Carrier

Airostar

39SQ

AIR HANDLING UNIT
0,4 - 7,3 m^3/s

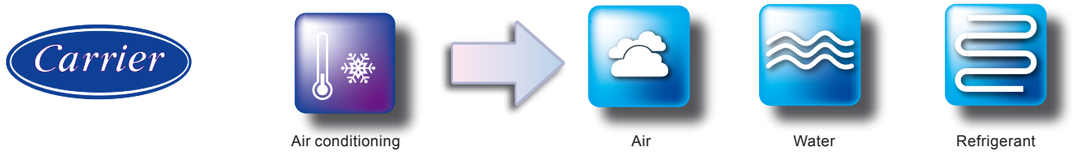
THE EVOLUTION OF THE STANDARD

CUSTOMISED SOLUTIONS

'To be our customers' first choice for air conditioning, heating and refrigeration solutions everywhere around the world.' That is Carrier's mission. Customised solutions are Carrier's speciality. Carrier has a very diverse product offer that perfectly matches the market demands. Over many years in the industry Carrier has built up an extensive experience in the area of heating, ventilation, air conditioning and cooling (HVAC). Carrier's history dates back to the beginning of the last century to the year 1902, when Willis Carrier started to work with cooling and laid the foundation for today's global company.

CARE FOR THE ENVIRONMENT

Carrier offers HVAC solutions using various cooling media, such as refrigerant, water or air. Carrier offers reliable, flexible and ecological solutions with water or air-cooled systems. Every Carrier solution is a global solution, combining comfort, performance and rational investment. Carrier's product portfolio sets industry standards for exceptional performance, energy savings and reliability. This is the result of more than a century of leadership in technology and innovation.



SYSTEMS AND SOLUTIONS

Carrier provides HVAC solutions for the comfort of the customers in every sense of the word, both for new buildings and refurbishment projects. The applications range from commercial centres and office applications to industrial processes. Carrier offers its customers a wide range of solutions such as chillers, heat pumps, fan coil units, chilled beams and ventilation solutions: air handling stations, rooftop units, grilles and diffusers. The solutions include standard products, as well as customised solutions and system controls.

AIR TREATMENT Solutions

VENTILATION

Carrier does not just provide air conditioning, but is also a major player in the fields of ventilation and air handling. With around ten air handling unit factories world-wide Carrier is among the top three air handling unit manufacturers. Carrier products create the correct climate always and everywhere. Good climate is very important, as it has a major influence on our well-being. If the climate is good, people feel at home. Ventilation plays an important part in this. Carrier offers a wide range of air treatment products, including an extensive choice of air handling units.

Airostar

STANDARDISED

The **39SQ Airostar** air handling unit (0.4-7.3 m^3/s) is the new standard. It incorporates standardised components and can be delivered very quickly. The Airostar design minimises the impact on the environment, has minimised air leakage values and optimal energy efficiency. It also offers a high degree of corrosion resistance and can be connected to the 30RA Aquasnap chillers.

Airovision

MODULAR AIR HANDLING

The **39HQ Airovision** is a modular air handling unit that can be fully customised, as required. Only high-quality components are installed in the unit casings, such as filters, heat recovery systems, fan assemblies, cooling coils, heating coils, humidifiers and silencers. Clean air and reduced energy consumption are among our top priorities.

AiroQ

MODULAR WITH INTEGRATED COOLING

The **39HQ AiroQ** offers an integrated solution for air flows up to over 11 m^3/s and a mechanical cooling capacity of 190 kW with all refrigeration components (DX) installed in the Carrier air handling unit. The AiroQ is controlled by specially developed Carrier DDC controls. The configuration model offers a lot of flexibility and modifications for specific customer requirements are possible.

