

AIR-COOLED CONDENSING UNITS



Commercial and industrial applications

Compact design

Quiet operation

38RBS

AQUASNAP.

Nominal cooling capacity 40-160 kW

The 38RBS condensing unit range was designed for commercial (air conditioning of offices, hotels etc.).

The units integrate the latest technological innovations:

- non-ozone depleting refrigerant R410A
- scroll compressors
- low-noise fans made of a composite material
- auto-adaptive microprocessor control

FEATURES AND BENEFITS

Features

- Compressors
 - Low-noise scroll compressors with low vibration level
 - The compressor assembly is installed on an independent chassis and supported by anti-vibration mountings
 - Dynamic suction and discharge piping support, minimising vibration transmission (Carrier patent)
- Condenser section
 - Vertical condenser coils
 - Anti-vibration mountings and optional grilles to protect the heat exchanger against possible shocks.
 - Low-noise latest-generation Flying Bird IV fans, made of a composite material (Carrier patent) are now even quieter and do not generate intrusive low-frequency noise
 - Fan motor controlled by a variable-frequency controller, to allow reduction of the fan speed, if the extra low noise option 15LS is selected.
 - Rigid fan installation for reduced start-up noise (Carrier patent)
- The refrigerant circuit includes all components for easy connection to a direct-expansion air handling unit: filter drier, moisture sight glass, high and low pressure switch, as well as solenoid valves for pumpdown (to be installed on the evaporator). All pipes and the refrigeration components are welded. From size 38RBS 140 onwards, two independent refrigerant circuits ensure partial cooling capacity in all circumstances, and more flexible operation at part load.
- Year-round operation

The 38RBS units are designed for year-round operation, and operate without the use of accessories down to -10°C. A control algorithm intelligently manages operation of the fans. Option 28 allows stable unit operation at air temperatures below -10°C and down to -20°C.

Easy and fast installation

- Physical features
 - Small unit footprint with a low height (1371 mm) for easy installation in any application.
 - The unit is enclosed by easily removable panels, covering all components (except air heat exchanger and fans).
- Simplified electrical connections
 - A single power supply point without neutral
 - Main disconnect switch (option 70) with high trip capacity
- The control circuit of the 38RBS units is equipped with a standard low-voltage transformer (24 V). This transformer can also supply the other electrical components of the air conditioning system: room thermostat and pumpdown solenoid valves.
- Fast commissioning
 - Systematic factory operation test before shipment
 - Quick-test function for step-by-step verification of the instruments, electrical components and motors

Economical operation

- Increased energy efficiency at part load

The refrigerant circuit includes several compressors connected in parallel. At part load, around 99% of the operating time, only the compressors that are absolutely necessary operate. At these conditions the compressors operating are more energy efficient, as they use the total condenser and evaporator capacity.

- Reduced maintenance costs
 - Maintenance-free scroll compressors
 - Fast diagnosis of possible incidents and their history via the Pro-Dialog+ control
 - R410A refrigerant is easier to use than other refrigerant blends

Environmental care

- Non-ozone depleting R410A refrigerant
 - Chlorine-free refrigerant of the HFC group with zero ozone depletion potential
 - Very efficient - gives an increased energy efficiency ratio (EER)
- Leak-tight refrigerant circuit
 - Brazed refrigerant connections for increased leak-tightness (factory nitrogen charge)
 - Verification of pressure transducers and temperature sensors without transferring refrigerant charge

Superior reliability

- State-of-the-art concept

Cooperation with specialist laboratories and use of limit simulation tools (finite element calculations) for the design of the critical components, e.g. motor supports, suction/discharge piping etc.
- Auto-adaptive control

Automatic compressor unloading in case of abnormally high condensing pressure. If an anomaly occurs (e.g. fouled air heat exchanger coil, fan failure) the condensing unit continues to operate, but at reduced capacity.
- Exceptional endurance tests
 - Corrosion resistance tests in salt mist in the laboratory
 - Accelerated ageing test on components that are submitted to continuous operation: compressor piping, fan supports
 - Transport simulation test in the laboratory on a vibrating table.

Pro-Dialog+ control

Pro-Dialog+ combines intelligence with operating simplicity. The control constantly monitors all machine parameters and precisely manages the operation of compressors and fans for optimum energy efficiency.

