



User & Installation Manual

SIGILUS / INTARBOX

MDF / BDF MDH / BDH



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1. DESCRIPTION

Sigilus and intarbox units are self-contained refrigeration equipment in horizontal construction. They are assembled on a prelacquered galvanised steel shell and its condensing unit has been designed for outdoor installation, with easily removable panels to give access to fans, refrigerant circuit, and electric board. These units are divided in the following versions:

MDF series is designed for positive temperature applications covering the nominal cooling capacity range from 0,6 kW to 14,3 kW.

BDF series is designed for negative temperature applications covering the nominal cooling capacity range from 0,7 kW to 8,8 kW.

MDH series is designed for positive temperature applications covering the nominal cooling capacity range from 0,6 kW to 11 kW.

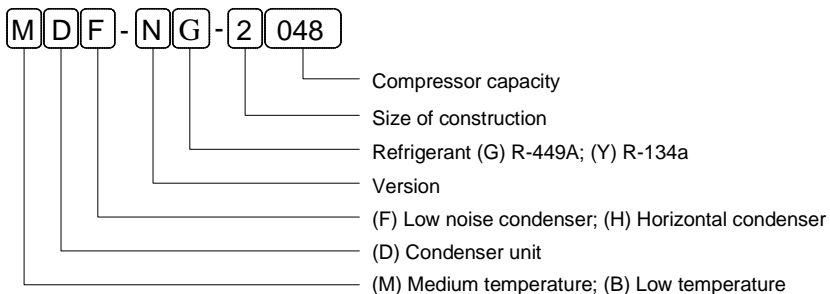
BDH series is designed for negative temperature applications covering the nominal cooling capacity range from 0,6 kW to 11 kW.

- N version – Electronic version, with electronic controller for condensing unit and evaporating unit control.
- M version – Electromechanical version, with electromechanical control by suction pressure.

- V version – Multi-service version, with progressive frigorific capacity regulation, depends on the demand of different evaporating units. Only in three-phase models.
- S version – Scroll compressor, with electronic control to manage the condenser unit and one evaporator unit.
- SM version – Scroll compressor, with electromechanical control by suction pressure.
- R version – Digital scroll compressor, with regulation capacity from 10 until 100%, according to the cooling demand.
- C version (only MDH/BDH) – Electronic centrifugal version, electronic control included to manage the condenser unit and one evaporator unit.
- CM version (only MDH/BDH) – Electromechanical centrifugal version, electromechanical control by suction pressure.
- CV version (only MDH/BDH) – Multi-service centrifugal version, with progressive cooling capacity regulation, depends on the demand of different evaporating units.

2. IDENTIFICATION

Units are identified according to the following nomenclature on the product data plate.



3. OPERATION

Sigilus and intarbox units are refrigeration machines operating under a vapour compression cycle.

Refrigeration cycle

The following steps define the refrigeration cycle in motocondenser refrigeration units:

Compression: The resultant refrigerant vapour is suctioned from the evaporator by the compressor through the suction line. The compressor compresses the refrigerant vapour up to high pressure and temperature.

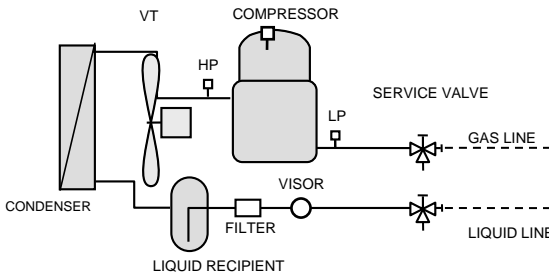
Condensation: the hot high pressure vapour is condensed, at a constant pressure and temperature, in the condenser by exhausting the latent evaporation to the outer ambient. Once the refrigerant has been fully condensed, the liquid refrigerant is overcooled beyond the condensing temperature.

The liquid refrigerant is storage at the liquid receiver, that is used as a compensation vessel, being available to be driven to an external expansion and evaporation unit, closing then the refrigerant cycle.

Defrost cycle (only electronic version)

Because the evaporator temperature is normally below 0 °C (32 °F), frost is likely to deposit on the evaporator surface through the condensation of the water vapour contained in the air. To prevent the air flow from being obstructed with the consequently loss of performance, the instrument switches automatically to the defrost operation mode.

During the defrost cycle, by activating the defrost heaters, the evaporator temperature is increased in order to melt the frost on it while the inside fan and compressor are off. The defrost water is collected in the drain tray and evacuated through the drain tube.



4. OPERATION LIMITS

Sigilus and intarbox units are designed for continuous operation within the following temperature limits

	Evaporation temperature		Ambient temperature	
	Max	Min	Max	Min
Positive temperature	0 °C	-15 °C	+50 °C	+5 °C
Negative temperature	-25 °C	-35 °C	+50 °C	+5 °C

Only for short periods of time or during the start-up should the unit work beyond these limits.

5. COMPOSITION

Sigilus and intarbox units are built on a self-contained construction. The components are assembled on a steel structure and covered with a prelacquered galvanised steel shell. It consists of:

- Hermetic reciprocating or scroll compressor with internal protection, assembled on silentblocks and with internal klixon.

- Compressor discharge muffler with hermetic reciprocating compressor.
- HP and LP pressure switches.
- HP and LP load nipple.
- Liquid receiver.
- Dehydrating filter.
- Condensation coil in copper tubes and aluminium fins.
- Low-speed direct driven axial fans with single phase motor. Dynamically equilibrated blades with protection grill.
- Centrifugal motor fan with available static pressure for a ducted outlet of condenser hot air (centrifugal version).
- Proportional pressure switch to control the condensation fan speed by voltage variation (optional, included in three-phase models).
- Service Valves with Flare type connections (welded connections for pipe sizes from MDF/MDH 1/2"-7/8" and BDF/BDH 3/8"-7/8").
- Liquid visor.
- Liquid solenoid valve (optional, except -V versions).
- Oil separator (optional, included in -V and -R versions).
- VRC system (only -V and -CV version). Check composition and operation in VRC manual attached.
- Rectangular to circular duct adaptor (optional in centrifugal version).
- Coil anticorrosion cover (optional).
- Outer grid coil protection (optional).
- Liquid injection system for negative temperature models with R-449A.

Electrical board

- Circuit breaker protection.
- Electronic control XW270K with the following elements and features:
 - transformer 230 VAC / 12 VCC,
 - microprocessor,
 - alarm relay,
 - compressor relay,
 - defrost relay,
 - evaporator fan relay,
 - room light relay,
 - condenser fan relay,
 - door switch digital input,
 - HP/LP pressure switch input,
 - inside temperature NTC probe,
 - outside temperature NTC probe,
 - defrost NTC probe,
 - RS485 connection,
 - V820 remote control pad.

- Compressor permanent power condenser in single-phase units.
- Relay and start capacitor of compressor in single-phase units.
- Ground connection.
- Compressor and fans contactor.

6. TEST PROTOCOL

Every Sigilus and intarbox units have been previously checked and tested in factory with the following test protocol:

- Helium leak-proof test. A certificate is supplied upon request.
- Refrigerant load.
- Operation test for refrigeration and defrost modes under nominal operating conditions.
- Safety devices checking.

7. SAFETY DEVICES

Sigilus and intarbox units features the following safety devices:

- HP and LP pressure limit switches to protect the unit against unusual pressure levels.
- Thermal switches with automatic restart in compressor and fans to protect motor wirings from overloads.
- General thermal protections.
- Common ground connection.

8. EMERGENCY SYSTEM

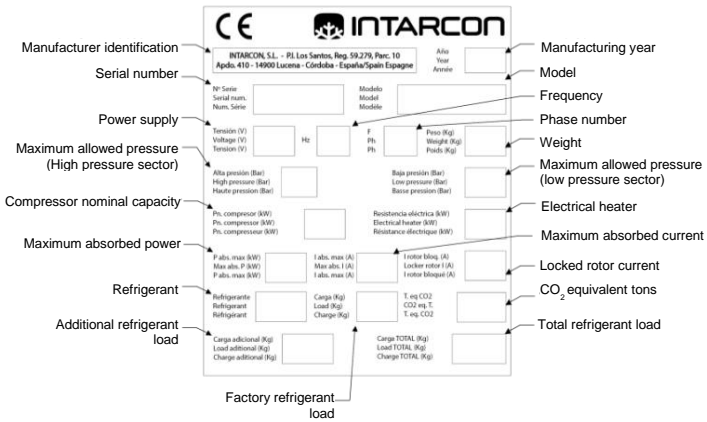
The electronic regulation (only electronic version) involves control routines and emergency alarms for the following causes:

- Probe failure.
- Too high and too low room temperature.
- Too high or too low refrigerant pressure.
- Too high condensing temperature.
- Electronic control failure
- Open door.

Upon a failure an external alarm is activated, and the unit turns into emergency operation mode.

