INTARCON

User & Installation Manual

intarCUBE MDV / BDV

Air-cooled refrigeration DX plants for industrial applications

CE

TÜVRheinland CERTIFIED ISO 9001:2008

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1. INTRODUCTION

intarCUBE refrigeration units are refrigeration units built-in compact construction. They provide high installation versatility in a very compact design and combine the latest technologies with proven solutions.

intarCUBE units are fully tested in the factory. Mounted on frame and body made of galvanized steel sheet with polyester coating, have been designed for installation in technical rooms or machine rooms, allowing the air discharge conduction to the outside.

intarCUBE units are presented in a wide range of compressor powers ranging from 4 to 50 HP, both for low and medium temperature

- **MDV/BDV-C or –N series**
  Refrigeration units with centrifugal or axial condensation for applications in MT (MDV) or LT (BDV) equipped with hermetic reciprocating compressors.

- **MDV/BDV-SC o –S series**
  Refrigeration units with centrifugal or axial condensation for applications in MT (MDV) or LT (BDV) equipped with scroll compressors.

- **MDV/BDV-RC o –R series**
  Refrigeration units with regulation capacity and centrifugal or axial condensation for applications in MT (MDV) or LT (BDV) equipped with digital scroll compressors.

- **MDV-CV o –V series**
  Refrigeration units with regulation capacity (VRC) and centrifugal or axial condensation for applications in MT (MDV) or LT (BDV) equipped with hermetic reciprocating compressors.

- **MDV/BDV-CM o –M series**
  Refrigeration units with centrifugal or axial condensation for applications in MT (MDV) or LT (BDV). Electromechanic version by suction pressure (pump-down), equipped with hermetic reciprocating compressors.

- **MDV/BDV-SCM o –SM series**
  Refrigeration units with centrifugal or axial condensation for applications in MT (MDV) or LT (BDV). Electromechanic version, with control by suction pressure (pump-down), equipped with scroll compressors.

- **MDV/ BDV -TC o –T series**
  Refrigeration units with centrifugal or axial condensation for applications in MT (MDV) or LT (BDV) equipped with semi hermetic compressors.

Once the unit is installed the user can control it through the electrical display. The technical specifications are described in the control and installation manual. (Only for electronic version)

2. OPERATION

intarCUBE units are refrigeration units that operates under a vapour compression cycle.

When cooling demands exist, the electronic controller (except electromechanic series 5) manages the starting of the compressors and the refrigerant suction starts. The control manages the compressor as follow:

There is a pressure Brand between the set point plus a differential and the set point pressure minus a differential, within which neither start or stop is performed.

When the pressure transducer detects a suction pressure higher than the set-point pressure plus a differential, the first compressor starts. If in a period of time set by parameters, the pressure keeps being higher than the set-point plus a differential, the second compressor starts, if this pattern repeats, the third compressor (if there is) will start. If between the start-up of the first compressor and the following one, the suction pressure is lower than the set-point pressure minus a differential the following step will not start.

In analogous way, the compressors stop is managed.

The controller allows, as well, managing the compressors according to a proportional regulation band.

For further information about the management of compressors and fans that the regulation does, and the configuration parameters, check the regulation manual attached (electronic versions).

For units with VRC system, check also the VRC regulation manual.

The cooling cycle uses a phase change refrigerant fluid in a closed circuit, with the following four steps.

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 des-upper-heated and 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 stored in the liquid receiver, which is used as compensation volume vessel and then carried to an expansion device and finally to the evaporator, closing the cooling circuit.

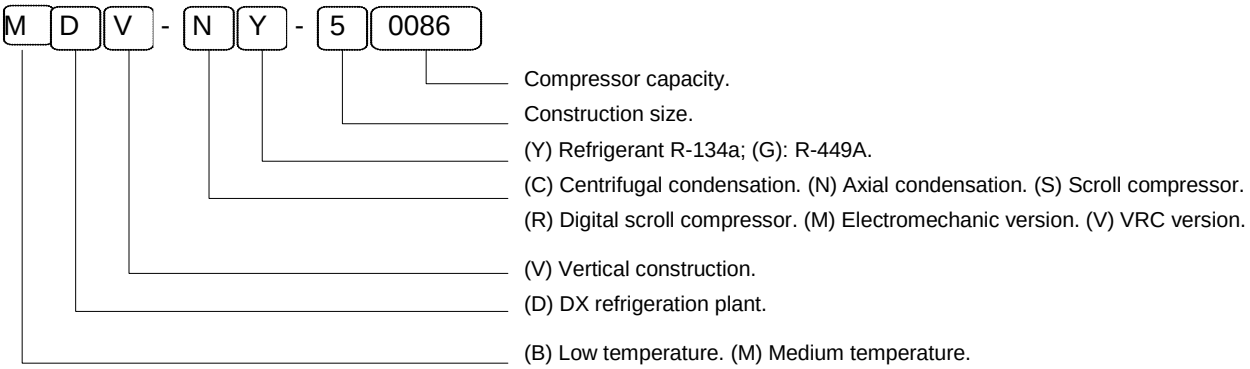
3. OPERATION LIMITS

intarCUBE refrigeration units are designed to operate properly between the temperature operations limits shown in the chart. Only at specific times and when starting-up the unit, it can operate further those operations limits.

	Evaporation temp.		Ambient temp.	
	Mín.	Máx.	Mín.	Máx.
BDV	-40 ºC	-10 ºC	-5 ºC	45 ºC
MDV	-20 ºC	+10 ºC	-5 ºC	45 ºC

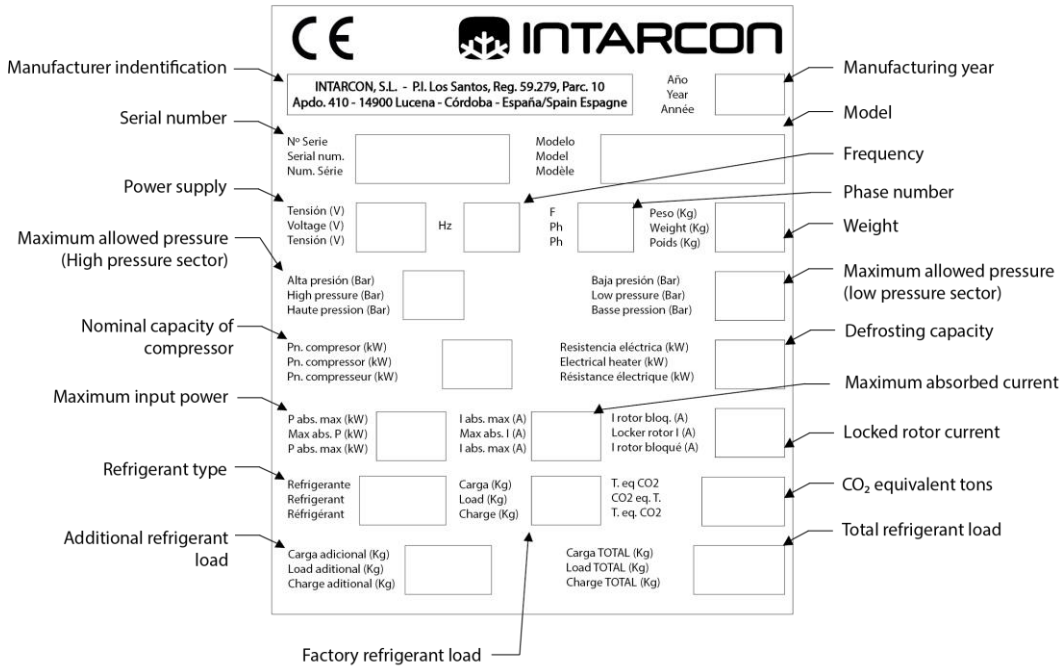
4. UNIT IDENTIFICATION

Every intarCUBE unit is identified by the following nomenclature, as shown at the unit characteristic plate



5. CHARACTERISTIC PLATE

Todo equipo lleva una placa que lo identifica inequívocamente, con las siguientes indicaciones:



Note: In every communication with manufacturer the serial number of the unit will be requested. The two first digits of the serial number show the manufacturing year

6. COMPOSITION

intarCUBE units are mounted on galvanized steel sheet with polyester coating. Feature the following components:

6.1. Cooling and air circuits

- Hermetic (reciprocating or scroll) compressors, acoustic insulation, with rotalock service valve (two compressors or more), services valves, discharge muffles (reciprocating compressors), mounted on antivibration pads, internal klixon and crankcase heater.
- Condenser coil made of copper pipes and aluminium fins.
- Axial or centrifugal motor-fans with vertical impulsion.
- Fan condensation control by voltage tension.
- Cooling circuit equipped with high and low pressure switches, ceramic dryer filter, liquid receiver and sight glass.
- Full control and power panel, with differential switch protection for each compressor and for each motor fan, MCB switch for compressors and motor-fans, and electronic control (depending on the version)
- Welded cooling connections.
- Liquid injection system for negative temperature models with R449A.
- VRC system for cooling capacity modulation for hermetic compressors, or Digital system for scroll compressors (optional).
- Oil separator (optional except with scroll tandem or three scroll compressors for low temperature and VRC system).
- Low voltage and phase change protection (optional).

6.2. Electronic controller (only electronic version)

- Three cooling step control with suction pressure set point.
- Fan speed regulation with PID control.
- Operating times balanced by compressors timing and sequencing. (except for VRC system).
- Condensation pressure protection against extreme ambient temperature, reducing cooling steps.
- Temperature and pressure displayed.
- Alarms management.
- Communication Modbus protocol with connection RS485 (optional).

Note: check the regulation manual for full electronic controller.

7. TESTS

Every intarCUBE system has been tested in laboratory according to the following protocol:

- Helium waterproof test. A waterproof certificate is supplied upon request.
- Refrigerant safety load.
- Operation test for refrigeration and defrost cycles.
- Safety devices check; verifying correct installation, in accordance to the regulation, and pressure switch verification.

8. SAFETY DEVICES

intarCUBE systems features the following safety devices:

- Protection against abnormal refrigerant pressure, both in high and low pressure sectors.
- MCB and thermal protection for compressors, motor-fan and heater.
- Main ground connection for electrical board.

9. TECHNICAL FEATURES MDV R-449A

MDV-NG/ -CG/ -MG/ -CMG/ -VG/ -CVG series			50086	50108	50136	60160	60215	60271	50097	50109	50120
Cooling capacity ① (kW)			7,1	9,0	11,1	14,3	17,7	21,8	7,8	8,9	10,1
Input power ② (kW)			3,7	4,7	6,0	6,8	8,5	11,2	4,0	4,5	5,3
C.O.P.			1,91	1,91	1,85	2,10	2,08	1,94	1,95	1,97	1,90
Installed power ③ (kW)			4,69	5,96	8,08	9,32	11,95	16,01	5,58	6,40	7,48
Dimensions (mm)			1194x740x1535			1194x850x1935			1194x740x1535		
Weight (kg)			162	164	167	254	258	263	173	175	177
Sound pressure level ④ (dBA)	Axial		48	45	44	50	49	48	39	39	38
	Centrifugal		69	67	66	71	70	69	63	63	63
Compressor	Type		Hermetic reciprocating								
	Number x model		MTZ-50	MTZ-64	MTZ-80	MTZ-100	MTZ-125	MTZ-160	2x MTZ-28	2x MTZ-32	2x MTZ-36
	Power		4 CV	5 CV	6,5 CV	8 CV	10 CV	13 CV	4 CV	5 CV	6 CV
	Swept volume (m3/h)		14,9	18,7	23,6	29,8	37,5	47,3	8,4	9,4	10,5
	Nominal discharge pressure (rel. bar)		18,00								
	Nominal suction pressure (rel. bar)		2,59								
	Oil load and type		1,8 litres POE-175PZ			3,9 litres POE-175PZ			0,95 litres POE-175PZ		
Refrigerant			R-449A / Group L1 / GWP-100: 1398								
Liquid receiver (litres)			5		7	15			5		7
Safety valve	Differential pressure calibration (rel. bar)		30 bar								
	Step section (mm2)		17,72								
	Discharge capacity at the pressure calibration (kg/h)		379			400			379		
Pressure switch	Type		ACB								
	Brand		Danfoss								
	Model		061F8175								
	Calibrated pressure (bar rel.)		28								
Dryer filter			1/2"			5/8"			1/2"		
Crankcase heater			35 W						2 x 35 W		
Fan	Power supply		230V - I - 50Hz			230V - I - 50Hz			230V - I - 50Hz		
	Fan speed regularion		Voltage variation								
	Number		1			2			1		
	Axial	Nominal flow rate (m3/h)	4300			2x 3600			4300		
		Maximum power consumption (W)	350			2x 350			350		
		r.p.m.	1300								
	Centrifugal	Available pressure (Pa)	120			160			120		
		Nominal flow rate (m3/h)	3600			2x 3600			3600		
		Maximum power consumption (W)	550			2x 550			550		
		r.p.m.	1400								
Cooling connections			1/2"-7/8"		1/2"-1 1/8"	5/8"-1 1/8"	5/8"-1 3/8"		1/2"-7/8"		1/2"-1 1/8"
Power supply			400V - III - 50Hz								
Maximum continuous current (per compressor) (A)			11,50	14,00	18,00	22,00	27,00	36,00	7,50	8,00	9,00
Locked rotor current (per compressor) (A)			48,50	64,00	80,00	90,00	105,00	140,00	22,00	25,00	30,00
Axial	Fan(s) maximum current consumption (A)		1,55								
	Maximum continuous current (compressors + fans) (A)		13,05	15,55	19,55	23,35	28,20	37,55	16,55	17,55	19,55
	Maximum start-up current (A)		50,05	65,55	81,55	91,35	106,20	141,55	31,05	34,55	40,55
Centrifugal	Fan(s) maximum current consumption (A)		7,40								
	Maximum continuous current (compressors + fans) (A)		19,07	23,57	24,55	27,65	32,50	41,50	22,72	22,72	25,72
	Maximum start-up current (A)		56,07	73,57	86,55	95,65	110,50	145,50	37,22	39,72	46,72

