

DANFOSS OPTYMA PLUS INVERTER UNITS



Optyma Plus Inverter Condensing Units

Danfoss Optyma Plus Inverter Units are designed with the unique benefits of stepless inverter scroll technology resulting in a 20-30% higher energy efficiency in a flexible plug-and-play package for medium and high temperature refrigeration applications

Main Product Features

Outdoor Applications

- Weatherproof compact design housing
- Robust and resistant to corrosion
- Hinged access doors

Quiet Operation

- Acoustic dampening insulation
- Low day/night controller operation
- Highly optimized fan blade

Micro Channel Condenser Coil

- High efficiency
- Less refrigerant charge
- Longer life time & easy cleaning

Optyma Plus Electronic Controller

- Parameter monitoring & control
- Plug & play flexible package
- Built in clock function with power reserve
- Compressor on/off & variable speed regulation
- Intelligent fan speed control
- Crankcase heater control
- Condensing pressure control in relation to ambient
- Monitoring discharge temperature TD
- Oil return management at variable speed operation
- Built-in Modbus data communication
- High & low pressure monitoring



Standard Features

- Medium Temperature Units (R404A, R507, R449A, R448A, R407A, R407F)
- Variable Speed Scroll Compressors
- Compressor Drive with EMI filter
- Acoustic Housing
- Compressor Oil Sight Glass
- Crankcase Heater
- Shut Off Ball Valves
- High Efficiency Fan Motor
- Hi Pressure & Low Pressure Switches
- Liquid line Drier & Sight Glass
- Oil Separator with oil heater
- Liquid Receiver with isolator valve
- Circuit Breaker MCB, comp contactor & overload
- IP54 rating for complete unit (Compressor: IP22 , Fan: IP54 , Controller: IP20 , Drive: IP20)



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R404A / R507 – Medium Temperature Inverter Condensing Units

Unit Model	Compressor Speed		Ambient Temp °C	Refrigeration Capacity Watts				
	Drive Output Frequency	Revolutions revs per minute (revs per second)		Evaporating Temperature °C				
				-15	-10	-5	0	+5
OPMPPM028VVLP01E (Three Phase) Danfoss Unit Code: 114X4302 Scroll Inverter Compressor Model: VLZ028TGNE9A Oil Type: POE 215PZ	100 Hz	3000 rpm (50 rps)	32	2505	3106	3802	4601	5510
			38	2266	2820	3461	4198	5039
			43	2060	2574	3168	3853	4636
	150 Hz	4500 rpm (75 rps)	32	3707	4574	5569	6701	7981
			38	3354	4151	5066	6110	7290
			43	3048	3785	4633	5600	6698
	200 Hz	6000 rpm (100 rps)	32	4832	5939	7198	8620	10214
			38	4368	5384	6539	7845	9310
			43	3962	4899	5965	7171	8528
OPMPPM035VVLP01E (Three Phase) Danfoss Unit Code: 114X4316 Scroll Inverter Compressor Model: VLZ035TGNE9A Oil Type: POE 215PZ	100 Hz	3000 rpm (50 rps)	32	3158	3899	4755	5735	6846
			38	2854	3533	4317	5215	6236
			43	2590	3215	3937	4766	5711
	150 Hz	4500 rpm (75 rps)	32	4610	5659	6866	8240	9790
			38	4169	5126	6226	7481	8899
			43	3784	4662	5672	6826	8133
	200 Hz	6000 rpm (100 rps)	32	5901	7218	8727	10438	12360
			38	5331	6529	7901	9460	11214
			43	4828	5926	7183	8614	10227
OPMPPM044VVLP01E (Three Phase) Danfoss Unit Code: 114X4334 Scroll Inverter Compressor Model: VLZ044TGNE9A Oil Type: POE 215PZ	100 Hz	3000 rpm (50 rps)	32	4012	4932	5987	7183	8532
			38	3623	4470	5439	6541	7784
			43	3284	4067	4964	5985	7139
	150 Hz	4500 rpm (75 rps)	32	5812	7111	8583	10234	12070
			38	5243	6432	7777	9289	10972
			43	4744	5839	7078	8472	10027
	200 Hz	6000 rpm (100 rps)	32	7406	9033	10856	12879	15102
			38	6648	8128	9785	11626	13651
			43	5980	7335	8852	10539	12399