Airosmart

ENERGY RECOVERY

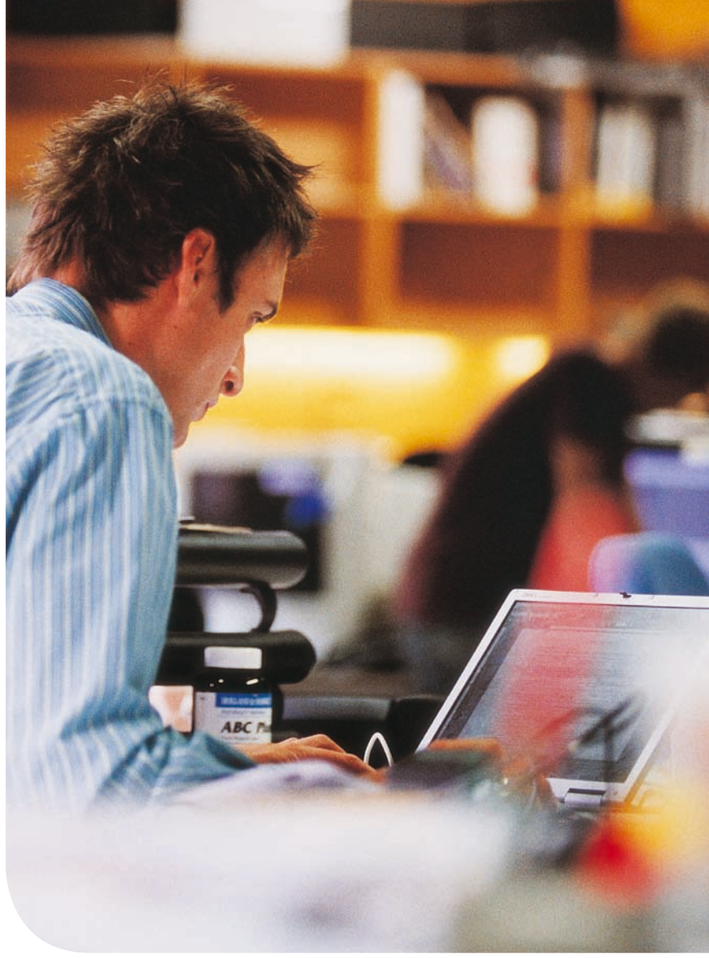
The **39HR Airosmart** heat reclaim unit (0.2-4.2 m^3/s) is the answer to the increasing demands for energy savings and indoor air quality. The Airosmart is a plug & play solution and includes the control. It is designed for operation with a Carrier Aquasnap chiller, and can also be easily integrated into the Aquasmart system.

STANDARD FRESH AIR

Everybody really wants it ... fresh air. At work, at home or at leisure. But there it is not always fresh air everywhere, and sometimes it is necessary to help a bit. Building regulations specify how much ventilation must be provided per person, and each country sets standards for this. To meet these standards and to keep an eye on the costs, Carrier now has a concept, that offers well-known Carrier quality in a standardised range, but it also offers a choice and fast delivery times. Standardisation means cost saving and simplifies stock keeping. Production costs are lower and it is easier to make the air handling units on the production lines.

STANDARDISATION

Building standard air handling units is possible, especially as buildings can be grouped into a number of categories. Within these categories the buildings have many common characteristics, and standard air handling units are designed for these. An average-size classroom has a surface of approximately 70 m^2 and a volume of around 200 m^3. The same is true for offices. A standard office module has an average surface of approximately 10 m^2 and a volume of around 30 m^3. It seems obvious that we should also be able to use certain standards for air treatment. These make it possible to design standard air handling units that still meet specific requirements. With this balanced mix of standard building sizes and the associated ideal functions that the meet the requirements, standard air handling units have many advantages such as price, specific possibilities, comfort and durability. Choosing a standard air handling unit is more for Carrier than: ‘this should do’. The customer will never have to compromise in any way. Within the standard there are enough possible variations for specific office or classroom surfaces or volumes. The price will remain favourable.



AIR QUALITY AND AIR LEAKAGE CLASS

Air handling units take fresh air from outside or re-circulate a part of the air within the building. In both cases the quality of the air must be good. Filters remove the pollutants. These can be panel filters or bag filters or a combination of both. Air handling units that are equipped with a combination of G4 panel filters and an F7 bag filter are easier to maintain than air handling units with only a bag filter. The filter combination prolongs the life of the F7 bag filter, as the G4 filter removes most of the pollutants from the air. This means that the F7 filter does not get dirty so fast. The G4 panel filter is easy to change.

