



# MSAT-SC 65D-180F

AIR COOLED CONDENSING UNIT FOR OUTDOOR INSTALLATION



SPINCHILLER represents the very latest step in the evolution of chiller units. Designed specifically to optimize efficiency at partial loads, units of the SPINCHILLER series offer lower energy consumption — under normal operating conditions — than any other chiller of similar rated capacity.

## MSAT-SC 65D - 180F (R-407C)

Size	Cooling [kW]
65D	210
70D	226
75D	241
80D	255
90D	278
100D	318
110D	364
120D	386
135F	429
150F	462
165F	518
180F	588

The SPINCHILLER series signals a turning point in the development of this type of unit. It incorporates all the newest technology currently available, and is characterized by:

**EFFICIENCY**

thanks to special features of construction, the SPINCHILLER guarantees high energy efficiency, especially when operating under partial load conditions;

**SELF-ADAPT CAPABILITY**

evolved electronics ensure that the operating parameters of the chiller can be adapted to the load conditions of the overall system, optimizing power consumption, minimizing noise and extending the life of components;

**RELIABILITY**

SCROLL compressors and newly designed electronic controllers combine to give levels of reliability unattainable hitherto with conventional units of similar rated capacity

BT05G013GB-02

Clivet is participating in the EUROVENT Certification Programme. Products are listed in the EUROVENT Directory of Certified Products and in the site [www.eurovent-certification.com](http://www.eurovent-certification.com).



**CERTIFIED QUALITY SYSTEM ISO 9001 : 2008**

**STANDARD UNIT SPECIFICATIONS**

**COMPRESSOR**

Scroll compressor complete with: overload thermal protection, high refrigerant discharge temperature, rubber antivibration mounts, oil charge, acoustic and weather proof cabinet.

A oil heater is automatically switched on at the compressor shut-down to prevent oil dilution by the refrigerant.

**STRUCTURE**

hot-galvanized and painted plate structure with pre-painted aluminium external panelling to ensure maximum weatherability. The uniform distribution of the weight of the unit is guaranteed by the base structure, made up of galvanized and painted plate section bars, and featuring holes to simplify the lifting and earthing of the unit.

**EXTERNAL EXCHANGER**

Heat exchange coil with aluminium fins and copper tubes in staggered rows. The coils are complete with integral subcooling circuit which assures the correct refrigerant feeding of the expansion valve. Available in different options as per optional list.

**FAN**

helical fans with die-cast aluminium blades, directly coupled to a three-phase electric motor with external rotor, with built-in thermal overload protection, IP 54 index of protection. Housed inside an aerodynamically shaped nozzles to increase efficiency and minimise noise levels; fitted with safety grills.

**REFRIGERANT CIRCUIT**

the units are made with two independent refrigerant circuits, each with:

- high pressure switch
- low pressure switch
- low pressure safety valve
- high pressure safety valve
- compressor discharge shut-off valve
- compressor suction shut-off valve
- high and low pressure gauges

The units are shipped with a sealed charge of nitrogen.

**ELECTRICAL PANEL**

the Power Section includes:

- main door lock isolator switch
- isolating transformer for auxiliary circuit power supply
- compressor circuit breaker
- fan overload circuit breakers
- compressor control contactor
- fan control contactors
- phase-cutting fan speed control

the control section includes:

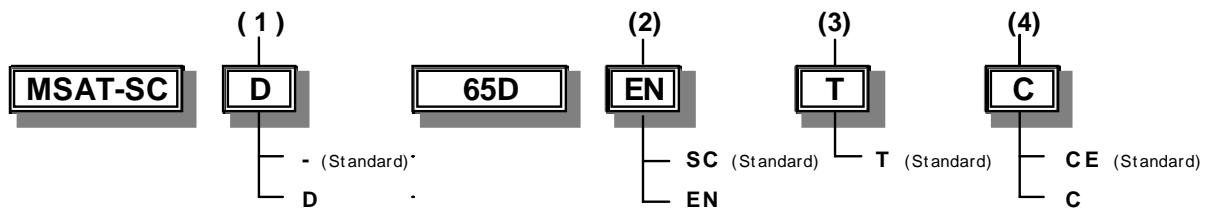
- free contacts for capacity-control step management

- compressor overload protection and timer
- self-diagnosis system with immediate display of the error code
- compressor operating hour display
- remote ON/OFF control
- automatic compressor start rotation control
- relay for remote cumulative fault signal
- input for demand limit (absorbed power limit according to an external signal 0±10V or 4±20mA)
- display of the set values, the error codes and the parameter index
- ON/OFF and alarm reset buttons
- UP and DOWN buttons to increase and decrease the values
- interface terminal with graphic display

**ACCESSORIES**

- copper / aluminium condenser coils with Fin Guard (Silver) treatment
- copper / aluminium condenser coils with acrylic lining
- copper / copper condenser coils
- copper / tinned copper condenser coils
- device for reduction of fan consumption Eco Breeze
- 25 litre liquid receiver for each circuit
- inlet liquid separator
- phase monitor
- power factor correction capacitors (cosfi > 0.9)
- free contacts for compressor state
- electronic expansion valves
- data logger
- remote microprocessor control unit
- connection set
- CAN/MODBUS serial converter kit
- CAN/LON WORKS serial converter kit
- spring antivibration mounts

**CONFIGURATION CODE**



**(1) ENERGY RECOVERY**

Not required (-)

**Partial Recovery (D)**

Performed using braze-welded plate exchangers suitable for recovering the desuperheating heat, up to a maximum of 20% of the total heat of the unit.

**(2) ACOUSTIC CONFIGURATION**

**compressors soundproofing (SC)**

this configuration is obtained by inserting the compressors in a soundproofed chamber.

**Extremely low noise (EN)**

this configuration is obtained by inserting the compressors in a soundproofed chamber and reducing the speed of the fans, with a larger condensing section.

**(3) ENERGY EFFICIENCY**

**Temperate Climate (T)**

standard

**(4) HEAT EXCHANGERS APPROVALS**

CE = PED (European testing)

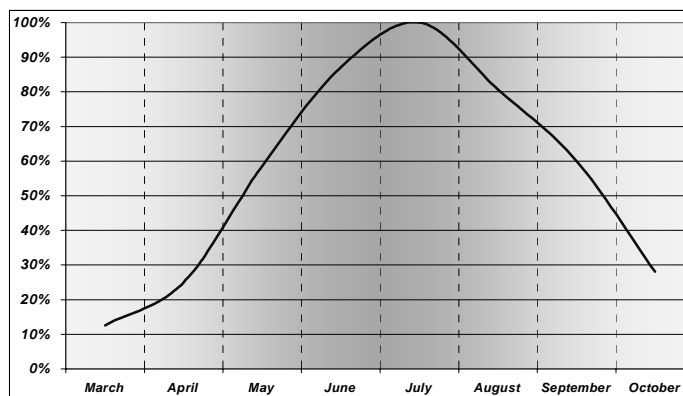
C = CLIVET (Internal testing)

**Comfort is a human right. Care for the environment is a human duty.**

The SPINCHILLER is an appliance of new conception, designed especially to operate with increasing efficiency as thermal load reduces, yet able to handle the maximum load demand whenever necessary. Because of significant diurnal and seasonal variations in load, chillers must operate for prolonged periods under partial load conditions. A SPINCHILLER unit always ensures conditions of maximum comfort coupled with ultra high efficiency for most of the system's working life, which means a big saving in electrical energy. This reflects the corporate policy of CLIVET, namely: offering fundamental and concrete solutions to help safeguard the well-being of people and their environment. By way of example, here is a seasonal thermal load graph relating to a multi-use building (shops, offices and apartments) located in the Milan area.



**SEASONAL THERMAL LOAD**

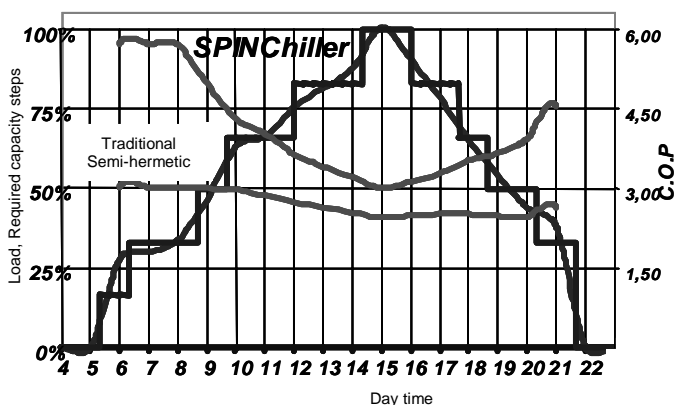
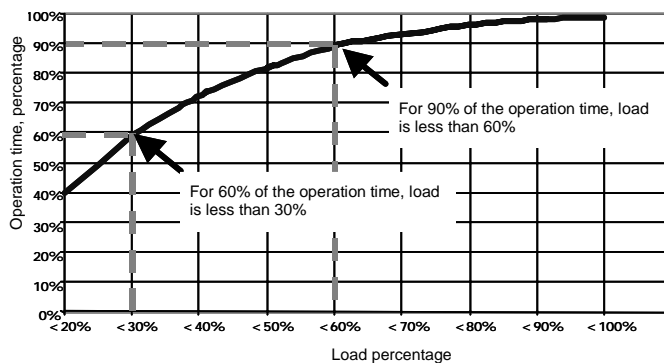


**MULTIPLE HIGH EFFICIENCY SCROLL COMPRESSORS IN THE SAME COOLING CIRCUIT**

A key aspect of the approach adopted in designing the SPINCHILLER is the notion of equipping a single cooling circuit with a battery of SCROLL compressors, rather than the conventional smaller number of bigger semi-hermetic compressors. This enables the unit to adapt perfectly to the system load by switching the available compressors in and out of operation progressively in response to the demand. The evolved control equipment used with SPINCHILLER units will optimize the activation sequence and balance the operating cycles of the compressors to maximum advantage.