Note: Based on 10K Superheat & inherent sub-cooling

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R448A / R449A – Medium Temperature Inverter Condensing Units

Unit Model	Compressor Speed		Ambient Temp °C	Refrigeration Capacity Watts			
	Drive Output Frequency	Revolutions revs per minute (revs per second)		Evaporating Temperature °C			
				-10	-5	0	+5
OPMPPM028VVLP01E (Three Phase) Danfoss Unit Code: 114X4302 Scroll Inverter Compressor Model: VLZ028TGNE9A Oil Type: POE 215PZ	100 Hz	3000 rpm (50 rps)	32	2930	3605	4379	5259
			38	2706	3338	4064	4891
			43	2510	3106	3790	4571
	150 Hz	4500 rpm (75 rps)	32	4270	5226	6324	7573
			38	3949	4842	5866	7032
			43	3670	4509	5472	6569
	200 Hz	6000 rpm (100 rps)	32	5451	6648	8028	9605
			38	5056	6170	7454	8922
			43	4713	5761	6967	8346
OPMPPM035VVLP01E (Three Phase) Danfoss Unit Code: 114X4316 Scroll Inverter Compressor Model: VLZ035TGNE9A Oil Type: POE 215PZ	100 Hz	3000 rpm (50 rps)	32	3616	4442	5381	6441
			38	3327	4102	4983	5977
			43	3076	3806	4637	5577
	150 Hz	4500 rpm (75 rps)	32	5238	6396	7713	9200
			38	4827	5907	7136	8523
			43	4472	5487	6641	7945
	200 Hz	6000 rpm (100 rps)	32	6683	8119	9765	11631
			38	6185	7518	9045	10779
			43	5757	7006	8436	10061
OPMPPM044VVLP01E (Three Phase) Danfoss Unit Code: 114X4334 Scroll Inverter Compressor Model: VLZ044TGNE9A Oil Type: POE 215PZ	100 Hz	3000 rpm (50 rps)	32	4544	5570	6739	8058
			38	4185	5144	6238	7473
			43	3876	4779	5808	6973
	150 Hz	4500 rpm (75 rps)	32	6572	8003	9609	11397
			38	6034	7371	8873	10544
			43	5566	6825	8237	9810
	200 Hz	6000 rpm (100 rps)	32	8375	10149	12112	14265
			38	7634	9291	11123	13130
			43	6982	8539	10260	12145

Note: Based on 10K Superheat & inherent sub-cooling

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Optyma Plus Inverter Technical Specifications

