FORM WSHP

Water Source Heat Pump (3-22 kW)

Central contol

UV-C STERILIZATION opportunity

WORKING WITH 100% FRESH AIR

FORM 55 YIL YEARS

Designed With 55 Years Experience

FORM, a leading Turkish HVAC company having extensive experience of 55 years in air conditioning market and 30 years in heat pumps, introduces its innovative and highly energy-efficient locally produced **Water Source Heat Pump (WSHP)** unit based on its comprehensive knowledge and experience.

Mayadrom Shopping Mall and Business Center was one of the first wshp projects in Turkey and it was completed with equipment that FORM provided in 1998. The facility is still using the wshp units for both heating and cooling successfully. Since then a lot of very important projects have been provided wshp units by FORM; **Meydan Shopping Mall** has Turkey's largest, **Europe's 5th largest, ground source heat pump system** with 18,327 meters of underground drilling. Terracity Shopping Mall has both Turkey's and **Europe's largest underground water source system**. Up to 2019 FORM has sold over 40,000 water source heat pump units for the Turkish and foreign markets, with applications in shopping centers, business office buildings, residential centers, factories, sea vessels and others.

FORM Water Source Heat Pump Units are produced in the new production facility established on 20,000 square meters open area with 14,000 square meters closed area in İzmir Pancar Organized Industrial Zone, Turkey. FORM also produces its own design of innovative Fancoil units, Evaporative Coolers, Daylighting systems and Smoke & Heat extraction systems.

FORM is also producing Rooftop units under license from Lennox company, one of the world's leading air-conditioning manufacturers, in it's Izmir production facility. FORM is the only company in the world that Lennox has given rooftop manufacturing license rights to.

- High energy efficiency, low operating cost
- R410A environment friendly refrigerant gas
- High-quality and highly efficient components
- Reliable operation and wide operating limits
- Ergonomic design
- Advanced central control and touch screen options
- Flexible solutions

R410A Environment friendly refrigerant

High energy efficiency, low operating cost

High efficiency and quiet scroll compressor

Coaxial Heat Exchanger with high thermal efficiency

Quiet Radial fan with 3 speed control via thermostat

Advanced thermostat and BMS solutions

Special design filter rails for easy duct connection

Wide operating limit

Thanks to ergonomic design, quick & easy installation.

FORM WSHP Nomenclature

FORM	DEVICE TYPE	CAPACITY (kW)	BMS	REVISION	POWER SUPPLY	ELECTRIC HEATER	FAN TYPE	RETURN AIR	SUPPLY AIR
F	H	11	M	A	3	0	S	L	B

FORM BRAND

HEAT PUMP

CAPACITY (kW)

M: MODBUS
B: BACNET

REVISION

1-PHASE (1P)
3-PHASE (3P)

0: NO HEATER
1: PRE-HEATER
2: HEATER

S: STANDARD FAN

L: LEFT RETURN
R: RIGHT RETURN

B: BACK DISCHARGE
S: STRAIGHT DISCHARGE

General Features

Cabinet and Insulation

Cabinet; Form FH Heat Pumps is made of corrosion-resistant galvanized sheet metal. The compressor and fan sections are separated by an insulated partition.

Multiple access points for the fan and compressor sections enable quick and easy service. **Insulation;** All inner surfaces are coated with FR reinforced XLPE insulation material with a thickness of 12 mm for thermal and acoustic insulation.

FH series units have CE approved design details.

Fan

FH Heat Pump has high efficiency, quiet running radial fans with 3-staged speed control. 3-staged speed control can be made via thermostat.

Filter and Filter Rails

Thanks to additional profile integrated on the filter rail, easy duct installation is provided. Therefore there's no need to uninstall the duct for cleaning. Profile integrated in the filter rail facilitates easy duct connection.

Refrigerant Circuit

FH series are designed using optimum combinations of compressor, condenser and evaporator so as to provide maximum performance at different air and water conditions.