**HIGH EFFICIENCY AT PARTIAL LOADS**

The unit in an air-conditioning system is selected on the basis of the maximum load the system is designed to handle. In practice however, maximum load conditions account only for a small percentage of the overall operating time, whereas the partial load operation is the true condition in which the unit had to operate. Simulation tests conducted in different buildings have shown that systems operate on average for 90% of total operating time with thermal load lower than 60%. Accordingly, operating efficiency under partial load conditions is a key consideration when selecting a chiller.

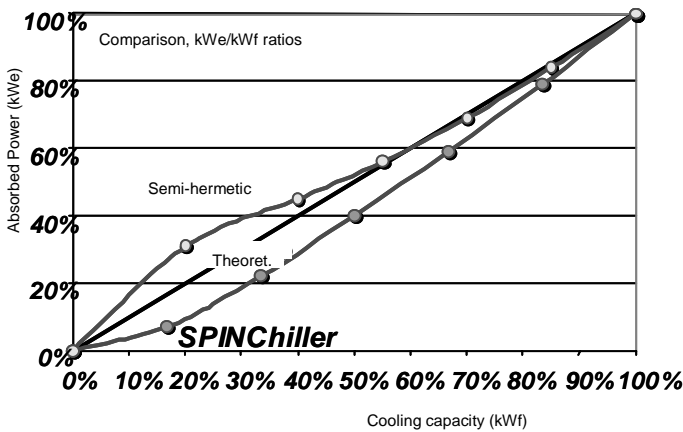


**RESPONSE TO CHANGING LOAD**

The higher efficiency of the SCROLL compressor and the special constructional features highlight the thermodynamic efficiency of the SPINChiller units. The graph to the side illustrates the extreme smoothness with which capacity delivered is adapted to the demand and shows how, even when not all the compressors are in operation, the efficiency of the SPINChiller remains higher than that of a conventional chiller, ACHIEVING EVEN DOUBLE THE EFFICIENCY WHEN OPERATING AT UNDER 50% LOAD. An advanced control system optimises the operating cycle and the rotation sequence of the compressors, significantly prolonging their service life. To obtain maximum efficiency, the electronic control activates the compressors according to the most favourable ratio between the heat exchange surfaces, so that the condensing and evaporation temperatures are always at the most beneficial values.

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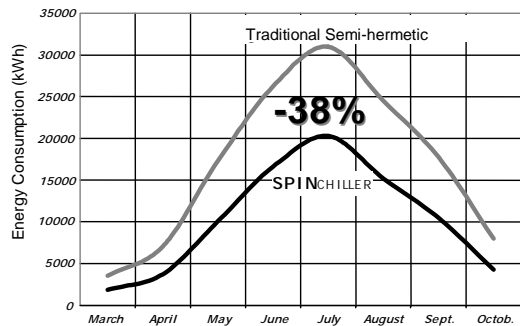
**HIGHER EFFICIENCY GEARED TO OPTIMUM USE OF HEAT EXCHANGE SURFACES**



In a conventional chiller, cooling capacity in practice follows a curve lower than the theoretical curve by reason of friction and losses that adversely affect the efficiency of the machine, especially when not operating under maximum load. SPINCHILLER units, on the other hand, deliver a cooling capacity much higher in percentage terms than their electrical input, by virtue of the fact that they can operate with oversized heat exchange surfaces whenever maximum load conditions do not prevail. This means that extremely high EER values are obtainable — higher than by any other chiller of comparable rated capacity.

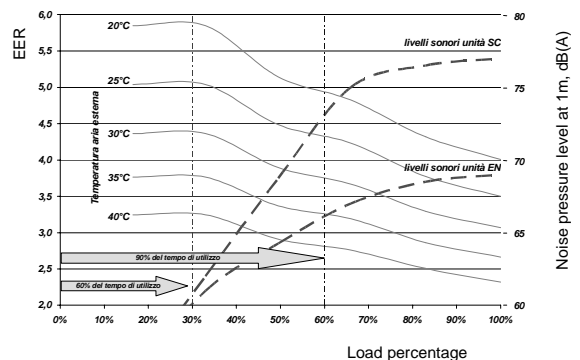
**LOW RUNNING COSTS**

Thanks to the various advantages already mentioned, a unit of the SPINCHILLER series can count on levels of efficiency much higher than those of a conventional chiller almost all of the time when in operation. Comparing the electrical power consumption of a SPINCHILLER with that of a conventional chiller of similar rated capacity — operating in the same system — the SPINCHILLER delivers a saving of around 38% over the season. These performance values, and unparalleled intrinsic reliability, make the SPINCHILLER an unbeatable option in terms both of pay back and of troublefree operation.



**NOISE TOO IS LOAD-DEPENDENT**

The electronic condensation control, included as standard on all SPINCHILLER units, is designed to adjust the speed of the fans automatically as the thermal load reduces. Given that the fans are the main source of noise in a chiller, this is a feature that brings important benefits, especially at night-time, when the demand on the system is less but sensitivity to noise is greatest. From the graph, it will be seen that for 90% of operating time, the sound pressure level is around 6-8 dB(A) lower than would be the case when operating at maximum load.

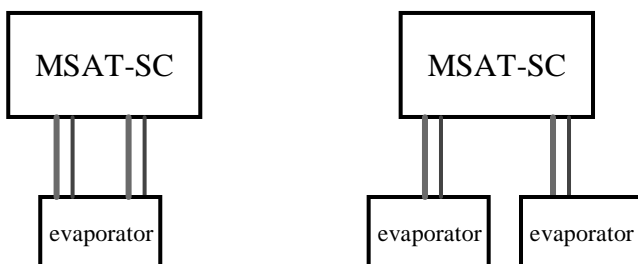
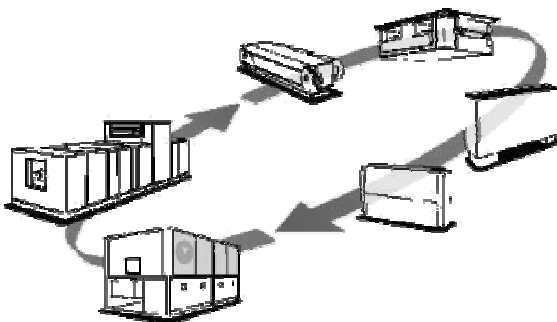


**INTEGRATION INTO THE SYSTEM**

The SPINchiller unit is able to communicate with other units of the CLIVET-maxi programme when installed and connected. All products of the CLIVET-maxi use the CLIVETtalk facility. This allows connected units to engage in a continuous exchange of information on ambient conditions, and on how to use the information. Each individual unit can control its own operating parameters natively, on the basis not only of the conditions impacting on it directly, but also of those affecting the entire installation. The result is an extremely high level of overall efficiency, as only a fully integrated system of components can deliver.

**THE HIGHEST FLEXIBILITY IN THE CONNECTION TO THE EVAPORATING GROUP**

Condensing unit of MSAT-SC series give the possibility to manage one or two remote evaporating groups. This allows a higher flexibility during selection and installation of the groups.



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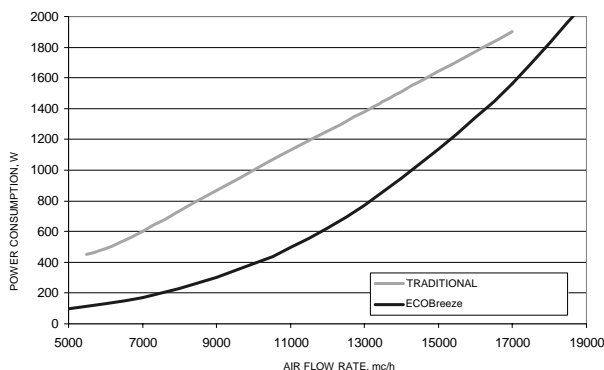
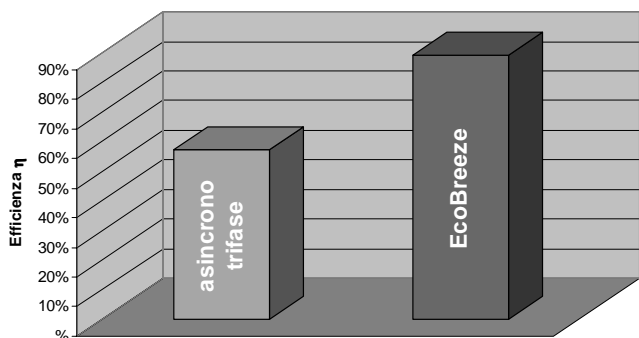
**Accessory: ECOBreeze**



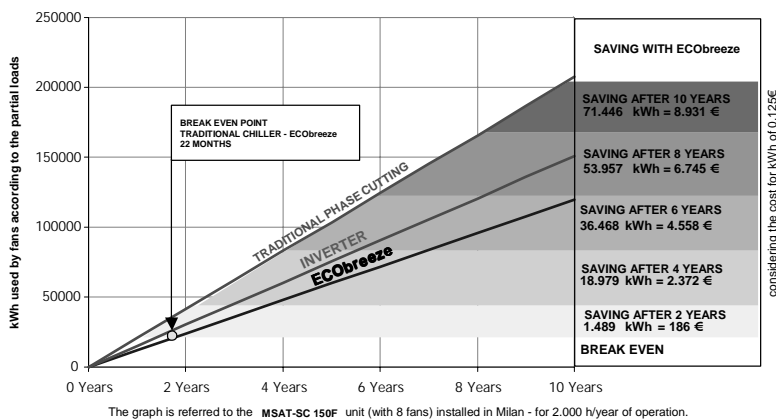
Within the range of air condensation-based products, Clivet introduces an innovative technology based on the deployment of fans driven by Brushless motors, completely electronically-controlled, characterised by extremely high efficiency and which allow a very advanced adjustment of fan speeds.

