



**AIR-COOLED  
WATER CHILLER**

**WSAT-2** 2.230-2.260-2.280-2.300  
2.360-2.400-2.440-3.450-3.540-  
3.580-3.620-3.660-4.720



**R-407C**

## **INSTALLATION, OPERATION AND MAINTENANCE MANUAL**

### **GENERAL**

THIS MANUAL CONTAINS THE FOLLOWING SECTIONS WHICH ARE TO BE CONSIDERED AN INTEGRAL PART OF THE WHOLE AND ARE THEREFORE NOT TO BE DETACHED

G1B5GB-3 General	R1B5GB-3 Reception/Positioning	E1B5GB-3 Electrical connections	F1B5GB-3 Start-up	C1B5GB-3 Control
T1B5GB-3 Troubleshooting	M1B5GB-3 Maintenance	L1B5GB-3 Water connections	K1B5GB-3 Residual Risks	

### **IMPORTANT**

The contents of this manual are designed to assure the correct installation, adjustment and maintenance of the unit; therefore:

- read the instructions with due care and attention;
- the appliance must be installed, tested and serviced by properly qualified personnel (law n.45, 5.3.1990) licensed in accordance with established legislation.
- The manufacturer declines all liability, and guarantee coverage is automatically waived, if electrical and/or mechanical modifications are made to the unit. Tampering and unauthorized repairs or modifications to the unit will automatically void the guarantee.
- Observe the safety regulations in force at the time of installation.
- Make sure that the characteristics of the mains network conform to the data on the serial number plate inside the electrical panel.

- Conserve this manual and the circuit diagram with care. Make sure that they are available for consultation by the operator whenever necessary.
- Packing materials (plastic wrappings, expanded polystyrene, nails, etc.) are potentially hazardous and must be kept out of reach of children. Recycle packing materials in accordance with local bylaws.
- The water chilled must be used only for the purpose for which it is designed. The manufacturer bears no responsibility in the case of applications other than the specified use.
- Disconnect the unit in the case of breakdowns or malfunctions.
- If repairs are necessary use only Clivet-approved service centres and always insist on original spare parts. The use of non-original parts and/or unauthorized service centres may result in unsafe operation of the unit.

The manufacturer declines all liability for direct or indirect damage to property or injury to persons resulting from failure to adhere to the instructions in this manual.

### **ADDITIONAL SAFETY PRECAUTIONS**

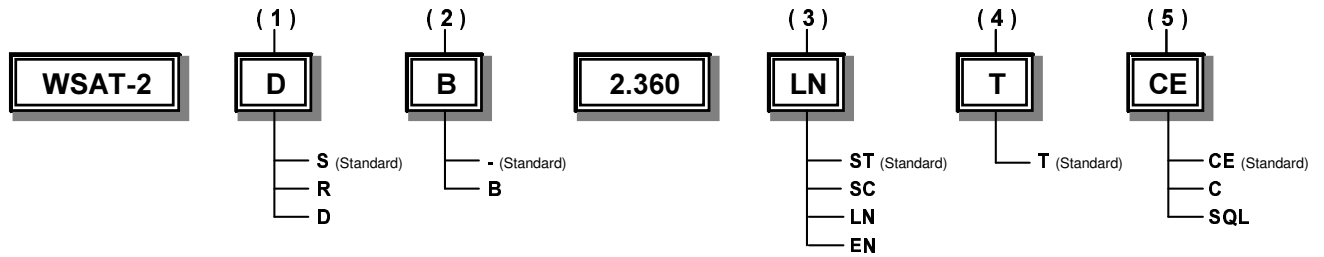
This unit has been especially designed and manufactured so to prevent any risk to persons and health hazard. For this reason, design solutions fit to eliminate (where possible) any cause of risk and sensibly reduce the probability of danger have been adopted. Please refer to the RESIDUAL RISKS section of this manual and strictly observe the behaviour prescriptions listed there in order to prevent any possible risk that hasn't been possible to avoid in the design stage.







## UNIT CONFIGURATIONS



### (1) VERSION

#### Standard (S)

standard

#### ENERGY RECOVERY

##### Partial heat recovery (D)

Desuperheaters, shell and tube type are used to reclaim a small portion (around 20%) of the total condenser heat.

##### Total heat recovery (R)

Heat recovery water cooled condenser, shell and tube type, are used to remove 100% of the condenser heat to produce hot water.

### (2) LOW TEMPERATURE

#### Water low temperature (B)

Range of application of this version is between +5°C down to -8°C, using glycol solution.

Available versions:

- Brine chiller
- Double set-point function

The availability of reduction capacity steps by means of solenoid valve for the compressor depends on the application temperature range. Please call our commercial dept. for details.

\* ( Compatible with versions: D - R - FCD )

#### ENERGY SAVINGS

##### Direct Free Cooling (FCD)

Version that allows to recovery free-cooling from ambient when the ambient air temperature is lower than the system outlet water temperature.

### (3) ACOUSTIC CONFIGURATION

#### Standard (ST)

##### Soundproofed compressors (SC)

this configuration is provided with compressor acoustical enclosure.

##### low noise (LN)

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

##### Extremely low noise (EN)

with reference to configuration LN, flexible connection joints are also used, together with vibration-damping springs/rubber on the compressors.

