

HMAH / HMAH-1 Series

Hygienic Modular Air Handling Units



Range 1000 cfm to 42500
cfm (472 l/s to 20058 l/s)





CERTIFICATE
N° 15.05.004



Air Handling Unit / Centrales de traitement d'air

Range Name / Nom de Gamme :
HMAH

Granted on May 12, 2015 - *Date 1ère admission 12 mai 2015*

This document is valid at the date of issue - Check the current validity on:
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Participant/Titulaire

SKM Air Conditioning Equipment LLC
Industrial Area 13 - PO Box 6004
Sharjah, United Arab Emirates

This product performance certificate is issued by Eurovent Certita Certification according to the certification rules:

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*CE CERTIFICAT A ÉTÉ EMIS LE 07/07/2022
CE CERTIFICAT EST VALIDE JUSQU'AU 30/09/2022*

Paris, 7 juillet 2022



Organisme accrédité n° 5-0517
Certification Produits et Services selon la norme NF EN ISO/CEI 17065:2012
Portée disponible sur www.cofrac.fr
Accreditation #5-0517 Products and Services Certification according to NF EN ISO/CEI 17065:2012 -
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MANAGING BOARD MEMBER / MEMBRE DIRECTOIRE



Industrie Service

Herewith it is confirmed to the company

S.K.M Air Conditioning LLC

in

Sharjah – United Arab Emirates

based on the positive results of the tests on the

**Air handling unit in hygienic design
AHU Range: “HMAH”**

according to the standard

VDI 6022 part 1: 2018-01

VDI 3803 part 1: 2020-05

DIN 1946 part 4: 2018-09

DIN EN 13053: 2020-05

that the requirements of the Certification Program of the
TÜV SÜD Industrie Service GmbH are fulfilled.

The manufacturer is allowed to use the following
TÜV SÜD Certification Mark.



This certificate is valid until 2024-06-30

Certificate Registration Number: 13/21/51 (Revision 03)



Handwritten signature

Certification Body for Products
Refrigeration and Air-Conditioning
Munich, 2022-06-13





Herewith it is confirmed to the company

S.K.M Air Conditioning LLC
in
Sharjah – United Arab Emirates

based on the positive results of the tests on the

Air handling unit in hygienic design
AHU Range: “HMAH-1”

according to the standard
VDI 6022 part 1: 2018-01
VDI 3803 part 1: 2020-05
DIN EN 13053: 2020-05

that the requirements of the Certification Program of the
TÜV SÜD Industrie Service GmbH are fulfilled.

The manufacturer is allowed to use the following
TÜV SÜD Certification Mark.



This certificate is valid until 2024-06-30

Certificate Registration Number: 19/21/77 (Revision 02)



Signature
Certification Body for Products
Refrigeration and Air-Conditioning
Munich, 2022-06-13



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Nomenclature

SKM Hygienic Air Handling Units are based on Standard Module sizes.

Series- 02 03	
Height in Module (Including Base Height)	Width in Module
02=900 mm	02=750 mm
03=1225 mm	03=1075 mm
04=1475 mm	04=1375 mm
05=1800 mm	05=1700 mm
06=2100 mm	06=2000 mm
07=2400 mm	07=2325 mm
08=2700 mm	08=2575 mm
	09=2950 mm
	10=3250 mm
	11=3575 mm
	12=3875 mm



SKM reserves the right to change, in part or in whole the specifications of its Air Conditioning Equipment at any time in order to add the latest technology. Therefore, the enclosed information may change without any prior notice.

Introduction

SKM Hygienic Modular Air handling units are designed to a high engineering standard and are ideal, where the requirements of clean and hygiene air are mandatory, like hospitals, pharmaceuticals, laboratories, food industry, electronic facilities and clean room applications

HMAH & HMAH-1 Units are available in 16 models to deliver from 1000 cfm (472 l/s) to 42500 cfm (20058 l/s) nominal air flow rate against total static pressure up to 8.0 inwg (2000 Pa).