The ECOBreeze option envisages the utilisation of special fans driven by electrical Brushless motors. This technology envisages a permanent-magnets rotor, coupled with a very advanced magnetic field electronic switching control to the stator, directly integrated within the motor itself. A veritable "feather in the cap" is the electronic switching device that manages the precise and effective modulation of the fan's rotation speed and, therefore, of the fan's capacity. The management of this device is entrusted to the unit's general control system, thus assuring complete integration with the other refrigerating unit's components; this also allows the attaining of an exceptional overall efficiency. Furthermore, by integrating the control directly within the fan, one is guaranteed absolute suitability in the regulator/fan pair, differently from what is experienced in traditional systems. Finally, under particularly demanding or emergency conditions, for example should the environment temperature rise beyond the limits foreseen, before shutting the delivered power and/or setting the unit under alarm, the control device will detect the specific situation and will force the fans to a rotation speed beyond the nominal value, thus assuring an additional capacity of about 15% of the specified value. In this way, it is possible to assure the production of refrigerated water also when traditional units would be forced into alarm conditions.

**Electric motor intrinsic efficiency guarantees a consumption reduction in every operation conditions.**



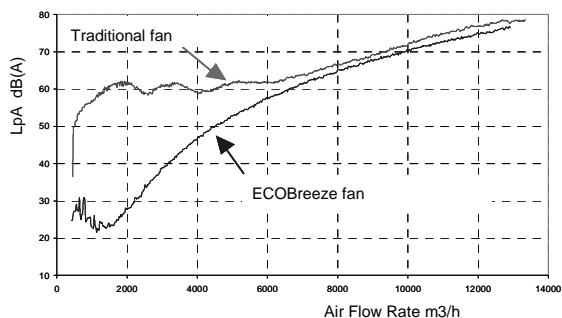
The final result confirms that in comparison to the traditional three-phase induction motors, also with frequency and/or voltage governing, the internal losses within the iron are reduced by 60%, those of the copper by 40%, whereas the intrinsic consumption is about half of that of a traditional modulator (inverter, phase adjuster). The energy cutback, and therefore the money saved, under all operating conditions are truly remarkable and the initial investment is repaid in very few months. From that moment onwards the reduced operative costs turn directly into an economic gain for the user.



MSAT-SC		75C	90C	65D	70D	75D	80D	90D	100D	110D	120D	135F	150F	165F	180F
PAY-BACK	Months	22													
Saving after 10 Years	kWh	26'792				35'723			53'585	62'516		71'446			
	€ (0.125)	3'349				4'465			6'698	7'814		8'931			
Using rate	h/Year	2'000													

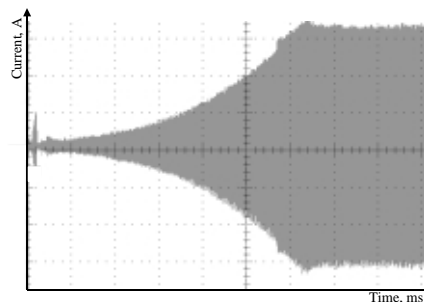
**When fans turn at minimum necessary speed, noise emissions are reduced.**

In addition to this, a generalised reduction in noise emission is obtained, due to the effect of both the rotation speed which is always modulated to the most suitable value, in keeping with the operation conditions, and the technology deployed in the governing which doesn't induce particular frequencies and vibrations in the rotation.



**The start-up is progressive, without start absorption peaks.**

The current damping at start-up (see diagram) due to the control typology, but also to the absence of brushing contacts for the power supply to the rotor, drastically reduce the harmful stresses for the lifetime of the component. In the final analysis, the fan's life can be considered as practically unlimited (greater than 80,000 hours).



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**CONVERSION TABLE : DEW / MID POINT**

<b>DP (°C)</b>	3	5	7	8	9.5	12
<b>MP (°C)</b>	1	3	5	6	7.5	10

THE FOLLOWING VALUES ARE REFERRED TO DEW POINT. AN INDICATION OF THE CORRESPONDING MEDIUM EVAPORATING TEMPERATURE (MID POINT) IS GIVEN IN THE TABLE.  
DP = DEW POINT TEMPERATURE (C°)  
MP = MEDIUM TEMPERATURE (C°)

**SOUND LEVELS**

**Acoustic configuration: compressors soundproofing (SC)**

Size	Sound Power Level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
<b>65D</b>	99	95	96	92	88	84	77	71	76	94
<b>70D</b>	99	95	95	92	88	84	77	70	76	94
<b>75D</b>	99	95	95	92	88	84	77	70	76	94
<b>80D</b>	99	95	95	92	88	84	77	70	76	94
<b>90D</b>	99	95	95	92	88	84	77	70	76	94
<b>100D</b>	99	95	96	92	88	84	77	70	76	94
<b>110D</b>	101	97	98	94	90	86	79	73	78	96
<b>120D</b>	100	98	98	95	91	86	80	73	78	97
<b>135F</b>	101	98	99	95	91	87	80	74	78	97
<b>150F</b>	102	98	99	96	92	87	81	74	78	97
<b>165F</b>	102	99	100	96	92	88	81	75	79	98
<b>180F</b>	102	99	99	96	92	88	81	74	79	98

**Acoustic configuration: Extremely low noise (EN)**

Size	Sound Power Level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
<b>65D</b>	88	91	87	83	80	75	69	62	67	85
<b>70D</b>	88	91	87	83	80	75	69	62	68	86
<b>75D</b>	88	91	87	84	80	75	69	62	68	86
<b>80D</b>	88	91	87	85	80	75	69	62	68	86
<b>90D</b>	88	91	87	84	80	75	70	62	68	86
<b>100D</b>	87	90	87	85	80	75	70	61	68	86
<b>110D</b>	90	93	89	86	82	77	71	64	70	88
<b>120D</b>	90	93	89	87	82	77	71	64	70	88
<b>135F</b>	92	95	91	87	84	78	72	66	71	89
<b>150F</b>	93	96	92	88	84	79	72	67	71	90
<b>165F</b>	92	95	92	89	85	80	74	66	72	91
<b>180F</b>	92	95	92	90	84	80	74	66	72	91

Measures according to ISO 3744 regulations, with respect to the EUROVENT 8/1 certification.  
The sound levels refer to the unit at full load, in the rated test conditions.  
The sound pressure level refers to a distance of 1m from the external surface of the units operating in an open field.  
Data referred to the following conditions :  
saturated suction temperature (SST) = 9.5 °C (Dew Point)  
outside air temperature 35°C

**Acoustic configuration: compressors soundproofing (SC)**

**GENERAL TECHNICAL SPECIFICATIONS**

Size	65D	70D	75D	80D	90D	100D	110D	120D	135F	150F	165F	180F
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**COOLING**

Cooling capacity	1	kW	210.3	226.2	240.5	254.8	277.6	318	363.5	386.4	428.8	462.1	518.3	587.9
Compressor power input		kW	56.5	61.2	67.6	73.9	81.2	88.5	99.5	113.8	124.2	140.1	156.8	171.6
Total power input	2	kW	64.8	69.5	75.9	82.2	89.5	96.8	111.9	126.2	138.5	156.4	178.6	193.4
EER			3.25	3.25	3.17	3.1	3.1	3.29	3.25	3.06	3.1	2.95	2.9	3.04

**COMPRESSOR**

Type of compressors			SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL
No. of Compressors		Nr	4	4	4	4	4	4	4	4	6	6	6	6
Rated power (C1)		HP	30	35	35	40	45	50	55	60	60	75	75	90
Nominal Power (C2)		HP	35	35	40	40	45	50	55	60	75	75	90	90
Std Capacity control steps		Nr	4	4	4	4	4	4	4	4	6	6	6	6
Oil charge (C1)		l	12	14	14	16	16	16	19	24	24	24	24	24
Oil charge (C2)		l	14	14	16	16	16	16	24	24	24	24	24	24
Refrigerant circuits		Nr	2	2	2	2	2	2	2	2	2	2	2	2