Compressor; High efficiency and quiet scroll compressors are used.

Evaporator; Coils consisting of copper pipe and aluminum fins have high thermal efficiency thanks to their special fin forms. All coils are tested at 35-bar pressure.

4-way Valve; 4-way valve allows for the unit to run in heating or cooling mode.

Expansion Valve; All FH series are typically controlled by a thermal expansion valve (TXV). TXV adjusts the refrigerant flow rate depends on the capacity load.

Coaxial Heat Exchanger; On coaxial heat exchangers, water side is made of steel and gas side is made of copper material and exterior surface is coated with corrosion-resistant paint. It has high thermal efficiency due to cross flow direction. Thanks to low pressure drop on the water side and the minimum blocking risk, it can operate with high performance for many years.

Quiet Operation

Anti-vibration rubber mounts located under the compressor provide silent operation.

Stainless Drain Pan

With the electronically controlled overflow sensor on the stainless steel drain pan, it automatically shuts down the unit when the water reaches a critical level.

Hanger Brackets

Thanks to factory-assembled brackets, the unit can be easily assembled. The direction of brackets can be changed if required.

Bracket assembly kit; Horizantal units include rubber mounts and rings required for the installation.

Water Side Connections

The water inlet and outlet fittings of the unit are fixed to the casing by counter rings on the inside of the unit. Thus, hose kit can be easily connected without the need of using counter key.

Control Board

It ensures proper and efficient operation of the unit. It was specially designed by FORM for its heat pumps and can ensure wide operating limits at water and air side.

Electric Panel

The unit's electric panel is specially designed to be detached from the unit to provide easy service and maintenance.