HMAH Units are tested and certified by TUV SUD Germany, according to VDI 6022, VDI 3803, DIN EN 13053 and DIN 1946 standards. HMAH-1 Units are tested and certified by TUV SUD Germany, according to DI 6022, VDI 3803 and DIN EN 13053.

Mechanical characteristics & rating performances are certified by Eurovent according to the standards EN1886 and EN13053.

SKM HMAH & HMAH-1 Units are manufactured in a facility registered to ISO 9001 manufacturing quality standards and Coil performances are certified in accordance with AHRI Standard 410.

SKM Hygienic Modular Air Handling Units are another premium international quality product from SKM.

SKM provides qualified service and stock of replacement parts in all major cities of the G.C.C. countries, Egypt, Jordan, and Pakistan. See back cover for details or call SKM.

SKM Air Conditioning LLC



You name it....We cool it.

General Features

- Modular construction.
- Application flexibility.
- Perfect Thermal break.
- No materials that cause a threat to human health.
- No Material which facilitates the growth of harmful microorganisms.
- Internal surfaces of the units are made of wear-resistant materials.
- Easy for maintenance.
- Easy for cleaning inside the units and its components.
- Conformity with applicable European health and safety standards.

A typical **HMAH & HMAH-1** Unit consists of a wide choice of a combination but not limited to the following sections, fan, cooling coil, heating coil, humidifier, filter section, mixing box with dampers, plenums etc.



Component Features

Casing & Construction

Penta-Post Frame

- Extruded Aluminium Profile with built in thermal break system.
- Aluminium profiles frames are joined by means of strong nylon corners.



Fig 1: Aluminum Profile with built in thermal/break system.

Panels

- Panels shall be double skin construction with Polyurethane foam insulation sandwiched between the inner and outer panels.
- In **HMAH**, panel thickness is 63 mm, powder coated hot-dipped galvanised sheet (GI) outer skin, stainless steel inner skin for the complete unit.
- In **HMAH-1**, bottom panels are 63 mm thick and side & top panels are 48 mm thick, powder coated hot-dipped GI sheet outer skin, stainless steel inner skin for the bottom panel and powder coated galvanized sheet (GI) for top and side panels.
- Access panels are provided for all sections to facilitate access to all internal components for maintenance and cleaning.
- Removal of any panels shall not affect on the structural integrity of the units.

Access Doors

- Suitable access doors are provided for all sections to facilitate access to all components for maintenance and cleaning.
- Hinged access doors with Q turn handles with internal handles for fan section. Hinged or lift off access panels for all other sections.
- View port along with light are provided upstream to the components for all access doors.

Finish

- Powder coated finish, standard Colour RAL 7032.

Insulation

- All panels are internally insulated with polyurethane foam insulation with density of 2.5 lb/ft³ (40 kg/m³) and thermal conductivity of 0.14 BTU.in/ft² F.h (0.02 W/mK).

Gaskets

- Specially designed closed cell gaskets liner between the panel and frame to ensure an excellent leak tight and thermal bridge protection.
- Gaskets using in SKM Hygienic AHU are totally closed cell type, and it will not help growth of bacteria or fungus, preventing contamination.
- Gaskets coming contact with air flow are certified according to VDI 6022 standards and material of gaskets are tested based on ISO 846 standard in laboratories which are accredited according to EN 17025 standard.

Base Frame and Floor Panel

- Painted Hot dip galvanised sheet metal or structural steel base frame.
- Provision for drainage through floor panels for each section, can be provided on request.



Fig 2: Drainable Floor Panel.
(optional)

Major sections and Sub Assemblies:

Fan Section

- Direct driven centrifugal fans are supplied as standard in **HMAH**.
- Direct driven fans are Centrifugal type, designed for operation w/o casing, with motor for installation horizontally. Backward curved impellers are mounted directly on the motor rotor, statically and dynamically balanced in accordance with DIN ISO 21940-11. Fan motors are IP55 protected and class F insulated.
- A suitable speed variation system shall be required for the optimum adjustment of the desired operating point. (Not included in SKM standard supply). In order to limit transmission of noise and vibration, complete fan-motor assembly is mounted on floating sub base with anti-vibration mounts.
- In **HMAH-1** series, units are supplied with either belt driven centrifugal fans or direct driven centrifugal fans depending on the requirement.