**EXTERNAL EXCHANGER**

Front surface		m2	11.9	11.9	11.9	11.9	11.9	11.9	17.3	17.3	17.3	17.3	17.3	17.3
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**EXTERNAL SECTION FANS**

Type of fans	3		AX	AX	AX	AX	AX	AX	AX	AX	AX	AX	AX	AX
Number of fans		Nr	2 + 2	2 + 2	2 + 2	2 + 2	2 + 2	2 + 2	3 + 3	3 + 3	3 + 4	4 + 4	4 + 4	4 + 4
Standard air flow		l/s	24400	23900	23900	23900	23900	23900	36700	35750	39700	43600	46000	44800

**CONNECTIONS**

Gas connection		mm	42 + 54	54 + 54	54 + 54	54 + 54	54 + 54	54 + 54	64 + 64	64 + 64	64 + 64	64 + 64	64 + 76	76 + 76
Liquid connection		mm	22 + 28	28 + 28	28 + 28	28 + 28	28 + 28	35 + 35	35 + 35	35 + 35	35 + 35	35 + 35	35 + 42	42 + 42

**POWER SUPPLY**

Standard power supply		V	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
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**DIMENSIONS**

Length		mm	2950	2950	2950	2950	2950	2950	4250	4250	4250	4250	4250	4250
Depth		mm	2195	2195	2195	2195	2195	2195	2195	2195	2195	2195	2195	2195
Height		mm	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410

**STANDARD UNIT WEIGHTS**

Shipping weight		kg	2032	2092	2152	2212	2217	2214	2690	2863	2988	3070	3378	3570
Operating weight		kg	2102	2164	2226	2288	2293	2298	2805	2983	3113	3200	3508	3700

(1) data referred to the following conditions :  
saturated suction temperature (SST) = 9.5 °C (Dew Point)  
outside air temperature 35°C

(2) Total absorbed power is given by the compressor absorbed power + fan absorbed power + auxiliary circuit absorbed power.  
(3) AX = axial-flow fan

**ELECTRICAL DATA**

**Voltage: 400/3/50**

Size	65D	70D	75D	80D	90D	100D	110D	120D	135F	150F	165F	180F
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**F.L.A. - FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS**

F.L.A. - Total		A	142.6	151.9	161.2	170.5	187.9	205.3	243.7	274.1	285.6	315.7	369.3	406.9
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**L.R.A. LOCKED ROTOR AMPERES**

L.R.A. - Single External Fan		A	14	14	14	14	14	14	14	14	14	14	16	16
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**F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION**

F.L.I. - Total		kW	83.8	90.3	97	103.6	113.8	124.1	145.6	163.1	172.9	190.1	217.1	243.5
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**M.I.C. MAXIMUM INRUSH CURRENT**

M.I.C. - Value		A	339.1	348.4	357.7	367	430.7	448.1	531.3	561.7	543.4	578.5	670.9	716.5
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voltage unbalance: max 2 %  
power supply: 400/3/50 Hz +/-6%  
Electrical data refer to standard units; according to the installed accessories, the data can suffer light variations.

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**ACOUSTIC CONFIGURATION: COMPRESSORS SOUNDPROOFING (SC)**

**COOLING PERFORMANCE**

Size	SST (°C)	EXTERNAL EXCHANGER AIR INTAKE TEMPERATURE (°C)													
		25		30		32		35		38		40		42	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
65D	3	189.0	44.0	179.2	48.4	175.1	50.3	168.9	53.3	162.4	56.4	158.0	58.6	153.6	60.8
	5	202.6	44.9	192.1	49.4	187.8	51.3	181.2	54.2	174.3	57.4	169.7	59.5	164.9	61.8
	7	216.6	45.8	205.5	50.3	200.9	52.2	193.9	55.2	186.6	58.3	181.7	60.5	176.6	62.8
	8	223.8	46.3	212.3	50.8	207.6	52.7	200.4	55.7	192.9	58.9	187.8	61.0	182.6	63.3
	9.5	234.7	47.0	222.8	51.5	217.9	53.5	210.3	56.5	202.5	59.6	197.2	61.8	191.8	64.1
	12	253.6	48.2	240.8	52.8	235.5	54.8	227.4	57.8	219.1	61.0	213.4	63.2	207.6	65.4
70D	3	202.3	47.8	192.0	52.5	187.8	54.5	181.3	57.6	174.6	60.9	170.1	63.2	165.4	65.6
	5	216.9	48.8	206.0	53.5	201.5	55.5	194.6	58.7	187.5	62.0	182.7	64.3	177.8	66.7
	7	232.0	49.8	220.4	54.6	215.6	56.6	208.3	59.8	200.8	63.1	195.7	65.5	190.5	67.8
	8	239.8	50.3	227.8	55.1	222.9	57.2	215.4	60.4	207.6	63.7	202.4	66.0	197.1	68.4
	9.5	251.6	51.1	239.2	56.0	234.0	58.0	226.2	61.2	218.1	64.6	212.6	66.9	207.1	69.3
	12	272.1	52.5	258.7	57.5	253.1	59.6	244.7	62.8	236.1	66.2	230.2	68.5	224.3	70.9
75D	3	214.9	52.6	204.1	57.6	199.6	59.8	192.8	63.2	185.9	66.7	181.2	69.2	176.4	71.7
	5	230.5	53.8	218.9	58.9	214.2	61.0	206.9	64.4	199.6	68.0	194.6	70.5	189.5	73.0
	7	246.5	55.0	234.2	60.2	229.2	62.4	221.5	65.8	213.7	69.4	208.5	71.8	203.1	74.4
	8	254.7	55.7	242.1	60.9	236.9	63.1	229.0	66.5	221.0	70.1	215.5	72.5	210.0	75.1
	9.5	267.3	56.7	254.1	61.9	248.7	64.1	240.5	67.6	232.1	71.2	226.4	73.6	220.7	76.2
	12	288.9	58.4	274.7	63.7	268.9	66.0	260.1	69.4	251.1	73.1	245.1	75.6	238.9	78.1
80D	3	227.6	57.5	216.1	62.8	211.5	65.1	204.4	68.7	197.2	72.5	192.3	75.1	187.4	77.8
	5	244.0	58.8	231.8	64.3	226.9	66.6	219.3	70.2	211.7	74.0	206.5	76.6	201.3	79.3
	7	261.0	60.3	248.0	65.8	242.8	68.1	234.8	71.8	226.7	75.6	221.2	78.2	215.6	80.9
	8	269.6	61.0	256.3	66.6	250.9	68.9	242.7	72.6	234.3	76.4	228.7	79.1	223.0	81.8
	9.5	282.9	62.2	269.0	67.8	263.4	70.2	254.8	73.9	246.1	77.7	240.2	80.4	234.2	83.1
	12	305.7	64.2	290.8	69.9	284.8	72.4	275.5	76.1	266.2	79.9	259.9	82.6	253.5	85.3
90D	3	250.1	63.5	237.4	69.5	232.3	72.1	224.4	76.1	216.4	80.2	210.9	83.0	205.4	86.0
	5	267.1	65.1	253.8	71.2	248.4	73.7	240.2	77.6	231.8	81.7	226.2	84.5	220.5	87.3
	7	284.7	66.8	270.7	72.8	265.1	75.3	256.5	79.2	247.8	83.2	242.0	85.9	236.1	88.7
	8	293.7	67.7	279.4	73.7	273.6	76.2	264.8	80.0	256.0	83.9	250.1	86.6	244.1	89.4
	9.5	307.4	69.0	292.6	75.0	286.6	77.4	277.6	81.2	268.5	85.1	262.4	87.7	256.3	90.4
	12	330.9	71.3	315.2	77.2	308.9	79.6	299.4	83.3	289.9	87.0	283.5	89.6		
100D	3	283.6	69.3	270.1	75.9	264.7	78.6	256.4	82.9	248.1	87.4	242.5	90.4	236.9	93.6
	5	303.1	71.0	289.0	77.6	283.2	80.3	274.6	84.6	266.0	89.0	260.2	92.0	254.3	95.0
	7	323.4	72.8	308.5	79.4	302.5	82.1	293.5	86.3	284.5	90.6	278.5	93.5	272.4	96.5
	8	333.7	73.7	318.5	80.3	312.3	83.0	303.2	87.2	294.0	91.4	287.9	94.3	281.7	97.2
	9.5	349.6	75.1	333.8	81.7	327.5	84.4	318.0	88.5	308.6	92.7	302.3	95.5	296.0	98.3
	12	377.0	77.6	360.2	84.1	353.5	86.8	343.6	90.8	333.7	94.8	327.1	97.5		
110D	3	323.5	78.0	308.5	85.3	302.6	88.4	293.6	93.2	284.5	98.1	278.5	101.4	272.5	104.9
	5	345.8	79.9	330.1	87.3	323.8	90.3	314.3	95.0	304.9	99.9	298.7	103.2	292.4	106.6
	7	368.9	81.9	352.3	89.3	345.7	92.3	335.8	97.0	325.9	101.7	319.4	105.0	312.9	108.3
	8	380.8	82.9	363.7	90.3	356.9	93.3	346.7	98.0	336.7	102.7	330.0	105.9	323.3	109.2
	9.5	398.9	84.5	381.0	91.9	374.0	94.9	363.5	99.5	353.0	104.2	346.1	107.4	339.2	110.6
	12	430.0	87.2	410.9	94.6	403.4	97.6	392.1	102.2	381.1	106.8	373.7	109.9		

kWf = Cooling capacity in kW  
kWe = Compressor power input in kW  
SST = saturated suction temperature corresponds to the pressure at the compressor (°C) (dew point)