① Cooling capacity calculated for the following nominal conditions:

- Ambient temperature: 32 ºC.
- Evaporation temperatura: -10 ºC
- Superheating: 10 K.
- Subcooling: 3 K.

50137	60172	60216	60272	70320	70430	70542	70258	70324
11,2	14,3	18,2	22,5	27,8	34,1	41,6	21,6	27,6
6,1	7,2	9,1	11,8	14,1	17,5	22,9	11,1	14,1
1,83	1,98	2,00	1,90	1,97	1,94	1,81	1,95	1,95
8,76	9,38	11,92	16,16	18,64	23,90	32,02	14,07	17,88
1194x740x1535	1194x850x1935			1715x850x1935				
179	264	268	274	413	421	431	396	402
38	51	48	47	46	46	45	46	45
63	72	60	69	67	67	67	66	66
Hermético alternativo								
2x MTZ-40	2x MTZ-50	2x MTZ-64	2x MTZ-80	2x MTZ-100	2x MTZ-125	2x MTZ-160	3x MTZ-50	3x MTZ-64
7 CV	8 CV	10 CV	13 CV	16 CV	20 CV	26 CV	12 CV	15 CV
11,8	14,9	18,7	23,6	29,8	37,5	47,3	14,9	18,7
18,00								
2,59								
0,95 litres POE-175PZ	1,8 litres POE-175PZ			3,9 litres POE-175PZ			1,8 litres POE-175PZ	
R-449A / Group L1 / GWP-100: 1398								
7	15			24			15	24
30 bar								
17,72								
379	400							
ACB								
Danfoss								
061F8175								
28								
1/2"	5/8"			7/8"			5/8"	7/8"
2 x 35 W							3 x 35 W	
230V-I-50Hz								
Voltage variation								
1	2			3				
4300	2x 3600			3x 4750				
350	2x 350			3x 490				
1300								
120	160							
3600	2x 3600			3x 3600				
550	2x 550			3x 550				
1400								
1/2"-1 1/8"	5/8"-1 1/8"	5/8"-1 3/8"		7/8"-1 5/8"		7/8"-2 1/8"	5/8"-1 3/8"	7/8"-1 5/8"
400V - III - 50Hz								
10,00	11,50	14,00	18,00	22,00	27,00	36,00	11,50	14,00
38,00	48,50	64,00	80,00	90,00	105,00	140,00	48,50	64,00
1,55				2,36				
21,55	24,55	29,10	35,95	46,36	56,36	74,36	33,08	44,36
49,55	61,55	79,10	97,95	114,36	134,36	178,36	70,08	94,36
7,40								
25,70	27,10	33,80	43,80	51,40	61,40	79,40	41,90	49,40
53,70	64,10	83,80	105,80	119,40	139,40	183,40	78,90	99,40

② Total power absorbed by the compressor and fans at nominal conditions.

③ Definition given in 'RD138/2011 Reglamento de seguridad para instalaciones frigoríficas y sus I.T. complementarias'. IF-01.

④ Sound pressure level at 10 meters for axial fans and 1 meter for centrifugal fans from the condensing unit measured in open field.

MDV-SG/ -SCG/ -SMG/ -SCMG/ -RG/-RCG series			50422	60582	60762	60902	61142	60633	71713
Cooling capacity ① (kW)			10,7	13,8	17,5	20,5	27,1	15,7	39,3
Input power ② (kW)			4,8	6,4	8,3	9,9	11,3	7,4	18,9
C.O.P.			2,23	2,16	2,12	2,07	2,40	2,12	2,08
Installed power ③ (kW)			6,68	8,82	11,06	12,52	16,50	10,02	24,75
Dimensions (mm)			1194x740x1535	1194x850x1935					1715x850x1935
Weight (kg)			183	247	265	281	281	277	404
Sound pressure level ④ (dBA)		Axial	36	36	39	39	46	38	43
		Centrifugal	62	65	65	65	65	65	65
Compressor		Type	Hermetic scroll						
		Number x model	2x ZB21	2x ZB29	2x ZB38	2x ZB45	2x ZB57	3x ZB21	3x ZB57
		Power	2x 3 CV	2x 4 CV	2x 5 CV	2x 6 CV	2x 8 CV	3x 3 CV	3x 8 CV
		Swept volume (m3/h)	8,61	11,40	14,40	17,10	21,40	8,61	21,40
		Nominal discharge pressure (rel. bar)	18,00						
		Nominal suction pressure (rel. bar)	2,59						
		Oil load and type	1,24 litres Emkarate RL32 3 MAF	1,45 litres Emkarate RL32 3 MAF	1,9 litres Emkarate RL32 3 MAF			1,24 litres Emkarate RL32 3 MAF	1,9 litres Emkarate RL32 3 MAF
Refrigerant			R-449A / Group L1 / GWP-100: 1398						
Liquid receiver (litres)			7	15					45
Safety valve		Differential pressure calibration (rel. bar)	30 bar						
		Step section (mm2)	17,72						
		Discharge capacity at the pressure calibration (kg/h)	379	400					
Pressure switch		Type	ACB						
		Brand	Danfoss						
		Model	061F8175						
		Calibrated pressure (bar rel.)	28						
Dryer filter			1/2"	5/8"			7/8"	5/8"	7/8"
Crankcase heater			2x 35 W		2x 70W		2x 90W		
Fan		Power supply	230V - I - 50Hz						
		Fan speed regularion	Variación de tensión						
		Number	1	2					3
	Axial	Nominal flow rate (m3/h)	4300	2x 3600		2x 4800		2x 3600	3x 4750
		Maximum power consumption (W)	350	2x 350		2x 490		2x 350	3x 490
		r.p.m.	1300						
	Centrifugal	Available pressure (Pa)	120	160					
		Nominal flow rate (m3/h)	3600	2x 3600					3x 3600
		Maximum power consumption (W)	550	2x 550					3x 550
		r.p.m.	1400						
Cooling connections			1/2"-1 1/8"	5/8"-1 1/8"	5/8"-1 3/8"		7/8"-1 5/8"	5/8"-1 1/8"	7/8"-2 1/8"
Power supply			400V - III - 50Hz						
Maximum continuous current (per compressor) (A)			7,20	10,00	12,80	13,10	15,90	7,20	15,90
Locked rotor current (per compressor) (A)			40,00	50,00	65,50	74,00	102,00	40,00	102,00
Axial		Fan(s) maximum current consumption (A)	1,55			2,36			
		Maximum continuous current (compressors + fans) (A)	15,95	21,55	27,15	28,56	34,16	23,96	50,06
		Maximum start-up current (A)	48,75	61,55	79,85	89,46	120,26	56,76	136,16
Centrifugal		Fan(s) maximum current consumption (A)	7,40						
		Maximum continuous current (compressors + fans) (A)	21,80	27,40	33,00	33,60	39,20	29,00	53,70
		Maximum start-up current (A)	54,60	67,40	85,70	94,50	125,30	61,80	139,80

① Cooling capacity calculated for the following nominal conditions:

- Ambient temperature: 32 ºC.
- Evaporation temperature: -10 ºC.
- Subcooling: 10 K.
- Superheating: 3 K.

② Total power absorbed by the compressor and fans at nominal conditions.

③ Definition given in 'RD138/2011 Reglamento de seguridad para instalaciones frigoríficas y sus I.T. complementarias'. IF-01.

④ Sound pressure level at 10 meters for axial fans and 1 meter for centrifugal fans from the condensing unit measured in open field.

MDV-TG/ -TCG series			80251	80301	80351
Cooling capacity ① (kW)			39,5	43,4	52,2
Input power ② (kW)			17,5	19,5	24,9
C.O.P.			2,26	2,23	2,09
Installed power ③ (kW)			21,60	23,50	30,60
Dimensions (mm)			2200x850x2050		
Weight (kg)			521	522	536
Sound pressure level ④ (dBA)		Axial	62	62	62
		Centrifugal	82	82	82
Compresor		Type	Semi-hermético		
		Number x model	4MH-25X	4MI-30X	4MK-35X
		Power	25 CV	30 CV	35 CV
		Swept volume (m3/h)	71,40	78,20	99,40
		Nominal discharge pressure (rel. bar)	18,00		
		Nominal suction pressure (rel. bar)	2,59		
		Oil load and type	3,3 litres Emkarate RL32 3 MAF		
Refrigerant			R-449A / Group L1 / GWP-100: 1398		
Liquid receiver (litres)			30	45	
Safety valve		Differential pressure calibration (rel. bar)	30 bar		
		Step section (mm2)	17,72		
		Discharge capacity at the pressure calibration (kg/h)	400		
Pressure switch		Type	ACB		
		Brand	Danfoss		
		Model	061F8175		
		Calibrated pressure (bar rel.)	28		
Dryer filter			7/8"		1 1/8"
Crankcase heater			100 W		
Fan	Power supply		400V - III - 50Hz		
	Fan speed regularion		Double speed (delta-star)		
	Number		2		
	Axial	Nominal flow rate (m3/h)	2x 10000		
		Maximum power consumption (W)	2x 1250		
		r.p.m.	1330		
	Centrifugal	Available pressure (Pa)	150		
		Nominal flow rate (m3/h)	2x 10000		
		Maximum power consumption (W)	2x 2200		
		r.p.m.	960		
Cooling connections			7/8"-2 1/8"		1 1/8"-2 1/8"
Power supply			400V - III - 50Hz		
Maximum continuous current (per compressor) (A)			41,60	46,60	61,10
Locked rotor current (per compressor) (A)			199,00	221,00	255,00
Axial	Fan(s) maximum current consumption (A)		4,96		
	Maximum continuous current (compressors + fans) (A)		42,41	51,56	66,06
	Maximum start-up current (A)		199,81	225,96	259,96
Centrifugal	Fan(s) maximum current consumption (A)		14,90		
	Maximum continuous current (compressors + fans) (A)		56,50	61,50	76,00
	Maximum start-up current (A)		213,90	235,90	269,90

① Cooling capacity calculated for the following nominal conditions:

- Ambient temperature: 32 ºC.
- Evaporation temperature: -10 ºC.
- Superheating: 10 K.
- Subcooling: 3 K.

② Total power absorbed by the compressor and fans at nominal conditions.

③ Definition given in 'RD138/2011 Reglamento de seguridad para instalaciones frigoríficas y sus I.T. complementarias'. IF-01.

④ Sound pressure level at 10 meters for axial fans and 1 meter for centrifugal fans from the condensing unit measured in open field.