Options

- Units can be provided with standby fans on request.
- The fans shall be equipped with a flow measuring device as option. With the flow measuring device it is possible to measure/monitor the flow easily after the fan is installed.



Fig 3: Fan Section

Coil Section

- Variety of coils including chilled water, direct expansion, and hot water are available to meet a wide range of application requirements. Coil performance are certified in accordance with AHRI Standard 410. Coils are tested by air pressure while coils are submerged in water to a pressure of 300 psig.
- Coils are constructed from seamless copper tubes. Aluminium fins are provided as standard. Stainless steel coil frame.
- Minimum fins per inch: 10 and Maximum fins per inch :12
- Coils can be provided with moisture eliminator depending on the air conditions. Stainless steel eliminator frame. Eliminator can be pulled out for cleaning.
- Stainless steel, double skin, insulated condensate drain pan
- Drain pans are slopped from three sides for a complete drainage.



Fig 4: Coils are installed on rails and are free to be removed from AHU, for cleaning.



Fig 5: Eliminators installed on rails are removable for cleaning.



Fig 6: Stainless Steel, Double Skin Condensate Drain Pan.

Filter Section

A wide variety of filtration systems are available to meet the different applications, which includes flat filters, bag filters, HEPA filters and other types. Filters using in SKM air handling units are in accordance with ISO 16890 and EN779 standards.

- **Pre Filter**

ePM1 55% in accordance with ISO 16890 standard.

- **Fine Filters**

ePM1 80% in accordance with ISO 16890 standard.

- **Hepa filter**

Ultra high absolute HEPA (High Efficiency particulate air) Filter with efficiency in excess of 99% when measured by using DOP (Di-Octyle Phthalate) method. HEPA filters in SKM Hygienic AHU are in accordance with EN1882 standards.

- Stainless steel filter rack
- Inspection Window
- Bulk head light and
- Manometer across filters provide as standard.



Fig 7: Pre Filter (ePM1 55%)



Fig 8: Fine Filter (ePM1 80%)



Fig 9: Fine Filter Section



Fig 10: Pre Filter Section

Electric Heater Section

Electric heater batteries are available in a wide range of capacity (kW) and steps as an integral part of HMAH units. It consists of finned-type heating elements constructed from 80/20 nickel chrome resistance wire, which is connected to terminal pins and centered in stainless steel grade 304L sheath metal tubes by compressed magnesium oxide. The fins are helical; mild steel galvanized and tightly wound around tubular heating elements. The terminal pins shall be insulated from metal tube by ceramic bushes. Electric heater elements are in accordance with IEC standards. Controls and starter contactors are NOT included in this option. If required, heater control box can be supplied as option.

Standard components included with the heater option are:

- Finned heating element attached to the heater frame
- Primary over temperature protection provided by auto reset high limit safety cut outs
- Secondary over temperature protection provided by manual reset high limit safety cut-out for positive break
- Junction box including the power and control terminals for heater wiring.

If Heater Control Box (HCB) opted, then heater control box can be provided which will include the below.

- 3-pole magnetic contactor per stage.
- Control fuse / breaker. Control switch.
- Power fuses / circuit breaker as per NEC, if total load exceeds 48 Amps.
- Factory installed air flow switch. Note that necessary controls for staging the heater for temperature control to be provided by others.

If opted Thyristor controller [SCR], then it will include the below options.

- Thyristor(s) for the heater
- Power contactor for thyristor
- Control fuse / breaker. Control switch
- Power fuses / circuit breaker as per NEC, if total load exceeds 48 Amps
- Factory installed airflow switch. Note that necessary controls for modulating the heater thyristor for temperature control to be provided by others.