- Energy management
 - Seven-day internal time schedule clock: permits unit on/off control and operation at a second set-point
 - Set-point reset by the user via a room sensor (option).
- Integrated features
 - Night mode: capacity and fan speed limitation for reduced noise level
 - Solenoid valve control for evaporator pumpdown (valves supplied as a kit with the unit).

Carrier Comfort Network (CCN) operating mode

A simple two-wire communication bus between the RS485 port and the Carrier Comfort Network offers multiple remote control, monitoring and diagnostic possibilities. Carrier offers a vast choice of control products, specially designed to control, manage and supervise the operation of an air conditioning system. Please consult your Carrier representative for more information on these products.

FEATURES AND BENEFITS

Remote operating mode with volt-free contacts (standard)

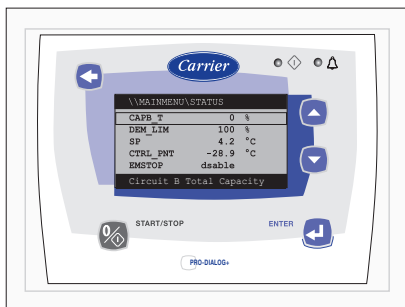
- Start/stop: opening of this contact will shut down the unit
- Alarm indication using an LED: availability of a volt-free contact that indicates the presence of a major fault that has led to the shut-down of one or two refrigerant circuits.
- User safety: this contact can be used for any customer safety loop, opening of the contact generates a specific alarm.

Remote Pro-Dialog+ interface (option)

This interface can be installed up to 300 m away. It includes a box that can be mounted inside the building. The power supply is provided via a 220 V/24 V transformer supplied.

- Ease-of-use
 - Backlit LCD interface (option) includes a manual control potentiometer to ensure legibility under any lighting conditions.
 - The information is displayed clearly in English, French, German, Italian and Spanish (for other languages please consult Carrier)
 - The Pro-Dialog+ navigation uses intuitive tree-structure menus, similar to the Internet navigators. They are user-friendly and permit quick access to the principal operating parameters: number of compressors operating, suction/discharge pressure, compressor operating hours, set-point, air temperature.

Pro-Dialog+ interface



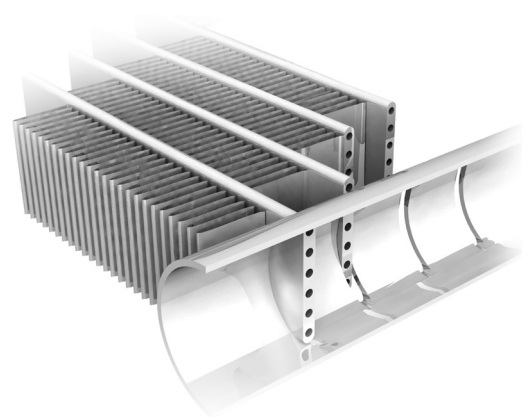
Room temperature and supply air temperature sensors for capacity control (option)

- The room temperature sensor permits temperature adjustment using a potentiometer.
- The supply air temperature sensor must be installed in the air handling unit air flow to control the minimum supply air temperature (adjustable via the remote Pro-Dialog+ interface).

Adjustable room temperature sensor (option)



All-aluminium micro-channel heat exchanger (MCHE)



Already utilised in the automobile and aeronautical industries for many years, the MCHE micro-channel heat exchanger is entirely made of aluminium. This one-piece concept significantly increases its corrosion resistance by eliminating the galvanic currents that are created when two different metals (copper and aluminium) come into contact in traditional heat exchangers.

As an option, the Enviro-Shield and Super Enviro-Shield anti-corrosion protections have been developed to increase the application range of the MCHE coil from medium to very corrosive environments. With Enviro-Shield protection, corrosion resistance of the MCHE coil is doubled without any impact on heat exchange.

With Super Enviro-Shield protection corrosion resistance of the MCHE coil is multiplied by four, and allows use in very corrosive industrial or marine environments

The MCHE heat exchanger allows a reduction in chiller refrigerant charge by up to 50%.

The low thickness of the MCHE reduces air pressure losses by 50% and makes it less susceptible to fouling (e.g. by sand) than a traditional coil. Cleaning of the MCHE heat exchanger is very fast using a dry air jet or a high-pressure washer, while observing the usage precautions.