10. CARACTERÍSTICAS TÉCNICAS MODELOS BDV R-449A

BDV-NG/ -CG/ -MG/ -CMG/ -VG/ -CVG series			50215	50271	50192	50216	50272	60430	60542
Cooling capacity ① (kW)			5,9	7,8	5,0	5,9	7,3	11,9	15,8
Input power ② (kW)			4,8	6,4	4,1	4,8	6,5	9,5	12,6
C.O.P.			1,23	1,22	1,22	1,23	1,12	1,25	1,25
Installed power ③ (kW)			9,65	12,41	8,62	9,42	13,30	19,30	12,37
Dimensions (mm)			1194x740x1535					1194x850x1935	
Weight (kg)			193	168	199	200	200	326	326
Sound pressure level ④ (dBA)		Axial	36	29	39	37	32	39	39
		Centrifugal	70	70	72	71	68	73	73
Compressor		Type	Hermético alternativo						
		Number x model	NTZ-215	NTZ-271	2x NTZ-96	2x NTZ-108	2x NTZ-136	2x NTZ-215	2x NTZ-271
		Power	7 1/2 CV	10 CV	2x 3 1/2 CV	2x 4 CV	2x 5 CV	2x 7 1/2 CV	2x 10 CV
		Swept volume (m3/h)	37,4	47,1	16,7	18,8	23,7	37,4	47,1
		Nominal discharge pressure (rel. bar)	18,00						
		Nominal suction pressure (rel. bar)	0,60						
		Oil load and type	3,9 litros POE-175Z		1,8 litros POE-175Z			3,9 litros POE-175Z	
Refrigerant			R-449A / Grupo L1 / PCA-100: 1398						
Liquid receiver (litres)			5	7	5		7	15	
Safety valve		Differential pressure calibration (rel. bar)	30						
		Step section (mm2)	17,72						
		Discharge capacity at the pressure calibration (kg/h)	379					400	
Pressure switch		Type	ACB						
		Brand	Danfoss						
		Model	061F8175						
		Calibrated pressure (bar rel.)	28						
Dryer filter			1/2”	1/2”	1/2”	1/2”	1/2”	5/8”	5/8”
Crankcase heater			27 W	27 W	2x 27 W	2x 35 W	2x 35 W	2x 35 W	2x 35 W
Fan		Power supply	1					2	
		Fan speed regularion	Voltage variation						
		Number	230V - I - 50Hz						
	Axial	Nominal flow rate (m3/h)	4300					2x 3600	
		Maximum power consumption (W)	350					2x 350	
		r.p.m.	1300						
	Centrifugal	Available pressure (Pa)	120					160	
		Nominal flow rate (m3/h)	3600					2x 3600	
		Maximum power consumption (W)	550					2x 550	
		r.p.m.	1400						
Cooling connections			1/2”-1 1/8”					5/8”-1 5/8”	5/8”-2 1/8”
Power supply			400V - III - 50Hz						
Maximum continuous current (per compressor) (A)			22,30	27,00	10,10	12,10	14,30	22,30	27,00
Locked rotor current (per compressor) (A)			74,00	96,00	32,00	45,00	51,00	74,00	96,00
Axial		Fan(s) maximum current consumption (A)	1,55						
		Maximum continuous current (compressors + fans) (A)	23,85	28,55	21,75	25,75	30,15	43,42	49,87
		Maximum start-up current (A)	75,55	97,55	43,65	58,65	66,85	95,12	118,87
Centrifugal		Fan(s) maximum current consumption (A)	7,40						
		Maximum continuous current (compressors + fans) (A)	29,70	34,40	27,60	27,72	35,72	47,72	61,40
		Maximum start-up current (A)	81,40	103,40	49,50	60,62	72,42	99,42	130,40

① Cooling capacity calculated for the following nominal conditions:

- Temperatura exterior: 32 ºC.
- Temperatura de evaporación: -30 ºC.
- Sobrecalentamiento: 10 K.
- Subenfriamiento: 3 K.

② Total power absorbed by the compressor and fans at nominal conditions.

③ Definition given in ‘RD138/2011 Reglamento de seguridad para instalaciones frigoríficas y sus I.T. complementarias’. IF-01.

④ Sound pressure level at 10 meters for axial fans and 1 meter for centrifugal fans from the condensing unit measured in open field.

BDV-SG/ -SCG/ -SMG/ -SCMG/ -RG/ RCG/ series			50181	60251	60341	60411	60262	60362	70682	70822	71233
Cooling capacity ① (kW)			8,0	10,2	13,6	17,0	13,0	16,7	24,0	30,0	44,6
Input power ② (kW)			4,5	5,7	7,6	9,5	5,8	8,9	15,2	18,9	28,3
C.O.P.			1,78	1,79	1,79	1,78	2,24	1,88	1,58	1,59	1,58
Installed power ③ (kW)			5,87	7,20	11,05	13,45	8,08	11,74	22,10	26,90	40,35
Dimensions (mm)			1194x740x 1535	1095x850x1935					1715x850x1935		
Weight (kg)			168	233	259	271	274	289	424	424	493
Sound pressure level ④ (dBA)	Axial		29	32	30	30	28	34	34	34	43
	Centrifugal		61	64	64	67	64	67	65	65	65
Compressor	Type		Hermetic scroll								
	Number x model		ZF18KVE EVI	ZF25K5E EVI	ZF34K5E EVI	ZF41K5E EVI	2x ZF13KVE EVI	2x ZF18KVE EVI	2x ZF34K5E EVI	2x ZF41K5E EVI	3x ZF41K5E EVI
	Power		6 CV	8 CV	10 CV	13 CV	2x 4 CV	2x 6 CV	2x 10 CV	2x 13 CV	3x 13 CV
	Swept volume (m3/h)		17,1	21,4	29,1	35,3	11,7	17,1	29,1	35,3	35,3
	Nominal discharge pressure (rel. bar)		18,00								
	Nominal suction pressure (rel. bar)		0,60								
	Oil load and type		1,9 litres Emkarate RL32 3 MAF		3,37 litres Emkarate RL32 3 MAF		1,9 litres Emkarate RL32 3 MAF		3,37 litres Emkarate RL32 3 MAF		
Refrigerant			R-449A / Group L1 / GWP-100: 1398								
Liquid receiver (litres)			7	15					24		45
Safety valve	Differential pressure calibration (rel. bar)		30								
	Step section (mm2)		17,72								
	Discharge capacity at the pressure calibration (kg/h)		379	400							
Pressure switch	Type		ACB								
	Brand		Danfoss								
	Model		061F8175								
	Calibrated pressure (bar rel.)		28								
Dryer filter			1/2”	1/2”	1/2”	1/2”	1/2”	1/2”	7/8”	5/8”	1 1/8”
Crankcase heater			70 W	70 W	66 W	66 W	2x 70 W	2x 70 W	2x 66 W	2x 66 W	3x 66 W
Fan	Power supply		1	2					3		
	Fan speed regularion		Voltage variation								
	Number		230V - I - 50Hz								
	Axial	Nominal flow rate (m3/h)	4300	2x 3600		2x 4800	2x 3600	2x 4800	3x 4750		
		Maximum power consumption (W)	350	2x 350		2x 490	2x 350	2x 490	3x 490		
		r.p.m.	1300								
	Centrifugal	Available pressure (Pa)	120	160							
		Nominal flow rate (m3/h)	3600	2x 3600					3x 3600		
		Maximum power consumption (W)	550	2x 550					3x 550		
		r.p.m.	1400								
Cooling connections			1/2”-1 1/8”	1/2”-1 3/8”					7/8”-2 1/8”	5/8”-2 1/8”	1 1/8”-2 1/8”
Power supply			400V - III - 50Hz								
Maximum continuous current (per compressor) (A)			13,70	16,00	25,00	29,00	9,00	13,70	25,00	29,00	29,00
Locked rotor current (per compressor) (A)			74,00	102,00	100,00	118,00	64,00	74,00	100,00	118,00	118,00
Axial	Fan(s) maximum current consumption (A)		1,55			2,36	1,55	2,36			
	Maximum continuous current (compressors + fans) (A)		15,25	17,55	26,55	31,36	19,55	28,95	52,36	60,36	89,36
	Maximum start-up current (A)		15,25	103,55	101,55	120,36	74,55	89,25	127,36	149,36	178,36
Centrifugal	Fan(s) maximum current consumption (A)		7,40								
	Maximum continuous current (compressors + fans) (A)		29,70	23,40	32,40	34,60	25,40	34,80	57,40	65,40	94,40
	Maximum start-up current (A)		81,40	109,40	107,40	125,40	80,40	95,10	132,40	154,40	183,40

① Cooling capacity calculated for the following nominal conditions:

- Ambient temperature: 32 ºC.
- Evaporation temperature: -30 ºC.
- Superheating: 10 K.
- Subcooling: 3 K.

② Total power absorbed by the compressor and fans at nominal conditions.

③ Definition given in ‘RD138/2011 Reglamento de seguridad para instalaciones frigoríficas y sus I.T. complementarias’. IF-01.

④ Sound pressure level at 10 meters for axial fans and 1 meter for centrifugal fans from the condensing unit measured in open field.

BDV-TG/ -TCG series			60131	60151	60201	60221	60251	80301	80351	80401
Cooling capacity ① (kW)			11,8	14,7	16,2	19,7	19,2	25,2	27,9	30,7
Input power ② (kW)			8,9	10,5	11,6	13,1	14,6	19,1	21,0	23,4
C.O.P.			1,33	1,40	1,40	1,50	1,32	1,32	1,33	1,31
Installed power ③ (kW)			15,95	18,55	20,70	23,90	26,50	30,90	35,20	38,50
Dimensions (mm)			1194x850x1935				2200x850x2050			
Weight (kg)			379	382	384	385	388	549	555	559
Sound pressure level ④ (dBA)	Axial		37	38	38	40	39	45	44	45
	Centrifugal		70	70	70	71	72	83	83	83
Compressor	Type		Semi hermetic							
	Number x model		4MF-13X	4ML-15X	4MM-20X	4MT-22X	4MU-25X	6MM-30X	6MT-35X	6MU-40X
	Power		13 CV	15 CV	20 CV	22 CV	25 CV	30 CV	35 CV	40 CV
	Swept volume (m3/h)		61,7	71,4	78,2	87,7	99,4	120,5	135,1	153,2
	Nominal discharge pressure (rel. bar)		18,00							
	Nominal suction pressure (rel. bar)		0,60							
	Oil load and type		3,3 litres Emkarate RL32 3 MAF							
Refrigerant			R-449A / Group L1 / GWP-100: 1398							
Liquid receiver (litres)			15				45			
Safety valve	Differential pressure calibration (rel. bar)		30 bar							
	Step section (mm2)		17,72							
	Discharge capacity at the pressure calibration (kg/h)		400							
Switch pressure	Type		ACB							
	Brand		Danfoss							
	Model		061F8175							
	Calibrated pressure (bar rel.)		28							
Dryer filter			5/8"					7/8"		
Crankcase heater			100 W							
Fan	Nominal flow rate (m3/h)		2							
	Maximum power consumption (W)		Voltage variation					Double speed (star-delta)		
	r.p.m.		230V - I - 50Hz					400V - III - 50Hz		
	Axial	Nominal flow rate (m3/h)	2x 4800					2x 10000		
		Maximum power consumption (W)	2x 490					2x 1250		
		r.p.m.	1300					1330		
	Centrifugal	Available pressure (Pa)	160					150		
		Nominal flow rate (m3/h)	2x 3600					2x 10000		
		Maximum power consumption (W)	2x 550					2x 2200		
		r.p.m.	1400					960		
Cooling connections			5/8"-1 5/8"		5/8"-2 1/8"			7/8"-2 1/8"		7/8"-2 5/8"
Power supply			400V - III - 50Hz							
Maximum continuous current (per compressor) (A)			30,80	35,40	39,00	44,50	51,90	59,70	67,30	75,80
Locked rotor current (per compressor) (A)			105,00	156,00	175,00	175,00	199,00	255,00	255,00	306,00
Axial	Fan(s) maximum current consumption (A)		2,36					4,96		
	Maximum continuous current (compressors + fans) (A)		33,16	37,76	41,36	46,86	54,26	62,06	72,26	80,76
	Maximum start-up current (A)		107,36	158,36	177,36	177,36	201,36	257,36	259,96	310,96
Centrifugal	Fan(s) maximum current consumption (A)		7,40					14,90		
	Maximum continuous current (compressors + fans) (A)		38,20	42,80	46,40	51,90	59,30	74,60	82,20	90,70
	Maximum start-up current (A)		112,40	163,40	182,40	182.40	206,40	269,90	269,90	320,90

① Cooling capacity calculated for the following nominal conditions:

- Ambient temperature: 32 ºC.
- Evaporation temperature: -30 ºC.
- Superheating: 10 K.
- Subcooling: 3 K.