Electric Heater							
Model HMAH/HMAH-1	Airflow	Option - 1		Option - 2		Option - 3	
	CFM	kW	No of Stages	kW	No of Stages	kW	No of Stages
0202	1000	3	1	6	1	6	2
0203	1750	6	1	9	1	9	2
0204	2500	12	1	15	2	24	2
0303	2917	12	1	15	2	18	2
0304	4167	18	2	24	2	36	2
0305	5417	24	2	30	2	48	2
0306	6667	30	2	36	2	60	2
0405	7583	36	2	48	2	72	2
0406	9333	36	2	48	2	90	2
0407	11083	48	2	60	2	90	2
0506	12000	60	2	72	2	108	3
0507	14250	72	2	90	2	126	3
0508	15938	72	2	90	2	126	3
0509	18750	90	2	108	3	126	3
0608	19479	90	2	108	3	162	4
0609	22917	90	2	126	3	180	4
0709	27083	126	3	144	4	216	6
0710	30333	144	4	180	5	270	6
0711	33583	144	4	180	5	270	6
0811	38750	144	4	216	6	324	6
0812	42500	180	5	216	6	324	6

Table 1

Mixing Box Section

- Mixing box with fresh air and return air dampers are available to mix the outside fresh air with recirculated return air. Both the return and fresh air dampers are sized to handle 0-100% of the total supply air.
- Damper blades are available in Aluminium or Stainless steel with opposed blades. Links are provided for motorized operation.

Humidifier Section

- This system consists of immersed electrode steam generating cylinders, steam distribution pipe and necessary controls. Steam generating cylinders are mounted on to the AHU within a separate enclosure. The steam distributor passes through the unit casing to inject steam in the air stream to reach the required humidity conditions.
- ON/ OFF control for humidifier is provided as standard. Stainless Steel condensate drain pan is provided. Access door, view port, bulk head light and air flow switch are provided in the humidifier section.

Steam Humidifier			
Model HMAH/HMAH-1	Airflow CFM	Option-1	Option-2
		Capacity kg/hr	Capacity kg/hr
0202	1000	5	10
0203	1750	5	15
0204	2500	8	15
0303	2917	8	15
0304	4167	10	18
0305	5417	15	25
0306	6667	18	35
0405	7583	18	35
0406	9333	18	35
0407	11083	25	45
0506	12000	25	45
0507	14250	25	45
0508	15938	35	70
0509	18750	35	70
0608	19479	35	70
0609	22917	35	70
0709	27083	35	70
0710	30333	45	90
0711	33583	45	90
0811	38750	45	90
0812	42500	70	90

Table 2

Plenum (Access) Sections

- Empty plenum sections can be supplied either for future use or for particular applications like access, end vertical assembly, end bottom plenum for bottom return air applications and etc.
- Custom sizes to suit a particular requirement can be supplied as an option.

Hygienic Sealants

- The sealant, which is used inside the AHU to seal some of the components against the air or water leaks is antibacterial, non-toxic and doesn't contain any dangerous or allergenic components. Sealants used in **HMAH & HMAH-1** are certified according to VDI 6022 standard and material of sealant are tested based on ISO 846 standard in laboratories which are accredited according to EN 17025 standard.

Sound Attenuator Section

Sound attenuator can be provided in both supply and return air side. The standard design is with specially designed vertical splitters consisting of sound absorbing material parallel to the air stream matching unit cross section. Two different media depths of 24" (600mm) [SAT1] and 48" (1200mm) [SAT2] are available as standard. Outer skin of the splitters are constructed of perforated galvanized steel. The insulation material of splitters are fiberglass. Installation rails are made of stainless steel.