OPTIONS

Options	No.	Description	Advantages	Use
Very low noise level	15LS	Acoustic compressor enclosure and low-speed fans	Noise emission reduction at reduced fan speed	38RBS 039-160
Protection grilles	23	Metallic protection grilles	Coil protection against possible impact	38RBS 039-160
Soft starter	25	Electronic compressor starter	Reduced compressor start-up current	38RBS 039-080
Winter operation	28	Fan speed control by frequency variator	Stable unit operation, when the air temperature is between -10°C and -20°C	38RBS 039-160
Main disconnect switch without fuse	70	Factory-installed main electric disconnect switch in the control box	Ease-of-installation and compliance with local electrical regulations	38RBS 039-160
Suction and liquid line valves	92B	Ball valves on the suction and liquid line	Unit isolation from the rest of the refrigerant circuit	38RBS 039-160
JBus gateway	148B	Two-directional communications board, complies with JBus protocol	Easy connection by communication bus to a building management system	38RBS 039-160
Bacnet gateway	148C	Two-directional communications board, complies with Bacnet protocol	Easy connection by communication bus to a building management system	38RBS 039-160
LonTalk gateway	148D	Two-directional communications board, complies with LonTalk protocol	Easy connection by communication bus to a building management system	38RBS 039-160
Enviro-Shield anti-corrosion protection	262	Coating by conversion process which modifies the surface of the aluminum producing a coating that is integral to the coil. Complete immersion in a bath to ensure 100% coverage. No heat transfer variation, tested 4000 hours salt spray per ASTM B117	Improved corrosion resistance, recommended for use in moderately corrosive environments	38RBS 039-160
Super Enviro-Shield anti-corrosion protection	263	Extremely durable and flexible epoxy polymer coating applied on micro channel heat exchangers by electro coating process, final UV protective topcoat. Minimal heat transfer variation, tested 6000 hours constant neutral salt spray per ASTM B117, superior impact resistance per ASTM D2794	Improved corrosion resistance, recommended for use in extremely corrosive environments	38RBS 039-160
Remote Pro-Dialog+ user interface	275	Pro-Dialog+ user interface for remote installation	Remote control of the unit and its operating parameters	38RBS 039-160
Replaceable filter drier	277	Filter drier with cartridge to replace hermetic filter	Easy filter replacement without emptying the refrigerant circuit	38RBS 039-160
Temperature sensor kit	278	Room temperature sensor with adjustable set-point and supply air sensor for installation in the air handling unit for capacity control	Optimisation of the unit capacity control, based on the usage conditions	38RBS 039-160
Reinforced ECM filtration for fan VFD*	282A	Fan variable frequency drive compliance to IEC 61800-3 C1 class	Allows unit installation in domestic residential environment by reducing electromagnetic interferences	38RBS 039-160

* 38RBS 039-160 with option 28

PHYSICAL DATA

38RBS		039	045	050	060	070	080	090	100	120	140	160
Nominal cooling capacity, standard unit*	kW	40,4	45,9	52,4	58,5	66,7	77,9	90,4	100,9	119,4	139,6	161,7
Power input	kW	13,8	16,3	19,0	21,2	24,4	28,8	31,8	36,0	43,6	50,2	58,7
EER	kW/kW	2,92	2,81	2,75	2,76	2,74	2,7	2,84	2,81	2,74	2,78	2,75
Sound levels												
Standard unit												
Sound power level ⁽¹⁾	dB(A)	80	81	81	81	87	87	84	84	84	90	90
Sound pressure level at 10 m ⁽²⁾	dB(A)	49	49	49	49	55	55	52	52	52	58	58
Standard Unit + option 15LS ⁽³⁾												
Sound power level ⁽¹⁾	dB(A)	79	80	80	80	80	80	83	83	83	83	83
Sound pressure level at 10 m ⁽²⁾	dB(A)	48	48	48	48	48	48	51	51	51	51	51
Operating weight ⁽⁴⁾												
Standard unit	kg	371	380	381	396	396	407	641	644	671	736	750
Compressors												
Hermetic scroll compressor 48,3 r/s												
Circuit A		2	2	2	2	2	2	3	3	3	2	2
Circuit B		-	-	-	-	-	-	-	-	-	2	2
No of control stages		2	2	2	2	2	2	3	3	3	4	4
Refrigerant												
R-410A												
Capacity Control												
Pro-Dialog+												
Minimum capacity	%	50	50	50	50	50	50	33	33	33	25	25
Capacity splits, circuits A/B	%	100/0	100/0	100/0	100/0	100/0	100/0	100/0	100/0	100/0	50/50	50/50
Condensers												
All-aluminium microchannel heat exchanger (MCHE)												
Fans												
Axial FLYING-BIRD IV with rotating shroud												
Quantity		1	1	1	1	1	1	2	2	2	2	2
Maximum total air flow	l/s	3885	3883	3687	3908	5013	5278	6940	6936	7370	10026	10556
Maximum rotation speed	r/s	12	12	12	12	16	16	12	12	12	16	16
Refrigerant connections												
Suction line diameter	inch	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8
Liquid line diameter	inch	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8
Chassis paint colour												
Colour code: RAL 7035												