② Total power absorbed by the compressor and fans at nominal conditions.

③ Definition given in 'RD138/2011 Reglamento de seguridad para instalaciones frigoríficas y sus I.T. complementarias'. IF-01.

④ Sound pressure level at 10 meters for axial fans and 1 meter for centrifugal fans from the condensing unit measured in open field.

11. TECHNICAL FEATURES MDV R-134a

MDV-NY/ -CY/ -MY/ CMY/ -VY/ -CVY series			50215	50271	50137	50216	50272	60320	60430	60542	70513
Cooling capacity ① (kW)			9,0	12,0	6,5	9,1	11,9	14,5	17,8	23,5	22,5
Input power ② (kW)			4,5	6,4	3,3	4,7	6,4	7,7	9,0	12,7	11,7
C.O.P.			2,00	1,88	1,97	1,94	1,86	1,88	1,98	1,85	1,92
Installed power ③ (kW)			9,03	12,05	6,80	9,28	12,34	14,98	18,06	24,10	22,47
Dimensions (mm)			1194x740x1535					1194x850x1935			1715x850x1935
Weight (kg)			193	198	179	203	209	318	326	336	395
Sound pressure level ④ (dBA)		Axial	49	48	38	48	47	53	52	51	47
		Centrifugal	69	69	63	69	68	73	72	72	68
Compressor		Type	Hermetic reciprocating								
		Number x model	MTZ-125	MTZ-160	2x MTZ-40	2x MTZ-64	2x MTZ-80	2x MTZ-100	2x MTZ-125	2x MTZ-160	3x MTZ-100
		Power	10 CV	13 CV	2x 3 1/2 CV	2x 5 CV	2x 6 1/2 CV	2x 8 CV	2x 10 CV	2x 13 CV	3x 8 CV
		Swept volume (m3/h)	37,5	47,2	11,8	18,7	23,6	29,8	37,5	47,2	29,8
		Nominal discharge pressure (rel. bar)	10,56								
		Nominal suction pressure (rel. bar)	0,99								
		Oil load and type	3,90 litres POE-175PZ		0,95 litres POE-175PZ	1,80 litres POE-175PZ		3,90 litres POE-175PZ			
Refrigerant			R-134a / Group A1 / GWP-100: 1430								
Liquid receiver (litres)			7					15			24
Safety valve		Differential pressure calibration (rel. bar)	21								
		Step section (mm2)	17,72								
		Discharge capacity at the pressure calibration (kg/h)	269					280			
Pressure switch		Type	ACB								
		Brand	Danfoss								
		Model	061F6147								
		Calibrated pressure (bar rel.)	20								
Dryer filter			3/8"	1/2"	3/8"	3/8"	1/2"	1/2"	1/2"	5/8"	5/8"
Crankcase heater			35 W	35 W	2x 35 W	2x 35 W	2x 35 W	2x 35 W	2x 35 W	2x 35 W	3x 35 W
Fan	Nominal flow rate (m3/h)		1					2			3
	Maximum power consumption (W)		230V - I - 50Hz								
	r.p.m.		Voltage variation								
	Axial	Nominal flow rate (m3/h)	4300					2x 3600			3x 4750
		Maximum power consumption (W)	350					2x 350			3x 490
		r.p.m.	1300								
	Centrifugal	Available pressure (Pa)	120					160			
		Nominal flow rate (m3/h)	3600					2x 3600			3x 3600
		Maximum power consumption (W)	550					2x 550			3x 550
		r.p.m.	1400								
Cooling connections			3/8"-1 1/8"	1/2"-1 3/8"	3/8"-1 1/8"		1/2"-1 3/8"		1/2"-1 5/8"	5/8"-2 1/8"	
Power supply			400V - III - 50Hz								
Maximum continuous current (per compressor) (A)			27,00	36,00	10,00	13,50	18,50	22,00	27,00	36,00	22,00
Locked rotor current (per compressor) (A)			105,00	130,00	38,00	64,00	80,00	90,00	105,00	130,00	90,00
Axial	Fan(s) maximum current consumption (A)		1,55								2,36
	Maximum continuous current (compressors + fans) (A)		28,55	37,55	21,55	28,55	38,55	45,55	55,55	73,55	68,36
	Maximum start-up current (A)		106,55	131,55	49,55	79,05	100,05	113,55	133,55	167,55	136,36
Centrifugal	Fan(s) maximum current consumption (A)		7,40								
	Maximum continuous current (compressors + fans) (A)		34,40	43,40	27,40	34,40	44,40	51,40	61,40	79,40	73,40
	Maximum start-up current (A)		112,40	137,40	55,40	84,90	105,90	119,40	139,40	173,40	141,40

① Cooling capacity calculated for the following nominal conditions:

- Ambient temperature: 32 ºC.
- Evaporation temperature: -10 ºC.
- Superheating: 10 K.
- Subcooling: 3 K.

② Total power absorbed by the compressor and fans at nominal conditions.

③ Definition given in 'RD138/2011 Reglamento de seguridad para instalaciones frigoríficas y sus I.T. complementarias'. IF-01.

④ Sound pressure level at 10 meters for axial fans and 1 meter for centrifugal fans from the condensing unit measured in open field.

MDV-SY/ -SCY/ -SMY/ -SCMY/ -RY/ -RCY series		50571	61141	50422	50582	50762	60902	61142	71522	72282	61353	61713
Cooling capacity ① (kW)		7,8	15,5	6,2	7,7	10,1	12,5	15,5	20,7	31,6	18,1	22,2
Input power ② (kW)		4,0	7,7	3,0	4,0	5,1	5,6	7,9	10,4	16,4	8,8	12,5
C.O.P.		1,95	2,01	2,07	1,93	1,98	2,23	1,96	1,99	1,93	2,06	1,78
Installed power ③ (kW)		8,63	14,70	5,72	7,50	9,40	10,88	14,94	18,18	29,4	16,32	22,41
Dimensions (mm)		1194x740 x1535	1194x850x 1935	1194x740x1535			1194x850x1935		1715x850x1935		1194x850x1935	
Weight (kg)		165	256	183	182	200	296	269	407	417	309	309
Soind pressure level ④ (dBA)	Axial	43	46	36	36	39	39	46	43	43	41	48
	Centrifugal	65	68	62	62	63	65	68	68	70	66	69
Compressor	Type	Hermetic scroll										
	Number x model	ZB57	ZB114	2x ZB21	2x ZB29	2x ZB38	2x ZB45	2x ZB57	2x ZB76	2x ZB114	3x ZB45	3x ZB57
	Power	8 CV	15 CV	2x 3 CV	2x 4 CV	2x 5 CV	2x 6 CV	2x 8 CV	2x 10 CV	2x 15 CV	3x 6 CV	3x 8 CV
	Swept volume (m3/h)	21,40	43,40	8,61	11,40	14,40	17,10	21,40	28,80	43,40	17,10	21,40
	Nominal discharge pressure (rel. bar)	10,56										
	Nominal suction pressure (rel. bar)	0,99										
	Oil load and type	1,9 litres Emkarate RL32 3 MAF	3,37 litres Emkarate RL32 3 MAF	1,24 litres Emkarate RL32 3 MAF	1,45 litres Emkarate RL32 3 MAF	1,90 litres Emkarate RL32 3 MAF			3,37 litres Emkarate RL32 3 MAF		1,9 litres Emkarate RL32 3 MAF	
Refrigerant		R-134a / Group A1 / GWP-100: 1430										
Liquid receiver (litres)		5	15	7			15		24	30	15	24
Safety valve	Differential pressure calibration (rel. bar)	21										
	Step section (mm2)	17,72										
	Discharge capacity at the pressure calibration (kg/h)	280		269			280					
Pressure switch	Type	ACB										
	Brand	Danfoss										
	Model	061F6147										
	Calibrated pressure (bar rel.)	20										
Dryer filter		3/8”	1/2”	3/8”	3/8”	3/8”	1/2”	1/2”	5/8”	5/8”	1/2”	5/8”
Crankcase heater		70 W	90 W	2x 70 W	2x 70 W	2x 70 W	2x 70 W	2x 100 W	2x 100 W	2x 90 W	3x 70 W	3x 100 W
Fan	Nominal flow rate (m3/h)	1	2	1			2		3		2	
	Maximum power consumption (W)	230V - I - 50Hz										
	r.p.m.	Voltage vartiation										
	Axial – Nominal flow rate (m3/h)	4300	2x 3600	4300			2x 3600		3x 4750		2x 3600	
	Axial – Maximum power consumption (W)	350	2x 350	350			2x 350		3x 490		2x 350	
	Axial – r.p.m.	1300										
	Centrifugal – Available pressure (Pa)	120	160	120			160					
	Centrifugal – Nominal flow rate (m3/h)	3600	2x 3600	3600			2x 3600		3x 3600		2x 3600	
	Centrifugal – Maximum power consumption (W)	550	2x 550	550			2x 550		3x 550		2x 550	
	Centrifugal – r.p.m.	1400										
Cooling connections		3/8”-1 1/8”	1/2”-1 5/8”	3/8”-1 1/8”		3/8”-1 3/8”	1/2”-1 3/8”	1/2”-1 5/8”	5/8”-2 1/8”		1/2”-1 5/8”	5/8”-2 1/8”
Power supply		400V - III - 50Hz										
Maximum continuous current (per compressor) (A)		15,90	33,50	7,20	10,00	12,80	13,10	15,90	20,40	33,50	13,10	15,90
Locked rotor current (per compressor) (A)		102,00	174,00	40,00	50,00	65,50	74,00	102,00	118,00	174,00	74,00	102,00
Axial	Fan(s) maximum current consumption (A)	1,55							2,36		1,55	
	Maximum continuous current (compressors + fans) (A)	16,96	35,05	15,95	21,55	27,15	27,75	33,35	43,16	69,81	40,85	49,25
	Maximum start-up current (A)	103,06	175,55	48,75	61,55	79,85	88,65	119,45	140,76	210,31	101,75	135,35
Centrifugal	Fan(s) maximum current consumption (A)	7,40										
	Maximum continuous current (compressors + fans) (A)	22,81	40,90	21,80	27,40	33,00	33,60	39,20	48,20	72,25	46,70	55,10
	Maximum start-up current (A)	108,91	181,40	54,60	67,40	85,70	94,50	125,30	145,80	212,75	107,60	141,20

① Cooling capacity calculated for the following conditions:

- Ambient temperature: 32 ºC.
- Evaporation temperature: -10 ºC.
- Superheating: 10 K.
- Subcooling: 3 K.

② Total power absorbed by the compressor and fans at nominal conditions.

③ Definition given in ‘RD138/2011 Reglamento de seguridad para instalaciones frigoríficas y sus I.T. complementarias’. IF-01.

④ Sound pressure level at 10 meters for axial fans and 1 meter for centrifugal fans from the condensing unit measured in open field.