Item Description		Unit Model		
		OPMPPM028VVLP01E (114X4302)	OPMPPM035VVLP01E (114X4316)	OPMPPM044VVLP01E (114X4334)
Compressor Note: compressor cannot operate without a frequency converter as it will be destroyed immediately if connected directly to the public network.	MCC (max continuous current)	8.1 amps (400v / 3 phase)	9.8 amps (400v / 3 phase)	12.0 amps (400v / 3 phase)
	revs per sec range	30 rps – 100 rps	30 rps – 100 rps	30 rps – 100 rps
	revs per min range	1800 rpm – 6000 rpm	1800 rpm – 6000 rpm	1800 rpm – 6000 rpm
	Drive Output	60 Hz – 200 Hz	60 Hz – 200 Hz	60 Hz – 200 Hz
Condenser Fan Motor	Qty	1	1	1
	Diameter	500 mm	500 mm	500 mm
	Voltage	230v / single phase	230v / single phase	230v / single phase
	MCC (max continuous current)	0.96 amps	0.96 amps	0.96 amps
	Power Output	130 watts	130 watts	130 watts
	Power Input	220 watts	220 watts	220 watts
Refrigeration Connections	Suction	3/4"	3/4"	3/4"
	Liquid	5/8"	5/8"	5/8"
Liquid Receiver	Volume	6.2 Litres	6.2 Litres	6.2 Litres
Condenser Coil	Type	G7	G7	G7
	Airflow	5200 m ³ /h	5200 m ³ /h	5200 m ³ /h
	Internal Volume	1.62 dm ³	1.62 dm ³	1.62 dm ³
Limits for Unit Voltage Supply	Voltage Limits	360v min / 440v max	360v min / 440v max	360v min / 440v max
	Phase Asymmetry	± 3%	± 3%	± 3%
	Frequency Limits	50Hz ±1%	50Hz ±1%	50Hz ±1%
Unit Weight	Net (uncrated)	124 kg	125 kg	125 kg
	Gross (crated)	150 kg	151 kg	151 kg
Unit Dimensions	Depth	481 mm	481 mm	481 mm
	Width	1406 mm	1406 mm	1406 mm
	Height	965 mm	965 mm	965 mm

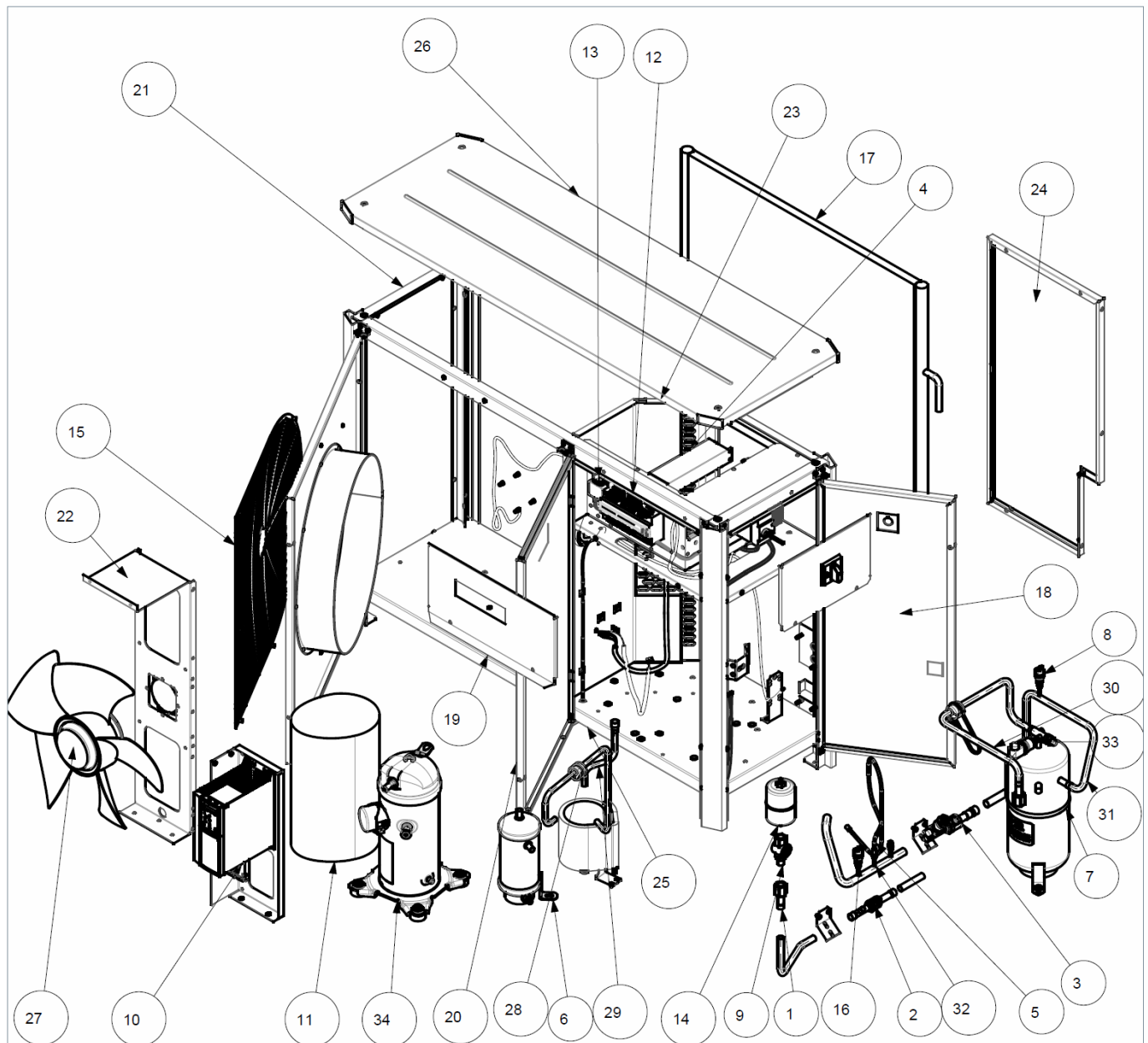
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Optyma Plus Inverter Spare Parts