Heat Recovery Section

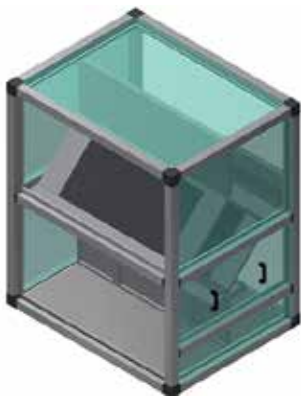
In order to conserve the energy consumption by exchanging energy between the supplies and exhaust air streams, various types of heat recovery systems can be provided as an integral part of SKM air handling units. These depend upon special installation and other requirements like:

- **Fixed Plate Heat Recovery System**

Consists of layers of Aluminum plates, which are separating the exhaust and supply air streams. The exhaust air passes through the exchanger from end to end and the supply air stream individual passages formed by the plates within the exchanger.

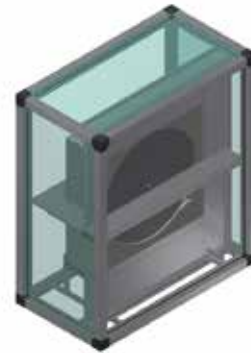
The plates separating the two air streams act as the heat transfer medium. This system recovers sensible heat only.

Plate type heat recovery system is available in both **HMAH & HMAH-1** Series



- **Rotary Heat Recovery System (Thermal Wheel)**

Heat recovery wheels are available to recover either sensible heat only or both sensible and latent heat to meet the requirements. Thermal wheels constructed of Aluminum, coated with heat transfer material (Molecular sieve) which shall rotate by an electric motor at constant speed. The heat wheel rotates between the fresh and return air streams, and two fan sections are required (supply and exhaust fan). Rotary Heat Recovery system is available only in HMAH-1 series.



- **Heat Pipe System**

Heat pipe is a simple heat transfer device consisting of two coils, pre-cooling and re-heating, connected together without any moving part in between them and containing phase change fluid. According to the arrangement of the heat pipe coils with respect to other components, it can be used for either dehumidification (horseshoe type arrangement) or for heat recovery (vertical/horizontal arrangement).

For dehumidification function (horseshoe type arrangement), pre-cooling coil is located in the incoming air flow allows the evaporator cooling coil to work cooler and condense more moisture. Re-heat coil located after the evaporator coil, reheats the supply air and brings about a more comfortable temperature and relative humidity. This entire function of humidity reduction is performed while saving energy.

For heat recovery function (vertical/horizontal arrangement), heat pipe coils are installed between the fresh and return air streams and two fan sections are required; supply and exhaust fan.

Dimensional Data

BELT DRIVEN FAN



PLUG FAN



HUMIDIFIER



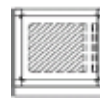
HEATER



COIL



FILTER



MIXING BOX



Unit Model	Airflow (cfm)	Unit Height mm	Unit Width mm	Section Length mm (For HMAH-1 Only)	Section Length mm	Section Length mm	Section Length mm		Section Length mm	Section Length mm	Section Length mm	
							Standard	With HCB Option				
HMAH-0202	1000	900	750	MOTOR LOCATION	1075	1075	750	375	375	950	750	275
HMAH-0203	1750	900	1075		1075	1075	750	375	375	950	753	400
HMAH-0204	2500	900	1375		1075	1075	750	375	375	950	756	400
HMAH-0303	2917	1225	1075		1175	1175	750	375	375	950	757	400
HMAH-0304	4167	1225	1375	MOTOR LOCATION SIDE	1175	1175	750	375	375	950	760	400
HMAH-0305	5417	1225	1700		1175	1175	750	375	375	950	763	400
HMAH-0306	6667	1225	2000		1175	1175	750	375	575	950	766	400
HMAH-0405	7583	1475	1700		1375	1375	750	495	575	950	767	550
HMAH-0406	9333	1475	2000		1375	1375	750	375	750	950	770	550
HMAH-0407	11083	1475	2325		1375	1375	750	375	750	950	772	725
HMAH-0506	12000	1800	2000		1700	1700	750	375	750	950	773	725
HMAH-0507	14250	1800	2325		1700	1700	750	375	750	950	775	725
HMAH-0508	15938	1800	2575		1700	1700	750	375	750	950	776	725
HMAH-0509	18750	1800	2950		1700	1700	750	375	750	950	778	725
HMAH-0608	19479	2100	2575		2075	2075	750	375	750	950	779	725
HMAH-0609	22917	2100	2950		2075	2075	750	375	950	950	781	725
HMAH-0709	27083	2400	2950		2300	2075	750	575	950	950	783	1025
HMAH-0710	30333	2400	3250		2300	2075	750	575	950	950	785	1025
HMAH-0711	33583	2400	3575		2300	2075	750	575	950	950	787	1025
HMAH-0811	38750	2700	3575		2300	2075	750	575	950	950	789	1150
HMAH-0812	42500	2700	3875		2300	2075	750	575	950	950	791	1150