MDV-TY/ -TCY series			60131	60151	60201	60251	80301	80351	80401	80302	80402	80502
Cooling capacity ① (kW)			18,9	22,4	24,2	29,1	38,2	42,5	45,6	44,7	48,6	58,2
Input power ② (kW)			9,4	11,2	12,3	15,6	19,0	21,7	23,7	22,5	24,6	31,1
C.O.P.			2,01	2,00	1,97	1,87	2,01	1,96	1,92	1,99	1,98	1,87
Installed power ③ (kW)			15,35	17,55	19,50	24,90	32,50	34,20	38,00	35,10	39,00	49,80
Dimensions (mm)			1194x850x1935				2200x850x2050					
Weight (kg)			379	382	384	388	549	555	559	694	698	706
Sound pressure level ④ (dBA)		Axial	44	45	50	51	62	62	62	62	62	62
		Centrifugal	69	69	70	71	82	82	82	82	82	82
Compressor		Type		Semi hermetic								
		Number x model	4MF-13X	4ML-15X	4MM-20X	4MU-25X	6MM-30X	6MT-35X	6MU-40X	2x 4ML-15X	2x 4MM-20X	2x 4MU-25X
		Power	13 CV	15 CV	20 CV	25 CV	30 CV	35 CV	40 CV	2x 15 CV	2x 20 CV	2x 25 CV
		Swept volume (m3/h)	61,70	71,40	78,20	99,40	120,50	135,10	153,20	71,40	78,20	99,40
		Nominal discharge pressure (rel. bar)	10,56									
		Nominal suction pressure (rel. bar)	0,99									
		Oil load and type	3,3 litres, POE Emkarate RL 32 3 MAF									
Refrigerant			R-134a / Group A1 / GWP-100: 1430									
Liquid receiver (litres)			15				45					
Válvula de seguridad		Differential pressure calibration (rel. bar)	21									
		Step section (mm2)	17,72									
		Discharge capacity at the pressure calibration (kg/h)	280									
Limitador de presión		Type	ACB									
		Brand	Danfoss									
		Model	061F6147									
		Calibrated pressure (bar rel.)	20									
Dryer filter			1/2"	5/8"	5/8"	5/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"
Crankcase heater			100 W	100 W	100 W	100 W	100 W	100 W	100 W	2x 100 W	2x 100 W	2x 100 W
Fan	Nominal flow rate (m3/h)		2									
	Maximum power consumption (W)		230V - I - 50Hz				400V - III - 50Hz					
	r.p.m.		Variación de tensión				Doble velocidad (estrella-triángulo)					
	Axial	Nominal flow rate (m3/h)	2x 4800				2x 10000					
		Maximum power consumption (W)	2x 490				2x 1250					
		r.p.m.	1300				1330					
	Centrífugo	Available pressure (Pa)	160				150					
		Nominal flow rate (m3/h)	2x 3600				2x 10000					
		Maximum power consumption (W)	2x 550				2x 2200					
		r.p.m.	1400				960					
Cooling connections			1/2"-1 5/8"	5/8"-1 5/8"	5/8"-2 1/8"		7/8"-2 1/8"		7/8"-2 5/8"			7/8"-3 1/8"
Power supply				400V - III - 50Hz								
Maximum continuous current (per compressor) (A)			30,80	35,40	39,00	51,90	59,70	67,30	75,80	35,40	39,00	51,90
Locked rotor current (per compressor) (A)			105,00	156,00	175,00	199,00	255,00	255,00	306,00	156,00	175,00	199,00
Axial	Fan(s) maximum current consumption (A)		2,36				4,96					
	Maximum continuous current (compressors + fans) (A)		33,16	37,76	41,36	54,26	64,50	72,26	80,76	75,76	82,96	108,76
	Maximum start-up current (A)		107,36	158,36	177,36	201,36	260,50	259,96	310,96	196,36	218,96	255,86
Centrífugal	Fan(s) maximum current consumption (A)		7,40				14,90					
	Maximum continuous current (compressors + fans) (A)		38,20	42,80	46,40	59,30	74,44	82,20	90,70	85,70	92,90	118,70
	Maximum start-up current (A)		112,40	163,40	182,40	206,40	270,44	269,90	320,90	206,30	228,90	265,80

① Cooling capacity calculated for the following conditions:

- Ambient temperature: 35 ºC.
- Evaporation temperature: -10 ºC.
- Superheating: 10 K.
- Subcooling: 3 K.

② Total power absorbed by the compressor and fans at nominal conditions.

③ Definition given in 'RD138/2011 Reglamento de seguridad para instalaciones frigoríficas y sus I.T. complementarias'. IF-01.

④ Sound pressure level at 10 meters for axial fans and 1 meter for centrifugal fans from the condensing unit measured in open field.

12. COOLING CAPACITY

12.1. Models MDV/BDV R449A - Hermetic reciprocating compressor

Model	Cooling capacity (W)				
	Evaporation temperature				
	0 ºC	- 5 ºC	- 10 ºC	- 15 ºC	
MDV-NG-50086	10800	8900	7100	5500	Ambient temperature 32ºC
MDV-NG-50108	13300	11000	9000	7100	
MDV-NG-50136	16000	13400	11100	8900	
MDV-NG-60160	21900	17900	14300	11200	
MDV-NG-60215	26500	21900	17700	13900	
MDV-NG-60271	31900	26700	21800	17400	
MDV-NG-50097	11800	9700	7800	6100	
MDV-NG-50109	13200	10900	8900	7000	
MDV-NG-50120	14700	12300	10100	8100	
MDV-NG-50137	16100	13600	11200	9100	
MDV-NG-60172	21900	17900	14300	11100	
MDV-NG-60216	27000	22400	18200	14400	
MDV-NG-60272	32600	27300	22500	18100	
MDV-NG-70320	42000	34600	27800	21800	
MDV-NG-70430	50400	41800	34100	27100	
MDV-NG-70542	60000	50500	41600	33500	
MDV-NG-70258	33300	27100	21600	16800	
MDV-NG-70324	41200	34100	27600	21800	
MDV-NG-70408	50100	41700	34300	27500	
MDV-NG-70480	56400	47100	38500	30800	

Model	Cooling capacity (W)					
	Evaporation temperature					
	-20 ºC	- 25 ºC	- 30 ºC	- 35 ºC	- 40 ºC	
BDV-NG-50215	10200	7900	5900	4200	2700	Ambient temperature 32ºC
BDV-NG-50271	12800	10200	7800	5700	3900	
BDV-NG-50192	9000	6800	5000	3400	2000	
BDV-NG-50216	10300	8000	5900	4200	2700	
BDV-NG-50272	12300	9700	7300	5300	3500	
BDV-NG-60430	20800	16000	11900	8400	5300	
BDV-NG-60542	26100	20700	15800	11600	7900	
BDV-NG-70645	31700	24400	18000	12600	7900	
BDV-NG-70813	39900	31600	24100	17500	12000	

12.2. Models MDV R134a – Hermetic reciprocating compressor

Model	Cooling capacity (W)				
	Evaporation temperature				
	0 °C	- 5 °C	- 10 °C	- 15 °C	
MDV-NY-50136	10000	8200	6600	5200	Ambient temperature 32°C
MDV-NY-50171	11500	9300	7300	5700	
MDV-NY-50215	13700	11200	9000	7100	
MDV-NY-50271	17600	14700	12000	9600	
MDV-NY-50137	9900	8100	6500	5200	
MDV-NY-50172	11800	9500	7500	5800	
MDV-NY-50216	13800	11300	9100	7100	
MDV-NY-50272	17400	14500	11900	9500	
MDV-NY-60320	22500	18300	14500	11200	
MDV-NY-60430	26700	21000	17800	13900	
MDV-NY-60542	34300	28700	23500	18900	
MDV-NY-70513	36500	29200	22500	16700	
MDV-NY-70645	43400	34900	27300	20400	
MDV-NY-70813	55000	45200	36300	28500	

12.3. Models MDV R134a – Scroll compressor

Model	Cooling capacity (W)				
	Evaporation temperature				
	0 °C	- 5 °C	- 10 °C	- 15 °C	
MDV-SY-50451	9200	7600	6300	5100	Ambient temperature 32°C
2MDV-SY-50571	11300	9500	7800	6400	
MDV-SY-60761	14500	12200	10200	8400	
MDV-SY-60951	19200	16000	13200	10800	
MDV-SY-61141	22300	18700	15500	12700	
MDV-SY-50422	9100	7600	6200	5100	
MDV-SY-50582	11000	9300	7700	6300	
MDV-SY-50762	14300	12100	10100	8300	
MDV-SY-60902	18200	15200	12500	10200	
MDV-SY-61142	22400	18700	15500	12700	
MDV-SY-71522	30000	25100	20700	16900	
MDV-SY-71902	39700	33000	27100	21800	
MDV-SY-72282	46100	38400	31600	25600	
MDV-SY-60633	13900	11500	9500	7700	
MDV-SY-60873	17200	14300	11700	9600	
MDV-SY-61143	22400	18800	15600	12700	
MDV-SY-61353	25900	21800	18100	14900	
MDV-SY-61713	31300	26500	22200	18400	
MDV-SY-72283	45700	38100	31500	25800	
MDV-SY-72853	55900	46900	38900	31900	
MDV-SY-73423	64400	54300	45300	37300	

12.4. Models MDV/BDV R449A – Scroll compressor

Model	Cooling capacity (W)				
	Evaporation temperature				
	0 ºC	- 5 ºC	- 10 ºC	- 15 ºC	
MDV-SG-50422	15600	13000	10700	8800	Ambient temperature 32ºC
MDV-SG-60582	20100	16700	13800	11300	
MDV-SG-60762	24900	210000	17500	14400	
MDV-SG-60902	29000	24500	20500	16800	
MDV-SG-61142	25500	22100	19000	16200	
MDV-SG-60633	22500	18900	15700	12900	
MDV-SG-60873	28800	24300	20300	16600	
MDV-SG-61143	35300	30100	25300	21000	
MDV-SG-71353	43700	36900	30800	25300	
MDV-SG-71713	54600	46600	39300	32900	

Model	Cooling capacity (W)				
	Evaporation temperature				
	-20 ºC	- 30 ºC	- 35 ºC	- 40 ºC	
BDV-SG-50131	6200	5200	4300	3500	Ambient temperature 32ºC
BDV-SG-50181	9500	8000	6600	5500	
BDV-SG-60251	12100	10200	8400	6900	
BDV-SG-60341	16200	13600	11300	9300	
BDV-SG-60411	20200	17000	14100	11600	
BDV-SG-60491	21800	18400	15200	12500	
BDV-SG-60262	15600	13000	10700	8800	
BDV-60SG-362	20100	16700	13800	11300	
BDV-SG-70682	34200	24000	20000	16300	
BDV-SG-70822	42500	30000	25000	20300	
BDV-SG-70982	45800	32300	26900	22000	
BDV-SG-60393	19500	13700	11400	9300	
BDV-SG-62543	29900	21100	17600	14300	
BDV-SG-70753	38000	26800	22300	18200	
BDV-SG-71023	50500	35800	29800	24400	
BDV-SG-71233	62500	44600	37000	30400	

12.5. Models MDV R134a – Semi hermetic compressor

Model	Cooling capacity (W)				
	Evaporation temperature				
	0 ºC	- 5 ºC	- 10 ºC	- 15 ºC	
MDV-TY-60131	28000	23200	18900	15100	Ambient temperature 32ºC
MDV-TY-60151	32800	27300	22400	18000	
MDV-TY-60201	35400	29500	24200	19600	
MDV-TY-60251	41800	35100	29100	23600	
MDV-TY-80301	56700	46900	38200	30600	
MDV-TY-80351	62600	52000	42500	34100	
MDV-TY-80401	67000	55800	45600	36900	
MDV-TY-80262	56000	46400	37800	30200	
MDV-TY-80302	65700	54600	44700	36000	
MDV-TY-80402	70700	59000	48600	39100	
MDV-TY-80502	83500	70300	58200	47300	

12.6. Models MDV R449A – Semi hermetic compressor

Model	Cooling capacity (W)				
	Evaporation temperature				
	0 ºC	- 5 ºC	- 10 ºC	- 15 ºC	
MDV-TG-80221	50100	41700	34100	29800	Ambient temperature 32ºC
MDV-TG-80251	57200	47900	39500	34600	
MDV-TG-80301	57100	48400	40400	38200	
MDV-TG-80351	66900	57100	48100	46000	

Model	Cooling capacity (W)					
	Evaporation temperature					
	-20 ºC	- 25 ºC	- 30 ºC	- 35 ºC	- 40 ºC	
BDV-TG-60131	19700	15500	11800	8500	5800	Ambient temperature 32ºC
BDV-TG-60151	23600	18800	14700	11100	7900	
BDV-TG-60201	25700	20700	16200	12300	8900	
BDV-TG-60221	28100	22700	17900	13700	10000	
BDV-TG-60251	30200	24500	19200	14700	10700	
BDV-TG-80301	41000	32600	25200	18800	13300	
BDV-TG-80351	45000	35900	27900	20900	14800	
BDV-TG-80401	49300	39400	30700	23100	16400	

13. CORRECTION FACTORS FOR OTHER REFRIGERANTS

The cooling capacity indicated in the tables above is referred to R-134a and R449A refrigerant, to know the cooling capacity with other refrigerants here are purposed the correction factors:

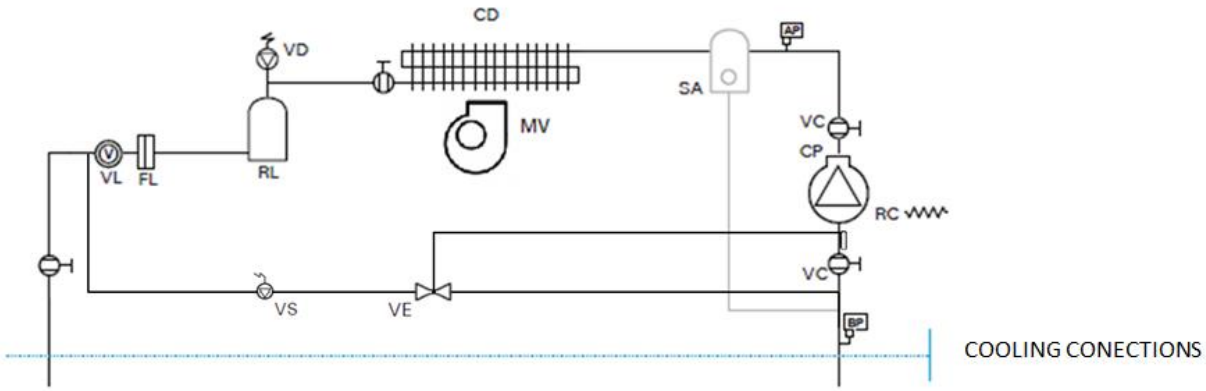
CORRECTION FACTORS	COOLING CAPACITY CORRECTION FACTOR					INPUT POWER FACTOR		GWP
MEDIUM EVAPORATION TEMP. (˚C)	0	-10	-20	-30	-40	-10	-30	IPCC AR4
R134a	1,00	1,00	1,00			1,00		1430
R450A (N13)	0,99	1,03	1,06			1,13		604
R513 (XP10)	1,00	1,03	1,06			1,13		633
R404A	0,95	0,96	0,96	0,96	0,99	0,99	1,02	3922*
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	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 to ambient temperature higher than 35 ºC.