### (4) ENERGY EFFICIENCY

#### Temperate climatic condition (T)

standard

### (5) HEAT EXCHANGERS APPROVALS

#### CE = PED (European testing)

#### C = CLIVET (Internal testing)

#### SQL

## ACCESSORIES

Units can be supplied with the following optional accessories:

- condenser coil in copper/acrylic protection on aluminium
- condenser coil in copper/copper
- condenser coil in copper/copper electrotinned
- ECOBreeze
- capacitors to increase power factor (cosfi > 0.9)
- electronic expansion valves

- set point compensation with 4-20 mA signal
- set point compensation with outside temperature probe
- set point compensation according to outdoor Enthalpy
- double operation set point with unit in version "B"
- data logger
- remote microprocessor module
- spring antivibration mounts
- rubber antivibration mounts

## EXCHANGER USE LIMITS

	Internal exchanger		
	Maximum operating pressure at refrigerant side		Maximum operating pressure at water side
	Standard (kPa)	Low temperature (kPa)	kPa
CLIVET (C)	2500	2100	1000
PED (CE)	2900	2100	1600
SQL	2450	2100	1000

## SETTING THE CUT-OUT DEVICES AND CONTROLS

		Opens	Closes	Value
High pressure safety switch	kPa	2750	1940	-
Low pressure safety switch	kPa	230	360	-
Antifreeze protection	°C	3	5,5	-
High pressure safety valve	kPa	-	-	3000
Low pressure safety valve	kPa	-	-	1900
Max compressor start per hour	nr	-	-	5
High compressor discharge temperature safety thermostat	°C	-	-	120

## CORRECTION FACTORS

m <sup>2</sup> °C/W	Internal exchanger	
	Cooling capacity correction factors	Compressors' input power correction factors
0,44 10 <sup>-4</sup>	1	1
0,88 x 10 <sup>-4</sup>	0,97	0,99
1,76 x 10 <sup>-4</sup>	0,94	0,98

## SOUND LEVELS

### Acoustic configuration ST

Grand.	SOUND POWER LEVEL (dB)								Sound pressure level dB(A)	Sound power level dB(A)
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000		
<b>2.230</b>	105	101	102	99	99	94	86	78	82	103
<b>2.260</b>	105	101	102	99	99	94	86	78	82	103
<b>2.280</b>	107	103	107	100	101	96	87	78	83	104
<b>2.300</b>	107	103	107	100	101	96	86	77	83	104
<b>2.360</b>	106	102	103	100	100	97	88	80	83	104
<b>2.400</b>	106	103	105	101	101	97	89	81	83	104
<b>2.440</b>	107	103	105	102	101	98	89	80	84	105
<b>3.450</b>	109	104	106	102	103	98	89	80	84	106
<b>3.540</b>	109	105	106	102	103	98	88	79	84	106
<b>3.580</b>	109	105	106	102	102	100	90	83	84	106
<b>3.620</b>	109	106	105	103	102	100	91	82	85	107
<b>3.660</b>	109	106	106	104	103	100	91	82	85	107
<b>4.720</b>	111	107	108	104	103	100	91	81	86	108

### Acoustic configuration SC

Grand.	SOUND POWER LEVEL (dB)								Sound pressure level dB(A)	Sound power level dB(A)
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000		
<b>2.230</b>	101	97	98	95	95	90	82	74	78	99
<b>2.260</b>	101	97	98	95	95	90	82	74	78	99
<b>2.280</b>	103	99	100	96	97	92	83	74	79	100
<b>2.300</b>	103	99	100	96	97	92	82	73	79	100
<b>2.360</b>	102	98	99	96	96	93	84	76	79	100
<b>2.400</b>	103	100	99	98	98	93	85	77	79	101
<b>2.440</b>	104	100	101	98	98	93	84	76	80	101
<b>3.450</b>	104	100	102	98	99	94	85	76	80	102
<b>3.540</b>	105	101	102	98	99	94	84	75	80	102
<b>3.580</b>	105	101	102	98	98	96	86	79	81	103
<b>3.620</b>	105	102	103	101	101	96	87	78	81	103
<b>3.660</b>	106	102	104	100	101	96	87	78	81	103
<b>4.720</b>	107	103	104	101	101	98	89	81	82	105

### Acoustic configuration LN

Grand.	SOUND POWER LEVEL (dB)								Sound pressure level dB(A)	Sound power level dB(A)
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000		
<b>2.230</b>	95	88	97	90	89	87	76	69	74	94
<b>2.260</b>	96	89	98	90	90	87	77	70	75	95
<b>2.280</b>	97	90	98	90	91	88	77	69	75	96
<b>2.300</b>	96	90	98	90	91	88	76	67	75	96
<b>2.360</b>	98	92	98	91	91	88	79	72	75	96
<b>2.400</b>	98	92	99	93	93	90	80	73	76	98
<b>2.440</b>	99	93	100	93	93	91	80	73	76	98
<b>3.450</b>	100	93	101	93	94	91	79	71	77	99
<b>3.540</b>	100	93	101	93	94	91	79	71	77	99
<b>3.580</b>	101	94	100	94	94	94	82	75	77	100
<b>3.620</b>	101	93	101	94	95	94	83	75	78	101
<b>3.660</b>	101	94	101	95	96	94	83	75	78	101