9. CHARACTERISTIC PLATE

All units are identified with the following data plate. In all communications with the manufacturer please indicate the serial number



Note: For any communications with the manufacturer indicate the serial number

10. TECHNICAL FEATURES R-449A

MDF-NG/-MG/-VG		0008	0010	0012	1014	1016	1018	1024	1026	1034	1038	2048	2054	2060	2068	
Cooling capacity ① (W)		630	800	940	1210	1400	1710	2210	2460	3120	3520	4510	5140	5880	6600	
Input power ② (W)		370	470	560	680	770	920	1060	1180	1660	1590	1970	2180	2590	2980	
COP		1,70	1,70	1,69	1,78	1,82	1,86	2,08	2,08	1,88	2,21	2,29	2,36	2,27	2,21	
Installed power ③ (kW)		0,53	0,73	0,86	0,98	1,10	1,38	1,68	1,89	2,63	2,35	3,11	3,46	4,09	4,71	
Fan	Air flow rate (m3/h)	350			1700						3200	3600				
	Type	Axial														
	Power (W) @ r.p.m	38 @ 1300				85 @ 880						142 @ 910				
Compressor	Type	Hermetic reciprocating														
	Swept volume (m3/h)	1,16	1,54	1,79	2,32	2,65	3,18	4,21	4,52	6,01	6,60	8,40	9,40	10,50	11,80	
	Discharge pressure nom. conditions (bar rel.)	18,00														
	Suction pressure nom. conditions (bar rel.)	2,59														
	Power (CV)	1/3	3/8	1/2	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	3	3 1/2	
Safety valve	Differential pres. calibration (bar rel.)	N/A						30								
	Step section (mm2)	N/A						17,72								
	Discharge capacity (kg/h)	N/A						379								
Pressure switch	Type	ACB														
	Brand	Danfoss														
	Model	061F8175														
	Calibrated pressure (bar rel.)	28														
Max. absorbed current ④ (A)	230V / I / 50Hz	3,9	5,3	6,1	5,7	7,1	8,4	11,7	13,1	15,6	Not available					
	400V / III / 50Hz	Not available							4,0	4,8	6,6	8,1	8,6	9,6	10,1	
Start-up current (A)	230V / I / 50Hz	15,5	18,0	19,4	19,3	22,6	30,0	33,5	38,5	45,0	Not available					
	400V / III / 50Hz	Not available							18,0	22,0	16,0	23,0	25,0	30,0	38,0	
Refrigerant		R-449A / Group L1 / GWP-100:1398														
Cooling connections (liq.-gas)		1/4" - 3/8"			1/4" - 1/2"			3/8" - 5/8"			3/8" - 3/4"			1/2" - 3/4"		
Dimensions and weight	L x W x H (mm)	670x308x440			1030x375x580						1080x415x830					
	Weight (kg)	51	51	51	66	76	76	78	78	78	81	85	86	87	88	
SPL	dB(A)	20	24	24	25	25	25	25	25	27	30	27	27	27	26	

① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.

② Total absorbed power by compressor and fans in nominal conditions (axial version).

③ As defined by RD138/2011. IF-01.

④ Maximum current even beyond compressor operation limits.

MDF-NG/-MG/-VG	3086	3108	4136	4160	7097	7109
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Cooling capacity	Cooling capacity ① (W)	7270	9600	12260	14100	7810	9200
	Input power ② (W)	3450	4410	5660	6630	3790	4230
	COP	2,11	2,18	2,17	2,13	2,06	2,17
Installed power ③ (kW)		4,89	6,58	8,68	10,10	5,56	6,40
Fan	Air flow rate (m3/h)	4000	6500	7000		4000	6500
	Type	Axial					
	Power (W) @ r.p.m	142 @ 910	2x 142 @ 910				
Compressor	Type	Hermetic reciprocating					
	Swept volume (m3/h)	14,90	18,70	23,60	29,80	8,36	9,40
	Discharge pressure nom. conditions (bar rel.)	18,00					
	Suction pressure nom. conditions (bar rel.)	2,59					
	Power (CV)	4	5	6 1/2	8	2x 2	2x 2 1/2
Safety valve	Differential pres. calibration (bar rel.)	30					
	Step section (mm2)	17,72					
	Discharge capacity (kg/h)	379					
Pressure switch	Type	ACB					
	Brand	Danfoss					
	Model	061F8175					
	Calibrated pressure (bar rel.)	28					
Max. absorbed current ④ (A)	230V / I / 50Hz	Not available					
	400V / III / 50Hz	12,7	16,3	19,2	23,2	15,60	17,47
Start-up current (A)	230V / I / 50Hz	Not available					
	400V / III / 50Hz	48,5	64,0	80,0	90,0	31,10	34,47
Refrigerant		R-449A / Group L1 / GWP-100:1398					
Cooling connections (liq-gas)		1/2" - 7/8"	3/8" - 3/4"	1/2" - 1 1/8"	5/8" - 1 1/8"	1/2" - 7/8"	
Dimensions and weight	L x W x H (mm)	1150x480x1100		1150x480x 1347		1600x587x1097	
	Weight (kg)	115	120	135	157	161	166
SPL	dB(A)	39	36	35	41	30	30

① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.

② Total absorbed power by compressor and fans in nominal conditions (axial version).

③ As defined by RD138/2011. IF-01.

④ Maximum current even beyond compressor operation limits.

BDF-NG/-MG/-VG		1026	1034	1054	1074	1086	2096	2108	2136	3215	3271	6137	
Cooling capacity ① (W)		600	810	1060	1420	1730	2060	2460	3100	4710	6310	3420	
Input power ② (W)		720	970	1380	1700	1630	1880	2220	3030	4460	5940	2640	
COP		0,83	0,84	0,77	0,84	1,06	1,10	1,11	1,02	1,06	1,06	1,30	
Installed power ③ (kW)		1,29	1,76	2,60	3,39	3,46	4,31	4,71	6,65	9,65	12,41	6,92	
Fan	Air flow rate (m ³ /h)	1700				3200	3600			6500		3600	
	Type	Axial											
	Power (W) @ r.p.m	85 @ 880				142 @ 910			2x142 @ 910		155 @ 880		
Compressor	Type	Hermetic reciprocating											
	Swept volume (m ³ /h)	4,57	6,01	9,25	12,91	11,80	16,70	18,80	23,70	37,40	47,10	11,83	
	Discharge pressure nom. conditions (bar rel.)	18,00											
	Suction pressure nom. conditions (bar rel.)	0,27											
	Power (CV)	3/4	1 1/4	1 3/4	2 1/2	3	3 1/2	4	5	7 1/2	10	6	
Safety valve	Differential pres. calibration (bar rel.)	N/A				30							
	Step section (mm2)	N/A				17,72							
	Discharge capacity (kg/h)	N/A				379							
Pressure switch	Type	ACB											
	Brand	Danfoss											
	Model	061F8175											
	Calibrated pressure (bar rel.)	28											
Max. absorbed current ④ (A)	230 V / I ph / 50 Hz	8,6	10,4	16,4	24,4	Not available							
	400 V / III ph / 50 Hz	Not available		6,3	7,2	9,0	10,7	12,7	14,9	23,6	28,3	16,9	
Start-up current (A)	230 V / I ph / 50 Hz	30,0	40,0	68,0	81,0	Not available							
	400 V / III ph / 50 Hz	Not available		23,0	28,0	25,0	32,0	45,0	51,0	74,0	96,0	33,5	
Refrigerant		R-449A / Group L1 / GWP-100:1398											
Cooling connections (liq-gas)		1/4" - 1/2"	3/8" - 5/8"				3/8" - 3/4"	3/8" - 7/8"		1/2" - 1 1/8"		3/8"-1 1/8"	
Dimensions and weight	L x W x H (mm)	1030x375x580				1080x415x830			1150x480x1100		1480x460x827		
	Weight (kg)	67	83	93	93	83	98	98	98	149	149	139	
SPL	dB(A)	18	20	27	30	27	36	34	29	36	36	26	

- ① Cooling capacity calculated for an evaporation temperature of -30 °C and ambient temperature 32 °C.
 ② Total absorbed power by compressor and fans in nominal conditions (axial version).
 ③ As defined by RD138/2011. IF-01.
 ④ Maximum current even beyond compressor operation limits.

BDF-SG/ -SMG/ -RG		2013	3018	4025	8026
Cooling capacity ① (W)		3820	5900	7460	7640
Input power ② (W)		3140	4400	5130	6340
COP		1,22	1,34	1,45	1,21
Installed power ③ (kW)		4,04	5,87	7,20	8,08
Fan	Air flow rate (m3/h)	3600	6500	7000	
	Type	Axial			
	Power (W) @ r.p.m	155 @ 880	2x 155 @ 880		
Compressor	Type	Hermetic scroll			
	Swept volume (m3/h)	11,70	17,10	21,40	11,70
	Discharge pressure nom. conditions (bar rel.)	18,00			
	Suction pressure nom. conditions (bar rel.)	0,27			
	Power (CV)	4	6	8	8
Safety valve	Differential pres. calibration (bar rel.)	30			
	Step section (mm2)	17,72			
	Discharge capacity (kg/h)	379	400		
Pressure switch	Type	ACB			
	Brand	Danfoss			
	Model	061F8175			
	Calibrated pressure (bar rel.)	28			
Max. absorbed current ④ (A)	400 V / III ph / 50 Hz	9,9	15,3	17,6	19,6
Start-up current (A)	400 V / III ph / 50 Hz	64,9	75,6	103,6	74,6
Refrigerant		R-449A / Group L1 / GWP-100:1398			
Cooling connections (liq.-gas)		3/8" - 7/8"	3/8" - 1 1/8"		
Dimensions and weight	L x W x H (mm)	1080x415x830	1150x480x1100	1150x480x1347	1600x587x1347
	Weight (kg)	103	124	136	178
SPL	dB(A)	25	29	32	28

① Cooling capacity calculated for an evaporation temperature of -30 °C and ambient temperature 32 °C.

② Total absorbed power by compressor and fans in nominal conditions (axial version).

③ As defined by RD138/2011. IF-01.

④ Maximum current even beyond compressor operation limits.