Item Description	Unit Model		
	OPMPPM028VVLP01E (114X4302)	OPMPPM035VVLP01E (114X4316)	OPMPPM044VVLP01E (114X4334)
Compressor - Scroll Inverter	120G0162 (VLZ028TGNE9A)	120G0159 (VLZ035TGNE9A)	120G0156 (VLZ044TGNE9A)
Condenser	118U5219	118U5219	118U5219
Fan Assembly	118U3829	118U3829	118U3829
Receiver	118U3476	118U3476	118U3476
Filter Drier	023Z5045 (DML165 - 5/8" male flare)	023Z5045 (DML165 - 5/8" male flare)	023Z5045 (DML165 - 5/8" male flare)
Sight Glass	014F0174 (SGN16 - 5/8" male/female flare)	014F0174 (SGN16 - 5/8" male/female flare)	014F0174 (SGN16 - 5/8" male/female flare)
Liquid Line Valve (*LBC valves will replace GBC in late 2018)	009G7053 (*GBC16S - 5/8" solder)	009G7053 (*GBC16S - 5/8" solder)	009G7053 (*GBC16S - 5/8" solder)
Suction Line Valve (*LBC valves will replace GBC in late 2018)	009G7054 (*GBC18S - 3/4" solder)	009G7054 (*GBC18S - 3/4" solder)	009G7054 (*GBC18S - 3/4" solder)
High Pressure Transmitter	118U4021 (was: 118U3722) (DST P100 0...32bar sensor)	118U4021 (was: 118U3722) (DST P100 0...32bar sensor)	118U4021 (was: 118U3722) (DST P100 0...32bar sensor)
Low Pressure Transmitter	118U4025 (was: 118U3721) (DST P100 -1...12bar sensor)	118U4025 (was: 118U3721) (DST P100 -1...12bar sensor)	118U4025 (was: 118U3721) (DST P100 -1...12bar sensor)
Suction & Ambient Temperature Sensor	084N0003 (AKS11 3.5M)	084N0003 (AKS11 3.5M)	084N0003 (AKS11 3.5M)
Discharge Temperature Sensor	084N2007 (AKS21A 3.5M)	084N2007 (AKS21A 3.5M)	084N2007 (AKS21A 3.5M)
Fan Grill	118U3485	118U3485	118U3485
Optyma Plus Controller	118U3465	118U3465	118U3465
Main Switch	118U3854 (ABB-MS132-20+HK1-12)	118U3854 (ABB-MS132-20+HK1-12)	118U3854 (ABB-MS132-20+HK1-12)
Compressor Contactor	118U3847 (ABB-A16-30-01-80+CA5-11)	118U3847 (ABB-A16-30-01-80+CA5-11)	118U3847 (ABB-A16-30-01-80+CA5-11)
Door Handle	118U3858	118U3858	118U3858
Crankcase Heater	120Z5040 (240 volt / 70 watt)	120Z5040 (240 volt / 70 watt)	120Z5040 (240 volt / 70 watt)
High Pressure Switch	118U3718 (ACB-2UB463W)	118U3718 (ACB-2UB463W)	118U3718 (ACB-2UB463W)
Low Pressure Switch	118U3720 (ACB-2UB418W)	118U3720 (ACB-2UB418W)	118U3720 (ACB-2UB418W)
Acoustic Hood	120Z5043	120Z5043	120Z5043
Compressor Inverter Drive	118U5518 (Inverter drive - VLZ028)	118U5519 (Inverter drive - VLZ035)	118U5520 (Inverter drive - VLZ044)
EMI Filter (Drive)	118U3972	118U3972	118U3972
EMI Filter (Controller)	118U3974	118U3974	118U3974
Compressor Oil	120Z0648 (POE 215PZ)	120Z0648 (POE 215PZ)	120Z0648 (POE 215PZ)
Oil Separator	118U3981 (SO/ER-31)	118U3981 (SO/ER-31)	118U3981 (SO/ER-31)
Top Panel	118U5131	118U5131	118U5131
Fan Panel	118U5132	118U5132	118U5132
Back Panel	118U5133	118U5133	118U5133
Front Panel	118U5134	118U5134	118U5134
Access Panel	118U5135	118U5135	118U5135
Left Side Panel	118U5165	118U5165	118U5165