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**ACOUSTIC CONFIGURATION: COMPRESSORS SOUNDPROOFING (SC)**

**COOLING PERFORMANCE**

Size	SST (°C)	EXTERNAL EXCHANGER AIR INTAKE TEMPERATURE (°C)													
		25		30		32		35		38		40		42	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
120D	3	342.8	89.4	327.5	97.7	321.4	101.2	312.3	106.5	303.3	112.0	297.4	115.8	291.4	119.7
	5	366.6	91.5	350.4	99.9	344.0	103.3	334.5	108.6	325.0	114.1	318.8	117.8	312.6	121.6
	7	391.2	93.8	374.0	102.2	367.2	105.6	357.2	110.9	347.2	116.3	340.7	119.9	334.2	123.7
	8	403.8	94.9	386.1	103.3	379.1	106.8	368.8	112.0	358.5	117.4	351.8	121.1	345.1	124.8
	9.5	423.0	96.7	404.5	105.1	397.2	108.6	386.4	113.8	375.7	119.2	368.7	122.8	361.8	126.5
	12	455.9	99.7	436.0	108.3	428.1	111.7	416.5	117.0	405.0	122.3	397.5	125.9		
135F	3	382.8	97.3	364.4	106.2	356.8	109.9	345.4	115.8	333.7	122.0	325.7	126.3		
	5	409.5	99.8	390.1	108.7	382.1	112.4	370.1	118.3	357.8	124.4	349.5	128.7		
	7	437.0	102.4	416.6	111.3	408.3	115.0	395.6	120.9	382.8	126.9	374.1	131.1		
	8	451.1	103.7	430.2	112.6	421.7	116.4	408.7	122.2	395.6	128.2	386.7	132.3		
	9.5	472.7	105.8	451.0	114.7	442.2	118.4	428.8	124.2	415.2	130.1	406.0	134.2		
	12	509.7	109.4	486.7	118.3	477.4	121.9	463.2	127.6	448.9	133.5	439.2	137.5		
150F	3	412.3	110.5	393.2	120.3	385.3	124.5	373.3	131.0	361.1	137.9	352.8	142.7		
	5	440.2	113.4	420.2	123.2	412.0	127.3	399.6	133.8	386.9	140.5	378.3	145.1		
	7	469.1	116.4	448.2	126.2	439.7	130.2	426.8	136.5	413.7	143.1	404.8	147.6		
	8	483.9	118.0	462.6	127.7	453.9	131.7	440.7	138.0	427.4	144.4	418.4	148.8		
	9.5	506.5	120.4	484.5	130.0	475.6	134.0	462.1	140.1	448.4	146.4	439.1	150.7		
	12	545.4	124.6	522.3	134.0	513.0	137.8	498.8	143.7	484.5	149.8	474.9	153.9		
165F	3	460.8	123.6	440.1	134.7	431.7	139.3	419.2	146.5	406.6	154.0	398.1	159.1		
	5	492.3	126.8	470.5	137.8	461.8	142.4	448.7	149.5	435.6	156.9	426.8	161.9		
	7	524.8	130.1	501.9	141.1	492.8	145.7	479.1	152.7	465.4	159.9	456.3	164.8		
	8	541.5	131.8	518.0	142.8	508.6	147.3	494.6	154.3	480.7	161.4	471.4	166.3		
	9.5	566.9	134.4	542.5	145.4	532.8	149.9	518.3	156.8	503.9	163.8	494.3	168.5		
	12	610.5	138.9	584.6	149.8	574.3	154.3	558.9	161.0	543.6	167.9	533.4	172.5		
180F	3	521.6	135.4	498.8	147.5	489.7	152.5	476.2	160.3	462.6	168.3	453.6	173.8		
	5	557.4	138.9	533.4	150.9	523.9	155.9	509.7	163.6	495.5	171.5	486.1	176.9		
	7	594.3	142.5	568.9	154.5	558.9	159.4	544.0	167.0	529.1	174.8	519.3	180.1		
	8	613.1	144.3	587.1	156.3	576.7	161.3	561.4	168.8	546.2	176.6	536.1	181.9		
	9.5	641.8	147.1	614.7	159.2	603.9	164.1	587.9	171.6	572.1	179.3	561.6	184.5		
	12	690.9	152.0	661.8	164.1	650.3	169.0	633.1	176.5	616.1	184.1	604.9	189.3		

kWf = Cooling capacity in kW  
 kWe = Compressor power input in kW  
 SST = saturated suction temperature corresponds to the pressure at the compressor (°C) (dew point)

**OPERATING LIMITS (COOLING)**

Size		65D	70D	75D	80D	90D	100D	110D	120D	135F	150F	165F	180F
<b>EXTERNAL EXCHANGER</b>													
Max air intake temperature	1	°C	45	45	43	43	42	42	42	42	41	41	41
Max air intake temperature	2	°C	48	48	46	46	45	45	45	45	44	44	44
Min. air intake temperature	3	°C	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
Min. air intake temperature	4	°C	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Min. air intake temperature	5	°C	3	3	3	3	3	3	3	3	3	3	3
Min. air intake temperature	6	°C	13	13	13	13	13	13	13	13	13	13	13
<b>COMPRESSOR</b>													
Max saturated suction temperature (SST)		°C	15	15	15	15	15	15	15	15	15	15	15

saturated suction temperature (SST) = 9.5 °C (Dew Point)  
 Warning: the still air condition is meant as absence of air flow to the unit. Any wind condition can let air pass through the condenser coil thus worsening the operating limits of the unit (see limits with air speed at 0,5 m/s & 1 m/s). In order to avoid such situation, windbreak barriers are necessary.

- (1) unit at full load
- (2) capacity-controlled unit (automatic capacity control)
- (3) unit at full load external exchanger air in quiet
- (4) capacity-controlled unit (automatic capacity control) external exchanger air in quiet
- (5) capacity-controlled unit (automatic capacity control) air to external exchanger = 0.5m/sec
- (6) capacity-controlled unit (automatic capacity control) air to external exchanger = 0.5m/sec

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Acoustic configuration: Extremely low noise (EN)

**GENERAL TECHNICAL SPECIFICATIONS**

Size	65D	70D	75D	80D	90D	100D	110D	120D	135F	150F	165F	180F
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**COOLING**

Cooling capacity	1	kW	204.1	219.7	230.7	243.9	264.4	299.6	350.3	379.3	405.5	449.6	500.4	551.2
Compressor power input		kW	58.4	64.2	71.8	78.7	86.8	97.3	103.4	117.5	131.7	145.8	165.5	185.2
Total power input	2	kW	63.7	69.5	77.1	84	92.1	102.6	111.3	125.4	140.8	159.3	179.3	199
EER			3.2	3.16	2.99	2.9	2.87	2.92	3.15	3.02	2.88	2.82	2.79	2.77

**COMPRESSOR**

Type of compressors			SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL
No. of Compressors		Nr	4	4	4	4	4	4	4	4	6	6	6	6
Rated power (C1)		HP	30	35	35	40	45	50	55	60	60	75	75	90
Nominal Power (C2)		HP	35	35	40	40	45	50	55	60	75	75	90	90
Std Capacity control steps		Nr	4	4	4	4	4	4	4	4	6	6	6	6
Oil charge (C1)		l	12	14	14	16	16	16	19	24	24	24	24	24
Oil charge (C2)		l	14	14	16	16	16	16	24	24	24	24	24	24
Refrigerant circuits		Nr	2	2	2	2	2	2	2	2	2	2	2	2

**EXTERNAL EXCHANGER**

Front surface		m2	11.9	11.9	11.9	11.9	11.9	11.9	17.3	17.3	17.3	17.3	17.3	17.3
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**EXTERNAL SECTION FANS**

Type of fans	3		AX	AX	AX	AX	AX	AX	AX	AX	AX	AX	AX	AX
Number of fans		Nr	4	4	4	4	4	4	6	6	7	8	8	8
Standard air flow		l/s	18200	17800	17800	17800	17800	16900	26550	26550	32500	35000	34200	33350

**CONNECTIONS**

Gas connection		mm	42 + 54	54 + 54	54 + 54	54 + 54	54 + 54	54 + 54	64 + 64	64 + 64	64 + 64	64 + 64	64 + 76	76 + 76
Liquid connection		mm	22 + 28	28 + 28	28 + 28	28 + 28	28 + 28	35 + 35	35 + 35	35 + 35	35 + 35	35 + 35	35 + 42	42 + 42

**POWER SUPPLY**

Standard power supply		V	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
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**DIMENSIONS**

Length		mm	2950	2950	2950	2950	2950	2950	4250	4250	4250	4250	4250	4250
Depth		mm	2195	2195	2195	2195	2195	2195	2195	2195	2195	2195	2195	2195
Height		mm	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410