MDF-SG / -RG / -SMG		2021	2029	3038	3045	4057	7042	8058
Cooling capacity ① (W)		5300	6820	8710	10380	13510	10430	13500
Input power ② (W)		2350	3170	4050	4690	5760	4890	6450
COP		2,26	2,15	2,15	2,21	2,35	2,13	2,09
Installed power ③ (kW)		3,34	4,41	5,53	6,26	8,25	7,16	9,12
Fan	Air flow rate (m3/h)	3600	3600	4000	6500	7000	6500	7000
	Type	Axial						
	Power (W) @ r.p.m	155 @ 880	155 @ 880	155 @ 880	2x 155 @ 880			
Compressor	Type	Hermetic scroll						
	Swept volume (m3/h)	8,61	11,40	14,40	17,10	21,40	8,61	11,40
	Discharge pressure nom. conditions (bar rel.)	18,00						
	Suction pressure nom. conditions (bar rel.)	2,59						
	Power (CV)	3	4	5	6	8	2x 3	2x 4
Safety valve	Differential pres. calibration (bar rel.)	30						
	Step section (mm2)	17,72						
	Discharge capacity (kg/h)	379						
Pressure switch	Type	ACB						
	Brand	Danfoss						
	Model	061F8175						
	Calibrated pressure (bar rel.)	28						
Max. absorbed current ④ (A)	400V / III / 50Hz	7,84	10,64	13,47	14,40	17,14	7,20	20,92
Start-up current (A)	400V / III / 50Hz	40,64	50,64	66,17	75,3	103,24	40,00	58,92
Refrigerant		R-449A / Group L1 / GWP-100:1398						
Cooling connections (liq-gas)		3/8"-7/8"	1/2"-7/8"	1/2"-7/8"	1/2"-1 1/8"	5/8"-1 1/8"	1/2"-1 1/8"	5/8"-1 1/8"
Dimensions and weight	L x W x H (mm)	1080x415x830		1150x480x1100		1150x480x1347	1600x587x1100	1600x587x1347
	Weight (kg)	90		115	121	133	139	150
SPL	dB(A)	21		23	24	30	24	24

- ① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.
- ② Total absorbed power by compressor and fans in nominal conditions (axial version).
- ③ As defined by RD138/2011. IF-01.
- ④ Maximum current even beyond compressor operation limits.

MDH-NG/ -MG/ -VG/ -CG/ -CMG/ -CVG	0012	1014	1016	1018	2024	2026	2034	3038	4048	4054	4060
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Cooling capacity ① (W)		870	1060	1180	1420	1910	2110	2610	3070	4140	4700	5340	
Input power ② (W)		590	680	760	920	1070	1210	1700	1530	2490	2700	3120	
COP		1,47	1,56	1,55	1,54	1,79	1,74	1,54	2,01	1,66	1,74	1,71	
Installed power ③ (kW)		0,86	0,94	1,11	1,38	1,68	1,89	2,63	2,27	2,79	3,20	3,75	
F _{in}	Centrifugal	Air flow rate (m ³ /h)	375	575			1000			1500	3500		
		Available static pressure (Pa)	120			65			140	100			
		Power (W) @ r.p.m	355 @ 1850						147 @ 1200	550 @ 1400			
	Axial	Air flow rate (m ³ /h)	375	575			1000			1500	3500		
		Power (W) @ r.p.m	85 @ 1300			120 @ 1300			65 @ 580	350 @ 1300			
Compressor	Type	Hermetic reciprocating											
	Swept volume (m ³ /h)	1,80	2,32	2,65	3,18	4,21	4,52	6,01	6,60	8,40	9,40	10,50	
	Discharge pressure nom. conditions (bar rel.)	18,00											
	Suction pressure nom. conditions (bar rel.)	2,59											
	Power (CV)	1/2	1/2	5/8	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/2	3	
Safety valve	Differential pres. calibration (bar rel.)	N/A									30		
	Step section (mm ²)	N/A									17,72		
	Discharge capacity (kg/h)	N/A									379		
Pressure switch	Type	ACB											
	Brand	Danfoss											
	Model	061F8175											
	Calibrated pressure (bar rel.)	28											
Max. absorbed current ④ (A)	230 V / I ph / 50 Hz (Centrifugal)	8,0	7,4	8,8	10,1	12,3	14,8	17,3	Not available				
	230 V / I ph / 50 Hz (Axial)	6,8	6,2	7,6	8,9	11,3	13,8	16,3	Not available				
	400 V / III ph / 50 Hz (Centrifugal)	Not available					6,0	8,3	7,9	15,2	15,7	16,7	
	400 V / III ph / 50 Hz (Axial)	Not available					5,1	7,3	6,6	9,3	9,8	10,8	
Start-up current (A)	230 V / I ph / 50 Hz (Centrifugal)	21,5	21,4	24,7	32,1	35,6	40,6	47,1	Not available				
	230 V / I ph / 50 Hz (Axial)	20,3	20,2	23,5	30,9	34,6	39,6	46,1	Not available				
	400 V / III ph / 50 Hz (Centrifugal)	Not available					20,0	24,1	17,9	30,7	32,7	37,7	
	400 V / III ph / 50 Hz (Axial)	Not available					19,1	23,1	16,6	24,8	26,8	31,8	
Refrigerant	R-449A / Group L1 / GWP-100: 1398												
Cooling connections (liq.-gas)	1/4" - 3/8"	1/4" - 1/2"			3/8" - 5/8"				3/8" - 3/4"				
Dimensions and weight	L x W x H (mm)	600x395x355	665x435x416			835x435x500			925x580x515	1000x615x585			
	Weight (kg)	46	50	60	60	60	61	61	78	95	96	97	
SPL	Axial dB(A)	33	33	33	33	33	34	36	39	36	36	35	
	Centrifugal dB(A)	53	54	54	54	56	57	58	61	62	62	62	

- ① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.
- ② Total absorbed power by compressor and fans in nominal conditions (axial version).
- ③ As defined by RD138/2011. IF-01.
- ④ Maximum current even beyond compressor operation limits.

MDH-NG/-MG/-VG/-CG/-CMG/-CVG		4068	5086	5108	5136	5097	5109	5120	5137	
Cooling capacity ① (W)		5950	7080	9010	11090	7800	8870	10080	11210	
Input power ② (W)		3510	3660	4660	5990	3990	4450	5280	6050	
COP		1,70	1,93	1,93	1,85	1,95	1,99	1,91	1,85	
Installed power ③ (kW)		4,39	4,39	5,96	8,08	5,58	6,40	7,50	8,78	
Fan	Centrifugal	Air flow rate (m ³ /h)		3500						
		Available static pressure (Pa)	100	120						
		Power (W) @ r.p.m	550 @ 1400							
	Axial	Air flow rate (m ³ /h)		4300						
		Power (W) @ r.p.m		350 @ 1300						
Compressor	Type		Hermetic reciprocating							
	Swept volume (m ³ /h)		11,80	14,90	18,74	23,62	8,36	9,37	10,52	11,81
	Discharge pressure nom. conditions (bar rel.)		18,00							
	Suction pressure nom. conditions (bar rel.)		2,59							
	Power (CV)		3 1/2	4	5	6 1/2	2x 2	2x 2 1/2	2x 3	2x 3 1/2
Safety valve	Differential pres. calibration (bar rel.)		30							
	Step section (mm ²)		17,72							
	Discharge capacity (kg/h)		379							
Pressure switch	Type		ACB							
	Brand		Danfoss							
	Model		061F8175							
	Calibrated pressure (bar rel.)		28							
Max. absorbed current ④ (A)	400 V / III ph / 50 Hz (Centrifugal)		17,8	18,9	21,4	25,4	22,4	23,4	25,4	27,4
	400 V / III ph / 50 Hz (Axial)		10,8	13,0	15,5	19,5	16,5	17,5	19,5	21,5
Start-up current (A)	400 V / III ph / 50 Hz (Centrifugal)		45,8	55,9	71,4	87,4	37,9	40,4	46,4	55,4
	400 V / III ph / 50 Hz (Axial)		38,8	50,0	65,5	81,5	47,5	34,5	40,5	49,5
Refrigerant		R-449A / Group L1 / GWP-100: 1398								
Cooling connections (liq.-gas)		1/2" - 3/4"	1/2" - 7/8"		1/2" - 1 1/8"	1/2" - 7/8"		1/2" - 1 1/8"		
Dimensions and weight	L x W x H (mm)		1000x615x585							
	Weight (kg)		98	152	154	157	163	165	167	169
SPL	Axial dB(A)		35	48	45	44	39	39	38	38
	Centrifugal dB(A)		62	69	67	66	63	63	63	63

- ① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.
- ② Total absorbed power by compressor and fans in nominal conditions (axial version).
- ③ As defined by RD138/2011. IF-01.
- ④ Maximum current even beyond compressor operation limits.

BDH-NG/ -MG/ -CG/ -CMG			1026	1034	2054	2074
Cooling capacity ① (W)			570	725	1005	1325
Input power ② (W)			690	940	1370	1690
COP			0,83	0,77	0,73	0,78
Installed power ③ (kW)			1,29	1,76	2,60	3,39
Fan	Centrifugal	Air flow rate (m3/h)	575		1000	
		Available static pressure (Pa)	45			
		Power (W) @ r.p.m	355 @ 1850			
	Axial	Air flow rate (m3/h)	575		1000	
Power (W) @ r.p.m		85 @ 1300		120 @ 1300		
Compressor		Type	Hermetic reciprocating			
		Swept volume (m3h)	4,57	6,01	9,25	12,91
		Discharge pressure nom. conditions (bar rel.)	18,00			
		Suction pressure nom. conditions (bar rel.)	0,27			
		Power (CV)	3/4	1 1/4	1 3/4	2 1/2
Safety valve		Differential pres. calibration (bar rel.)	N/A			
		Step section (mm2)				
		Discharge capacity (kg/h)				
Pressure switch		Type	ACB			
		Brand	Danfoss			
		Model	061F8175			
		Calibrated pressure (bar rel.)	28			
Max. absorbed current ④ (A)		230 V / I ph / 50 Hz (Centrifugal)	10,0	11,8	17,8	25,8
		230 V / I ph / 50 Hz (Axial)	8,8	10,6	16,9	24,9
		400 V / III ph / 50 Hz (Centrifugal)	Not available		8,1	9,0
		400 V / III ph / 50 Hz (Axial)			7,2	8,1
Start-up current (A)		230 V / I ph / 50 Hz (Centrifugal)	31,8	41,8	69,8	82,8
		230 V / I ph / 50 Hz (Axial)	30,6	40,6	68,9	81,9
		400 V / III ph / 50 Hz (Centrifugal)	Not available		24,8	29,8
		400 V / III ph / 50 Hz (Axial)			23,9	28,9
Refrigerant			R-449A / Group L1 / GWP-100: 1398			
Cooling connections (liq-gas)			1/4"-1/2"		3/8"-5/8"	
Dimensions and weight		L x W x H (mm)	665x435x416		835x435x500	
		Weight (kg)	60	61	75	
SPL		Axial dB(A)	28	32	40	43
		Centrifugal dB(A)	52	54	61	63

- ① Cooling capacity calculated for an evaporation temperature of -30 °C and ambient temperature 32 °C.
- ② Total absorbed power by compressor and fans in nominal conditions (axial version).
- ③ As defined by RD138/2011. IF-01.
- ④ Maximum current even beyond compressor operation limits.