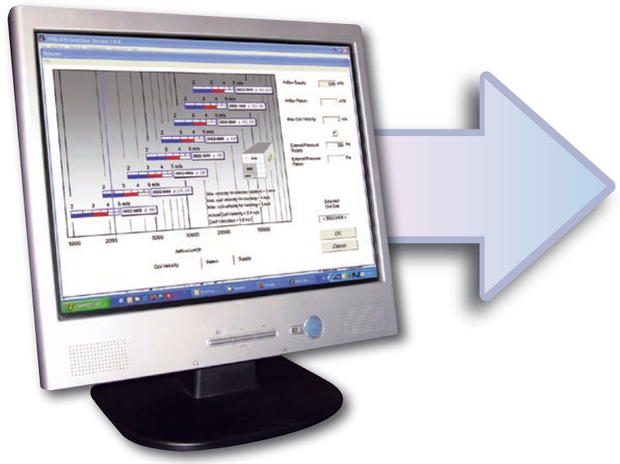
The air leakage class of an air handling unit must logically be better than the filter used. It should of course be low to minimise the amount of unfiltered air that gets into the unit. With air leakage class L2 the casing of the 39SQ Airostar is suitable up to filter class F8, and therefore easily suitable for F7 filters. Maximum leakage at -400 Pa is less than 0.44 l/s per m^2, and maximum leakage at +700 Pa is less than 0.63 l/s per m^2.

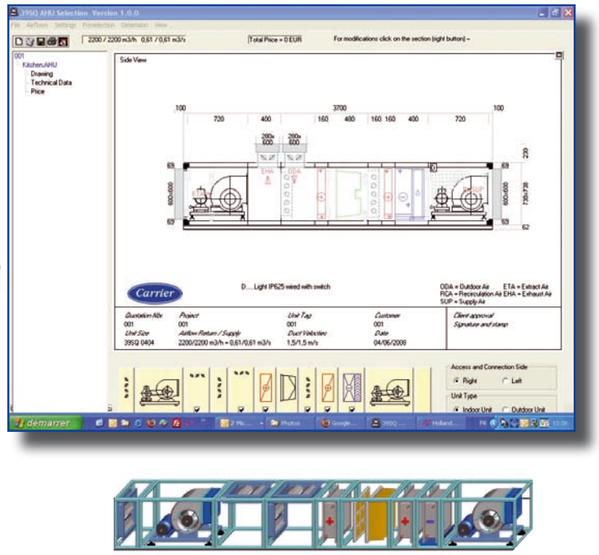
BEST INSTALLED COST

ECONOMICAL

We all know that standardisation leads to cost savings. With this in mind Carrier developed the 39SQ Airostar - a series of standardised air handling units. These central air handling stations are more than just a standard product. They offer a choice of possibilities. The Carrier range includes eight sizes and a range of up to 7.3 m^3/s (approximately 26.000 m^3/h) in various configurations. As a customer you benefit twice when you buy a standard 39SQ Airostar air handling unit. The first benefit is the availability of a product range with eight different sizes that allows you to match the air volume to the individual requirements. The 39SQ Airostar includes the following standard functions: fresh air, filtration, heating and cooling. In addition you have a choice of recirculation, mixing of

the air flows and a pre-heater. The second benefit is the possibility to connect the 39SQ to the 30RA Aquasnap unit. This ensures optimised system operation, just as you would expect from Carrier. The unit life cycle offers further cost savings. By evaluating the life cycle cost of the units, more savings can be realised. The acquisition of the unit may be more expensive, but it pays for itself over time with lower maintenance cost and lower energy cost for pumps and fans and thermal energy. This means that Carrier can offer the optimal solution.





FAST SELECTION AND DELIVERY

In addition to economical advantages standardisation has other advantages, for example fast selection. This is possible due to the optimised range of air handling units. The selection software for the 39SQ Airostar was especially developed for Carrier in accordance with the latest developments, making it very user-friendly and efficient. The advantage is that Carrier can quickly supply a complete offer with the required technical specification. The increased standardisation not only allows optimised transport, but also very short delivery times. An environmentally responsible solution that can be supplied quickly. For the 39SQ Airostar the delivery time is just four weeks.