**STANDARD UNIT WEIGHTS**

Shipping weight		kg	2042	2112	2172	2232	2237	2234	2710	2888	3078	3170	3468	3570
Operating weight		kg	2112	2184	2246	2308	2313	2318	2825	3008	3203	3300	3598	3720

- (1) data referred to the following conditions :  
saturated suction temperature (SST) = 9.5 °C (Dew Point)  
outside air temperature 35°C  
(2) Total absorbed power is given by the compressor absorbed power + fan absorbed power  
+ auxiliary circuit absorbed power.  
(3) AX = axial-flow fan

**ELECTRICAL DATA**

Voltage: 400/3/50

Size	65D	70D	75D	80D	90D	100D	110D	120D	135F	150F	165F	180F
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**F.L.A. - FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS**

F.L.A. - Total		A	135.8	145.1	154.4	163.7	181.1	198.5	233.5	263.9	278.6	307.7	353.3	398.9
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**L.R.A. LOCKED ROTOR AMPERES**

L.R.A. - Single External Fan		A	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	10	10	10	10
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**F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION**

F.L.I. - Total		kW	80.8	87.4	94	100.6	110.8	121	141	158.6	168.5	185.1	211.5	237.9
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**M.I.C. MAXIMUM INRUSH CURRENT**

M.I.C. - Value		A	317.1	326.4	335.7	345	408.7	426.1	498.3	528.7	525.9	558.5	638.9	684.5
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voltage unbalance: max 2 %  
power supply: 400/3/50 Hz +/-6%  
Electrical data refer to standard units; according to the installed accessories, the data can suffer light variations.

**ACOUSTIC CONFIGURATION: EXTREMELY LOW NOISE (EN)**

**COOLING PERFORMANCE**

Size	SST (°C)	EXTERNAL EXCHANGER AIR INTAKE TEMPERATURE (°C)											
		25		30		32		35		38		40	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
65D	3	185.1	45.3	175.1	49.8	171.0	51.8	164.7	54.8	158.2	57.9	153.9	60.1
	5	198.2	46.3	187.5	50.9	183.1	52.8	176.4	55.8	169.6	59.0	165.0	61.1
	7	211.6	47.3	200.2	52.0	195.6	53.9	188.5	57.0	181.3	60.1	176.4	62.2
	8	218.4	47.9	206.7	52.5	201.9	54.5	194.7	57.5	187.3	60.7	182.3	62.8
	9.5	228.9	48.7	216.6	53.4	211.7	55.4	204.1	58.4	196.4	61.5	191.2	63.7
	12	246.8	50.1	233.7	54.9	228.3	56.9	220.2	60.0	212.0	63.1	206.5	65.2
70D	3	198.7	49.7	188.1	54.6	183.8	56.7	177.2	59.8	170.6	63.2	166.1	65.4
	5	212.7	50.9	201.4	55.8	196.8	57.9	189.9	61.1	182.8	64.4	178.1	66.7
	7	227.1	52.1	215.1	57.1	210.2	59.2	202.9	62.4	195.5	65.7	190.5	68.0
	8	234.5	52.8	222.1	57.8	217.1	59.9	209.5	63.1	202.0	66.4	196.9	68.7
	9.5	245.7	53.8	232.7	58.9	227.5	61.0	219.7	64.2	211.8	67.5	206.5	69.7
	12	265.0	55.5	251.0	60.7	245.4	62.8	237.1	66.0	228.7	69.3	223.1	71.5
75D	3	208.6	55.5	197.5	60.8	193.0	63.1	186.3	66.5	179.5	70.1	174.9	72.5
	5	223.3	56.9	211.4	62.3	206.7	64.6	199.5	68.0	192.4	71.6	187.6	74.0
	7	238.3	58.4	225.8	63.9	220.7	66.2	213.2	69.6	205.6	73.2	200.6	75.6
	8	246.0	59.2	233.1	64.7	227.9	67.0	220.1	70.5	212.4	74.0	207.2	76.4
	9.5	257.7	60.5	244.2	66.0	238.8	68.3	230.7	71.8	222.7	75.3	217.3	77.7
	12	277.6	62.6	263.2	68.2	257.4	70.5	248.9	74.0	240.3	77.5	234.7	79.9
80D	3	220.5	60.8	208.8	66.5	204.1	68.9	197.1	72.6	190.1	76.3	185.4	78.9
	5	235.9	62.4	223.4	68.2	218.5	70.6	211.0	74.3	203.6	78.1	198.7	80.7
	7	251.7	64.2	238.5	70.1	233.2	72.5	225.4	76.2	217.6	80.0	212.4	82.5
	8	259.8	65.1	246.2	71.1	240.8	73.5	232.7	77.2	224.7	80.9	219.4	83.5
	9.5	272.0	66.6	257.8	72.6	252.2	75.0	243.9	78.7	235.6	82.4	230.1	85.0
	12	292.8	69.2	277.7	75.2	271.8	77.6	262.9	81.3	254.1	85.1	248.3	87.6
90D	3	241.3	67.7	228.3	74.1	223.1	76.7	215.3	80.7	207.4	84.9	202.2	87.7
	5	258.4	69.1	244.1	75.7	238.6	78.4	230.2	82.5	222.0	86.6	216.6	89.3
	7	274.9	71.0	259.8	77.7	253.9	80.4	245.3	84.3	237.0	88.3	231.6	90.9
	8	282.9	72.2	267.5	78.8	261.6	81.4	253.0	85.3	244.6	89.1	239.2	91.6
	9.5	294.7	74.1	279.0	80.6	273.1	83.1	264.4	86.8	256.2	90.4	250.9	92.8
	12	313.6	78.0	298.0	84.0	292.1	86.3	283.8	89.5	275.9	92.7		
100D	3	269.7	76.3	256.3	83.3	250.9	86.3	242.8	90.7	234.8	95.3	229.5	98.4
	5	287.7	78.4	273.6	85.5	268.0	88.4	259.7	92.7	251.4	97.2	246.0	100.2
	7	306.2	80.6	291.5	87.6	285.7	90.5	277.1	94.8	268.6	99.1	263.0	101.9
	8	315.7	81.8	300.6	88.8	294.7	91.6	286.0	95.8	277.4	100.0	271.8	102.8
	9.5	330.2	83.5	314.6	90.4	308.5	93.2	299.6	97.3	290.8	101.4	285.1	104.1
	12	355.1	86.5	338.6	93.3	332.3	95.9	323.0	99.9	314.0	103.7		
110D	3	313.2	80.8	298.4	88.4	292.5	91.6	283.7	96.5	274.9	101.5	269.0	104.9
	5	334.6	82.9	318.9	90.6	312.8	93.7	303.5	98.5	294.4	103.4	288.3	106.8
	7	356.6	85.1	340.1	92.8	333.6	95.9	323.9	100.6	314.5	105.5	308.2	108.7
	8	367.8	86.2	350.8	93.9	344.2	97.0	334.4	101.7	324.7	106.5	318.4	109.7
	9.5	385.0	88.0	367.3	95.7	360.4	98.8	350.3	103.4	340.3	108.0	333.9	111.1
	12	414.5	91.0	395.5	98.7	388.1	101.8	377.4	106.3	367.1	110.7	360.4	113.7

kWf = Cooling capacity in kW  
kWe = Compressor power input in kW  
SST = saturated suction temperature corresponds to the pressure at the compressor (°C) (dew point)