* Nominal evaporating temperature condition: 5°C, outdoor air temperature 35°C, superheat 5 K, 15 m equivalent length

(1) In dB ref=10⁻¹² W, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). Measured in accordance with ISO 9614-1 and certified by Eurovent.

(2) In dB ref 20µPa, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). For information, calculated from the sound power level Lw(A).

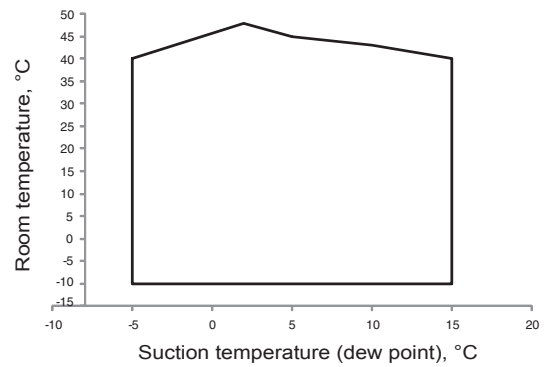
(3) Option 15LS= Very low noise

(4) Weight shown is a guideline only. Please refer to the unit nameplate.

OPERATING LIMITS, STANDARD UNITS

38RBS		Minimum	Maximum
Evaporator			
Suction temperature (dew point)	°C	-5	15
Condenser			
Entering air temperature ⁽¹⁾	°C	-10	48

- (1) For transport and storage of the 38RBS units the minimum and maximum allowable temperatures are -20°C and +48°C. It is recommended that these temperatures are used for transport by container. Option 28 allows stable unit operation at air temperatures below -10°C and down to -20°C.



ELECTRICAL DATA

38RBS		039	045	050	060	070	080	090	100	120	140	160	
Power circuit													
Nominal power supply	V-ph-Hz	400-3-50											
Voltage range	V	360-440											
Control circuit supply		24 V, via internal transformer											
Maximum start-up current (Un) ⁽¹⁾													
Standard unit	A	114,2	132,4	141,3	143,7	170,4	209,4	169,4	196,4	240,4	226,2	275,2	
Unit with electronic starter option	A	74,7	86,5	93,8	96,2	114,4	139,8	-	-	-	-	-	
Unit power factor at maximum capacity ⁽²⁾		0,83	0,81	0,81	0,83	0,81	0,78	0,83	0,81	0,79	0,81	0,78	
Maximum unit power input ⁽²⁾		kW	19,5	22,3	24,5	27,9	31,2	35,8	42,3	45,6	52,5	62,4	71,6
Nominal unit current draw ⁽³⁾		A	26,2	30,4	34,6	37,6	44,2	53,8	57,8	64,4	78,8	88,4	107,6
Maximum unit current draw (Un) ⁽⁴⁾		A	35,6	40,0	43,8	48,6	55,8	65,8	74,3	81,8	96,8	11,6	131,6
Maximum unit current draw (Un-10%)*		A	38,0	49,0	51,2	57,8	73,2	79,8	88,1	107,9	117,9	146,4	159,6
Customer-side unit power reserve		kW	Customer reserve at the 24 V control power circuit										
Short-circuit stability and protection		See table "Short-circuit stability current" below											

- (1) Maximum instantaneous start-up current at operating limit values (maximum operating current of the smallest compressor(s) + fan current + locked rotor current of the largest compressor).
- (2) Power input, compressors and fans, at the unit operating limits (saturated suction temperature 15°C, saturated condensing temperature 65°C) and nominal voltage of 400 V (data given on the unit nameplate).
- (3) Nominal conditions: suction temperature 5°C, outside air temperature 35°C.
- (4) Maximum unit operating current at maximum unit power input and 400 V (values given on the unit nameplate).
- * Maximum unit operating current at maximum unit power input and 360 V.

