the unit when no refrigerant is charged.
- All service valves must be in the open position.
- Rotalock valve on the receiver must be turned 1 round to close direction to get the right condensing pressure for the pressure transmitter
- 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. P05 models are equipped with a phase-reversal relay and compressor doesn't start, the compressor doesn't build up pressure, in case of wrong phase sequences. 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.

13 – 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.
- Follow the local regulations for restoring the refrigerant from unit.
- 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.

14 – 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.
- 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.
- 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).

15 – 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 a safe position, 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.

16 – Declaration of incorporation

- **Pressure Equipment Directive 2014/68/EU**

EN 378-2:2016 - Refrigerating systems and Heat Pumps - Safety and environmental requirements-Parts 2: Design, construction, testing, marking and documentation.

Low Voltage Directive 2014/35/EU EN 60335-1:2012 + A11:2014- Household and similar electrical appliances-Safety-Part 1: General requirements-for all above mentioned condensing units **Eco-design DIRECTIVE 2009/125/ EC**, establishing a framework for the setting of Eco-design requirements for energy-related products.

REGULATION (EU) 2015/1095, implementing Eco-design Directive 2009/125/EC with regard to Eco-design requirements for professional refrigerated storage cabinets, blast cabinets, condensing units and process Chiller.

• Condensing unit measurements are made according to standard "EN 13771-2:2017"

– Compressor and condensing units for refrigeration-performance testing and test methods- part 2: Condensing units.

17 - Warranty

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

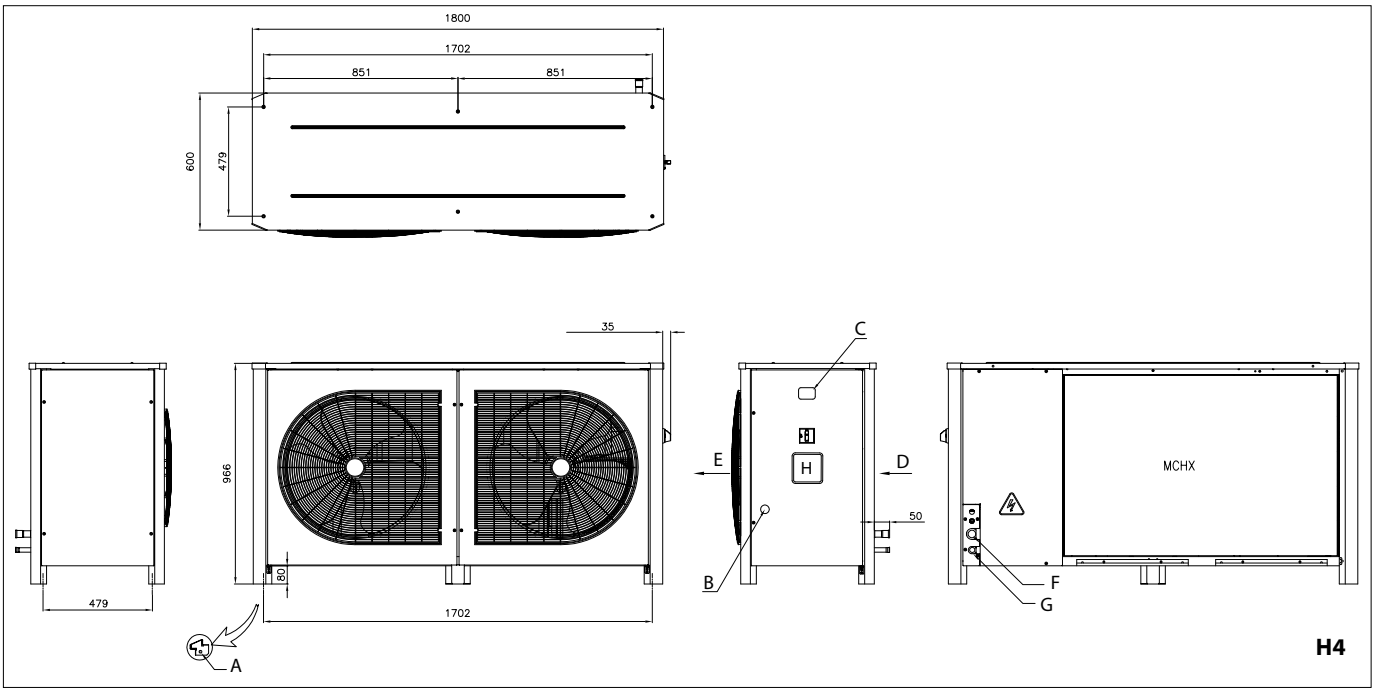
The product warranty may be void in following cases:

- 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 and serial number transmitted with the warranty claim.