BDH-NG/ -MG/ -CG/ -CMG		3086	3096	4108	5136	5215	5271	5192	5216	
Cooling capacity ① (W)		1695	1925	2450	3080	4630	6275	3880	4750	
Input power ② (W)		1600	1850	2390	3230	4550	5650	3020	3650	
COP		1,06	1,04	1,03	0,95	1,02	1,11	1,28	1,30	
Installed power ③ (kW)		3,46	4,31	4,71	6,65	9,64	12,37	8,62	9,42	
Fan	Centrifugal	Air flow rate (m3/h)	1500			3500				
		Available static pressure (Pa)	140			100	120			
		Power (W) @ r.p.m	147 @ 1200			550 @ 1400				
	Axial	Air flow rate (m3/h)	1500			3500	4300			
		Power (W) @ r.p.m	65 @ 850			350 @ 1300				
Compressor	Type	Hermetic reciprocating								
	Swept volume (m3/h)	11,80	16,70	18,80	23,70	37,41	47,15	16,70	18,80	
	Discharge pressure nom. conditions (bar rel.)	18,00								
	Suction pressure nom. conditions (bar rel.)	0,27								
	Power (CV)	3	3 1/2	4	5	7 1/2	10	2x 3 1/2	2x 4	
Safety valve	Differential pres. calibration (bar rel.)	N/A			30					
	Step section (mm2)				17,72					
	Discharge capacity (kg/h)				400					
Pressure switch	Type	ACB								
	Brand	Danfoss								
	Model	061F8175								
	Calibrated pressure (bar rel.)	28								
Max. absorbed current ④ (A)	400 V / III ph / 50 Hz (Centrifugal)	10,2	11,9	19,6	21,8	29,8	34,7	27,6	31,6	
	400 V / III ph / 50 Hz (Axial)	9,0	10,6	13,8	16,0	24,0	28,8	21,7	25,7	
Start-up current (A)	400 V / III ph / 50 Hz (Centrifugal)	26,8	33,8	52,5	58,5	81,5	103,7	49,5	64,5	
	400 V / III ph / 50 Hz (Axial)	25,6	32,5	46,7	52,7	75,7	97,8	43,6	58,6	
Refrigerant		R-449A / Group L1 / GWP-100: 1398								
Cooling connections (liq.-gas)		3/8"-5/8"	3/8"-3/4"	3/8"-7/8"		1/2"-1 1/8"		3/8"-3/4"	3/8"-1 1/8"	
Dimensions and weight	L x W x H (mm)	925x580x515			1000x615x585	1290x755x656				
	Weight (kg)	80	93	97		166	166	172		
SPL	Axial dB(A)	32	45	43	38	45	45	48	41	
	Centrifugal dB(A)	58	65	65	63	67	67	68	67	

① Cooling capacity calculated for an evaporation temperature of -30 °C and ambient temperature 32 °C.

② Total absorbed power by compressor and fans in nominal conditions (axial version).

③ As defined by RD138/2011. IF-01.

④ Maximum current even beyond compressor operation limits.

BDH-SG/ -SMG/ -RG/ -SCG/ -SCMG/ -RCG			4013	5036
Cooling capacity ① (W)			3550	10770
Input power ② (W)			2990	8920
COP			1,19	1,21
Installed power ③ (kW)			4,04	11,74
Fan	Centrifugal	Air flow rate (m3/h)	3500	
		Available static pressure (Pa)	100	120
		Power (W) @ r.p.m	550 @ 1400	
	Axial	Air flow rate (m3/h)	3500	4300
		Power (W) @ r.p.m	350 @ 1300	
Compressor		Type	Hermetic scroll	
		Swept volume (m3/h)	11,70	17,10
		Discharge pressure nom. conditions (bar rel.)	18,00	
		Suction pressure nom. conditions (bar rel.)	0,27	
		Power (CV)	4	2x 6
Safety valve		Differential pres. calibration (bar rel.)	30	
		Step section (mm2)	17,72	
		Discharge capacity (kg/h)	379	
Pressure switch		Type	ACB	
		Brand	Danfoss	
		Model	061F8175	
		Calibrated pressure (bar rel.)	28	
Max. absorbed current ④ (A)		400 V / III ph / 50 Hz (Centrifugal)	16,8	33,4
		400 V / III ph / 50 Hz (Axial)	11,0	27,5
Start-up current (A)		400 V / III ph / 50 Hz (Centrifugal)	71,8	94,4
		400 V / III ph / 50 Hz (Axial)	66,0	88,5
Refrigerant			R-449A / Group L1 / GWP-100: 1398	
Cooling connections (liq-gas)			3/8"-7/8"	1/2"-1 3/8"
Dimensions and weight		L x W x H (mm)	1000x615x585	1290x755x656
		Weight (kg)	102	185
SPL		Axial dB(A)	25	32
		Centrifugal dB(A)	61	62

① Cooling capacity calculated for an evaporation temperature of -30 °C and ambient temperature 32 °C.

② Total absorbed power by compressor and fans in nominal conditions (axial version).

③ As defined by RD138/2011. IF-01.

④ Maximum current even beyond compressor operation limits.

11. TECHNICAL FEATURES R-134a

MDF-NY/-MY/-VY		0010	0015	1015	1026	1033	1053	1074	2086	2108	2136	3160	3171	3215	3271	
Cooling capacity ① (W)		610	778	923	1381	1796	2436	3486	4326	5003	6752	7440	7786	9833	13503	
Input power ② (W)		290	360	390	630	740	1220	1540	1880	2130	2870	3500	3570	4120	5790	
COP		2,10	2,16	2,37	2,19	2,42	1,99	2,26	2,30	2,35	2,35	2,12	2,18	2,38	2,33	
Installed power ③ (kW)		0,59	0,83	0,83	1,22	1,44	2,20	2,90	3,68	4,40	6,17	7,49	7,49	9,03	12,05	
Fan	Air flow rate (m3/h)	350			1700				3700			4000		6500		
	Type	Axial														
	Power (W) @ r.p.m	38 @ 1300			85 @ 880				142 @ 910			2x142 @ 910				
Compressor	Type	Hermetic reciprocating														
	Swept volume(m3/h)	2,1	3,2	3,2	4,5	5,7	9,3	12,9	14,9	18,7	23,6	29,8	29,8	37,5	47,3	
	Discharge pressure nom. conditions (bar rel.)	10,56														
	Suction pressure nom. conditions (bar rel.)	0,99														
	Power (CV)	3/8	1/2	1/2	3/4	1	1 1/2	2	4	5	6 1/2	8	8	10	13	
Safety valve	Differential pres. calibration (bar rel.)	21														
	Step section (mm2)	17,72														
	Discharge capacity (kg/h)	269														
Pressure switch	Type	ACB														
	Brand	Danfoss														
	Model	061F6147														
	Calibrated pressure (bar rel.)	20														
Max. abs. current④(A)	230V / I / 50Hz	3,9	4,9	5,3	9,0	9,2	11,8	15,8	Not available							
	400V / III / 50Hz	Not available					4,8		12,6	15,6	18,9	22,7	22,6	28,3	37,5	
Start-up current (A)	230V / I / 50Hz	16	22	22	29	30	46	55	Not available							
	400V / III / 50Hz	Not available					24		49	64	80	90,7	90	105	140	
Refrigerant		R-134a / Group A1 / GWP-100: 1430														
Cooling connections (liq.-gas)		1/4"-3/8"		1/4"-1/2"		1/4"-5/8"	1/4"-3/4"		3/8"-7/8"			3/8"-1 1/8"			1/2"-1 3/8"	
Dimensions and weight	L x W x H (mm)	670x608x440			1030x375x580				1080x415x830			1150x480x1100				
	Weight (kg)	46	49	57	65	67	77	79	96	98	101	142	140	147	152	
SPL	dB(A)	20			22		27	28	39	37	36	41	40		39	

① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.

② Total absorbed power by compressor and fans in nominal conditions (axial version).

③ As defined by RD138/2011. IF-01.

④ Maximum current even beyond compressor operation limits.

MDF-NY/ -MY/ -VY		6097	6109	6120	6137	7172	7216	7272	8320
Cooling capacity ① (W)		4300	4920	5650	6350	7290	9550	11700	13800
Input power ② (W)		2000	2200	2700	3200	3700	4700	6100	7100
COP		2,15	2,23	2,09	1,98	1,97	2,03	1,92	1,94
Installed power ③ (kW)		4,50	5,25	6,11	6,79	7,33	9,28	12,34	14,98
Fan	Air flow rate (m3/h)	3700				4000	6500		7000
	Type	Axial							
	Power (W) @ r.p.m	155 @ 880				2x 155 @ 880			
Compressor	Number x Type	2x Hermetic reciprocating							
	Swept volume(m3/h)	8,36	9,37	10,52	11,81	14,9	18,74	23,62	29,80
	Discharge pressure nom. conditions (bar rel.)	10,56							
	Suction pressure nom. conditions (bar rel.)	0,99							
	Power (CV)	4	5	6	7	8	10	13	16
Safety valve	Differential pres. calibration (bar rel.)	21							
	Step section (mm2)	17,72							
	Discharge capacity (kg/h)	269							
Pressure switch	Type	ACB							
	Brand	Danfoss							
	Model	061F6147							
	Calibrated pressure (bar rel.)	20							
Max. abs. current④(A)	400V / III / 50Hz	15,65	16,65	18,65	20,65	24,65	28,3	38,3	45,3
Start-up current (A)	400V / III / 50Hz	31,15	33,65	39,65	48,65	59,65	78,8	99,8	113,3
Refrigerant		R-134a / Group A1 / GWP-100: 1430							
Cooling connections (liq.-gas)		3/8"-7/8"			3/8"- 1 1/8"			1/2"- 1 3/8"	
Dimensions and weight	L x W x H (mm)	1480x460x827				1600x587x1097			1600x587x1347
	Weight (kg)	139	141	143	145	187	194	200	256
SPL	dB(A)	30		29		42	39	38	44

① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.