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**COOLING PERFORMANCE**

Size	SST (°C)	EXTERNAL EXCHANGER AIR INTAKE TEMPERATURE (°C)											
		25		30		32		35		38		40	
		kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe	kWf	kWe
120D	3	339.3	92.0	323.8	100.4	317.6	103.9	308.4	109.3	299.1	114.9	292.9	118.8
	5	362.2	94.5	345.9	102.9	339.4	106.3	329.7	111.7	320.1	117.2	313.8	121.0
	7	385.8	97.1	368.5	105.5	361.6	108.9	351.5	114.2	341.4	119.6	334.8	123.3
	8	397.8	98.4	380.0	106.8	373.0	110.3	362.5	115.5	352.2	120.9	345.4	124.6
	9.5	416.0	100.5	397.5	108.9	390.2	112.3	379.3	117.5	368.5	122.9	361.4	126.5
	12	447.2	104.0	427.3	112.4	419.4	115.8	407.7	121.1	396.1	126.4		
135F	3	364.4	102.9	346.3	112.3	338.9	116.2	327.7	122.4	316.4	128.8	308.8	133.3
	5	388.9	106.0	370.1	115.2	362.5	119.1	350.8	125.2	339.0	131.5	331.0	135.9
	7	414.5	108.9	394.9	118.1	386.9	122.0	374.7	128.0	362.3	134.3	353.9	138.6
	8	427.8	110.3	407.6	119.6	399.4	123.5	386.9	129.5	374.2	135.7	365.7	139.9
	9.5	448.4	112.4	427.1	121.8	418.5	125.7	405.5	131.7	392.4	137.8	383.7	142.0
	12	484.2	115.8	460.7	125.6	451.4	129.5	437.5	135.5	423.7	141.5		
150F	3	403.5	114.9	384.1	125.1	376.2	129.4	364.3	136.1	352.1	143.0	343.9	147.8
	5	429.4	118.6	409.8	128.5	401.8	132.6	389.6	139.1	377.1	145.8	368.6	150.5
	7	457.0	122.0	436.7	131.7	428.4	135.8	415.7	142.1	402.8	148.6	394.1	153.1
	8	471.5	123.6	450.5	133.3	442.0	137.3	429.1	143.6	416.0	150.0	407.2	154.4
	9.5	494.1	125.8	471.9	135.7	463.0	139.7	449.6	145.8	436.1	152.1	427.2	156.4
	12	534.0	129.1	508.9	139.5	499.1	143.6	484.8	149.7	470.8	155.6		
165F	3	448.0	130.4	427.3	141.8	419.0	146.6	406.5	154.0	394.0	161.7		
	5	477.1	134.4	456.1	145.5	447.6	150.2	434.7	157.4	421.6	164.9		
	7	508.2	138.0	485.9	149.2	477.0	153.8	463.5	160.9	449.9	168.3		
	8	524.5	139.7	501.2	151.0	492.0	155.6	478.1	162.7	464.3	170.0		
	9.5	549.8	142.0	524.7	153.8	514.8	158.4	500.4	165.5	486.2	172.6		
	12	594.4	145.4	565.1	158.3	554.0	163.2	538.3	170.3	523.6	177.1		
180F	3	492.5	145.8	470.6	158.5	461.8	163.8	448.8	172.0	435.8	180.4		
	5	524.9	150.2	502.4	162.6	493.3	167.7	479.8	175.8	466.2	184.1		
	7	559.4	154.1	535.2	166.6	525.6	171.8	511.2	179.8	497.1	187.9		
	8	577.4	155.8	551.9	168.7	541.9	173.9	527.2	181.9	512.7	189.9		
	9.5	605.5	158.3	577.5	171.8	566.8	177.2	551.2	185.2	536.3	193.1		
	12	654.9	161.8	621.3	177.1	609.0	182.8	591.9	190.9	576.2	198.6		

kWf = Cooling capacity in kW  
 kWe = Compressor power input in kW  
 SST = saturated suction temperature corresponds to the pressure at the compressor (°C) (dew point)

**OPERATING LIMITS (COOLING)**

Size	65D	70D	75D	80D	90D	100D	110D	120D	135F	150F	165F	180F
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**EXTERNAL EXCHANGER**

Max air intake temperature	1	°C	43	43	41	41	40	40	41	40	40	39	39
Max air intake temperature	2	°C	46	46	44	44	43	43	44	43	43	42	42
Min. air intake temperature	3	°C	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
Min. air intake temperature	4	°C	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Min. air intake temperature	5	°C	3	3	3	3	3	3	3	3	3	3	
Min. air intake temperature	6	°C	13	13	13	13	13	13	13	13	13	13	

**COMPRESSOR**

Max saturated suction temperature (SST)		°C	15	15	15	15	15	15	15	15	15	15	15
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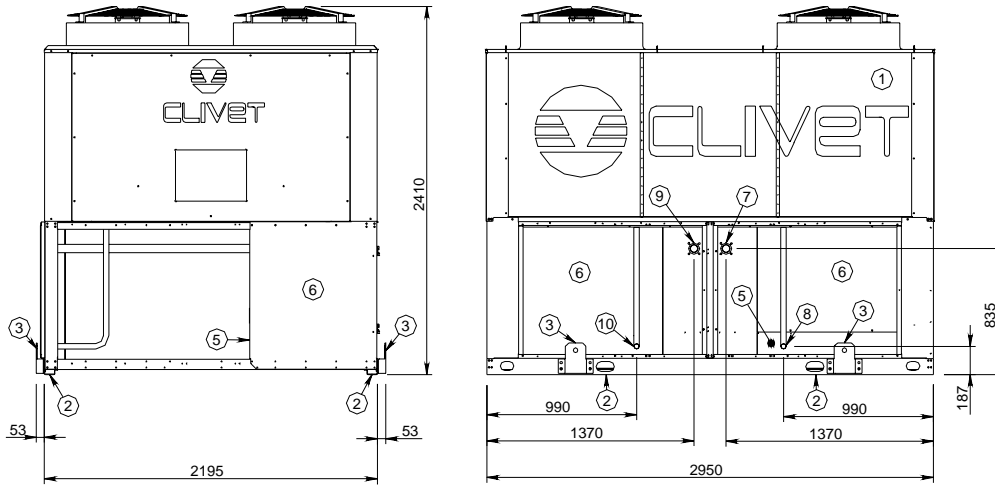
saturated suction temperature (SST) = 9.5 °C (Dew Point)  
 Warning: the still air condition is meant as absence of air flow to the unit. Any wind condition can let air pass through the condenser coil thus worsening the operating limits of the unit (see limits with air speed at 0.5 m/s & 1 m/s). In order to avoid such situation, windbreak barriers are necessary.

- (1) unit at full load
- (2) capacity-controlled unit (automatic capacity control)
- (3) unit at full load external exchanger air in quiet
- (4) capacity-controlled unit (automatic capacity control) external exchanger air in quiet
- (5) capacity-controlled unit (automatic capacity control) air to external exchanger = 0.5m/sec
- (6) capacity-controlled unit (automatic capacity control) air to external exchanger = 0.5m/sec

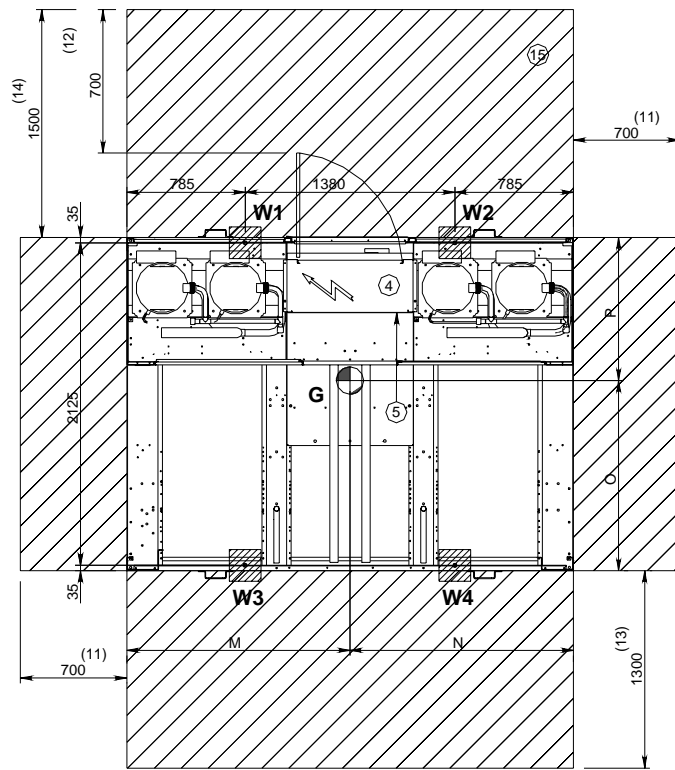
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**DIMENSIONAL DRAWING**

**DIMENSIONS: MSAT-SC 65D-70D-75D-80D-90D-100D**



- (1) EXTERNAL EXCHANGER (CONDENSER)
- (2) HOLE TO HANG UNIT
- (3) LIFTING BRACKETS
- (4) ELECTRICAL PANEL
- (5) POWER INPUT
- (6) SOUNDPROOFED CABIN
- (7) SUCTION LINE CONNECTION C1
- (8) LIQUID LINE CONNECTION C1
- (9) SUCTION LINE CONNECTION C2
- (10) LIQUID LINE CONNECTION C2
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (13) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (14) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (15) CLEARANCE ACCESS RECOMMENDED