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Exploded View of Condensing Units



Legend:

- | | | |
|--|---------------------------------|-------------------------------|
| 1: FSA Adaptor | 12: Optyma™ Plus controller | 24: Back panel |
| 2: Liquid line valve (with schrader) | 13: EMI filter (controller) | 25: Base plate |
| 3: Suction line valve + Extra service connection | 14: Refrigerant filter | 26: Top panel |
| 4: EMI filter (drive) | 15: Fan guard | 27: Fan assembly |
| 5: Oil return pipe | 16: Low pressure switch | 28: Discharge pipe |
| 6: Oil separator | 17: Microchannel heat exchanger | 29: Condenser outlet pipe |
| 7: Receiver | 18: Right side door | 30: Receiver outlet pipe |
| 8: High pressure switch | 19: E-box cover | 31: Oil separator outlet pipe |
| 9: Sight glass | 20: Front door, right side | 32: Suction line |
| 10: Compressor drive | 21: Unit frame | 33: Rotolock valve |
| 11: Acoustic hood | 22: Fan bracket | 34: Compressor |
| | 23: Separation panel | |

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Information for Optyma Plus Inverter Units

Optyma™ Plus Inverter are a perfect solution for typical MBP applications such as food retail, petrol sites & cold rooms etc. All units are fully wired, factory tested, have one cabinet size and are equipped with one fan.

It is important to ensure the condensing unit capacity at minimum speed (30 rps) will not be higher than the required cooling capacity of the smallest evaporator. Failure to ensure this may be detrimental to the unit in the longer term.

The Optyma™ Plus Inverter is equipped with a IPM (Interior Permanent Magnet) motor. The compressor should never be operated without a frequency converter as it would be destroyed immediately if connected directly to the public network.

It is extremely important to select the correct suction line insulation thickness in order to:

- Avoid high superheat during high ambient conditions that can create high discharge temperatures.
- Avoid low superheat during low ambient conditions that can cause the refrigerant to condensate in suction line.

Protection and features:

- Electronic thermal compressor protection against overload.
- Temperature monitoring of the heat sink ensures that the frequency converter trips in case of overtemperature.
- The frequency converter is protected against short-circuits between compressor terminals U, V, W.
- When a compressor phase is missing, the frequency converter trips and issues an alarm.
- When a mains phase is missing the frequency converter trips or issues a warning (depending on the load).
- Monitoring of the intermediate circuit voltage ensures that the frequency converter trips when the intermediate circuit voltage is too low or too high.
- The frequency converter is protected against ground faults on compressor terminals U, V, W.
- Occurring alarms will be shown in the controller display and by the red LED in front of the frequency converter.
- The root cause of an individual alarm can be shown with an optional LCP (local control panel, code 120Z0581) or the MCT10 setup software.