② Total absorbed power by compressor and fans in nominal conditions (axial version).

③ As defined by RD138/2011. IF-01.

④ Maximum current even beyond compressor operation limits.

MDF-SY / -RY / -SMY		1021	2029	2038	2045	3057	6030	6042	7058				
Cooling capacity ① (W)		3060	3860	5100	5950	7490	4190	5930	7420				
Input power ② (W)		1400	1800	2300	2800	3900	2000	2900	3900				
COP		2,18	2,14	2,22	2,12	1,92	2,10	2,04	1,90				
Installed power ③ (kW)		2,86	3,75	4,70	5,44	7,47	4,08	5,72	7,50				
Fan	Air flow rate (m3/h)	3200	3700			4000	3700		4000				
	Type						Axial						
	Power (W) @ r.p.m	155 @ 880					155 @ 880						
Compressor	Number x Type	1x Hermetic scroll					2x Hermetic scroll						
	Swept volume(m3/h)	8,61	11,4	14,4	17,1	21,4	5,92	8,61	11,4				
	Discharge pressure nom. conditions (bar rel.)	10,56											
	Suction pressure nom. conditions (bar rel.)	0,99											
	Power (CV)	3	4	5	6	8	4	6	8				
Safety valve	Differential pres. calibration (bar rel.)	21											
	Step section (mm2)	17,72											
	Discharge capacity (kg/h)	269											
Pressure switch	Type	ACB											
	Brand	Danfoss											
	Model	061F6147											
	Calibrated pressure (bar rel.)	20											
Max. abs. current④(A)	400V / III / 50Hz	7,9	8,6	13,5	13,8	16,6	10,5	15,1	16,5				
Start-up current (A)	400V / III / 50Hz	40,7	50,6	66,2	74,6	102,7	31,6	47,9	58,6				
Refrigerant		R-134a / Group A1 / GWP-100: 1430											
Cooling connections (liq-gas)		1/4"-3/4"	3/8"-3/4"	3/8"-7/8"	3/8"- 1 1/8"		3/8"-7/8"	3/8"-1 1/8"					
Dimensions and weight	L x W x H (mm)	1030x375x580	1080x415x830			1150x480x1100	1480x460x830		1600x587x1100				
	Weight (kg)	88	90	98	101	118	142	149	170				
SPL		dB(A)		21		23		30		21		23	

- ① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.
 ② Total absorbed power by compressor and fans in nominal conditions (axial version).
 ③ As defined by RD138/2011. IF-01.
 ④ Maximum current even beyond compressor operation limits.

MDH-NY/ -MY/ -VY/ -CY/ -CMY/ -CVY		0010	0015	1015	1026	1033	2053	3074		
Cooling capacity ① (W)		550	770	805	1175	1490	2110	3190		
Input power ② (W)		370	510	490	720	840	1260	1620		
COP		1,49	1,51	1,64	1,63	1,77	1,67	1,97		
Installed power ③ (kW)		0,54	0,80	0,80	1,20	1,43	2,17	2,95		
Fan	Centrifugal	Air flow rate (m3/h)	375		575		1000	1500		
		Available static pressure (Pa)	120					65	140	
		Power (W) @ r.p.m	355 @ 1850						147 @ 1200	
	Axial	Air flow rate (m3/h)	375		575		1000	1500		
		Power (W) @ r.p.m						85 @ 1300	120 @ 1300	65 @ 850
Compressor	Type	Hermetic reciprocating								
	Swept volume(m3/h)	2,1	3,2		4,5	5,7	9,3	12,9		
	Discharge pressure nom. conditions (bar rel.)	10,56								
	Suction pressure nom. conditions (bar rel.)	0,99								
	Power (CV)	3/8	1/2	1/2	3/4	1	1 1/2	2		
Pressure switch	Type	ACB								
	Brand	Danfoss								
	Model	061F6147								
	Calibrated pressure (bar rel.)	20								
Max. abs. current④(A)	230 V / I ph / 50 Hz (Centrifugal)	5,8	6,7	6,7	10,4	10,6	13,2	17,2		
	230 V / I ph / 50 Hz (Axial)	4,6	5,5	5,5	9,2	9,4	12,3	15,8		
	400 V / III ph / 50 Hz (Centrifugal)	Not available					6,2	8,5		
	400 V / III ph / 50 Hz (Axial)	Not available					5,3	7,1		
Start-up current (A)	230 V / I ph / 50 Hz (Centrifugal)	15,3	22,7	22,7	29,0	32,0	48,0	57,0		
	230 V / I ph / 50 Hz (Axial)	14,1	21,5	21,5	27,8	30,8	47,2	55,6		
	400 V / III ph / 50 Hz (Centrifugal)	Not available					26,0	26,8		
	400 V / III ph / 50 Hz (Axial)	Not available					25,2	25,4		
Refrigerant		R-134a / Group L1 / GWP-100: 1430								
Cooling connections (liq-gas)		1/4" - 3/8"			1/4" - 1/2"		1/4" - 5/8"	1/4" - 3/4"		
Dimensions and weight	L x W x H (mm)	600x395x355			665x435x416		835x435x500	925x580x515		
	Weight (kg)	37	40	41	48	50	63	84		
SPL	Axial dB(A)	23	30	30	26	31	37	44		
	Centrifugal dB(A)	44	50	53	51	53	58	65		

- ① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.
- ② Total absorbed power by compressor and fans in nominal conditions (axial version).
- ③ As defined by RD138/2011. IF-01.
- ④ Maximum current even beyond compressor operation limits.

MDH-NY/-MY/-VY/-CGY-CMY/-CVY		4086	4108	4136	5171	5215	5271	5137	5216	5272		
Cooling capacity ① (W)		3940	4760	6290	7280	8880	11770	6500	8950	11630		
Input power ② (W)		2080	2480	3280	3900	4540	6390	3430	4710	6420		
COP		1,89	1,92	1,92	1,87	1,96	1,84	1,90	1,90	1,81		
Installed power ③ (kW)		3,67	4,64	6,17	7,49	9,03	12,05	6,80	9,28	12,34		
Fan	Centrifugal	Air flow rate (m3/h)	3500									
		Available static pressure (Pa)	100			120						
		Power (W) @ r.p.m	550 @ 1400									
	Axial	Air flow rate (m3/h)	3500			4300						
Power (W) @ r.p.m		350 @ 1300										
Compressor	Type	Hermetic reciprocating										
	Swept volume(m3/h)	14,9	18,7	23,6	29,8	37,5	47,2	11,8	18,7	23,6		
	Discharge pressure nom. conditions (bar rel.)	10,56										
	Suction pressure nom. conditions (bar rel.)	0,99										
	Power (CV)	4	5	6 1/2	8	10	13	2x 3 1/2	2x 5	2x 6 1/2		
Safety valve	Differential pres. calibration (bar rel.)	21										
	Step section (mm2)	17,72										
	Discharge capacity (kg/h)	269										
Pressure switch	Type	ACB										
	Brand	Danfoss										
	Model	061F6147										
	Calibrated pressure (bar rel.)	20										
Max. abs. current ④(A)	400 V / III ph / 50 Hz (Centrifugal)	19,0	21,5	25,5	29,5	34,5	43,5	27,6	35,7	43,7		
	400 V / III ph / 50 Hz (Axial)	13,2	15,7	19,7	23,7	28,7	37,7	21,8	29,8	37,8		
Start-up current (A)	400 V / III ph / 50 Hz (Centrifugal)	56,0	71,5	87,5	97,5	112,5	147,5	55,6	85,7	105,7		
	400 V / III ph / 50 Hz (Axial)	50,2	65,7	81,7	91,7	106,7	141,7	49,8	79,8	99,8		
Refrigerant		R-134a / Group L1 / GWP-100: 1430										
Cooling connections (liq.-gas)		3/8"-7/8"		3/8"-1 1/8"			1/2"-1 3/8"	3/8"-1 1/8"		1/2"-1 3/8"		
Dimensions and weight	L x W x H (mm)	1000x615x585			1290x755x656							
	Weight (kg)	107	109	112	162	166	171	152	176	182		
SPL	Axial dB(A)	48	45	44	50	49	48	38	48	47		
	Centrifugal dB(A)	69	67	66	70	69	69	63	69	68		

- ① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.
 ② Total absorbed power by compressor and fans in nominal conditions (axial version).
 ③ As defined by RD138/2011. IF-01.
 ④ Maximum current even beyond compressor operation limits.