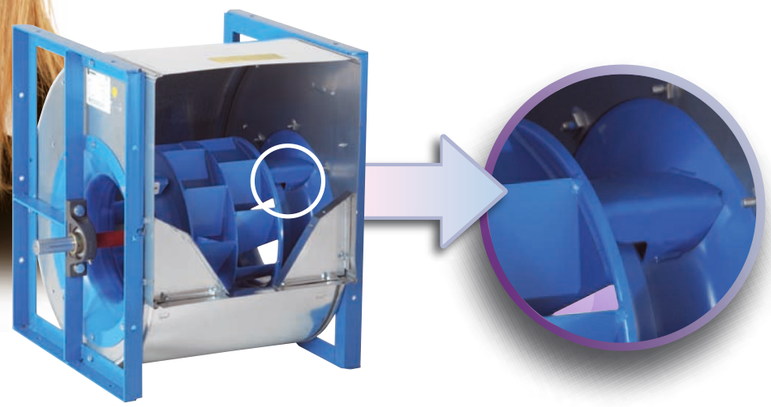
EASY INSTALLATION

With the Airostar design Carrier's objective was to supply as much as possible in one part. This means that the installer does not need to assemble the unit on site. The customer can specify in advance which additional components are required for the air handling unit, and these are then added in the factory. The damper actuator can also be added directly at the factory. The more complete the order for the air handling unit, the faster it can be installed. The Airostar uses the plug & play principle, making it very easy to connect the Airostar and saving time for the installer. He does not have to stop and leave to get parts required for the installation, that he does not have with him at the time. This also reduces the possibility of installation faults. The installer does not need to call the manufacturer, because the installation instructions are maybe not completely clear. This saves time and money in several areas.

MINIMUM NOISE AS STANDARD

WHISPER QUIET

Carrier has to maintain its reputation as the expert in the field of customised air handling solutions. The Airostar concept fits in well with this tradition. Like no one else Carrier knows that technical products must fully blend in with their surroundings. One of the most important factors in this respect is the noise level. With the design of the 39SQ Airostar Carrier not only reduced the noise generation of the components, but also minimised the transmission of contact noise. In addition the sound dampening effect of the casing wall has been optimised and reduced noise transmission to the minimum.

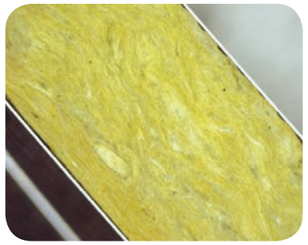


NOISE REDUCTION

Carrier fans are matched with the right direction blades as standard. Recirculation of air flows in the fan housing is a major source of leaks resulting in a reduction of fan efficiency and increased noise generation. The direction blades prevent the recirculation of air flows and actively guide the air flow to the fan discharge opening. This ensures a systematic improvement of fan performances as well as increased air flow and reduced noise generation.

CONTACT NOISE

All rotating devices vibrate and anything that vibrates, transmits contact noise. With the 39SQ the fans are placed on vibration dampers, as standard, to prevent contact noise. In addition the fan discharge opening is flexible in relation of the discharge wall, as standard. As an option and to reduce contact noise even further, a flexible connection can be installed between the unit and the ducts.



NOISE TRANSMISSION

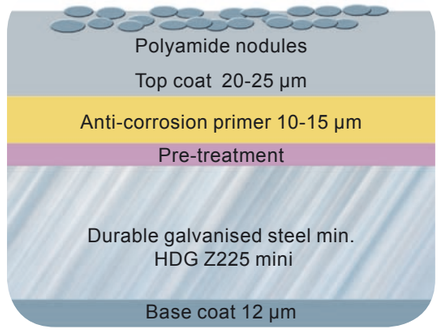
Besides reducing the noise at the source (noise generation and contact noise) Carrier also ensures that noise escapes via the casing wall. Carrier carried out extensive studies on this aspect and developed special 60 mm thick, double-skin panels and doors with insulation. This not only reduces thermal energy consumption, but also has a significant acoustic effect.

CORROSION-RESISTANT AS STANDARD

CORROSION-RESISTANCE

Air handling units must have a door for filter replacement and similar tasks. In most cases these doors are closed with a hard metal strip on the hinged side. Each time the door is opened or closed, the metal strip scratches the plating. With frequent use wear and damage occurs, and this in turn leads to corrosion. Carrier has found a simple solution in the form of a plastic roller bearing for this in itself small and not immediately obvious, but serious problem. The roller bearing rotates around its axis and rolls when the door is opened or closed, thus preventing scratches and damage.

Another point for possible corrosion is the panel plating material. This is often galvanised steel plate that is painted. If this is bent, the paint cracks at the bend lines. Hairline cracks develop, and in time corrosion will develop at these points. As corrosion protection for units installed outside the 39SQ panels are made of durable, galvanised steel plate that has been treated with a weather and scratch-resistant polymer coating. As the polyamide is flexible as well, the coating does not crack when the metal is bent and no hairline cracks or corrosion develop.