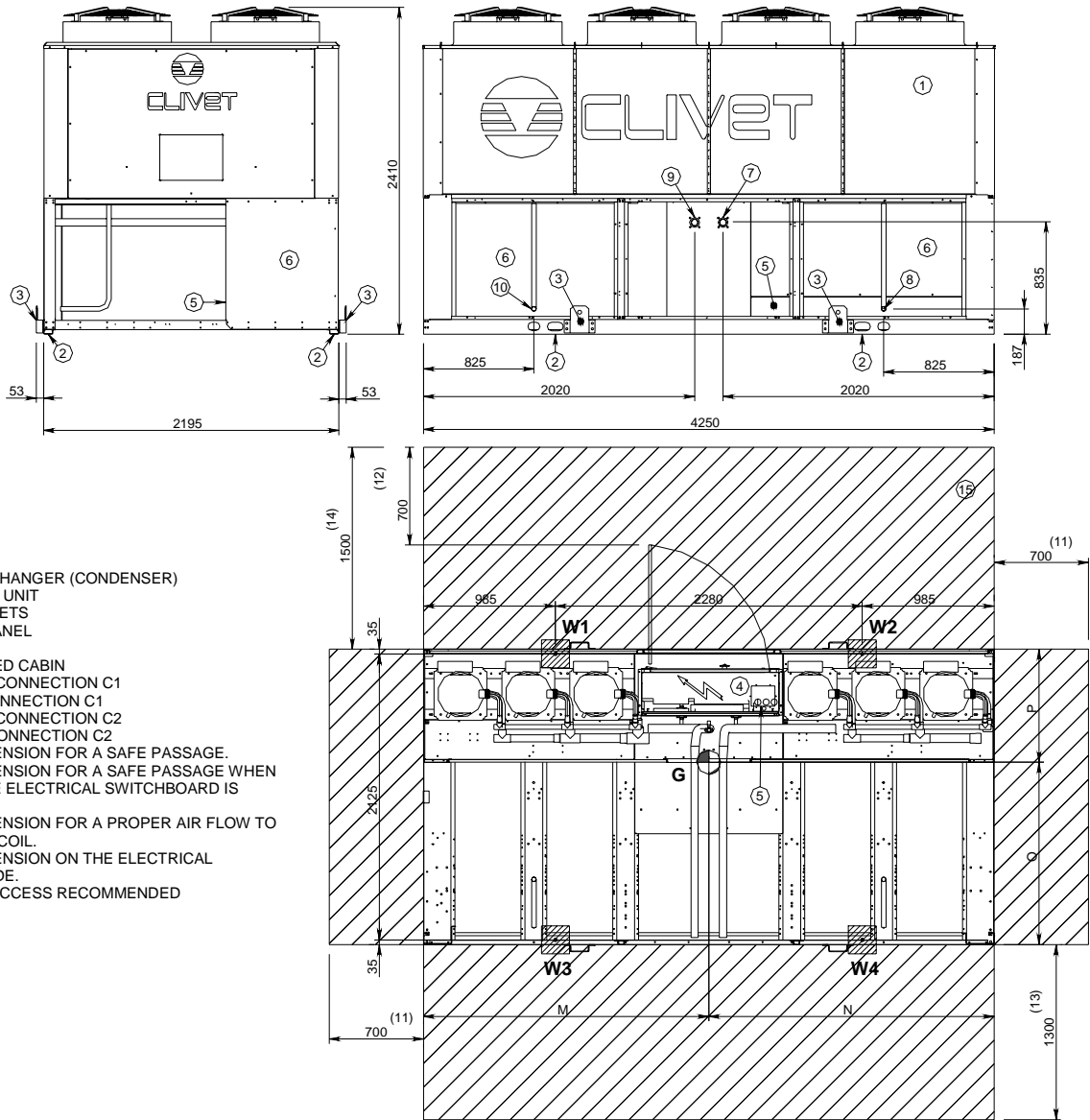


SIZES		SC						EN					
		65D	70D	75D	80D	90D	100D	65D	70D	75D	80D	90D	100D
W1	kg	692	695	747	750	751	752	680	700	752	755	756	757
W2	kg	617	665	665	715	716	717	645	670	671	720	721	722
W3	kg	420	411	430	422	423	424	404	416	435	427	428	429
W4	kg	374	393	383	402	403	405	383	398	388	407	408	410
Shipping weight	kg	2032	2092	2152	2212	2217	2214	2042	2112	2172	2232	2237	2234
Operation weight	kg	2102	2164	2226	2288	2293	2298	2112	2184	2246	2308	2313	2318

Particular accessories, executions or versions can bring about a great variation of the mass represented here. Please contact our Technical Department.

**DIMENSIONAL DRAWING**

**DIMENSIONS: MSAT-SC 110D-120D-135F-150F**



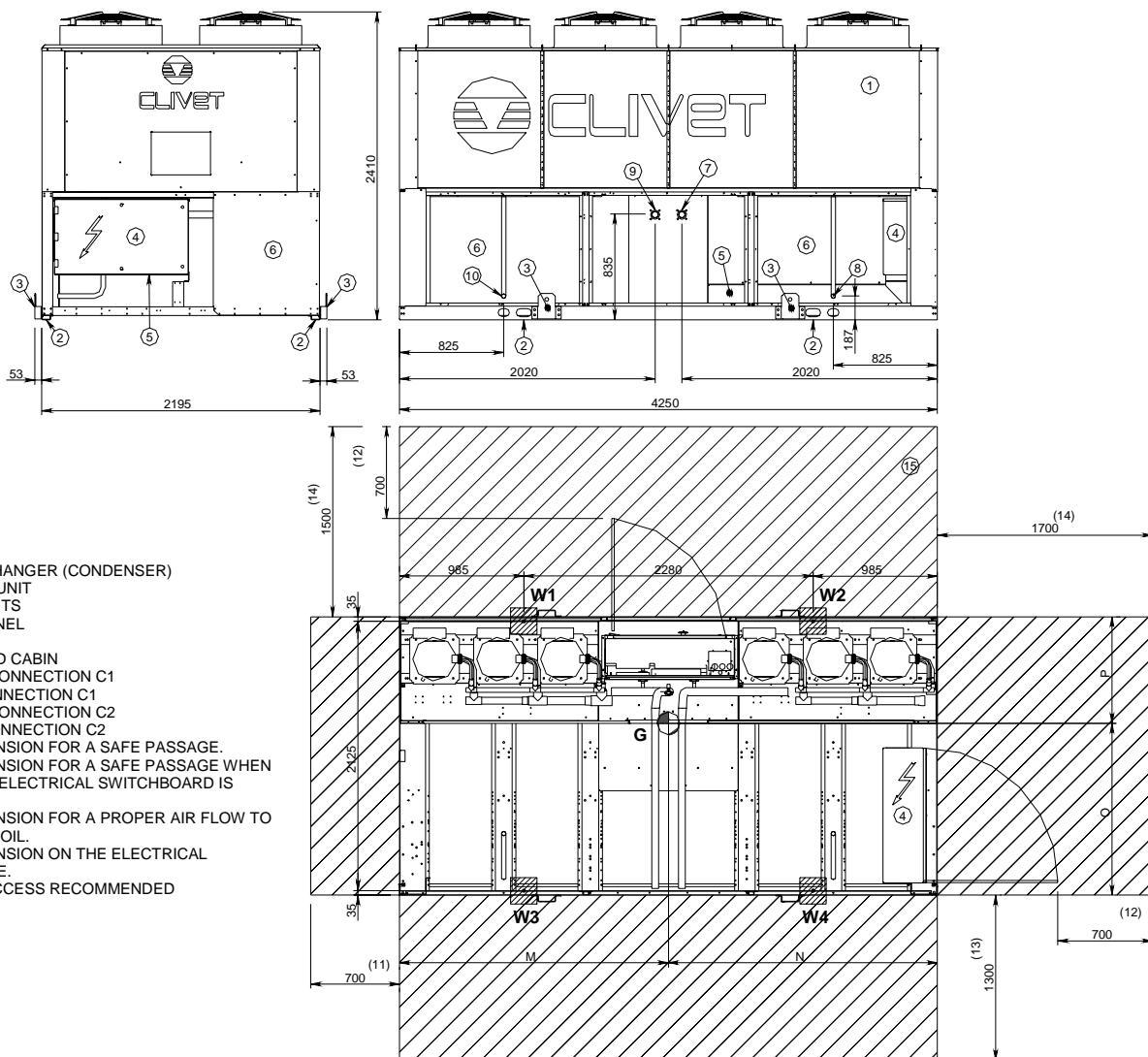
- (1) EXTERNAL EXCHANGER (CONDENSER)
- (2) HOLE TO HANG UNIT
- (3) LIFTING BRACKETS
- (4) ELECTRICAL PANEL
- (5) POWER INPUT
- (6) SOUNDPROOFED CABIN
- (7) SUCTION LINE CONNECTION C1
- (8) LIQUID LINE CONNECTION C1
- (9) SUCTION LINE CONNECTION C2
- (10) LIQUID LINE CONNECTION C2
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (13) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (14) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (15) CLEARANCE ACCESS RECOMMENDED

SIZES		SC				EN			
		110D	120D	135F	150F	110D	120D	135F	150F
W1	kg	893	969	1026	1001	960	977	1031	1073
W2	kg	912	950	1002	1071	856	958	1007	1049
W3	kg	495	537	549	545	533	542	589	596
W4	kg	506	527	536	583	475	532	575	582
Shipping weight	kg	2690	2863	2988	3070	2710	2888	3078	3170
Operating weight	kg	2805	2983	3113	3200	2825	3008	3203	3300

Particular accessories, executions or versions can bring about a great variation of the mass represented here. Please contact our Technical Department.

**DIMENSIONAL DRAWING**

**DIMENSIONS:MSAT-SC 165F-180F**



- (1) EXTERNAL EXCHANGER (CONDENSER)
- (2) HOLE TO HANG UNIT
- (3) LIFTING BRACKETS
- (4) ELECTRICAL PANEL
- (5) POWER INPUT
- (6) SOUNDPROOFED CABIN
- (7) SUCTION LINE CONNECTION C1
- (8) LIQUID LINE CONNECTION C1
- (9) SUCTION LINE CONNECTION C2
- (10) LIQUID LINE CONNECTION C2
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (13) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (14) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (15) CLEARANCE ACCESS RECOMMENDED

SIZES	SC		EN		
	165F	180F	165F	180F	
W1	kg	1125	1171	1164	1177
W2	kg	1138	1259	1178	1265
W3	kg	619	612	624	616
W4	kg	626	658	631	662
Shipping weight	kg	3378	3570	3468	3570
Operating weight	kg	3508	3700	3598	3720

Particular accessories, executions or versions can bring about a great variation of the mass represented here. Please contact our Technical Department.

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