MDH-SMY/ -SY/ -RY/ -SCY/ -SCMY/ -RCY/		2015	3021	4029	4038	5045	5057	5058
Cooling capacity ① (W)		2120	3100	3970	5250	6310	7830	7760
Input power ② (W)		1090	1460	2080	2580	2920	4020	4020
COP		1,94	2,12	1,91	2,03	2,16	1,95	1,93
Installed power ③ (kW)		2,62	3,34	4,41	5,53	6,26	8,25	8,82
Fan	Centrifugal	Air flow rate (m3/h)	1500			3600		
		Available static pressure (Pa)	65	140	100		120	
		Power (W) @ r.p.m	355 @ 1850	147 @ 1200	550 @ 1400			
	Axial	Air flow rate (m3/h)	1500			3500		4300
		Power (W) @ r.p.m	120 @ 1300	65 @ 850	350 @ 1300			
Compressor	Type	Hermetic scroll						
	Swept volume(m3/h)	5,9	8,6	11,4	14,4	17,1	21,4	11,4
	Discharge pressure nom. conditions (bar rel.)	10,56						
	Suction pressure nom. conditions (bar rel.)	0,99						
	Power (CV)	2	3	4	5	6	8	2x 4
Safety valve	Differential pres. calibration (bar rel.)	N/A	21					
	Step section (mm2)		17,72					
	Discharge capacity (kg/h)		269					
Pressure switch	Type	ACB						
	Brand	Danfoss						
	Model	061F6147						
	Calibrated pressure (bar rel.)	20						
Max. abs. current④(A)	400 V / III ph / 50 Hz (Centrifugal)	6,3	9,1	18,0	19,3	21,1	22,99	28,0
	400 V / III ph / 50 Hz (Axial)	6,0	7,9	12,1	13,4	14,6	18,04	22,1
Start-up current (A)	400 V / III ph / 50 Hz (Centrifugal)	27,4	41,9	58,0	72,0	82,0	109,09	68,0
	400 V / III ph / 50 Hz (Axial)	27,1	40,7	52,1	66,1	75,5	104,14	62,1
Refrigerant		R-134a / Group L1 / GWP-100: 1430						
Cooling connections (liq-gas)		1/4"-5/8"	1/4"-3/4"	3/8"-3/4"	3/8"-7/8"		3/8"-1 1/8"	
Dimensions and weight	L x W x H (mm)	835x435x500	925x580x515	1000x615x585			1290x755x656	
	Weight (kg)	64	85	89	98	137	137	155
SPL	Axial dB(A)	18	21	21	23	23	30	23
	Centrifugal dB(A)	53	57	61	61	61	61	61

- ① Cooling capacity calculated for an evaporation temperature of -10 °C and ambient temperature 32 °C.
- ② Total absorbed power by compressor and fans in nominal conditions (axial version).
- ③ As defined by RD138/2011. IF-01.
- ④ Maximum current even beyond compressor operation limits.

12. CORRECTION FACTOR

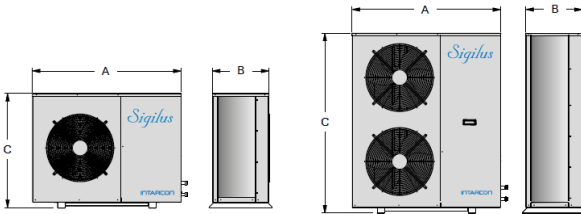
The cooling capacity indicated in the technical features are referred to R-134a and R-449A refrigerant, to estimate the cooling capacity with other refrigerant it is possible to calculate with the following correction factors:

CORRECTION FACTOR	COOLING CAPACITY FACTOR					INPUT POWER FACTOR		GWP	
	AVERAGE EVAP. TEMP. (°C)	0	-10	-20	-30	-40	-10		-30
R134a	1,00	1,00	1,00				1,00		1430
R450A (N13)	0,99	1,03	1,06				1,13		604
R513 (XP10)	1,00	1,03	1,06				1,13		633
R404A	0,95	0,96	0,96	0,96	0,99	0,99	1,02		3922*
R507A	0,97	0,98	0,98	0,98	1,02	1,01	1,05		3985*
R407A	0,96	0,95	0,94	0,92			0,95	0,92	2107
R407C	0,93	0,91	0,91	0,88*			0,90	0,87	1774
R407F	1,03	1,03	1,03*	1,02*			1,02	1,00	1824
R427a	0,90	0,88	0,87	0,84*			0,86	0,83	2138
R442A (RS50)	1,03	1,04	1,04	1,03*			1,02	1,01	1884
R448A (N40)	1,05	1,06	1,06	1,06			1,06	1,07	1387
R449A (XP40)	1,00	1,00	1,00	1,00	1,00	1,00*	1,00	1,00	1398
R452a (XP44)	0,97	0,97	0,97	0,96	0,98		1,04	1,05	2141
R22 OPD>0	1,00	1,01	1,03*				0,92	0,99	1810*
R424A	0,81	0,77	0,73	0,68	0,61		0,75	0,69	2422
R417A	0,81	0,77	0,72	0,68	0,61		0,74	0,68	2346

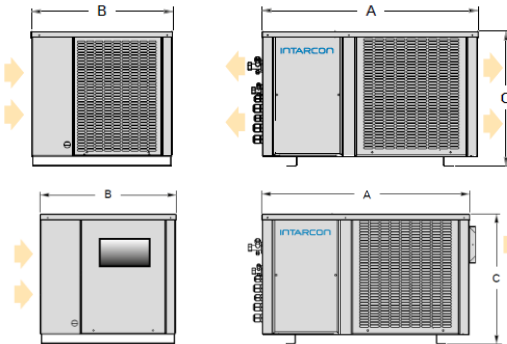
*In these conditions this refrigerant has limitations with an ambient temperature above 35 °C.

*From 2020, it will be forbidden by the EU the refrigerant with Global Warming Potential above 2500.

13. DIMENSIONS



MDF	A	B	C
Series 0	670	308	440
Series 1	1030	375	580
Series 2	1080	415	830
Series 3	1150	480	1100
Series 4	1150	480	1347



MDH	A	B	C	Fan outlet
Series 0	600	395	355	185x115
Series 1	665	435	416	185x115
Series 2	835	435	500	230x130
Series 3	925	580	515	236x266
Series 4	1000	615	585	305x266
Series 5	1290	755	656	305x266

*All dimensions in mm.

14. ELECTRICAL CONNECTIONS

Before connecting the unit to the electrical supply, make sure that the electrical board is in good conditions and please follow the following recommendations:

- Check the circuit diagram, given by manufacturer.
- Use suitable electrical wires, according to your installation and your current demand. Notice that single phase units have a three-wire supply and three phase units have a five-wire supply, being always the ground wire in green colour.
- Provide each unit with proper protection system, thermal and differential, in supply connection. If more than one unit it is installed, provide each one with different protections systems.
- For calculate wire diameter of the electrical supply, you will have to check data provided by manufacturer, supply length, wire type, etc.

Electronic version

The condensing units with electronic regulation are ready to manage an evaporating unit, and control temperature, defrosting, fans, light, door switch, solenoid valve, etc.

For that, the following section (\varnothing mm) wires must be used:

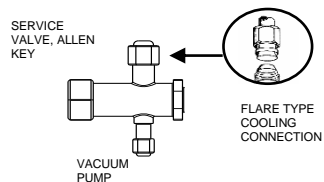
MDF/BDF MDH/BDH -N/-C/-S/-R	
Room light	2 x 1 mm ² + G
Door switch (as an option)	2 x 1 mm ²
Control keyboard	2 x 1 mm ²
Thermostatic and defrosting probe	4 x 1 mm ²
Solenoid valve	2 x 1 mm ²
Evaporating fans	According to demand
Defrosting resistors	According to demand

Electromechanical version

The electromechanical condensing units are provided with contactors and control board to manage the start/stop of the unit through a low pressure switch (pump-down regulation), and including an external contactor, to optionally control the unit from an external control board.

15. COOLING CONNECTIONS

Condensing units are supplied with Flare type connections, compression threaded joints with collar seals, with service valve and switch for refrigerant load. For units with a diameter of 7/8" or higher, connections are brazed.



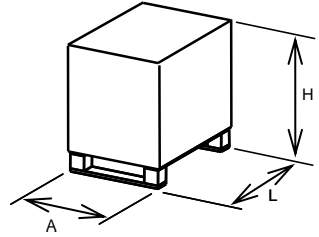
16. SOUND LEVEL

Sigilus and intarbox units include low noise components. The sound pressure level calculated at 10 m from the source in axial version and at 1 m in centrifugal version and free field distribution (directivity = 1) are indicated in the technical features chart.

17. TRANSPORT

Handle the unit with care to prevent damages during its transport. Please follow the following instructions:

- Always handle the unit in vertical position.
- Never pile up the units during transport.
- Never pile up the units during storage.
- Use a forklift or a pallet jack to handle the unit.
- Keep the unit on its pallet until its installation.



Dimensions (mm)	L	A	H
MDF/BDF-0 - - -	730	365	562
MDF/BDF-1 - - -	1150	430	720
MDF/BDF-2 - - -	1200	466	970
MDF/BDF-3 - - -	1310	547	1240
MDF/BDF-4 - - -	1310	547	1490
MDH/BDH-0 - - -	700	460	475
MDH/BDH-1 - - -	738	495	556
MDH/BDH-2 - - -	973	495	640
MDH/BDH-3 - - -	1015	640	655
MDH/BDH-4 - - -	1145	670	725
MDH/BDH-5 - - -	1475	815	796

18. SAFETY RECOMMENDATIONS

To minimise the risk of accidents during the installation, start up or maintenance tasks, you must follow the following instructions. The start-up of the unit and its maintenance must be carried out by qualified personnel.



Before operating on the unit, verify that the general supply is disconnected to avoid electrical shocks.

Refrigerant leakages may cause:

- Asphyxia due to the displacement of the oxygen in the atmosphere, and narcotic effect or heart arrhythmia due to the inhalation of refrigerant.



Ensure that the working area is properly ventilated.

- Eye irritations or burns due to refrigerant splatter or contact with the skin.



Use a safety mask and a pair of gloves. Avoid any contact between the refrigerant and the skin and mind any sharp end in the unit.

In case of accident by refrigerant inhalation follow the following instructions:

- Move the victim where it could breathe fresh air. The victim should lay on its back or its shoulder.
- Call emergency services if needed.

In case of eye injures due to refrigerant splatters:

- Never rub the eyes. In case contact lenses are used, you must take them out.
- Eyes should be kept open and washed with plenty of water.
- The victim should be taken to an emergency medical service

In case of burn due to contact with the skin

- Wash with plenty of running water the affected part and take out the clothes while water is applied.
- Never cover the affected parts with clothes, bandages or oil.