18 – Disposal

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

OP-LPQM215-271 & OP-MPXM125-162

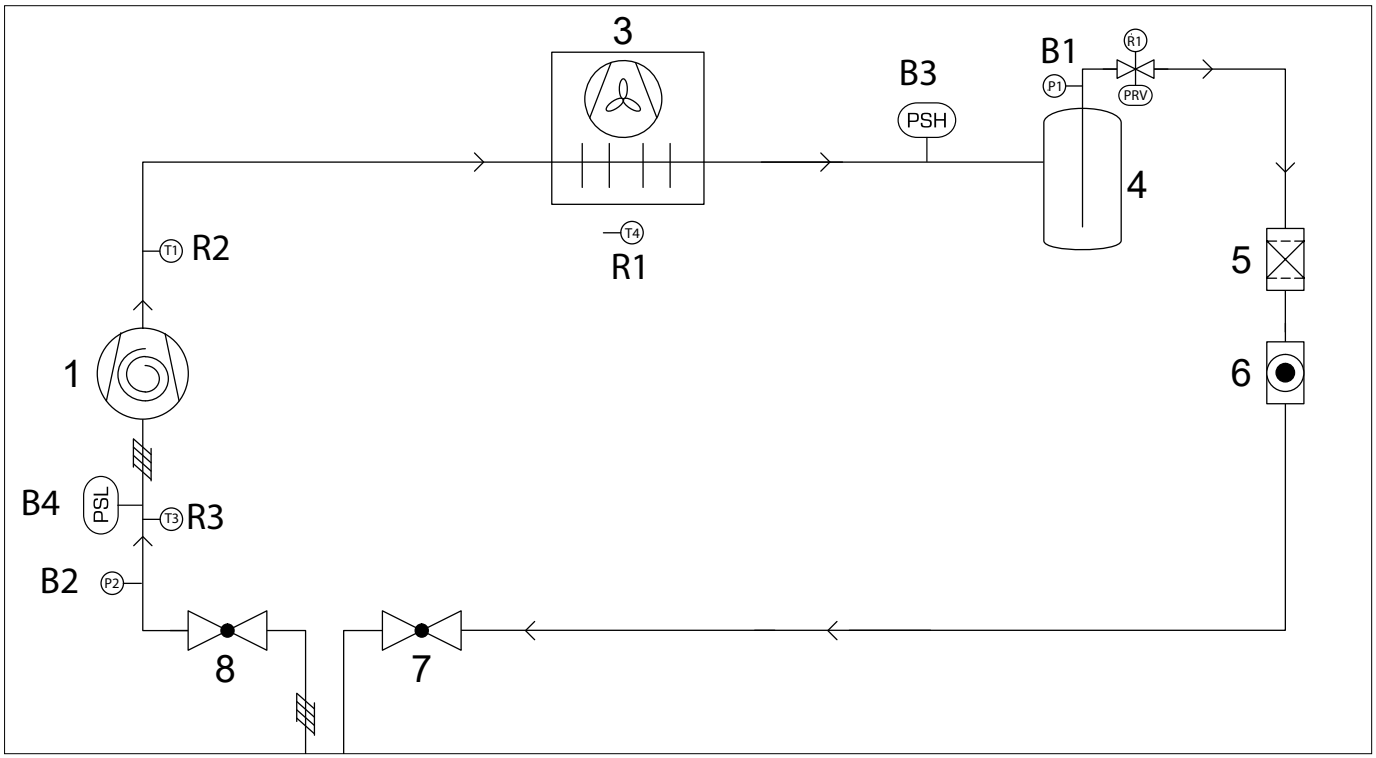


English Legend

A Ø12 Hole for Mounting
B Sight Glass
C Controller Display
D Air in
E Air out
F Suction Port
G Liquid Port
H Nameplate
⚠ Electrical Cables