### Acoustic configuration EN

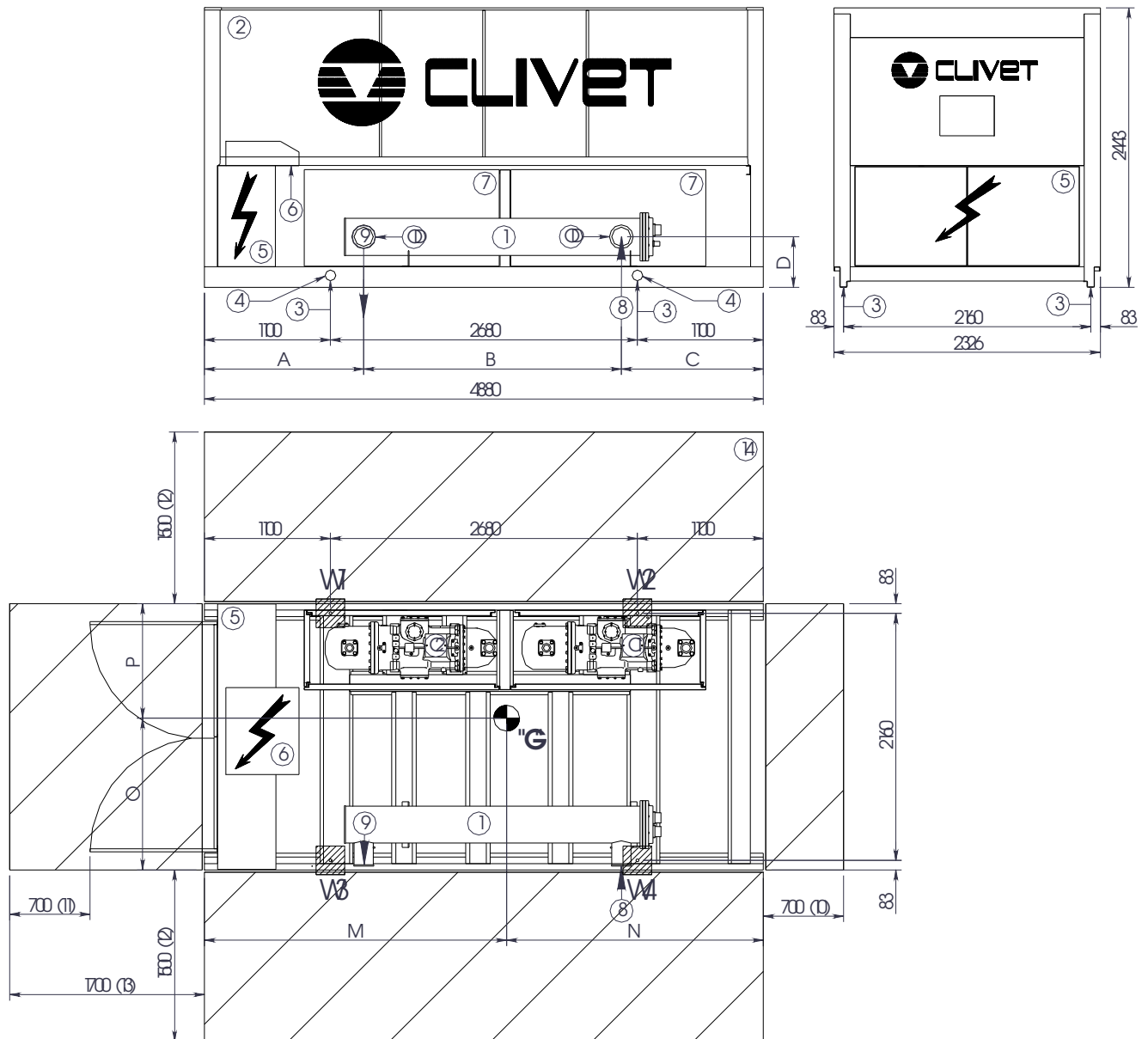
Grand.	SOUND POWER LEVEL (dB)								Sound pressure level dB(A)	Sound power level dB(A)
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000		
<b>2.230</b>	84	86	88	86	85	80	72	64	68	89
<b>2.260</b>	86	87	88	87	85	80	72	65	68	89
<b>2.280</b>	85	87	88	86	86	80	72	63	68	89
<b>2.300</b>	87	89	88	86	86	80	70	61	68	88
<b>2.360</b>	85	86	86	85	84	84	74	66	68	89
<b>2.400</b>	88	89	91	90	88	83	75	67	70	92
<b>2.440</b>	88	90	91	89	88	83	75	67	70	92
<b>3.450</b>	88	90	91	89	89	83	74	66	70	92
<b>3.540</b>	90	91	92	90	90	84	75	65	71	93
<b>3.580</b>	90	91	91	90	89	89	78	68	71	93
<b>3.620</b>	90	91	91	90	88	88	78	70	71	94
<b>3.660</b>	90	91	92	91	89	88	79	71	71	94

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:: outdoor air temperature 35°C, internal exchanger water = 12/7°C.