19. INSTALLATION AND MOUNTING

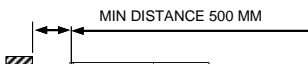
The final emplacement of the unit will affect the good performance of the unit. For an optimal performance, please follow the following recommendations:

- During the reception of your unit, verify that it is free from any transport damage. Otherwise indicate the perceived damages on the receipt.
- Install the condensing unit outside or in a room with good ventilation, away from heat sources, and as reasonably close to the evaporating unit. Please, keep the vertical distance limits indicated in the following picture.
- Keep clean the surroundings of the unit to facilitate the air intake and exhaust, and make sure the air does not reflow.

MDF/BDF

CONDENSING UNIT HIGHER THAN THE
EVAPORATOR

CONDENSING UNIT LOWER THAN THE
EVAPORATOR



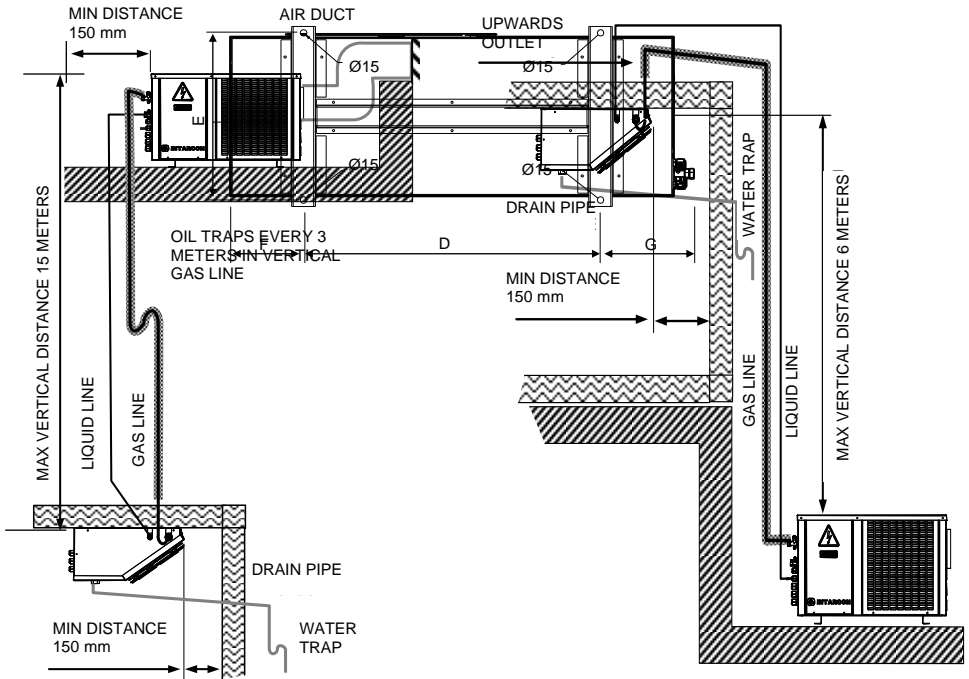
UPWARDS

MDH/BDH

CONDENSING UNIT HIGHER THAN THE
EVAPORATOR

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CONDENSING UNIT LOWER THAN THE
EVAPORATOR



To ensure good working conditions and easy access for maintenance, please keep free the recommended separation around the unit.

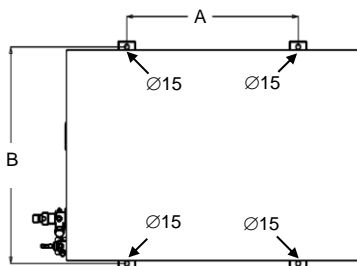
Fixing the units

- Fix the evaporating unit to the room ceiling keeping a separation to the wall of at least 150 cm. Use through screws and silentblocks to fasten the unit.

MDF/BDF

Dimensions (mm)	D	E	F	G
MDF/BDF-0 - - -	445	317	113	152
MDF/BDF-1 - - -	689	390	171	217
MDF/BDF-2 - - -	659	426	211	342
MDF/BDF-3 - - -	680	497	235	364
MDF/BDF-4 - - -	680	497	235	364
MDF/BDF-6 - - -	1059	476	209	364
MDF/BDF-7 - - -	1130	597	233	364
MDF/BDF-8 - - -	1130	597	233	395

MDH/BDH



Dimensions (mm)	A	B
MDH/BDH-0 - - -	405	413
MDH/BDH-1 - - -	484	450
MDH/BDH-2 - - -	654	450
MDH/BDH-3 - - -	480	596
MDH/BDH-4 - - -	587	635

Refrigerant piping

The length and support of refrigerant pipes have an important effect on the performance and reliability of the unit. Please follow the following recommendations:

- Install refrigerant piping between both units with a track as short and straight as possible and far from heat sources. Avoid any unnecessary curve or welding and use curve radius larger than 3,5 times the pipe diameter.
- Try to avoid any refrigerant pipe crossing aisles, halls, stairs, or lift holes. Should those be crossed, install the pipe at a height greater than 2.2 m, free from unions, and protect the pipe track with a rigid metal tube or duct.
- Pipe through fire resistant floors or walls must be sealed according to the corresponding regulations.
- To ensure a proper refrigerant return to the compressor, provide the horizontal tracks of the suction pipe with a slight slope towards the condensing unit, and install an oil trap every 3 meters on vertical tracks.
- Use only clean and dry copper tube, special for refrigeration (according to UNE EN 12735-1 standards), with the recommended diameters and with a nominal thickness of 0.8 mm, preferably supplied in rolls to avoid intermediate unions.

- To prevent condensation of water on the gas pipe surface and to limit superheating, it must be isolated properly. It is recommended to use airproof elastomeric insulation, with a minimum thickness of 20 mm, and externally protected against UV radiation.
- Clean and wipe the ends of the tubes to remove burrs and impurities. Apply the insulation to the pipe and fix the pipes to a fixed support by installing clamps every two meters or less, taking care not to damage the insulation.

Connecting and vacuuming the pipes

- Flare the ends of pipes and connect them to both units by mean of the Flare connections or weld the ends of the pipe to the unit connections, depending on the model.
- To extract moisture from the cooling pipes, perform a scan with dry nitrogen and a vacuum at the nipples on both liquid and gas service valves.
- After vacuuming, open the service valves of the condenser unit.

20. START-UP

(Electronic programming only in -N/-S/-C/-R version)

Before starting the unit, please check that the unit is properly fixed on its supports and the electrical connections are properly installed. If you have worked on the unit take care not to forget tools or any object inside.

Before starting the unit, or after a long time stopped, it is recommended to activate the carter resistor (if exists), with at least 12 hours advance. If you can't do this, you will have to warm the compressor by other way, to assure the refrigerant and oil separation. This operation is important in start-up in low ambient temperature.

Connect the electrical supply and switch on the unit with room door closed. The display will show the room temperature and after some few minutes (**Ods** parameter) the compressor will start.

Fix the target temperature and wait until the room reaches the target temperature. The high temperature alarm will not activate until the time fixed in parameter **dao**, past the start-up

Once the target temperature is reached, initialise the record of maximum and minimum temperature as indicated in this manual.

You may check whether the auxiliary devices work properly:

- Room light.- turn on and off the room light
- Door switch.- check that the compressor and fans stop when opening the door.

Force a manual defrost cycle to check this operation mode. Make sure that the evaporation coil gets clean and that the unit stays within the normal operating parameters without activating any safety device.



Depending on the application you may need to modify defrost parameters, such as time period between two consecutives defrost cycles, defrost cycle duration, or termination temperature. To do so, pay attention to the defrost cycles during normal operation.

Finally, you can easily test the proper operation of some of the safety devices such as:

- Open door alarm.- by leaving the door open for more than time set in parameter **doA**.
- High pressure switch or high temperature alarm.- by intentionally obstructing the air intake of the condenser.

Potential problems during the start-up

During the start-up of the installation some few problems may arise depending on the specific characteristics of each installation:

Insufficient refrigerant charge .- If the length of the pipe is greater than 15 m, or the diameter is larger than the recommended one, and you have not added enough refrigerant charge as recommended, the installation can suffer from a lack of refrigerant.

In that case, proceed to add refrigerant, always in liquid state through the liquid line nipple, until reaching a proper temperature in relation to the refrigerant service (between 8 and 12 K below). The unit is provided with a liquid sight glass.

Excessive suction pressure drop.- Due to an insufficient pipe diameter, too long piping, or bottlenecks of the refrigerant pipe, there may be a pressure drop along the suction line, activating the low pressure switch. In such a case:

- Check the pressure drop along the suction line between the suction pressure and the evaporating pressure at the evaporator. If this is too high (more than 2 K of saturation temperature difference), you should redesign the refrigerant piping.
- Reinstall refrigerant piping by shortening its length avoiding bottlenecks and small radio elbows. Use a large pipe for the horizontal tracks providing them with a slight slope to facilitate the oil return.

Excessive refrigerant charge.- Although the condensing unit features a liquid recipient to compensate refrigerant charge, the equipment could suffer from an excess of refrigerant charge, even activating the high pressure switch. In that case, please, take the following steps:

- Check that the condensation temperature is appropriate in relation to the inlet air temperature.
- Remove refrigerant, always from the liquid line until the condensation temperature is adequate.

Air inside the installation .- If the installation has not been properly vacuumed, there may remain some air inside, even activating the high pressure switch. In such a case you must replace the entire refrigerant charge, by vacuuming and reloading according to the recommendations of this manual.

21. MAINTENANCE

Sigilus and intarbox units are units free from specialised maintenance. Nevertheless, to keep your unit in an optimal working state, we recommend to periodically carrying out the following preventive maintenance tasks.

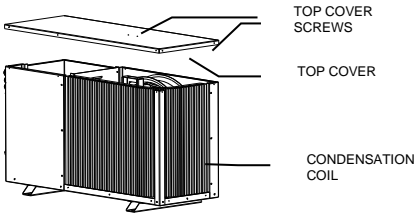


During the maintenance tasks, switch off the power supply and use gloves to avoid any possible cut.