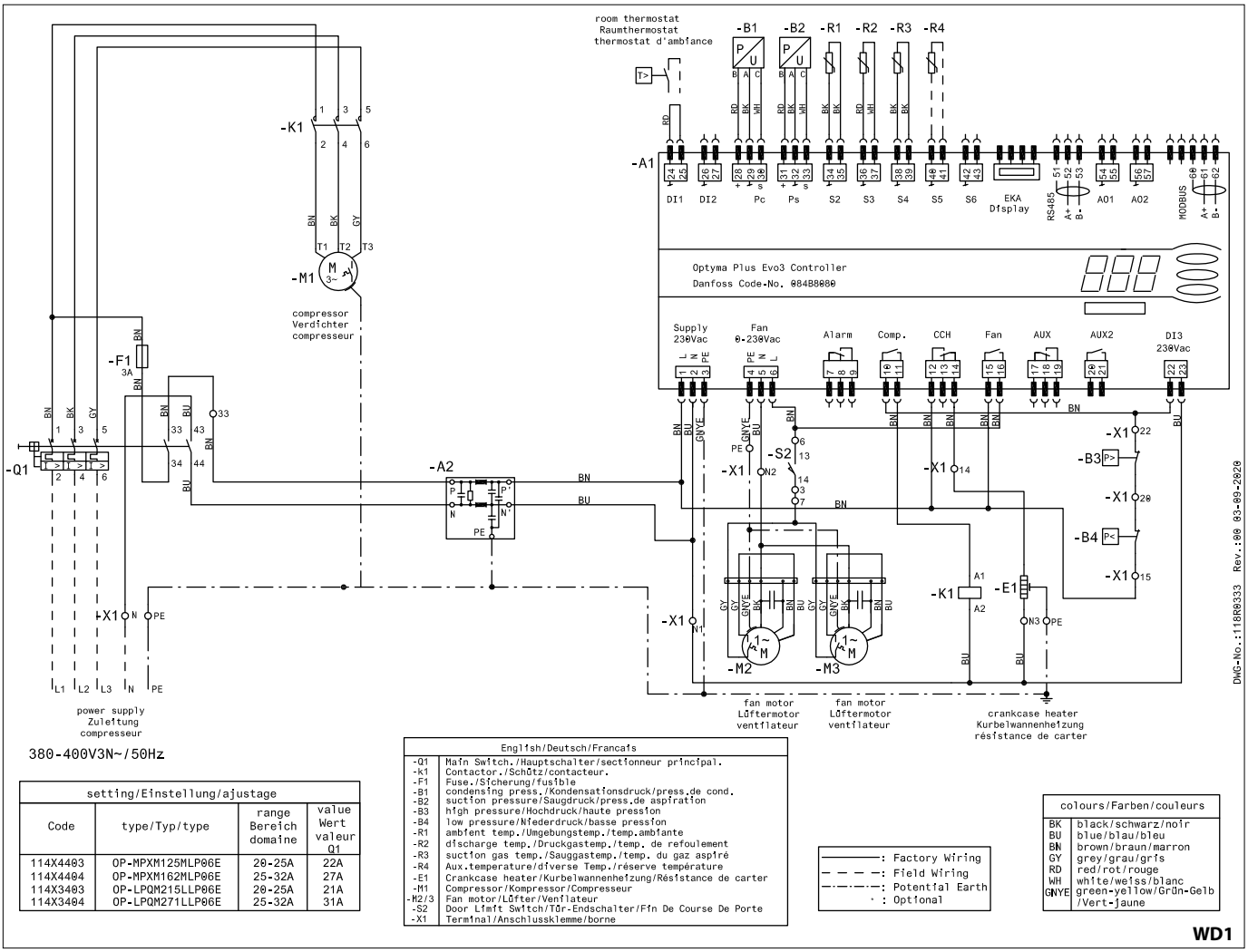
Note: all dimension are in mm

P06 Models: OP-LPQM215-271 & OP-MPXM125-162



1 Compressor
2 Electric Expansion Valve
3 Micro Channel Heat Exchanger with axial fan
4 Refrigerant receiver with rotalock valve
5 Filter Drier
6 Sight Glass
7 Liquid Ball Valve
8 Suction Ball Valve
B1 Condensing Pressure Transducer (P1)
B2 Suction Pressure Transducer (P2)
B3 High Pressure cartridge Switch (auto-reset)(PSH)
B4 Low Pressure cartridge Switch (auto-reset) (PSL)
D1 Pressure relief valve (PRV)
R1 Ambient Temperature sensor (T4)
R2 Discharge Temperature Sensor (T2)
R3 Suction Temperature Sensor (T3)
S1 Pressure Relief Valve
R8 Discharge Temperature Sensor (T1)
Insulation

Code E: OP-LPQM215-271 & OP-MPXM125-162



WD1

setting/Einstellung/ajustage			
Code	type/Typ/type	range Bereich domaine	value Wert valeur Q1
114X4403	OP-MPXM125MLP06E	20-25A	22A
114X4404	OP-MPXM162MLP06E	25-32A	27A
114X3403	OP-LPQM215LLP06E	20-25A	21A
114X3404	OP-LPQM271LLP06E	25-32A	31A

English/Deutsch/Francais	
-Q1	Main Switch./Hauptschalter/sectionneur principal.
-K1	Contactor./Schütz/contacteur.
-F1	Fuse./Sicherung/fusible
-B1	condensing press./Kondensationsdruck/press.de cond.
-B2	suction pressure/Saugdruck/press.de aspiration
-B3	high pressure/Hochdruck/haute pression
-B4	low pressure/Niederdruck/basse pression
-R1	ambient temp./Umgebungstemp./temp.ambiante
-R2	discharge temp./Druckgastemp./temp. de refoulement
-R3	suction gas temp./Sauggastemp./temp. du gaz aspiré