## DIMENSIONALS

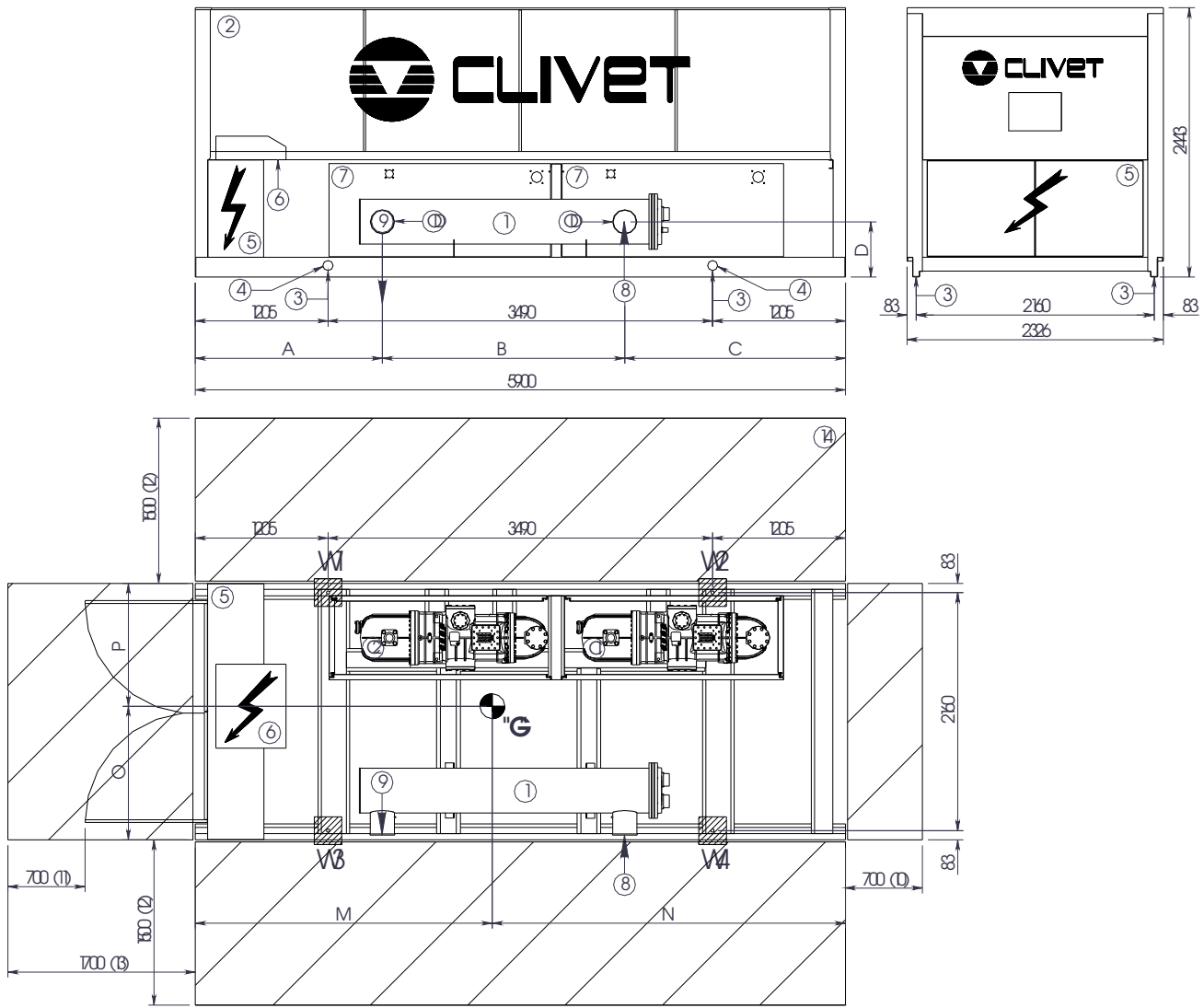


**Key:**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>(1) INTERNAL EXCHANGER (EVAPORATOR)</li> <li>(2) EXTERNAL EXCHANGER (CONDENSER)</li> <li>(3) UNIT FIXING HOLES</li> <li>(4) LIFTING HOLES FOR UNITS WITH LIFTING PIPES</li> <li>(5) ELECTRICAL PANEL</li> <li>(6) POWER SUPPLY INPUT</li> <li>(7) SOUND PROOF ENCLOSURE (ONLY IN THE EXPECTED VERSIONS)</li> </ul> | <ul style="list-style-type: none"> <li>(8) INTERNAL EXCHANGER WATER INLET</li> <li>(9) INTERNAL EXCHANGER WATER OUTLET</li> <li>(10) MINIMUM SAFE CLEARANCE.</li> <li>(11) MINIMUM CLEARANCE FOR A SAFE PASSAGE WHEN THE ELECTRICAL PANEL DOOR IS OPENED</li> <li>(12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL</li> <li>(13) MINIMUM CLEARANCE FOR A SAFE PASSAGE</li> <li>(14) CLEARANCE ACCESS RECOMMENDED</li> </ul> |
|---|---|

Size		ST		SC		LN	
		2.230	2.260	2.230	2.260	2.230	2.260
<b>A</b>	mm	1390	1440	1390	1440	1390	1440
<b>B</b>	mm	2250	2200	2250	2200	2250	2200
<b>C</b>	mm	1240	1240	1240	1240	1240	1240
<b>D</b>	mm	440	440	440	440	440	440
<b>M</b>	mm	2452	2458	2454	2460	2452	2457
<b>N</b>	mm	2428	2422	2426	2420	2428	2423
<b>O</b>	mm	1253	1221	1253	1221	1312	1277
<b>P</b>	mm	1073	1105	1073	1105	1014	1049
<b>OD</b>	"	6	8	6	8	6	8
<b>W1</b>	kg	1224	1309	1403	1441	1403	1488
<b>W2</b>	kg	1250	1351	1431	1579	1431	1531
<b>W3</b>	kg	1035	1176	1063	1166	1063	1204
<b>W4</b>	kg	1058	1213	1085	1278	1085	1240

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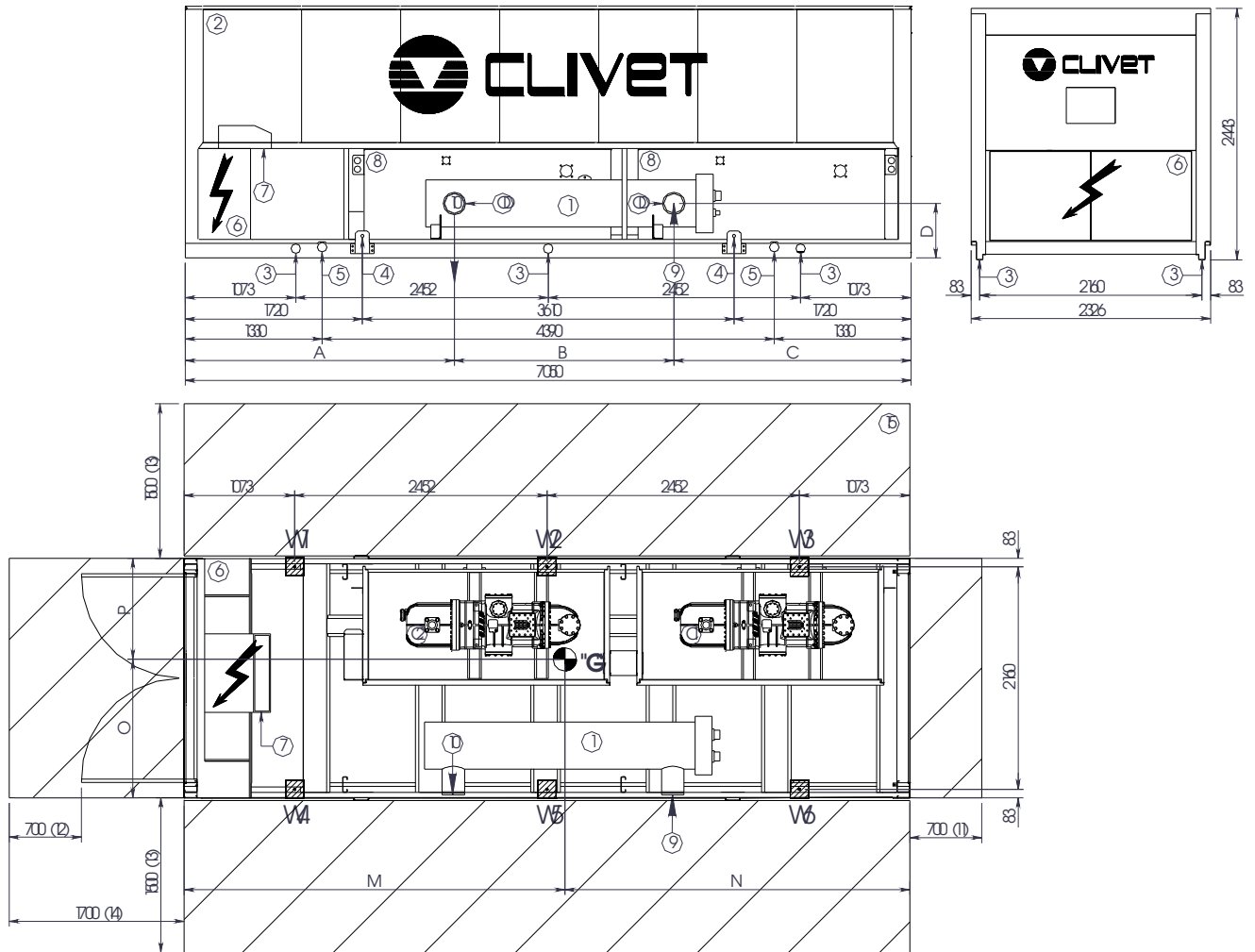