Emergency running without controller:

- If the controller fails the condensing unit can be operated when the controller standard wiring (WD1) is modified to temporary wiring as described in the application guidelines. (authorized electricians only to apply any modifications)

EMC compliance:

- All necessary actions are taken to secure EMC compliance of complete condensing unit.

Warning - working on unit that has been switched OFF:

- Frequency converters have DC-link capacitors that remain charged even when the frequency converter is not powered.
- To avoid an electrical hazard disconnect AC mains & wait 15 min for the capacitors to fully discharge before work on unit.
- Failure to wait for the specified time to expire after power is terminated to the unit could result in serious injury or death.
- Note: Digital inputs are not a safety switch & do not disconnect the frequency converter from the mains.
- Do not remove mains connections, compressor connections or other power connections while the frequency converter is still connected to power.

Leakage Current:

- The ground leakage current from the frequency converter exceeds 3.5 mA. According to IEC 61800- 5-1 a reinforced Protective Earth connection must be ensured with a min. 10 mm² Cu or an additional PE wire – with the same cable cross section as the mains wiring - must be terminated separately.

Residual Current Device:

- This product can cause a DC current in the protective conductor. Where a residual current device (RCD) is used for extra protection only an RCD of Type B (time delayed) shall be used on the supply side of this product.

Phase sequence:

- Optyma™ Plus INVERTER units are equipped with variable speed scroll compressors for which proper phase sequence is compulsory in order to secure rotation in right direction and therefore compression. The phase sequence has to be secured between the drive and compressor. (The phase sequence between network and unit drive is of no influence on the compressor rotation direction).

Unit start up:

- The condensing unit controller is factory set for R449A (change as required – see application guide) for quick installation and start up. The compressor drive is fully managed by the condensing unit controller and therefore all parameters settings should be done only via condensing unit controller.
- It is compulsory to energize crankcase and oil separator heaters at least 1 hour before initial start-up and start-up after prolonged shutdown to remove refrigerant in liquid phase from the compressor.