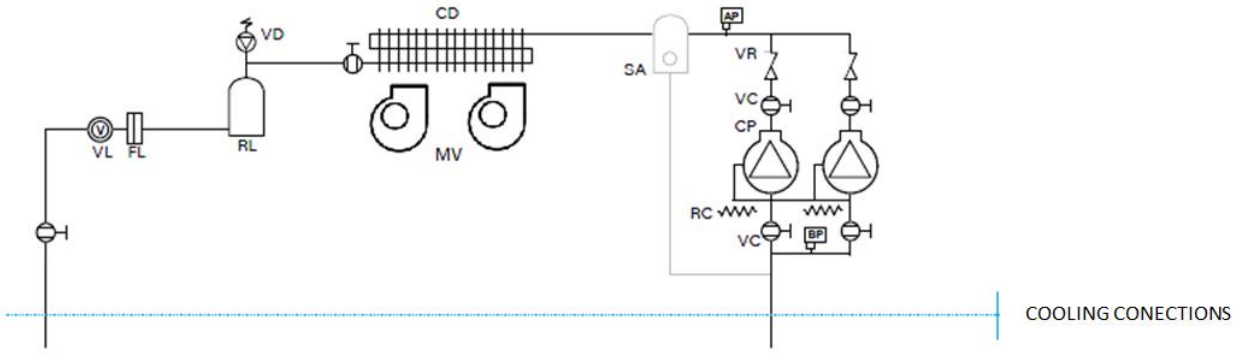
*From 2020, it will be forbidden in the EU the refrigerant with Global Warming Potential above 2500.

14. COOLING CIRCUIT

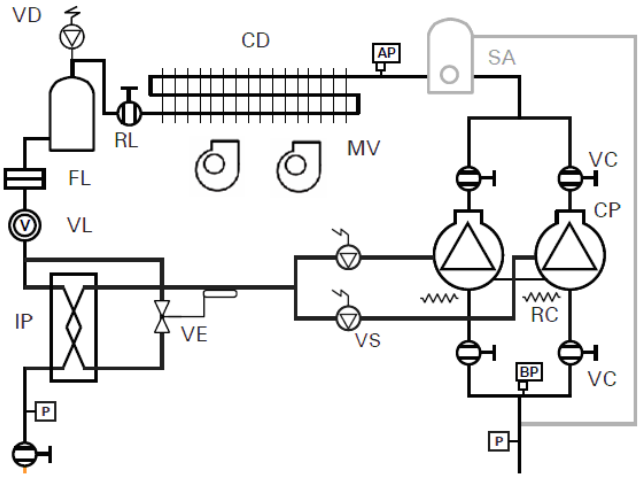
1 hermetic reciprocating compressor for low temperature



2 hermetic reciprocating compressors



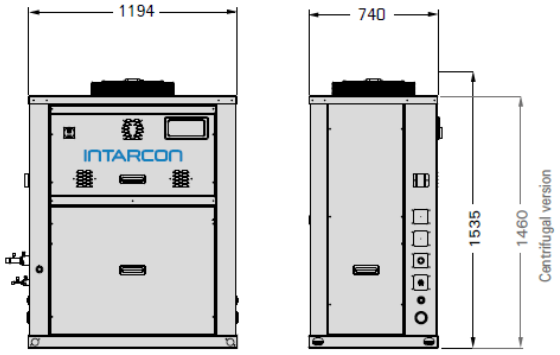
2 EVI scroll compressors for low temperature



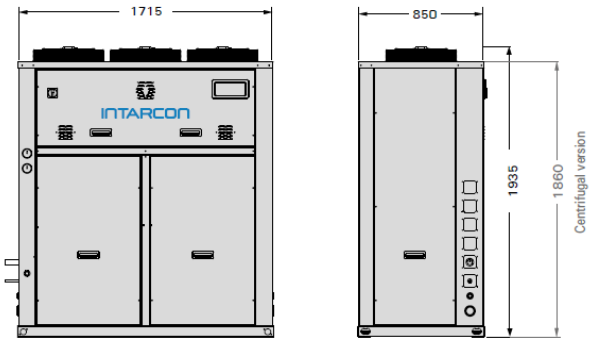
CP:	COMPRESSOR	VS:	SOLENOID VALVE	VD:	SAFETY VALVE
MV	MOTOR-FAN	AP:	HP SWITCH	VL:	SIGHT GLASS
CD	CONDENSER	BP:	LP SWITCH	VC:	BALL VALVE
FL	FILTER	IP:	PLATE HEAT EXCHANGERT	VR:	CHECK VALVE
VE:	EXPANSION VALVE	SA:	OIL SEPARATOR	P:	PRESSURE TRANSDUCER
CRANKCASE HEATER		RL:	LIQUID RECEIVER		

15. DIMENSIONS

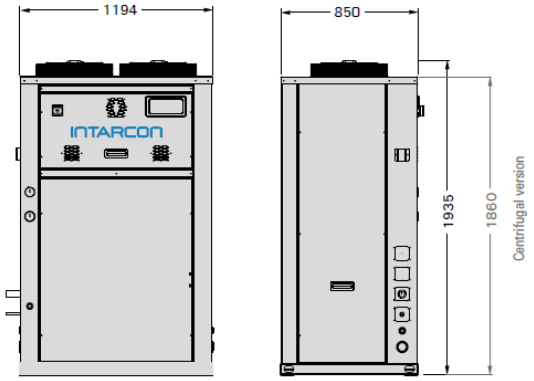
Series 5



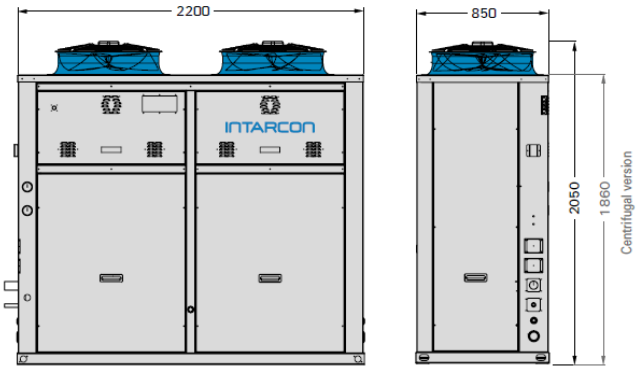
Series 7



Series 6



Series 8

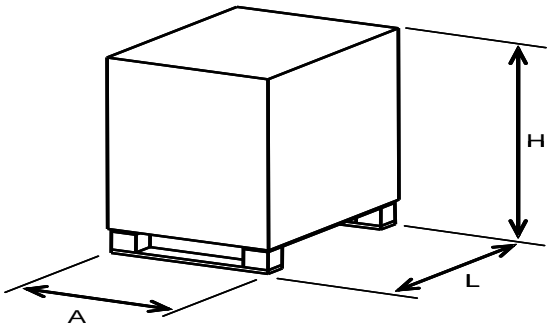


Note: Dimensions in mm

16. TRANSPORT

Every unit has to be handled carefully according to the following tips:

- Move and handle the units always in their vertical position.
- Never pile up the units during transport.
- Never pile up the units during stock.
- Use a forklift or a pallet jack to handle the unit.
- Keep the unit on its pallet until its final destination.
- To facilitate the lifting of the unit, there are holes in each corner for anchoring the slings. Slings with rings should be used, with adequate resistance, separated by a brace to avoid the deterioration of the chassis.



Dimensions (mm)	Road transport			Marine transport		
	Large	Width	High	Large	Width	High
Series 5	1304	790	1674	1344	830	1734
Series 6	1304	900	2074	1344	940	2134
Series 7	1820	900	1980	1860	940	2040
Series 8	2310	900	2190	2350	940	2250

17. SAFETY RECOMMENDATIONS

To avoid accident risk during installation, start-up or maintenance it is mandatory to consider the following tips. The start-up, repair and maintenance have to be taken by qualified personnel.

For low temperature scroll compressors, the chassis and the discharge line can reach temperatures above 177 ºC.

It is mandatory to follow the maintenance instructions, labels, and specific instructions, according to regulation in force.

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 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 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 be 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:

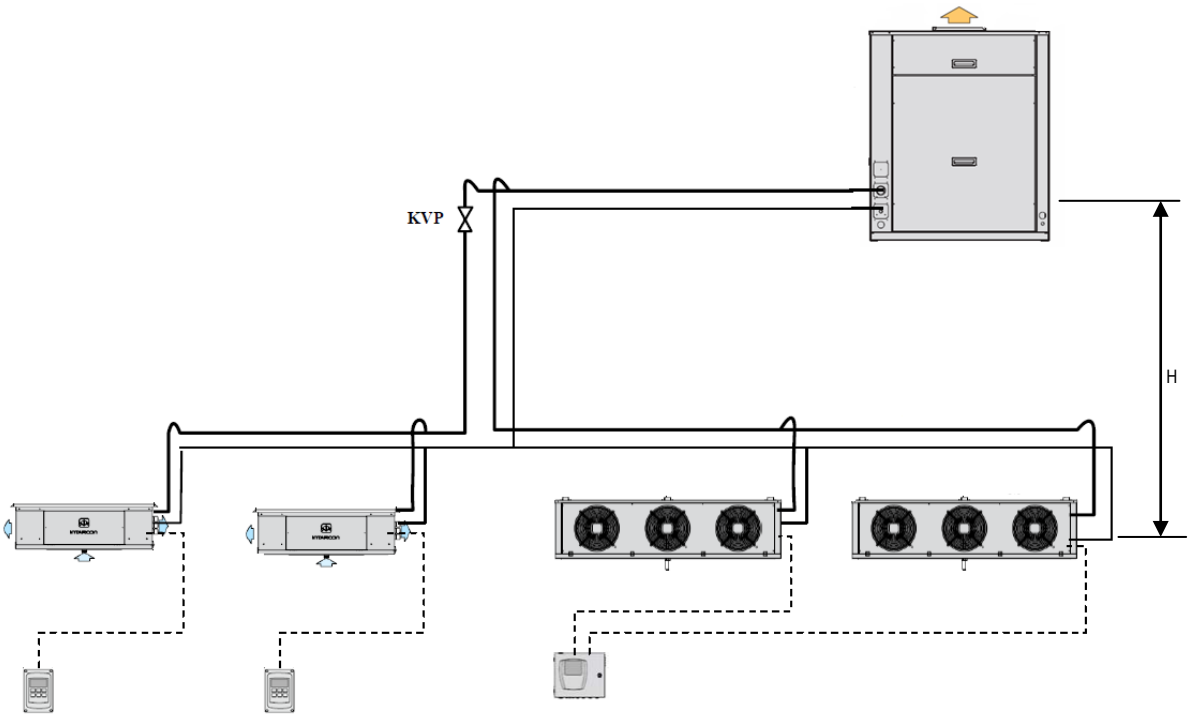
- Never rub the eyes. In case contact lenses are used, you must take them out.
- Eyes should be kept open and washed with plenty of water.
- The vistim should be taken to an emergency medical service.