PRE-HEATER

The construction of the air handling unit mostly starts with the fresh air dampers, followed by the filters, the heating and cooling coils and the fan. This order is not always practical, as it is very humid and misty in some climates. The moisture is drawn inside and the filters become wet and then form condensation. Another factor to consider is that the outside air always contains pollutants. If the filters form condensation, the acid from the outside air settles on the floor and this means that the floor can be damaged. The 39SQ offers an optional pre-heater that is relatively small and can be placed ahead of the filter to reduce the relative humidity and prevent sweating of the filters. It is obvious that this will increase the unit life. As an additional advantage this system will protect the filters against freezing, further enhancing reliability.

RELIABLE

As a consumer you have every right to demand high-efficiency air handling systems. If you buy a Carrier air handling unit, you not only buy the machine, but also over 100 years of experience in the fields of air conditioning and air treatment. In addition Carrier invests a lot in research and development. In addition to 45 production centres Carrier also has 14 R & D units. Certification of all locations according to the international quality standard ISO 9001:2000 is your guarantee for the quality of the Carrier product offering and the services provided. A large number of Carrier products also have Eurovent certification, giving the customer the assurance that the products meet all required performance specifications. If you buy Carrier, you buy quality.

Carrier

DURABLE

Carrier supplies durable units in every sense of the word. Durable, because we use high-quality materials. But we also spend a lot of time and attention on supplier selection. This gives our customers the guarantee of maximised product reliability for the lifetime of the product. Fan bearings, for example, are designed for a life of L_{h10} 25,000 hours at maximum speed n_{max}. The standard product offering takes not only the acquisition price into consideration, but also ease-of-use. Two examples are the completely smooth floor and the removable panels of the 39SQ Airostar making cleaning very easy.

ENVIRONMENT

If you choose Carrier, you also select a reliable partner in the areas of environment, health and safety. Carrier's Environment, Health & Safety (EH&S) programmes demonstrate the company's commitment to safeguarding our environment for future generations. This is one of our top priorities, and this is why the company uses the most ozone-friendly refrigerants. More and more components are recyclable. Carrier is a pioneer in the use of energy-saving technologies and production processes. Carrier systems meet tomorrow's requirements today.

EN 1886:2007

There are two European standards on air handling units that describe the characteristics of the casing wall construction and the classification and performances of units, components and sections, respectively:

- **EN 1886:2007 Air handling units – Mechanical performance**
- **EN 13053:2006 Air handling units – Ratings and performance for units, components and sections**

The characteristics of the casing wall construction must be established in accordance with EN 1886, based on measurements carried out on a model box and a real unit. A model box is an air handling unit without its installed components that consists of two sections with a joint and two doors. The dimensions and the construction must comply with the requirements of the standard. Thermal and acoustic characteristics of a casing wall construction are exclusively determined on the basis of measurements taken on the model box, while mechanical strength, air leakage and filter bypass leakage must be determined on the basis of measurements taken on a real unit, that has been designed for an HVAC application.

Air leakage classes

Leakage class	Maximum leakage at -400 Pa l x s^{-1} x m^{-2}	Maximum leakage at + 700 Pa l x s^{-1} x m^{-2}	Maximum Filter class acc. EN 779	Quality
L1	0.15	0.22	Better than F9	+
L2	0.44	0.63	F8-F9	↑
L3	1.32	1.90	G1-F7	-

Thermal transmission U

Class	Heat transfer coefficient [W x m^{-2}xK^{-1}]	Quality
T1	U < 0.5	+
T2	0.5 < U < 1.0	↑
T3	1.0 < U < 1.4	
T4	1.4 < U < 2.0	
T5	No requirements	-

Thermal bridging factor kb

Class	Thermal bridging factor [kb]	Quality
TB1	0.75 < kb < 1.0	+
TB2	0.60 < kb < 0.75	↑
TB3	0.45 < kb < 0.60	
TB4	0.30 < kb < 0.45	
TB5	No requirements	-

Maximum permissible filter bypass leakage

Class of built-in filter	G1-F5	F6	F7	F8	F9
Total bypass leakage k %	6	4	2	1	0,5

Mechanical classes

Deflection class	Maximum relative deflection mm x m^{-1}	Resistance against maximum fan pressure	Quality
D1	4	Yes	+
D2	10	Yes	↑
D3	No requirements	Yes	-