Short-circuit stability current (TN system⁽¹⁾)

38RBS		039	045	050	060	070	080	090	100	120	140	160
Value with unspecified upstream protection												
Short-term current at 1 s - I _{cs} - kA rms		3,36	3,36	3,36	3,36	3,36	3,36	5,62	5,62	5,62	5,62	5,62
Admissible peak current - I _{pk} - kA pk		20	20	20	20	20	15	20	20	15	20	15
Max, value with upstream protection (circuit breaker)												
Conditional short-circuit current I _{cc} - kA rms		40	40	40	40	40	40	40	40	40	30	30
Schneider circuit breaker - Compact series		NS100H	NS100H	NS100H	NS100H	NS100H	NS100H	NS100H	NS160H	NS160H	NS250H	NS250H
Reference number ⁽²⁾		29670	29670	29670	29670	29670	29670	29670	30670	30670	31671	31671

- (1) Earthing system type
- (2) If another current limitation protection system is used, its time-current and thermal constraint (I²t) trip characteristics must be at least equivalent to those of the recommended Schneider circuit breaker.
The short-circuit stability current values above are suitable with the TN system.

Electrical data and operating conditions notes

- 38RBS 039-160 units have a single power connection point located immediately upstream of the field power connections.
- The control box includes the following standard features:
 - starter and motor protection devices for each compressor, the fans and the pump,
 - the control devices.
 - A main disconnect switch can be installed within the box with the option 70.
- Field connections:
 - All connections to the system and the electrical installations must be in full accordance with all applicable local codes.
- The 38RBS units are designed and built to ensure conformance with these codes. The recommendations of European standard EN 60204-1 (machine safety - electrical machine components - part 1: general regulations - corresponds to IEC 60204-1) are specifically taken into account, when designing the electrical equipment⁽¹⁾.
- An auxiliary contactor is available with the QF breaker allowing a safety channel installation to ensure a feedback output about heater and board power supply status and then prevent evaporator from frosting when heaters and boards are off.

NOTES:

- Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60204-1 is the best means of ensuring compliance with the Machines Directive § 1.5.1.
- Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines.

- The operating environment for the 38RBS units is specified below:

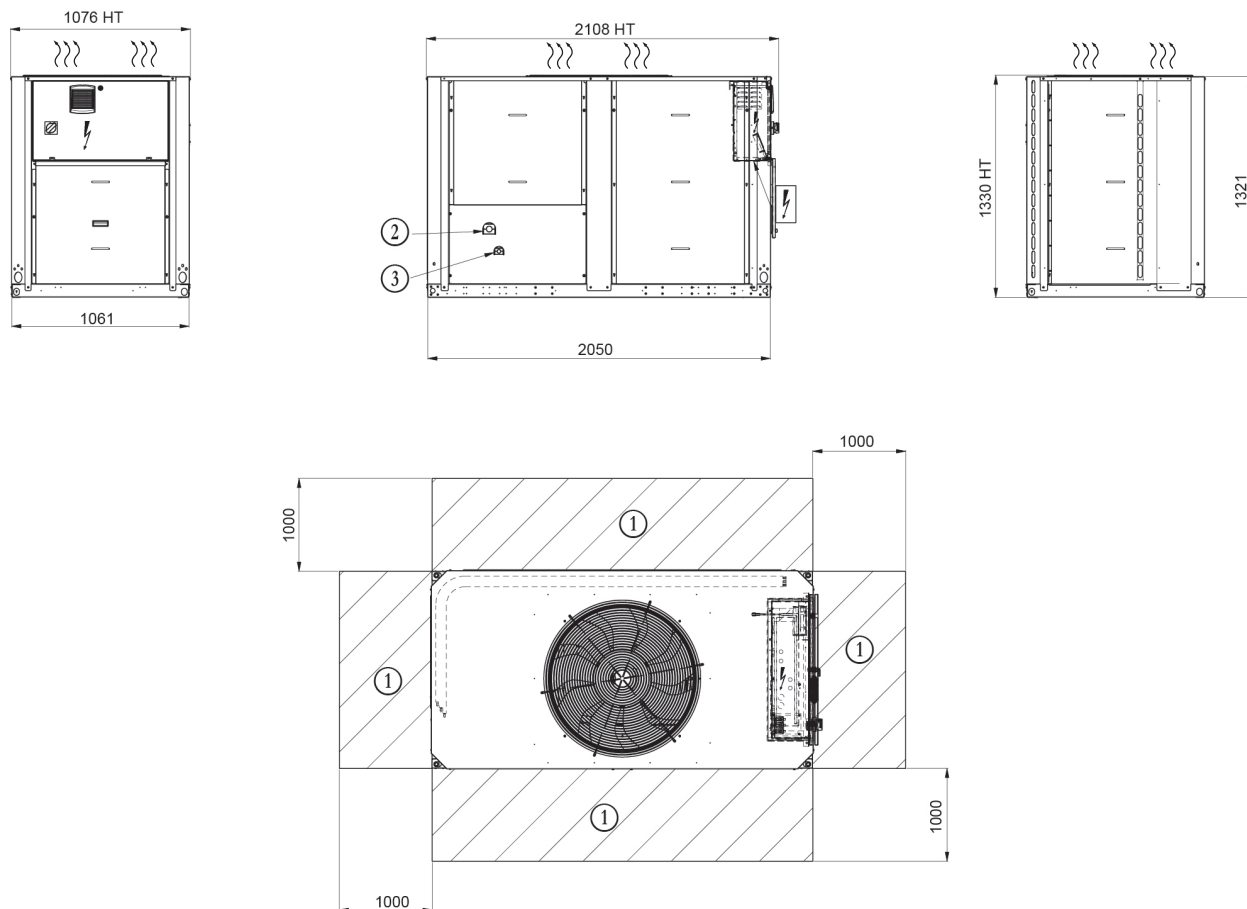
- Environment⁽²⁾ - Environment as classified in EN 60721 (corresponds to IEC 60721):
 - outdoor installation⁽²⁾
 - ambient temperature range: -10°C to +48°C, class 4K4H
 - altitude: ≤ 2000 m
 - presence of hard solids, class 4S2 (no significant dust present)
 - presence of corrosive and polluting substances, class 4C2 (negligible)
- Power supply frequency variation: ± 2 Hz.
- The neutral (N) conductor must not be connected directly to the unit (if necessary use a transformer).
- Overcurrent protection of the power supply conductors is not provided with the unit.
- The factory-installed disconnect switch (option 70) is of a type suitable for power interruption in accordance with EN 60947.
- The units are designed for connection to TN(S) networks (IEC 60364). For IT networks the earth connection must not be at the network earth. Provide a local earth, consult competent local organisations to complete the electrical installation.

Caution: If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local Carrier representative.

- The absence of main power disconnect switch on standard machines is an exception that must be taken into account at field installation level.
- The required protection level for this class is IP43BW (according to reference document IEC 60529). All 38RBS units are protected to IP44CW and fulfil this protection condition.
 - Closed electrical box is IP44CW
 - Open electrical box (when accessing to interface) is IPxxB

DIMENSIONS/CLEARANCES

38RBS 039-080



Legend

All dimensions are given in mm.

- ① Required space for maintenance
- ② Refrigerant inlet
- ③ Refrigerant outlet
- ⚡ Power wiring connection
- ⚡ Power supply
-))) Air outlet, do not obstruct

NOTES:

A Non-certified drawings.