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 partis with clothes bandages or coil.

18. INSTALLATION

18.1. Placing



> Respect the following limits for vertical distance between the air-cooled condensed plant and the evaporators. When the condenser is above the evaporators, the maximum distance (H) will be 20 meters. However, when the condenser unit is below the evaporators the maximum distance (H) will be 6 meters.

In the picture above it is shown an example of an installation.

> In the line gas, the connection between a branch and another main branch must be undertaken by the upper part of this last pipe, as shown in the previous picture.

> In low temperature units with scroll compressors and vapour injection (BDW-SG series) the liquid pipe must be isolated to keep the subcooling and to avoid bubbles. It is recommended use a elastomeric insulation shell, steam proof, with a minimum thickness of 10 mm.

The proper operation depends on the final placing of the units, for an optimal operation follow these tips:

- Check the unit once delivered to rule out damages.
- Install the unit outside, away from heating points.

> Before installing the unit checks that the Surface can withstand the weight, vibration and forces, guaranteeing the installation integrity and safety.

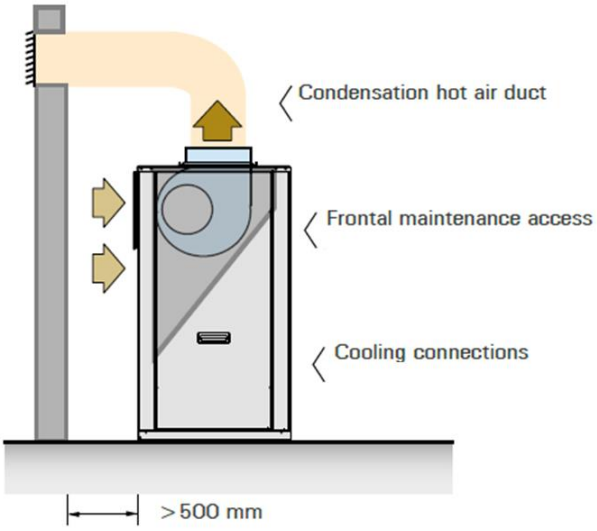
18.2. Minimal distance for start-up and maintenance tasks

Keep free the air intake area for proper air intake and outtake and avoid, as much as possible, the air recirculation.

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

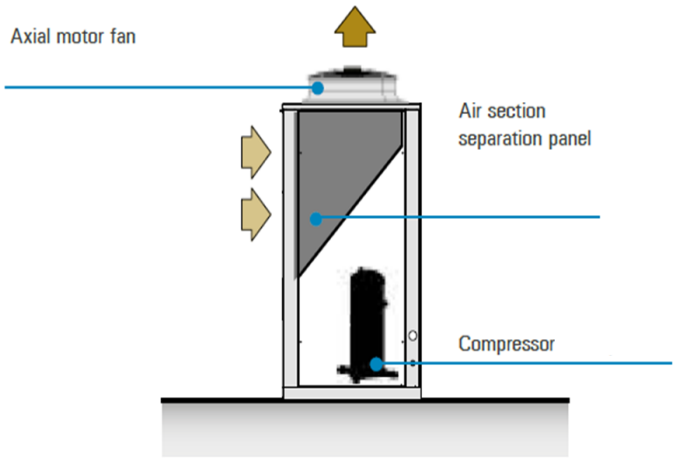
Centrifugal version

Centrifugal fans are assembled for vertical discharge with front and bi-side maintenance access.



Axial version

This model is designed for outdoor installation, using a minimum foot print. As standard, intarCUBE axial units are assembled with air separation and tropicalized condensing coil.



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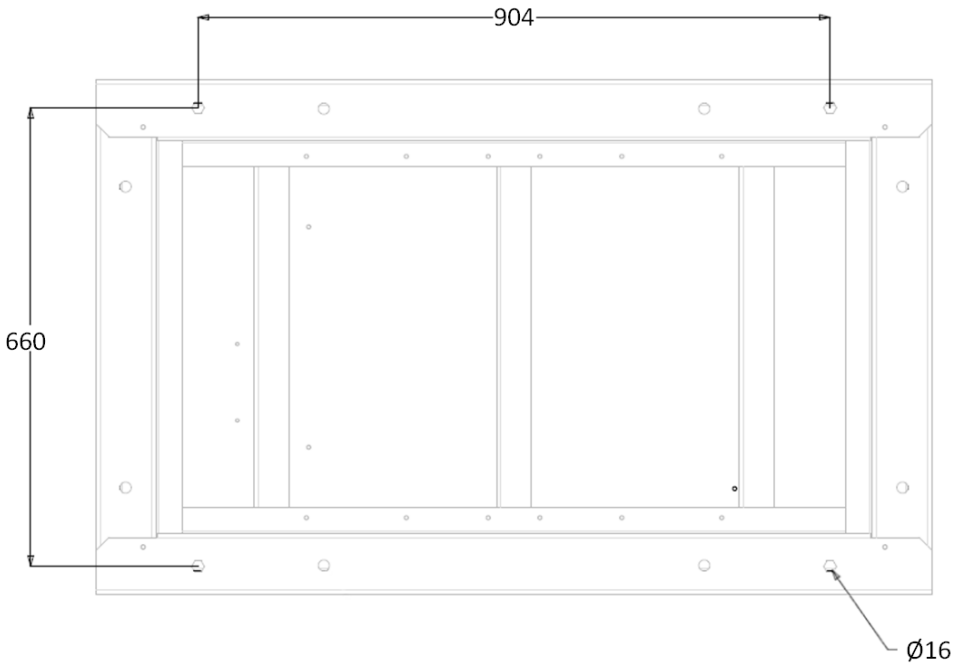
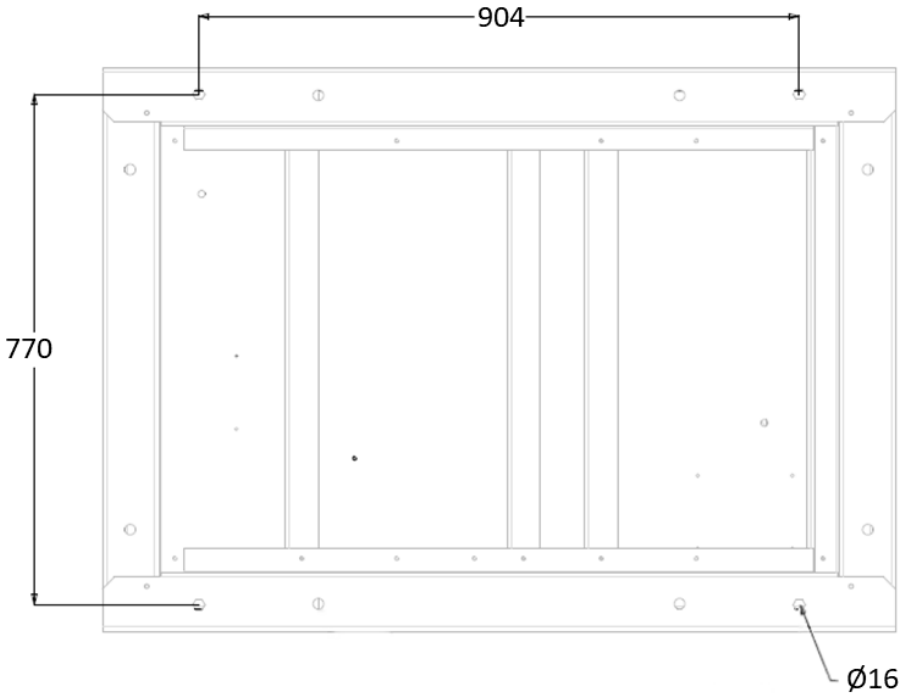
18.3. Unit fixation

- Install the unit on silent block type shock absorbers.
- The anti-vibration situation is shown below, from the down side of the unit.

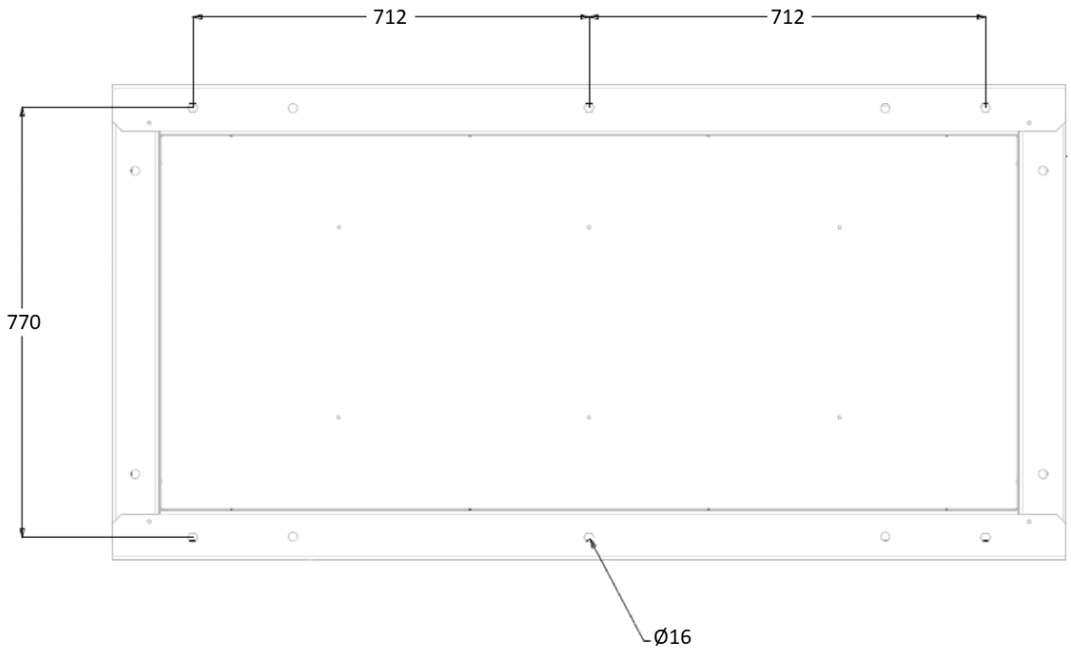
Series 5



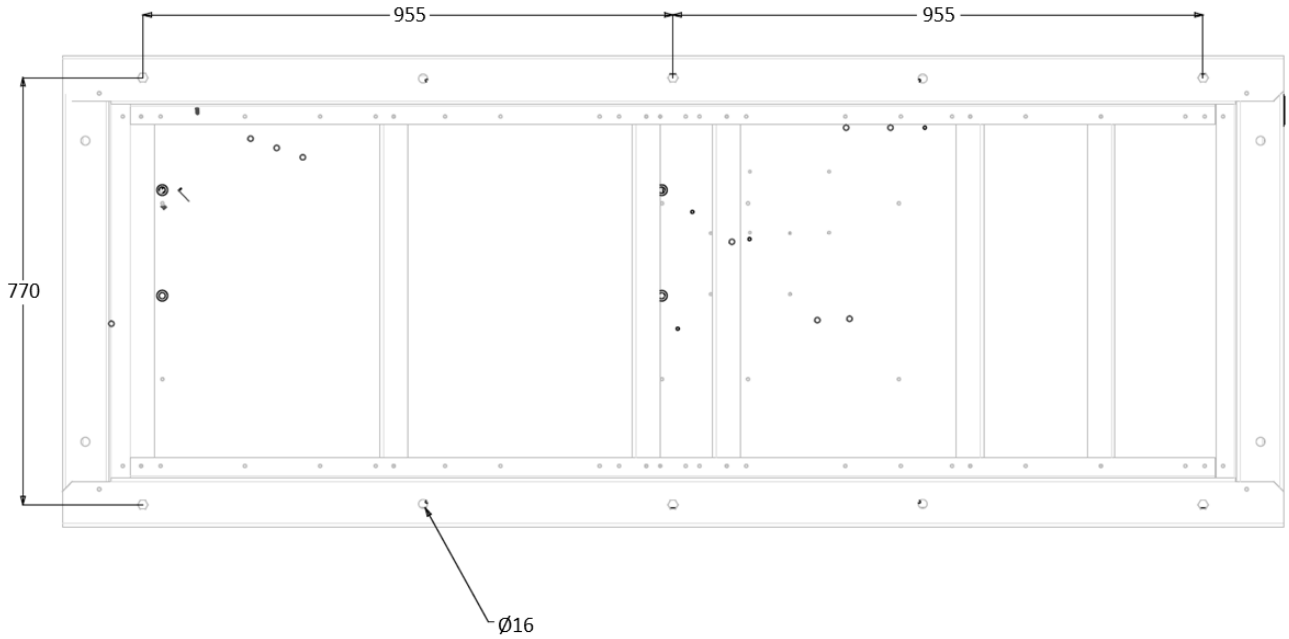
Series 6



Series 7



Series 8



Note: Dimensions in mm.