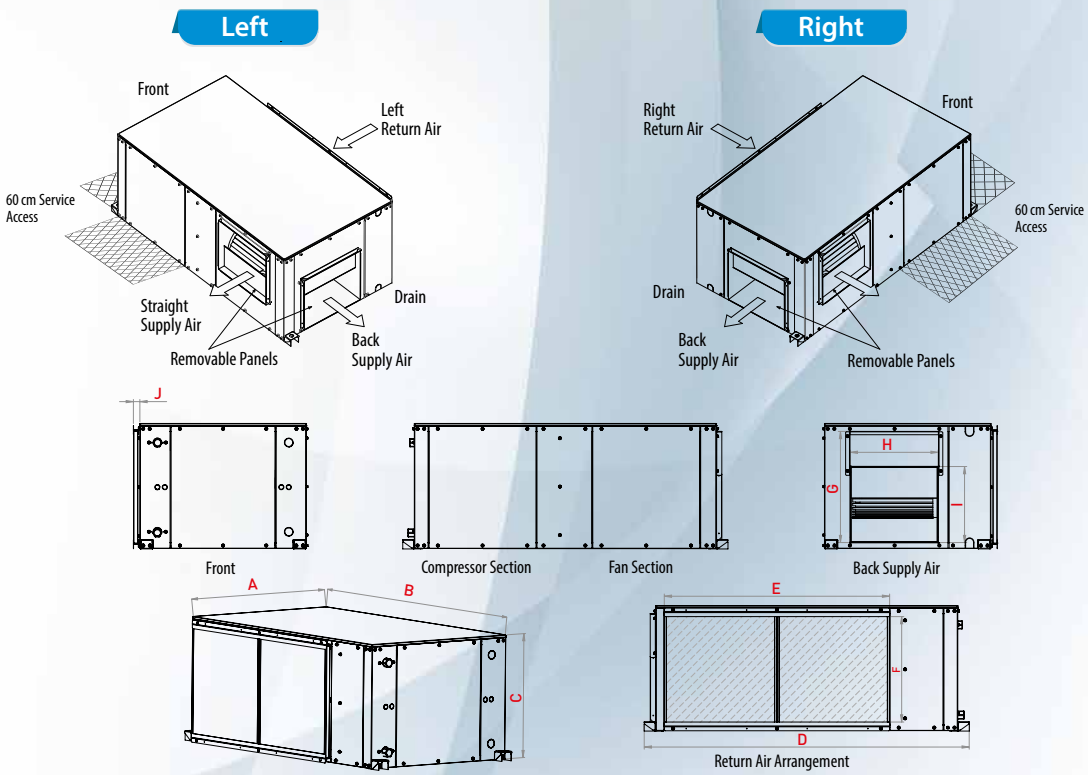
Technical Specifications

Description	Unit	FH-03	FH-07	FH-09	FH-11	FH-15	FH-22
Cooling Capacity (1)	kW	2.90	7.00	8.40	11.25	15.20	21.90
Heating Capacity (2)	kW	3.65	8.80	10.53	14.25	19.09	27.40
Total Power input	kW	0.75	1.80	2.13	3.00	3.89	5.50
EER (3)		3.87	3.89	3.94	3.75	3.91	3.98
COP(3)		4.87	4.89	4.94	4.75	4.91	4.98
Supply Airflow	m^3/h	670	1,500	1,800	2,350	3,000	4,000
External Static Pressure	Pa	100	120	120	120	120	150
Water Flow Rate (source side)	l/s	0.17	0.42	0.50	0.68	0.90	1.31
Water Pressure Drop	kPa	18	25	20	42	36	50
Water Connection Diameter (ø)	inch	1/2"	1/2"	1/2"	3/4"	1"	1"
Condensate connection	mm	25 mm					
Dimensions of Unit (WxLxH)	mm	560x945x387	560x1.070x490	590x1.095x490	660x1.330x516	760x1.330x520	760x1.380x570
Weight	kg	61	84	93	135	143	165
Refrigerant Gas		R410A					
Total Refrigerant Gas	kg	0.8	1.1	1.5	2	2.37	2.8
Type of Exchanger (water)		Co-axial exchager					
Type of Compressor		Rotary			Scroll		
Voltage/Power	V/Hz	220V/1Ph/50 Hz /Neutral			380-400V/3Ph/50 Hz/ Neutral		

Operating Limits (Standard)		Max.	Min
Return Air Temperature	Cooling	40°C	15°C
	Heating	30°C	10°C
Inlet Water Temperature	Cooling	44°C	10°C
	Heating	30°C	10°C

NOTE: These Operating Limits are given for the standard units and can be expanded to the optional features of the units.

1. Cooling capacity is based upon 27°C DB, 19°C WB entering air temperature & 30/35°C water inlet-outlet temperatures.
2. Heating Capacity is based on 20°C DB, entering air temperature & 20°C water inlet-outlet temperatures.
3. Fan power is included in total power input.
4. Form, reserves the right to modify the design & spects of the products due to R&D.



Dimensions

MODEL	A	B	C	D	Return Air Connection E	Return Air Connection F	Discharge Air Connection G	Discharge Air Connection H	I	J
FH-03	560	945	387	1,050	480	295	301	239	215	30
FH-07	560	1,070	490	1,175	605	398	393	239	269	30
FH-09	590	1,095	490	1,200	680	398	393	239	269	30

MODEL	A	B	C	D	Return Air Connection E	Return Air Connection F	Discharge Air Connection G	Discharge Air Connection H	I	J
FH-11	660	1,330	516	1,435	930	420	405	315	270	30
FH-15	760	1,330	520	1,435	980	425	460	345	300	30
FH-22	760	1,380	570	1,485	1,030	480	510	405	350	30

NOTE: Dimensions in mm.