-R4	Aux.temperature/diverse Temp./réserve température
-E1	Crankcase heater/Kurbelwannenheizung/Résistance de carter
-M1	Compressor/Kompressor/Compresseur
-M2/3	Fan motor/Lüfter/Ventilateur
-S2	Door Limit Switch/Tür-Endschalter/Fin De Course De Porte
-X1	Terminal/Anschlussklemme/borne

———	: Factory Wiring
– – – –	: Field Wiring
—·—·—	: Potential Earth
◦	: Optional

colours/Farben/couleurs	
BK	black/schwarz/noir
BU	blue/blau/bleu
BN	brown/braun/marron
GY	grey/grau/gris
RD	red/rot/rouge
WH	white/weiss/blanc
GNYE	green-yellow/Grün-Gelb /Vert-jaune

English Legend

A1 : Optyma™ Plus Controller
A2 : EMI Filter
A3 : Liquid Injection Controller
B1,B5 : Condensing Pressure Transducer
B2 : Suction Pressure Transducer
B3 : High Pressure Switch (OFF = 31bar(g), ON = 24bar(g))
B4 : Low Pressure Switch (OFF = -0,3bar(g), ON = 0,5bar(g))
C1 : Start Capacitor (Compressor)
C2 : Run Capacitor (Compressor)
C3 : Run Capacitor (Fan 1)
C4 : Run Capacitor (Fan 2)
F1 : Fuse (Control Circuit)
F2,F3 : Motor protector
K1 : Contactor
K2 : Start Relay
M1 : Compressor
M2 : Fan Motor 1
M3 : Fan Motor 2
M4 : Electronic Expansion Valve
Q1 : Main Switch
R1 : Ambient Temp. Sensor
R2,R8 : Discharge Temp. Sensor
R3 : Suction Temp. Sensor
R4,R5 : Auxiliary Temp. Sensor (optional)
R6 : Crankcase Heater
R7 : NTC Resistor
S1 : Room Thermostat (optional)
S2 : Door Limit Switch
X1 : Terminal
Supply : Supply
Fan : Fan
Alarm : Alarm
Comp. : Compressor
CCH : Crankcase Heater
Aux : Auxiliary

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