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  - (13) MINIMUM CLEARANCE FOR A SAFE PASSAGE
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Size		ST			SC			LN		EN	
		2.280	2.300	2.360	2.280	2.300	2.360	2.280	2.300	2.230	2.260
<b>A</b>	mm	1700	1700	1700	1700	1700	1700	1700	1700	1750	1700
<b>B</b>	mm	2200	2200	2200	2200	2200	2200	2200	2200	2250	2200
<b>C</b>	mm	2000	2000	2000	2000	2000	2000	2000	2000	1900	2000
<b>D</b>	mm	500	500	500	500	500	500	500	500	500	500
<b>M</b>	mm	2915	2915	2958	2915	2915	2959	2917	2918	2920	2883
<b>N</b>	mm	2985	2985	2942	2985	2985	2941	2983	2982	2980	3017
<b>O</b>	mm	1225	1228	1261	1226	1228	1261	1278	1274	1310	1279
<b>P</b>	mm	1101	1098	1065	1100	1098	1065	1048	1052	1016	1047
<b>OD</b>	"	8	8	8	8	8	8	8	8	6	8
<b>W1</b>	kg	1476	1507	1685	1651	1688	1865	1651	1746	1553	1700
<b>W2</b>	kg	1406	1446	1701	1591	1624	1882	1591	1682	1502	1576
<b>W3</b>	kg	1314	1336	1404	1335	1362	1432	1335	1420	1181	1370
<b>W4</b>	kg	1251	1281	1418	1286	1310	1445	1286	1368	1142	1270



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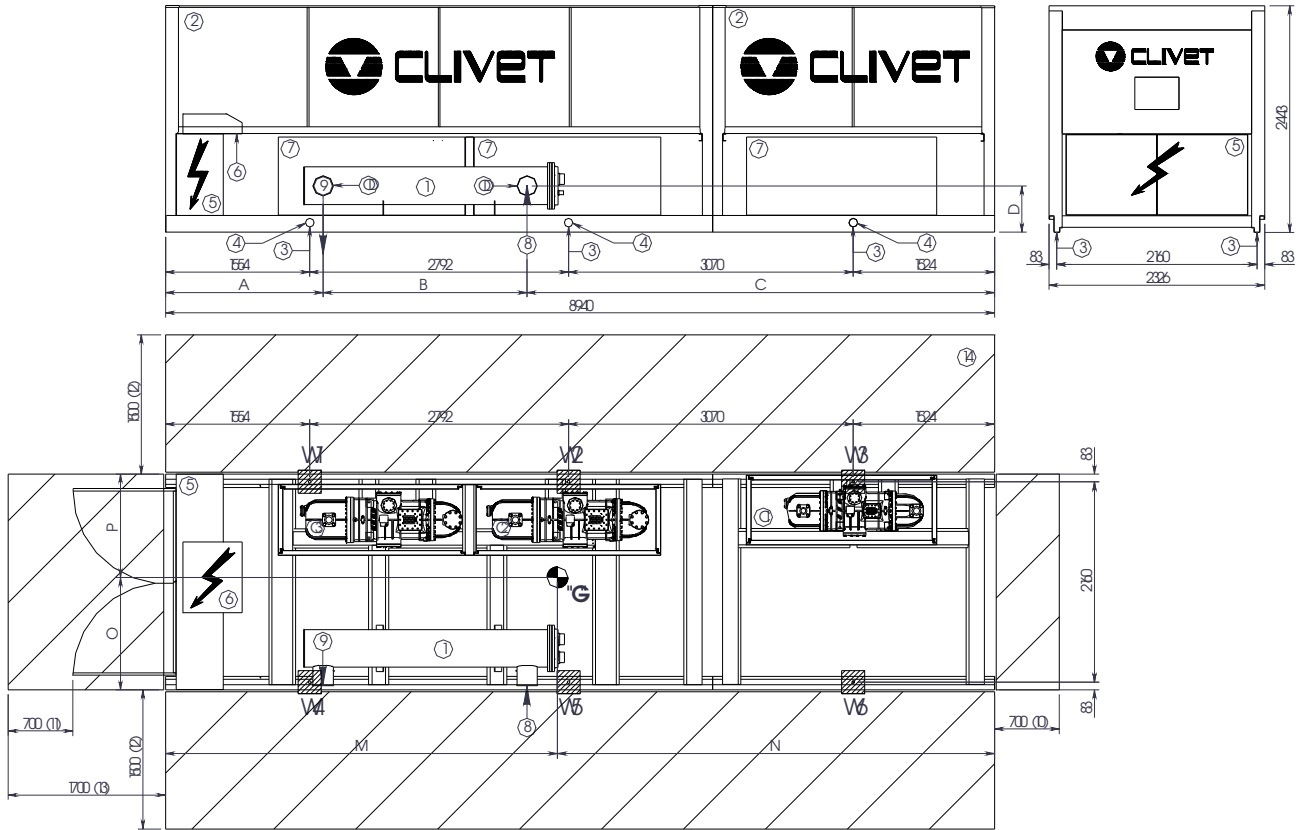
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| (5) ELECTRICAL PANEL                                      | (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL                 |
| (6) POWER SUPPLY INPUT                                    | (13) MINIMUM CLEARANCE FOR A SAFE PASSAGE  |
| (7) SOUND PROOF ENCLOSURE (ONLY IN THE EXPECTED VERSIONS) | (14) CLEARANCE ACCESS RECOMMENDED  |