Standard Accessories

Control Board and Automation

- Communication with Modbus –BACnet MS/TP-Bacnet
- Easy access to supply/ return air, inlet/outlet water temperature & condenser gas temperature via service menu
- Weekly timing program
- 3-speed fan control
- 2-staged electric heater control
- Factory reset option
- Alarm code
- Monitoring and recording of recent faults

Thermostat

- Cool/Heat/On/Off/Fan &Auto selection
- BMS Communication speed selection
- Supply / Return Air Temperature Data
- Condenser Inlet/Outlet Water Temperature Data
- Thermostat or return air setting
- Weekly Programming
- Monitoring and recording of recent faults
- Encoding / Locking
- Dimensions: 86x86x22,2 mm (WxHxD)

Cleanable Metal Filter

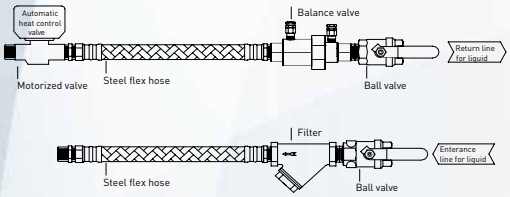
- Cleanable polyurethane material
- Galvanized profile
- Wire Grill Mesh Sheets

Optional Accessories

Central Control (Touch Screen)

- Multi central unit management with the touch screen
- Remote access capability via a single touch screen for up to 25 units

Connection Kit



Connection kits are provided as a set according to model/ flow rate of heat pump (HK060, HK048, HK024 etc.)

- 2 pieces of flex hose
- 1 piece of Y strainer valve
- 1 piece of dynamic balance valve
- 2 pieces of ball valve
- 1 piece of motorized valve and test ports
- Optional: Bypass connection kit

UV-C Sterilization Solutions

- With the addition of UV-C sterilization lights, all the bacteria and the viruses in the air flow are killed and the air supplied will be sterilized
- The UV-C light can be applied to existing units on the field or ordered with any new units ready installed
- The UV-C lights will be automatically shut off if the unit panel door is opened

Compressor Jacket

- Fireproof external coating and simple locking closures to ensure optimum connection
- Easily applicable solution
- Reduction in noise level by 6-10 dB (A)

Economizer for 100% Fresh Air

- Communication with WSHP Control Board
- Outdoor electric heater operation mode
- Thermostat Control

UV-C Sterilization Solutions

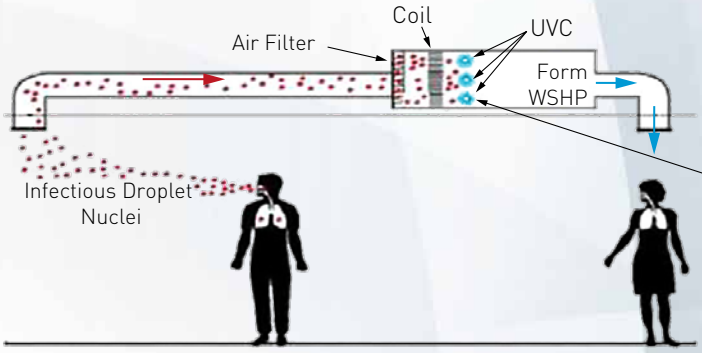
What is UV-C?

The Ultraviolet Rays that have a wavelength between 200 nm and 280 nm which are highly effective in killing viruses, fungus, bacteria are called UV-C.

The wavelength of light that is necessary for disinfection is 253 nm (0.0002537 mm).

How does the virus spread?

- In spaces with an air conditioner the air is less humid and that makes viruses vaporize quicker, thus producing more droplet nuclei.
- The droplets cannot easily absorb the water that caused them to drop because of the low humidity level within the buildings and that causes droplet nuclei to hang in the air for a longer time.
- HVAC systems cause those droplet nuclei to spread within the building and thus cause more people to be infected.