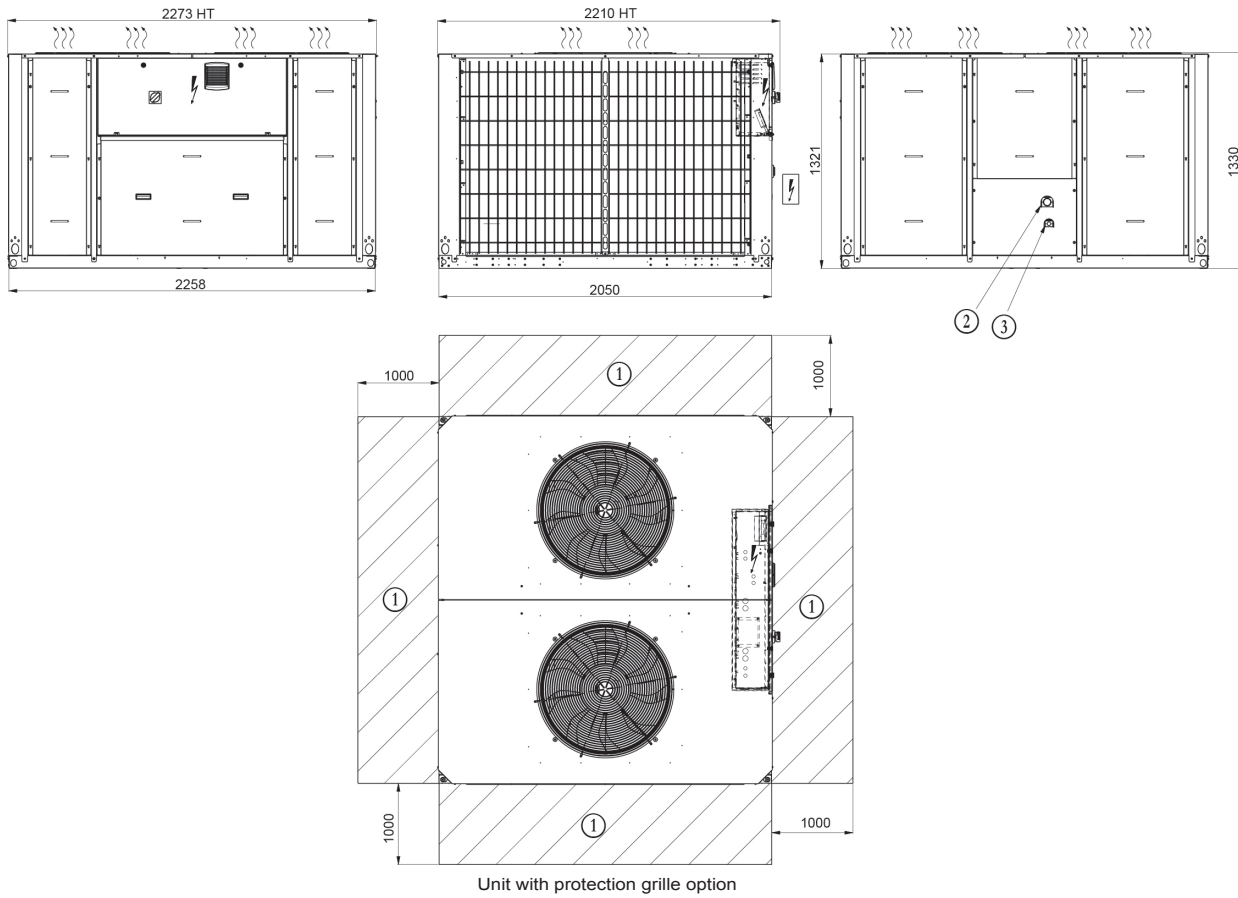
Refer to the certified dimensional drawings supplied with the unit or available on request, when designing an installation. For the location of fixing points, weight distribution and coordinates of the centre of gravity refer to the certified dimensional drawings.

B In multiple-unit installations (maximum four units), the side clearance between the units should be increased from 1000 to 2000 mm.

C The height of the solid surface must not exceed 2 m.

DIMENSIONS/CLEARANCES

38RBS 090-120



Legend

All dimensions are given in mm.

- ① Required space for maintenance
- ② Refrigerant inlet
- ③ Refrigerant outlet
- ⚡ Power wiring connection
- ⚡ Power supply
- }}} Air outlet, do not obstruct

NOTES:

A Non-certified drawings.