Size		ST		SC		LN			EN				
		2.400	2.440	2.400	2.440	2.360	2.400	2.440	2.280	2.300	2.360	2.400	2.440
<b>A</b>	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
<b>B</b>	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
<b>C</b>	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
<b>D</b>	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
<b>M</b>	mm	3258	3256	3258	3256	3204	3218	3218	3247	3257	3220	3225	3217
<b>N</b>	mm	3792	3794	3792	3794	3846	3832	3832	3803	3793	3830	3825	3833
<b>O</b>	mm	1311	1299	1311	1299	1353	1338	1326	1345	1341	1347	1336	1326
<b>P</b>	mm	1015	1027	1015	1027	973	988	1000	981	985	979	990	1000
<b>OD</b>	"	8	8	8	8	8	8	8	8	8	8	8	8
<b>W1</b>	kg	1247	1318	1409	1545	1351	1409	1545	1257	1300	1376	1422	1545
<b>W2</b>	kg	1245	1316	1361	1359	1287	1361	1359	987	1018	1318	1376	1359
<b>W3</b>	kg	1263	1341	1319	1407	1235	1319	1407	1219	1263	1275	1339	1407
<b>W4</b>	kg	943	1015	993	982	927	993	982	790	864	952	1006	982
<b>W5</b>	kg	971	1045	1006	1250	933	1006	1250	963	880	961	1019	1250
<b>W6</b>	kg	1274	1369	1294	1302	1199	1294	1302	1041	1157	1240	1315	1302

\* Work in progress

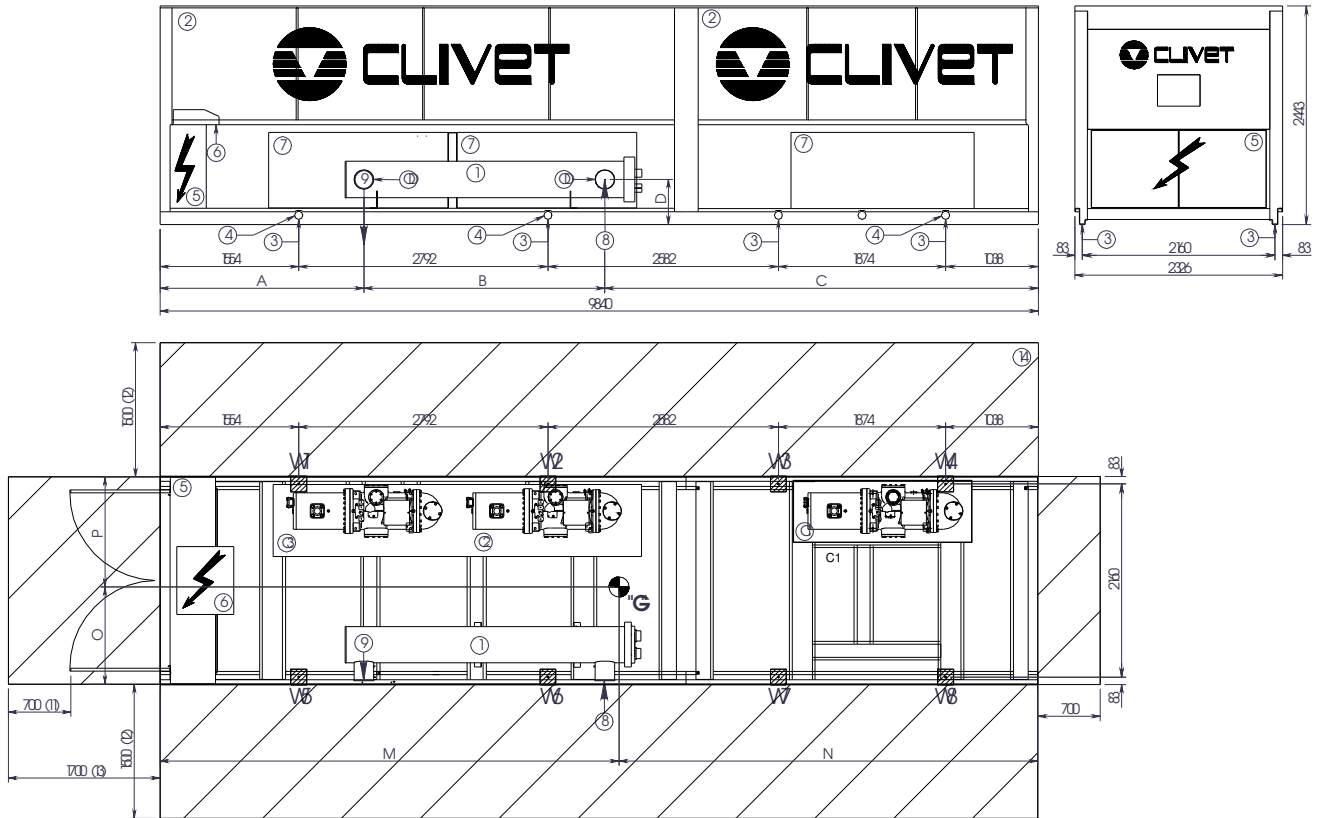
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Size		ST		SC		LN
		3.450	3.540	3.450	3.540	3.450
<b>A</b>	mm	(*)	(*)	(*)	(*)	(*)
<b>B</b>	mm	(*)	(*)	(*)	(*)	(*)
<b>C</b>	mm	(*)	(*)	(*)	(*)	(*)
<b>D</b>	mm	(*)	(*)	(*)	(*)	(*)
<b>M</b>	mm	4165	4168	4165	4168	4193
<b>N</b>	mm	4775	4772	4775	4772	4747
<b>O</b>	mm	1251	1271	1251	1271	1286
<b>P</b>	mm	1075	1055	1075	1055	1040
<b>OD</b>	"	8	8	8	8	8
<b>W1</b>	kg	1443	1676	1596	1828	1620
<b>W2</b>	kg	1638	1882	1857	2100	1888
<b>W3</b>	kg	1068	1245	1207	1384	1236
<b>W4</b>	kg	1241	1392	1258	1409	1308
<b>W5</b>	kg	1409	1563	1464	1619	1524
<b>W6</b>	kg	918	1034	952	1067	998