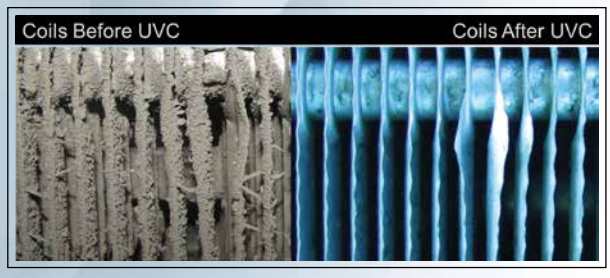


UVC energy areas create a barrier that wipes off the droplets nuclei such as those which belong to Coronavirus, SARS, measles and flu.

- **Large Infectious Droplets:** They fall over the ground after quickly moving forward up to 1 meter.
- **Small Infectious Droplets:** Those droplets can move 1 to 2 meters before they fall and can turn into droplet nuclei.
- **Infectious Droplet Nuclei:** The droplet nuclei are so microscopic that they can hang in air for an indefinite time.

Application of UV-C in WSHP Systems

Biofilm is the total of microorganisms which live by sticking to a living or inanimate surface within the slimy layer that has a polymeric structure, which they themselves produced. We can think the slimy layer (EPS) as a cement that holds bacteria together and which bacteria in the biofilm layer put off the cell. • It increases the air flow resistance and lowers the heat transfer. The fans work longer and increase kW input. Coolers and pumps consume more energy to reach set value for exit water temperature.
• The energy consumption is increased about 15-20%.



With the UV-C application the biofilm is removed. • The pressure drop on the coil is decreased and heat transfer efficiency is increased. • Cooling systems work more efficiently. • As a result of studies, it is estimated that about 30% energy saving is achieved with a HVAC system by cleaning of a biofilm layer of 0.024 thickness.

Thanks to the UV cleaning of coil, the clean air that flows through ducts also cleans the ducts themselves.

Benefits of FORM UV-C:

- **It provides energy saving in HVAC system:** By providing homogeneity in the air flow, it lowers the energy consumption.
- **It increases the air quality:** It prevents airborne pathogens to grow and to spread by destroying the biofilm.
- **It is safe:** It does not produce any ozone or secondary pollutant.
- **It increases the operational efficiency:** It removes the expensive HVAC cleaning applications and extends the equipment life. It is no longer necessary to clean coils with chemicals.
- The waste water that is created as a result of condensation in the process UV-C provides extra saving for the company by being used for different needs.
- **The payback period is short:** Payback generally takes shorter than 2 years.
- **Easy Installation:** It has the most comprehensive assembly options in sector.
- **It has quality certificates.**

Some of our FORM WSHP References


Istinye Park AVM
Istanbul


Metropol AVM
Istanbul


Hilltown AVM
Izmir


Kucukyali Hilltown AVM
Istanbul


Vega AVM
Istanbul


Camsan Park AVYM
Istanbul

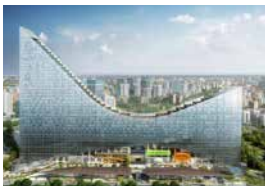
Korupark AVM
Bursa

Midtown AVM
Bodrum


Panora AVM
Ankara


Cadde 54 AVM
Sakarya


Atakule AVM
Ankara


YDA Center
Ankara


Kent Plaza
Konya

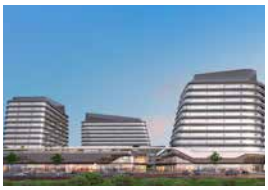

Batman Park AVM
Batman

Park Karaman AVM
Karaman


Vadistanbul AVM
Istanbul


WestPark AVM
Izmir

Tekira AVM
Tekirdag


Enntepe Mall
Konya


Bingol Park AVM
Bingol

Akasya AVM
Istanbul


Watergarden AVM
Istanbul


Trump Tower
Istanbul


Meydan AVM
Istanbul


Petrol City AVM
Batman


Piazza AVM
Istanbul-Samsun-S.Urfa


Adana Park AVM
Adana

Novamall
Antalya


Markantalya
Antalya


Beo Mall
Serbia

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55 YIL YEARS