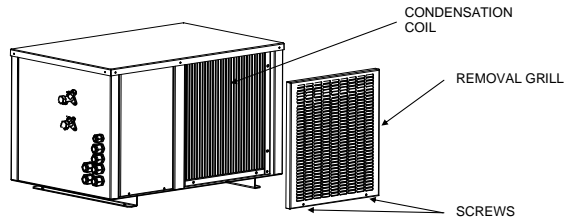
In general, you must check the corrosion in metallic parts of the condensing unit. Also, you should check the condition of electrical connection, as well as the water tightness of different circuits.

- **Cleaning the outer.**- To keep your unit free from dust and dirtiness, simply pass a wet cloth over the cover. Don't use solvents or detergents.
- **Cleaning the condenser.**- During the normal operation the dust and dirtiness will deposit on the coil surface and will obstruct the air flow. Periodically, and depending on the environment, the condenser should be cleaned. To do so, remove the external cover of the unit by removing the side screws. Use compressed air blowing from inside or a vacuum cleaner to remove dirtiness on the coil. Alternatively use a brush from the outer face of the coil.

MDF/BDF



MDH/BDH



- **Filter.**- The main function of the filter is to keep the cooling circuit clean and without humidity and sour. To check the dirt, you can measure the temperature difference between input/output filter.
- **Oil.**- Usually check the quality of oil, through a contamination test. If exist water, acid, or any metallic particle, it will be necessary to change the oil, as well as the filter. In case of oil change, it will use, the same type as original oil.
- **Refrigerant.**- You usually should check sealing in cooling circuit. In case of leaking, this must be fixed, and check after a month that it is properly fixed. To do a partial open of cooling circuit, it is necessary to restrict the loss of refrigerant, pumping and isolating, the total charge in other part of the circuit. Take care of avoid contact refrigerant with skin or eyes.

The next repair tasks must be done only by authorized refrigeration personal:

- Change or modification of electric elements.
- Modification of mechanical parts.
- Modification in cooling circuit.
- Change protection elements, control board, switches.

Besides of maintenance tasks recommended, the condensing unit will be under law applied in each place.

22. REFRIGERANT LOAD

These units are specifically designed for the refrigerant indicated in the characteristic plate. The use of any other refrigerant in the unit invalidates its guarantee.

Any operation related to the load, removal or replacement of refrigerant must always be carried out by qualified personnel and never by the user. Please refer to technical refrigeration manuals for such operations.



Units must always be loaded with the refrigerant in liquid phase through the liquid nipple.

If you need to disconnect the refrigerant connections to relocate any of the units, we recommend stocking the refrigerant charge in the condensing unit before disconnecting the refrigerant connections. Please proceed as follows:

- Close the service valve on the liquid line in the condensing unit.
- Run the compressor until the low pressure switch is activated to gather the entire refrigerant load in the condensing unit.
- Close the service valve of the suction line in the condensing unit before disconnecting the refrigerant connections.

23. DISPOSAL MANAGEMENT

After the installation dispose the packaging and pallet in an environmentally friendly manner and according to your regulations. When disposing your unit or any of its parts, do it through an authorised waste management company.

24. REGULATION AND CONTROL (only electronic version)

Electronic version are controlled with control board and a remote keyboard. Check the control instruction provided.

25. FAULT ANALYSIS

Symptom	Cause	Solution
The unit doesn't turn on	a) faulty power supply b) wrong connection of remote keyboard	a) Check protections, fuse, etc. b) Check connection and polarity
The compressor doesn't start. Compressor led is on	a) faulty power supply b) faulty contactor c) internal klixon is open	a) Check protections, fuse, etc. b) Replace c) Wait for recovery and check compressor intensity
The compressor doesn't start. Compressor led is flashing.	a) A safety device on the security chain is open (pressure switches) b) Short cycle timing is on c) The door input is open	a) Check the safety chain for the open contact b) Wait for some few minutes and check parameters c) Close the door / check electrical continuity
The compressor stops some few seconds after having started. The motor produces an intermittent noise, the compressor is hot.	a) Low supply voltage b) faulty starting kit (check the starting relay) c) Low oil level d) Blocked compressor	a) Check the power supply and look for the voltage drop b) Replace compressor and start kit c) Check oil level and oil return to the compressor through the suction line. If needed install oil traps or remake the suction line. d) Replace compressor

Symptom	Cause	Solution
Repetitive compressor starts and stops	<ul style="list-style-type: none"> a) if the compressor LED is flashing b) if the compressor LED is on (open klixon) c) Too small regulation differential or too powerful unit for the room size, or empty room without any thermal inertia. 	<ul style="list-style-type: none"> a) Check pressures and/or safety chain to look for the activated device. → HP pressure switch → LP pressure switch b) V Check oil level and oil return to the compressor through the suction line. If needed install oil traps or remake the suction line. c) Increase regulation differential (parameter Hy)
The unit runs but the room temperature does not go down	<ul style="list-style-type: none"> a) faulty room temperature probe b) Too often defrost cycles c) Too small unit for the room size 	<ul style="list-style-type: none"> a) Check the probe value and calibrate through parameters, check probe connections, or replace probe. b) Check defrost parameters c) Recalculate the necessary power
The evaporator gets too much frost and the drain tray overflows	<ul style="list-style-type: none"> a) Too low evaporation pressure b) Frozen drain pipe c) Poor airproof in room construction d) Too often door opening or too humid load. 	<ul style="list-style-type: none"> a) Check HP pressure is ok b) Check drain heater and replace or connect in continuous supply. Check drain pipe inclination. c) Seal room construction d) Check and increase defrost frequency
Condenser Alarm CSd or pressure alarm PAL Too high condensation pressure (HP Pressure switch activates)	<ul style="list-style-type: none"> a) Insufficient air flow or air reflow in condenser b) Faulty condenser fan c) Too high room temperature d) Too dirty and obstructed condenser e) Excess of refrigerant load f) Air inside refrigerant circuit 	<ul style="list-style-type: none"> a) Check air flow (rate, reflow, outlets) b) Repair or replace c) Check target temperature d) Clean condenser and air intakes e) Check and replace refrigerant load f) Evacuate and replace refrigerant
Pressure alarm PAL Too low evaporation pressure (LP pressure switch activates) Ice block in evaporator	<ul style="list-style-type: none"> a) Insufficient airflow in evaporator. b) Faulty evaporator fan c) Evaporator is always iced d) Frozen drain pipe e) Obstructed refrigerant filter (different inlet and outlet temperatures) f) lack of refrigerant (leakage) g) Too low condensation pressure h) Faulty solenoid valve 	<ul style="list-style-type: none"> a) Clean air intakes b) Repair or replace c) Check defrost and defrost parameters. Increase defrost frequency d) Check drain heater and replace or connect in continuous supply. Check drain pipe inclination. e) Change refrigerant filter f) Repair leakage, replace refrigerant load g) Too low ambient temperature, too high airflow rate, check and adjust condensation parameters (condensation temperature control). h) Repair or replace
Noisy compressor	<ul style="list-style-type: none"> a) Loose compressor b) low oil level c) Faulty compressor 	<ul style="list-style-type: none"> a) Check silentblock screws b) Add oil to the recommended level c) Replace
Noisy unit	<ul style="list-style-type: none"> a) Unit is installed without noise insulation 	<ul style="list-style-type: none"> a) Install insulating layer or supports under the unit
Defrost mode doesn't work	<ul style="list-style-type: none"> a) Faulty heater or solenoid valve b) Electrical fault. c) Faulty evaporator probe d) Wrong defrost parameters 	<ul style="list-style-type: none"> a) Repair or replace b) check contactor and fuse c) Check value Pb2, check connections, replace d) Check and adjust defrost parameters

Symptom	Cause	Solution
EAL alarm	a) Electronic control is reconfigured to default parameters	a) Reconfigure parameters.

26. VRC SYSTEM (V Version)

Check the instruction manual of VRC system from manufacturer in V version units.

27. WARRANTY

Validation of warranty. - The user is called to fill out the form through INTARCON's web site: <http://www.intarcon.com/en/contacto/registro-garantia/> during the following 20 days after the purchase date. Otherwise, the guarantee period will be in effect from the manufacturing date.

Coverage. - The manufacturer guarantees its products against any manufacturing or functioning defect for 12 months after the validation of the warranty or from the manufacturing date.

During the period of warranty the manufacturer is to assume the repair of the product in its facilities, the replacement of the product or the supply of replacement parts for faulty components, whichever is less costly and technically more viable; guaranteeing the repaired or replaced components during the following 6 months. The coverage the cost and taxes of refrigerant is expressly excluded, in the case it is not supplied by the manufacturer in hermetically sealed products.

The warranty does not include the work on-site to replace the product or components, nor the indirect damages or loss that could be attributed to the faulty operation of the product. In particular, the manufacturer is not to cover any tax on the refrigerant emitted to the environment as a result of a leak in a refrigeration equipment or component suitable to accomplish leak-proof tests according to in-vigour regulation.

Warranty application. - Before claiming a warranty application, the user is to assure they have correctly followed operation instructions and verify that the faulty operation is not due to an improper use of the equipment.

In general terms, the distributor or installer that sold and installed the equipment is called to attend the guarantee claims and to provide the guarantee service. The user is called to contact the distributor or installer in a maximum time of two months from the first fault appearance.

Warranty exclusions. - The following is not covered by the present guarantee:

- Personal injury or material damages for incorrect or negligent use, or the lack of user diligence in preventing these uses; especially the ones related to preservation of refrigerated goods.
- Damages caused by a defective installation or not attributable to the equipment.
- Emerging damages, as far as recognised by the law and regulations, and consequential damages, such as lack of production, loss of revenue or lost profits.
- Damages caused by unforeseeable circumstance or overwhelming force.

Warranty invalidation. - The guarantee will be invalidated in the following cases:

- In case that repairs, modifications or manipulations by unauthorised personnel are perceived.
- In case that wilful damages, fraud or bad faith in the correct use of the equipment are perceived.
- In case that the equipment has been bumped or dropped.
- In case the serial number or the guarantee documentation of the equipment has been modified or made illegible.



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