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**Key:**

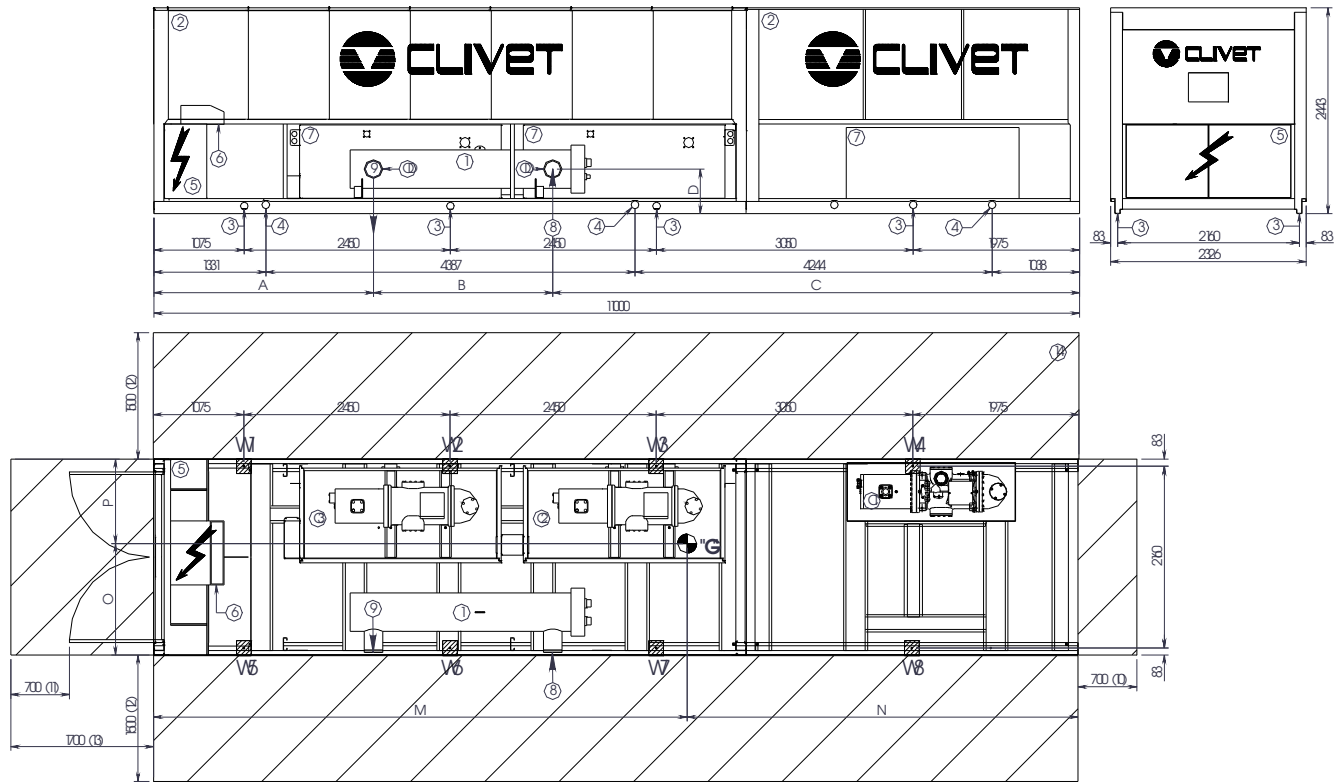
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|---|---|

		ST	SC
		3.580	3.580
<b>A</b>	mm	(*)	(*)
<b>B</b>	mm	(*)	(*)
<b>C</b>	mm	(*)	(*)
<b>D</b>	mm	(*)	(*)
<b>M</b>	mm	4645	4645
<b>N</b>	mm	5195	5195
<b>O</b>	mm	1262	1262
<b>P</b>	mm	1064	1064
<b>OD</b>	"	8	8
<b>W1</b>	kg	1539	1606
<b>W2</b>	kg	2135	2447
<b>W3</b>	kg	656	707
<b>W4</b>	kg	937	1055
<b>W5</b>	kg	1296	1256
<b>W6</b>	kg	1799	1915
<b>W7</b>	kg	552	553
<b>W8</b>	kg	790	825