18.4. Supply duct dimension

- For intarCUBE units with centrifugal fans it is recommended to redirect the condensation air flow and optionally the inlet air, through sheet metal, fiberglass or PVC.
- The recommended dimensions are in the following chart:

Equivalent length	Series 5	Series 6	Series 7	Series 8
20 m equivalent lenght	400 x 300 mm	500 x 400 mm	600 x 500 mm	1000 x 500 mm
40 m equivalent length	400 x 350 mm	550 x 400 mm	650 x 500 mm	1100 x 500 mm
60 m equivalent length	400 x 400 mm	600 x 400 mm	700 x 500 mm	1200 x 500 mm
Equivalent lenght for each 90º elbow	8 m	10 m	15 m	15 m

- It is recommended to design the duct as shorter as possible avoiding unnecessary elbows.
- When choosing to leave the air intake of the units free, it is necessary to provide an adequate external air intake in the room.
- The use of flexible conduct is discouraged due to the great loss of load it may cause, being only aceptable for very short straight sections.

It is recommended to select the return and supply air ducts in accordance with the following:

- Supply air grille with a low air flow rate at 5 m/s (equivalent to an area of 0,2 m^2 in series 5, 0,4 m^2 IN SERIES 6, 0,6 m^2 in series 7 and 1 m^2 in series 8).
- Return air grille with low air flow rate of 3 m/s (equivalent to an area of 0,3 m^2 in series 5, 0,7 m^2 in series 6, de 1 m^2 in series 7 and 2 m^2 in series 8).

18.5. Pipeline layout

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

- 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.
- Pipes through fire resistant floors of walls must be sealed according to the corresponding regulation.
- To ensure a proper oil return to the compressor, provide the horizontal tracks of the suction pipe with slight slope towards the condensing unit, and install an oil trap every 3 meters on vertical tracks. In installations with more than 30 meters long it is highly recommended to install and oil separator to ensure the proper oil return.
- In the line gas, the connection between a branch and another main branch must be undertaken by the upper part of this last pipe, as shown in the previous picture.
- 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, 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.
- In low temperature units with scroll compressors and vapour injection the liquid pipe must be isolated to keep the subcooling and to avoid bubbles. It is recommended use an elastomeric insulation shell, steam proof, with a minimum thickness of 10 mm.
- 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.
- In the units with 4 compressors and double suction, when VRC is installed, the suction pipes must be joined, either to the unit's entrance, or to the bottom of the uprights

18.6. Pipes connection and vacuum

- Carry out the relevant welds.
- 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 vacuum, open the service valves of the condenser unit.
- intarCUBE units are equipped with sight glass, which helps to the installer to adjust the refrigerant load.

19. SOUND PRESSURE

For a proper installation of the unit the sound level must be respected. To determinate the appropriate sound level the external environment must be considered, as well as the solid elements for vibrations transmission. If necessary a noise impact study must be considered.

intarCUBE systems feature low-noise components. The sound pressure level, in free field at 10 meters for axial version and 1 meter for centrifugal version from the source and directivity 1 are shown at the technical features chart.

20. ELECTRICAL WIRING

Check the electrical wiring, and follow the recommendation below:

- Check the electrical scheme provided by the manufacturer.
- For scroll compressors units check the right connection of the phases to the phase control relay.
- Every model features a 5 wires 400V/III/50Hz power supply, being the yellow-green the ground wire.
- Install the appropriate protection device, MCB or differential switch, to every unit main power supply wires. If more than one unit is installed, a protection device must be installed.
- For sizing up the wires gauge it must be considered the data provided at the data plate, as well as other factors as the length, the type of wires, etc., respecting the regulation in force.

21. START-UP

Before starting the unit, check that the unit is properly installed. If you have worked on the unit take care not to forget tools or any object inside, that there is not any leaks and that the installation has been properly performed.

Units with scroll compressors check the right connection of the phase to the phase control relay.

Before starting the unit, or after a long time stopped, it is recommended to activate the carter resistor with at least 12 hours advance. If the user is not able to do it, the compressor must be warm by other way to assure the refrigerant and oil separation. This operation is important in the start-up with low ambient temperature.

Connect the electrical supply and switch on the unit. Check the subcooling and the superheating to verify that the refrigerant load is correct in nominal conditions. Before the unit has been working for some hours, the main parameters must be verified to ensure the proper operation of the system or if any adjustment is necessary. Compare the evaporation and condensation temperature with the design conditions. Check the safety devices.

For units with VRC system, consult the start-up procedure in the VRC regulation manual.

21.1. Potential problems during 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 pipes is greater than 15 m, or it is a large diameter tan the recommended one, and the user have not added sufficient 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 room temperature.

Excessive suction pressure drop.- Due to an insufficient pipe diameter, too long piping, or bottlenecks of the refrigerant pipe, there may be a too high pressure drop along the suction line, even activating the low pressure switch. In that 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 the user has to resize the pipeline connection.
- Reinstall refrigerant piping by shortening its length eliminating bottlenecks and small radio elbow. Use a larger 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 receiver to compensate refrigerant charge, the equipment could suffer from an excess of refrigerant charge, even activating the high pressure switch. In that case, 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 still remain some air inside, even activating the high pressure switch. In such case the user must replace the entire refrigerant charge by vacuuming and reloading according to the recommendations of this manual.

22. MAINTENANCE TASKS

intarCUBE units are subject to specialized maintenance to be carried out by qualified personnel. To preserve the optimal operation of the units it is recommended to carry out the following preventive maintenance tasks.

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

Check the corrosion of every metal part (chassis, body, coils, electrical board, etc.) Every electrical wiring should be checked, as well as the leak proof of the circuits.

Clearing recommendations are below:

- Cleaning the exterior.- To keep the unit free from dust and dirtiness, simply pass a wet cloth over the cover. Do not use solvents or detergents.
- Cleaning 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.
- Dryer filter.- The dryer filter objective is to keep the circuit free of moisture and clean, neutralizing the acids in the circuit. To verify the cleanness check the temperature differential between the filter inlet and outlet. Replace if necessary.
- Oil.- Check the oil level and its look by mean of the sight glass. In case of colour change, check the quality by a contamination test. In case of acid or water presence, replace the oil of the circuit, as well as the dryer filter. If an oil change is necessary, use brand new oil, identical to the original oil. The type and quantity oil is shown in the technical features chart.
- Refrigerant.- Take a leak test periodically. In case of refrigerant lea kit should be repaired at the moment and take a leak test before one month after the leak detection to verify correct reparation. To make a partial opening of the circuit it is necessary to take all the precaution to minimize the missed refrigerant load by pumping and isolating the total load to other sector of the circuit as it is explained in its section. The contact between the refrigerant at low temperature and the skin or eyes may cause injuries, so it is recommended to wear glasses and gloves.

The following repair tasks should only be carried out by qualified personnel:

- Replacement of any electrical part in the unit.
- Any mechanical parts modification.
- Any operation on the cooling circuit.
- Any manipulation on the protection devices, control panel and control switches.

Over the recommended maintenances tasks it is mandatory to obey the regulation in force.

23. REFGRIGERANT LOADING AND EMPTYING

intarCUBE units are designed to operate with the refrigerant indicated in the characteristic plate of the unit. The use of any other refrigerant invalidates the guarantee terms.

Every task related to refrigerant loading, emptying or replacing has to be taken by qualified personnel and never by the user.

The refrigerant recovery for its later reutilization and/or elimination is mandatory according to the regulation in force.

If the user needs to disconnect the cooling pipes to relocate the unit, it is recommended to recover the refrigerant according to the following steps:

- Close the service valve in liquid line in order to cut the refrigerant outlet.
- Force the unit operating until the LP switch is active. In this way the compressor will store the refrigerant in the high pressure line.
- Close the service valve in suction line before disconnecting the cooling pipes.

24. DISPOSAL MANAGEMENT

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

25. FAILURE ANALYSIS

Symptom	Cause	Solution
The unit does not switch on	a) No power supply. b) Electronic controller wrong connection.	a) Check MCB, differential switch… b) Check controller wiring polarity
The compressor does not start, there is no operation noise.	a) No power supply. b) Contactor coil burnt. c) Open internal klixon. d) A safety device on the security chain is open. e) Short cycle timing is on. f) Open contactor. g) Flow switch closed. h) Compressor full of liquid (the refrigerant has moved to the compressor during stocking or after a long non operation time, with no power supply and no crankcase heater). i) For low temperature scroll compressors, stop due to internal electronic protection (thermistor).	a) Check MCB, differential switch… b) Change it. c) Wait for reaming, check absorbed intensity. d) Verify the safety chain by mean of the regulation. e) Check electronic regulation. f) Change it. g) Check if there is any leak in the hydraulic circuit or the hydraulic filter is blocked. h) Provide power supply to the unit and activate the crankcase heater, after some hours try to start-up the unit. It may be possible that a emptying and loading of the circuit is necessary i) Wait for recovery (30 min. if the temperature has gone down).
The compressor stops some few seconds after having started. The motor produces an intermittent noise and opens the internal klaxon	a) Low supply voltage. b) Low oil level. c) Blocked compressor. d) Compressor full of liquid (a starting-up may have been done without connecting the crankcase heater longer enough)	a) Check the power supply and look for the voltage drop. b) Check oil level and oil return to the compressor through the suction line. If needed install oil traps or remake the suction line. c) Replace compressor. d) Provide power supply to the unit and activate the crankcase heater, after some hours try to start-up the unit. It may be possible that a emptying and loading of the circuit is necessary.
Repetitive compressor starts and stops	a) Due to high pressure. b) Too small regulation differential. c) Lack of refrigerant, low pressure. d) Blocked dehydrating filter (safety cut due to low pressure).	a) Check refrigerant load. b) Increase differential point. c) Look for the leak. d) Change it.
Too high condensation pressure (HP Pressure switch activates)	a) Insufficient air flow or air reflows 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 g) Too high air inlet temperature.	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. g) Evacuate and replace refrigerant f) Evacuate and replace refrigerant. g) Check the regulation thermostat tuning.

Symptom	Cause	Solution
Too low evaporation pressure (LP pressure switch activates)	a) Frozen heat exchanger. b) Obstructed refrigerant filter (different inlet and outlet temperatures). c) Lack of refrigerant. d) Too low condensation pressure. e) Blocked thermostatic expansion valve.	a) Check the antifreeze heater operating. b) Change refrigerant filter. c) Repair leakage, replace refrigerant load. d) Too low ambient temperature, too high airflow rate, checks and adjusts condensation parameters (condensation temperature control). e) Check the valve and the potential moisture inlet to the circuit.
Noisy compressor	a) Loose compressor. b) Low oil level. c) Faulty compressor.	a) Check silent block screws. b) Add oil to the recommended level. c) Replace.
Noisy unit	a) Unit is installed without noise insulation.	a) Install insulating layer or supports under the unit.

26. REGULATION AND CONTROL

The units are managed with control boards and remote keyboards. Check the regulation manual provided (only electronic versions).

For units with VRC system, check the VRC regulation manual provided by the manufacturer.

27. WARRANTY

Validation of warranty.- The user is called to fill out the form through INTARCON's website: http://www.intarcon.com/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 manufacturers 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 force 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 warranty 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 recognized 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 warranty will be invalidated in the following cases:

- In case that repairs, modifications or manipulations by unauthorized personnel are perceived.

- In case that willful 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 guarantee documentation of the equipment has been modified or mad illegible.

Headquarters and factory:

Pol. Ind. Los Santos, Bulevar de Los Santos, 34, Apdo. 410

14900 - Lucena - Córdoba (Spain)

Tlf.: +34 957 50 92 93

www.intarcon.com