Attenuation

Average octave band frequency	Hz	125	250	500	1000	2000	4000	8000
Attenuation (DE)	dB	17	20	20	22	21	29	36

TECHNICAL DATA

39SQ size		0402	0404	0604	0606	0806	0808	1008	1010
Max. air volume with cooling coil	m^3/s	0.55	1.00	1.72	2.60	3.21	4.39	5.74	7.10
Max. velocity, cooling coil	m/s	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5
Max. air volume with heating coil	m^3/s	0.58	1.17	1.75	2.63	3.50	4.67	5.83	7.29
Max. velocity, cooling coil	m/s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max. static pressure in full configuration	Pa	1415	1391	1526	1530	1339	1298	1331	1323
Pre-heater									
Capacity	kW	7.7	15.4	23.2	34.8	46.3	61.8	77.2	96.6
Static pressure	Pa	18.5	20.5	17.4	16.8	15.5	14.5	13.8	13.9
Water flow rate	l/h	0.17	0.34	0.52	0.77	1.03	1.37	1.72	2.15
Water-side pressure loss	kPa	12.0	17.5	13.5	19.4	18.9	16.6	18.5	18.7
Water volume	l	0.6	1.1	1.8	2.8	4.5	6.5	7.7	10.6
Filter (average pressure loss @ Qheater)									
Panel filter G4	Pa	116	110	119	120	115	116	119	118
Bag filter F7	Pa	213	204	218	219	211	213	218	217
Hot-water heater									
Capacity	kW	27.6	55.1	82.7	124	165	220	276	344
Static pressure	Pa	112	128	105	103	95	90	86	86
Water flow rate	l/h	0.34	0.67	1.01	1.51	2.01	2.68	3.35	4.19
Water-side pressure loss	kPa	17.3	55.1	33.7	26.2	24.9	24.3	25.8	31.7
Water volume	l	1.1	2.2	3.4	6.1	7.9	11.7	16.1	20.1
Electric heater									
Capacity size 1	kW	7.5	7.5	18	27	36	36	45	60
Capacity size 2	kW	11.3	15.0	27	36	48	60	75	90
Capacity size 3	kW	15.0	22.5	36	54	72	96	120	150
Capacity size 4	kW	18.8	30.0	45	63	84	120	150	180
Capacity size 5	kW	30.0	37.5	54	81	108	144	180	225
Minimum air flow	m^3/s	0.22	0.38	0.77	1.22	1.58	2.17	3.14	4.00
Cooling coil									
Capacity	kW	10.0	18.6	32.1	48.7	61.2	83.5	105	131
Static pressure	Pa	313	313	313	313	199	199	185	188
Water flow rate	l/h	0.48	0.89	1.53	2.33	2.92	3.99	5.01	6.27
Water-side pressure loss	kPa	24.4	23.7	24.1	25.9	35.5	31.0	29.4	30.5
Water volume	l	2.8	5.8	9.4	15.2	21.6	33.2	40.5	53.2
Fan/motor combination 1									
Fan size		160	225	280	355	400	450	500	560
Voltage	V	230/400	230/400	400/690	400/690	400/690	400/690	400/690	400/690
Motor power input	kW	0.75	1.5	3	4	5.5	7.5	11	11
Nominal motor current	A	2.0	3.7	6.6	8.6	10.8	14.7	20.2	20.2
Fan/motor combination 2									
Fan size		160	250	280	355	400	500	560	630
Voltage	V	230/400	230/400	400/690	400/690	400/690	400/690	400/690	400/690
Motor power input	kW	2.2	2.2	4	5.5	7.5	11	11	15
Nominal motor current	A	5.0	5.0	8.6	11.5	14.7	20.2	20.2	27.4

Standard conditions:
Pre-heater (HWC) Air: -5/+5°C, water: 80/70°C
Filter Average pressure loss of the filter at maximum air flow rate with pre-heater
Heater (HWC) Air: -10/+25°C, water: 80/60°C
Electric heater Air: -7/+20°C, bars of 230 V in sets of 3 each, power supply 400 V/3~/50 Hz
Cooling coil (CWC) Air: +28°C/50% rh to +16°C, Water: 7/12°C

TECHNICAL DATA 39SQ

SERVICOM R.C.S. BOURG EN BRESSE 497 752 964

Carrier
A member of the United Technologies Corporation family

Order No.: 13937-20-06/2008.
Supersedes order No.: 13937-20-03/2006.

Printed in the Netherland