\* Work in progress



## DIMENSIONALS



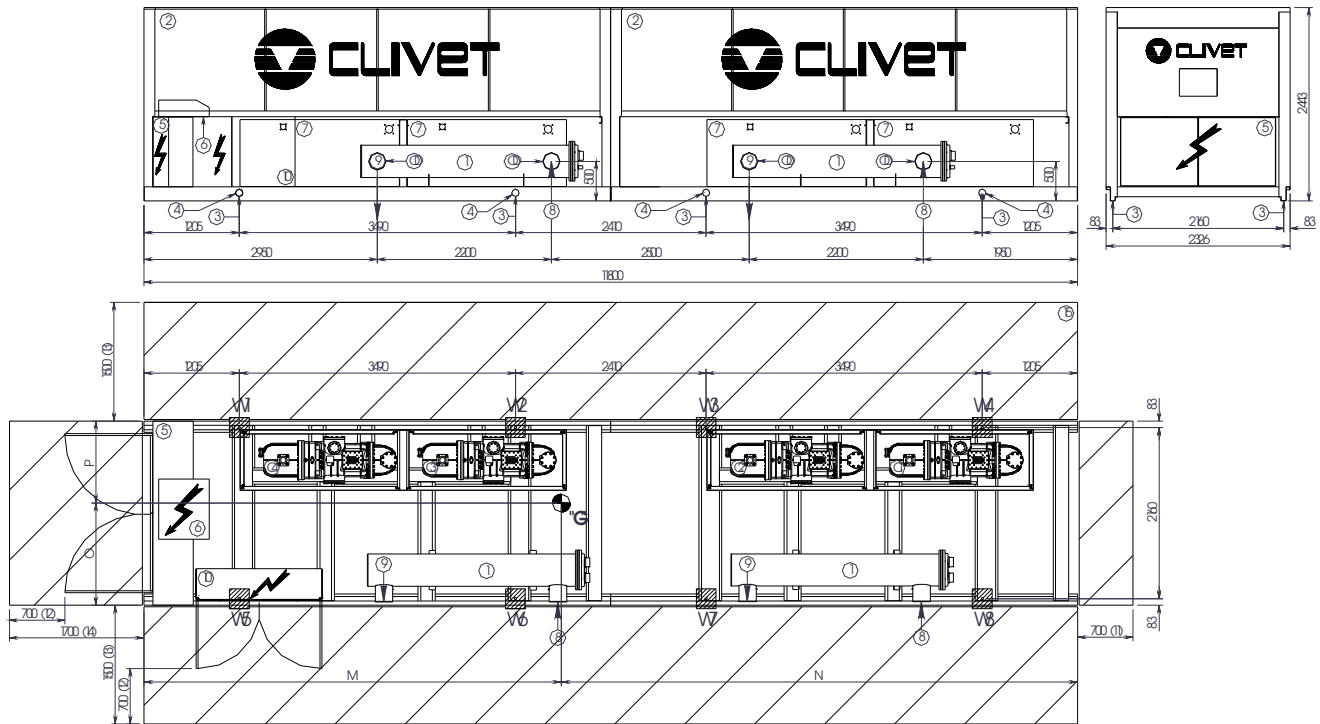
**Key:**

- |   |  |
|---|--|
| (1) INTERNAL EXCHANGER (EVAPORATOR)                       | (8) INTERNAL EXCHANGER WATER INLET   |
| (2) EXTERNAL EXCHANGER (CONDENSER)                        | (9) INTERNAL EXCHANGER WATER OUTLET  |
| (3) UNIT FIXING HOLES                                     | (10) MINIMUM SAFE CLEARANCE.   |
| (4) LIFTING HOLES FOR UNITS WITH LIFTING PIPES            | (11) MINIMUM CLEARANCE FOR A SAFE PASSAGE WHEN THE ELECTRICAL PANEL DOOR IS OPENED |
| (5) ELECTRICAL PANEL                                      | (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL                 |
| (6) POWER SUPPLY INPUT                                    | (13) MINIMUM CLEARANCE FOR A SAFE PASSAGE  |
| (7) SOUND PROOF ENCLOSURE (ONLY IN THE EXPECTED VERSIONS) | (14) CLEARANCE ACCESS RECOMMENDED  |

	Size	LN						EN				
		3.660	3.660	3.540	3.580	3.620	3.660	3.450	3.540	3.580	3.620	3.660
<b>A</b>	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
<b>B</b>	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
<b>C</b>	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
<b>D</b>	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
<b>M</b>	mm	5270	5270	5320	5308	5295	5305	5305	5328	5315	5300	5313
<b>N</b>	mm	5730	5730	5680	5692	5705	5695	5695	5672	5685	5700	5687
<b>O</b>	mm	1222	1222	1262	1260	1251	1253	1250	1263	1260	1253	1255
<b>P</b>	mm	1104	1104	1064	1066	1075	1073	1076	1063	1066	1073	1071
<b>OD</b>	"	8	8	8	8	8	8	8	8	8	8	8
<b>W1</b>	kg	856	894	904	901	890	892	908	938	935	924	926
<b>W2</b>	kg	1603	1781	1678	1718	1768	1770	1523	1725	1765	1815	1817
<b>W3</b>	kg	1288	1407	1365	1370	1396	1397	1287	1417	1421	1448	1449
<b>W4</b>	kg	1458	1624	1608	1602	1589	1609	1529	1671	1666	1652	1672
<b>W5</b>	kg	773	762	762	763	765	763	781	789	790	792	791
<b>W6</b>	kg	1449	1518	1414	1455	1519	1515	1310	1451	1492	1555	1552
<b>W7</b>	kg	1164	1199	1150	1160	1199	1196	1107	1191	1202	1240	1237
<b>W8</b>	kg	1317	1384	1354	1357	1364	1377	1314	1405	1408	1415	1428

\* Work in progress

## DIMENSIONALS



- Key:**
- (1) INTERNAL EXCHANGER (EVAPORATOR)
  - (2) EXTERNAL EXCHANGER (CONDENSER)
  - (3) UNIT FIXING HOLES
  - (4) LIFTING HOLES FOR UNITS WITH LIFTING PIPES
  - (5) ELECTRICAL PANEL
  - (6) POWER SUPPLY INPUT
  - (7) SOUND PROOF ENCLOSURE (ONLY IN THE EXPECTED VERSIONS)
  - (8) INTERNAL EXCHANGER WATER INLET
  - (9) INTERNAL EXCHANGER WATER OUTLET
  - (10) AUXILIARY WIRING DIAGRAM
  - (11) MINIMUM SAFE CLEARANCE.
  - (12) MINIMUM CLEARANCE FOR A SAFE PASSAGE WHEN THE ELECTRICAL PANEL DOOR IS OPENED
  - (13) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL
  - (14) MINIMUM CLEARANCE FOR A SAFE PASSAGE
  - (15) CLEARANCE ACCESS RECOMMENDED

		Size	
		ST 4.720	SC 4.720
<b>A</b>	mm	(*)	(*)
<b>B</b>	mm	(*)	(*)
<b>C</b>	mm	(*)	(*)
<b>D</b>	mm	(*)	(*)
<b>M</b>	mm	5904	5904
<b>N</b>	mm	5896	5896
<b>O</b>	mm	1242	1242
<b>P</b>	mm	1084	1084
<b>OD</b>	"	8 + 8	8 + 8
<b>W1</b>	kg	1612	1739
<b>W2</b>	kg	1815	2036
<b>W3</b>	kg	1516	1673
<b>W4</b>	kg	1724	1909
<b>W5</b>	kg	1407	1409
<b>W6</b>	kg	1585	1650
<b>W7</b>	kg	1324	1355
<b>W8</b>	kg	1505	1547

\* Work in progress