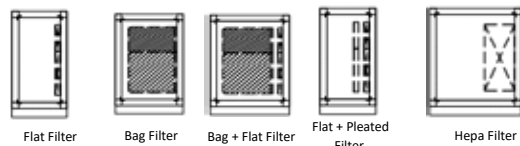
Table 3



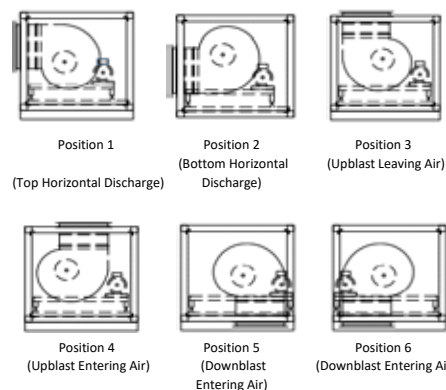
Unit Model	Airflow (cfm)	Unit Height mm	Unit Width mm	Plate Heat Exchanger	Heat Pipe	Heat Wheel (For HMAH-1 Only)
				Section Length mm	Section Length mm	Section Length mm
HMAH-HR-0202	1000	1700	975	1050	950	750
HMAH-HR-0203	1750	1700	1175	1050	950	750
HMAH-HR-0204	2500	1700	1475	1050	950	750
HMAH-HR-0303	2917	2350	1300	1050	950	750
HMAH-HR-0304	4167	2350	1500	1050	950	750
HMAH-HR-0305	5417	2350	1800	1050	950	750
HMAH-HR-0306	6667	2350	2100	1300	950	750
HMAH-HR-0405	7583	2850	1800	1300	950	750
HMAH-HR-0406	9333	2850	2100	1350	950	750
HMAH-HR-0407	11083	2850	2425	1650	950	750
HMAH-HR-0506	12000	3500	2200	1650	950	750
HMAH-HR-0507	14250	3500	2425	1650	950	750
HMAH-HR-0508	15938	3500	2650	1650	950	750
HMAH-HR-0509	18750	3500	3000	1650	950	750
HMAH-HR-0608	19479	4100	2775	1900	950	750
HMAH-HR-0609	22917	4100	3050	1900	950	750
HMAH-HR-0709	27083	4725	3175	-	950	750
HMAH-HR-0710	30333	4725	3375	-	950	750
HMAH-HR-0711	33583	4725	3675	-	950	750
HMAH-HR-0811	38750	5325	3775	-	950	750
HMAH-HR-0812	42500	5325	3975	-	950	750

Table 4

Different Filter Arrangements



Possible Fan positions:



Filter Type	Filter Depth	Section Length (mm)
Flat Filter	2"	575
	4"	575
Rigid Filter	12"	950
	15"	750
Bag Filter	21"	950
	12"	950
Hepa Filter	2" + 15"	750
	2" + 21"	950
Flat + Rigid Filter	2" + 12"	1075
Flat + Pleated Filter	2" + 4"	575

									
Plenum Section		Hot Water Coil	DX Coil	UV Lamp- 575 mm	Sand Trap Louver	Full Face Damper	Filter in Neck	Sound Attenuator	
PEM1	575 mm	375 mm	950 mm					SAT1	950 mm
PEM2	750 mm							SAT2	1375 mm
PEM3	950 mm								

* Heat wheels and belt driven fans are applicable for HMAH-1 series only.

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