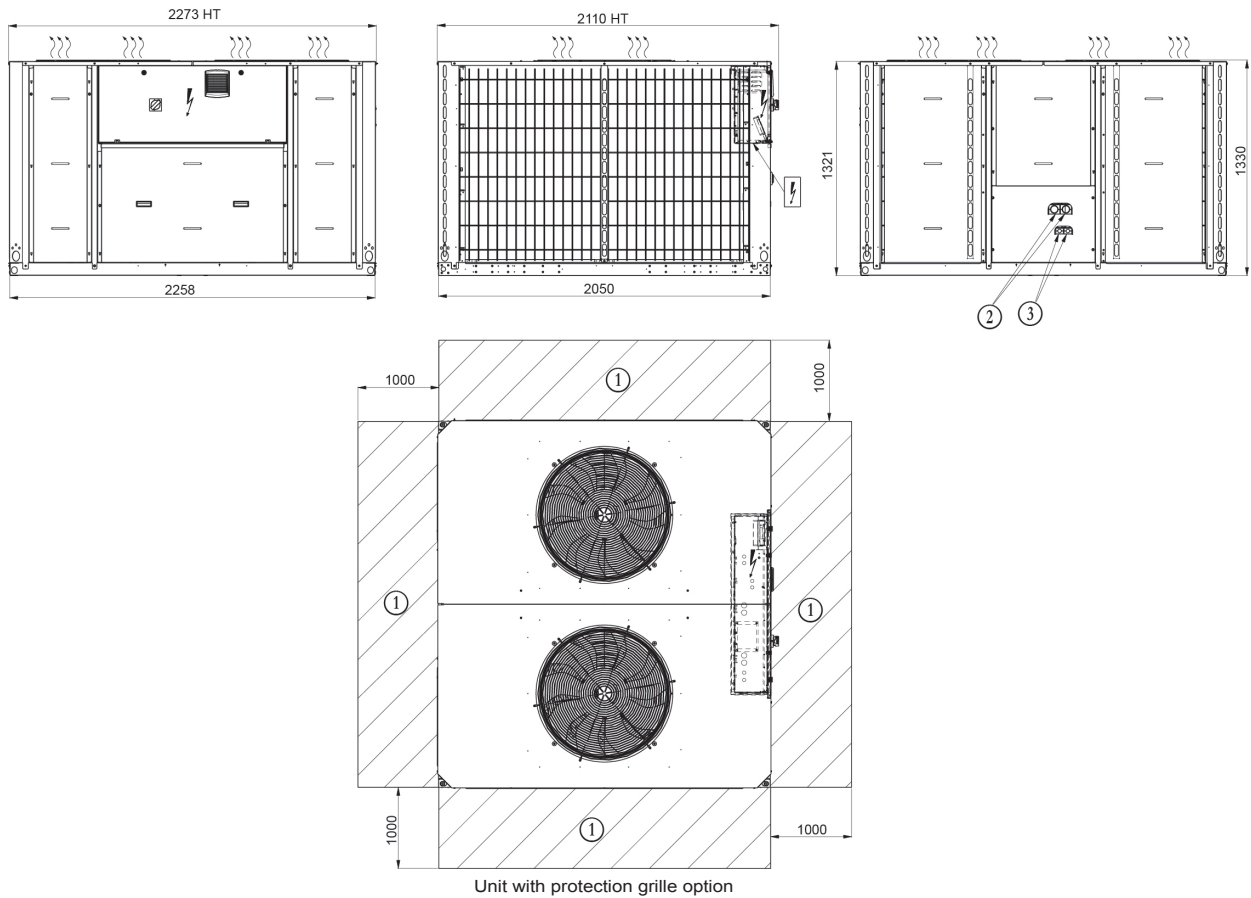
Refer to the certified dimensional drawings supplied with the unit or available on request, when designing an installation. For the location of fixing points, weight distribution and coordinates of the centre of gravity refer to the certified dimensional drawings.

B In multiple-unit installations (maximum four units), the side clearance between the units should be increased from 1000 to 2000 mm.

C The height of the solid surface must not exceed 2 m.

DIMENSIONS/CLEARANCES

38RBS 140-160



Legend

All dimensions are given in mm.

- ① Required space for maintenance
- ② Refrigerant inlet
- ③ Refrigerant outlet
- ⚡ Power wiring connection
- ⚡ Power supply
-))) Air outlet, do not obstruct

NOTES:

A Non-certified drawings.

Refer to the certified dimensional drawings supplied with the unit or available on request, when designing an installation. For the location of fixing points, weight distribution and coordinates of the centre of gravity refer to the certified dimensional drawings.

B In multiple-unit installations (maximum four units), the side clearance between the units should be increased from 1000 to 2000 mm.

C The height of the solid surface must not exceed 2 m.



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Quality and Environment
Management Systems
Approval