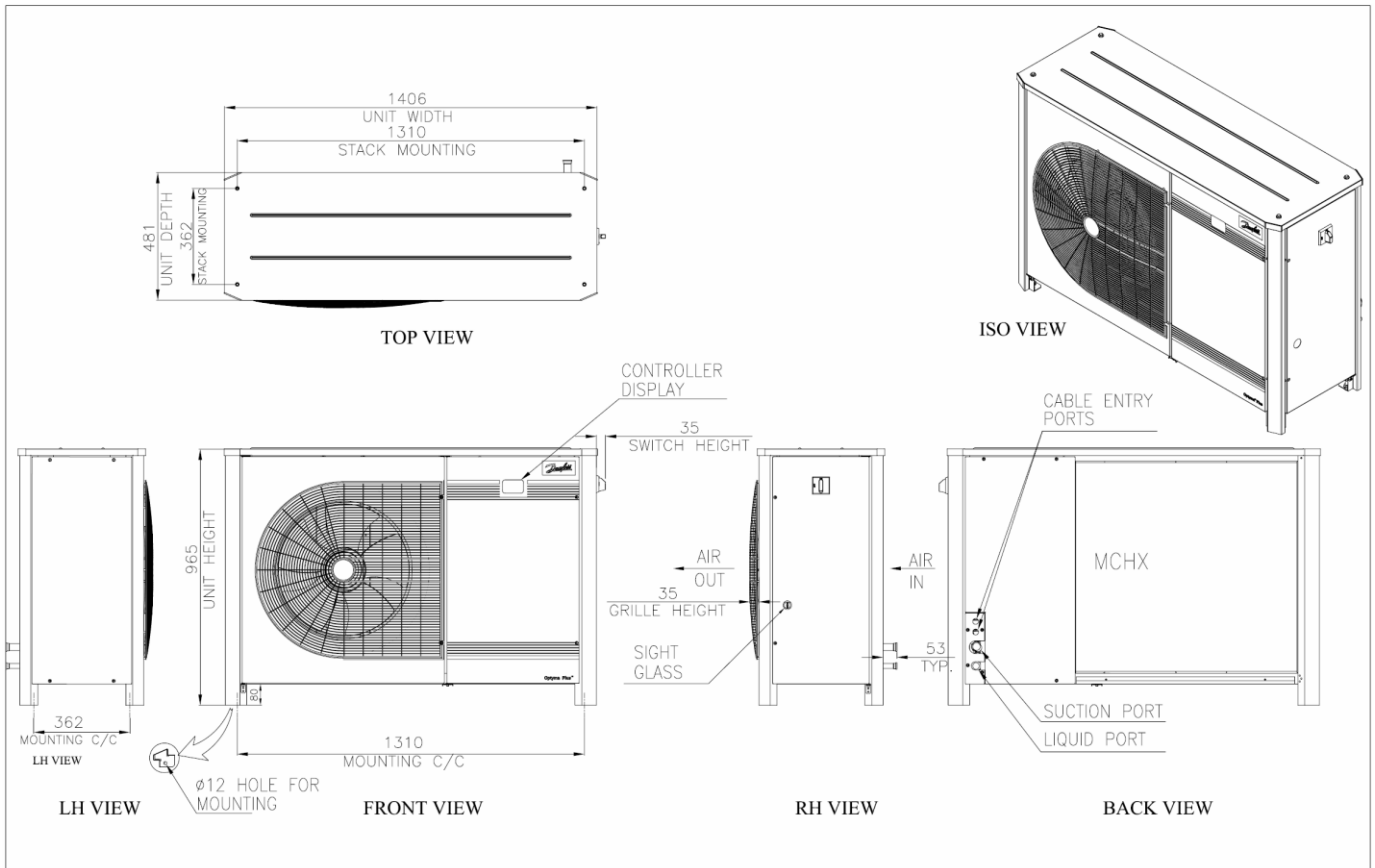
Unit maximum test pressure is 28 bar.

Note: Please read appropriate application guidelines & manuals for more detailed information.

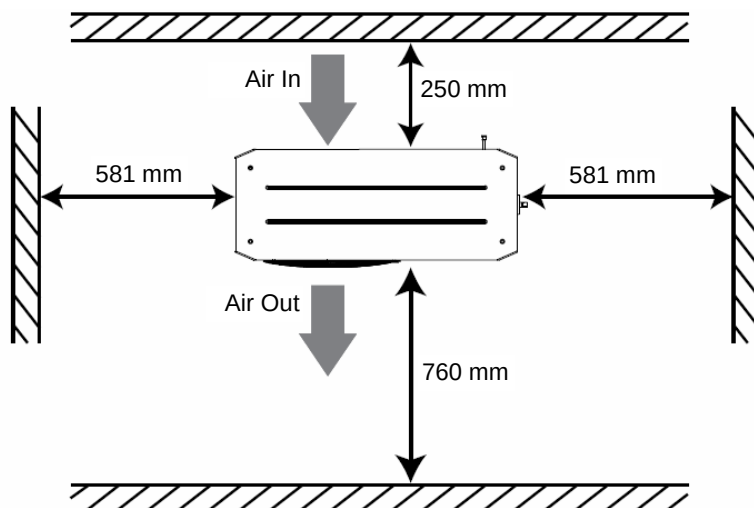
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Unit Dimensions

Unit Models: OPMPPM028VVLP01E, OPMPPM035VVLP01E & OPMPPM044VVLP01E



Unit Minimum Mounting Distances



Unit Wiring Diagram

