

# FORM WSHP

Water Source  
Heat Pump  
(3-22 kW)



**FORM**

# About Form

Founded in 1965, the main activity of Form Group companies is the Production, Sales & After Sales Services of Commercial and Residential air conditioners, in order to improve the quality of life. The Group is active in the sectors of hotels, hospitals, shopping malls, commercial buildings, schools, factories and homes. The Group consists of 4 companies.

**FORM Endüstri Ürünleri A.S.** specializes in commercial and industrial air conditioning solutions. The products sold and serviced are either manufactured by the sister companies in the Group; fancoils, air handling units, water source heat pumps, rooftops, or imported from the exclusive representations from world known brands; Lennox, Clivet, Climate Master, Dunhambush, Montair. The main products are rooftops, chillers, fancoils, heat pump units, air handling units, cooling towers and other commercial air conditioning products. The company is one of the top commercial sales and service providers in the Turkish A/C market.

**FORM Endüstri Tesisleri A.S.** is the manufacturing company of the Group and maintains its activities in 20,000 m<sup>2</sup> factory in Izmir. The company focus on two main field of activity. The first one is manufacturing and selling of natural smoke and heat extraction systems, evaporative coolers, natural daylight systems and air purifier devices mostly for the roofs of industrial buildings. Besides the second field of activity is manufacturing rooftops, air handling units, water source heat pumps and fancoils for the group companies which called Form Endüstri Ürünleri.

**FORM MHI Klima Sistemleri A.S.** is a Joint Venture company with Mitsubishi Heavy Industries. The



company provides sales and After Sales Services for commercial and Residential applications, with VRF and Split – Multi Split air conditioners. The company is one of the three biggest suppliers in the Turkish market for VRF equipment.

**FORM Yonetim Destek A.S.** is the management company that provides finance, accounting, logistics, IT, H&R and marketing services to the above three group companies, as they only comprise of manufacturing, sales and service personnel.

The head office of FORM Group is located in Istanbul, Maslak business district. There are regional offices in Ankara, Antalya, Izmir, Adana and Bursa for each sales company separately, with the factory in Izmir.

FORM Group is a founding member of ISKID Turkish HVAC Association and ISKAV Turkish HVAC Foundation. The group believes in professional organization and work ethics, by being a serious, reliable, technical and trustworthy provider, depending on the ethical values.



★ 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

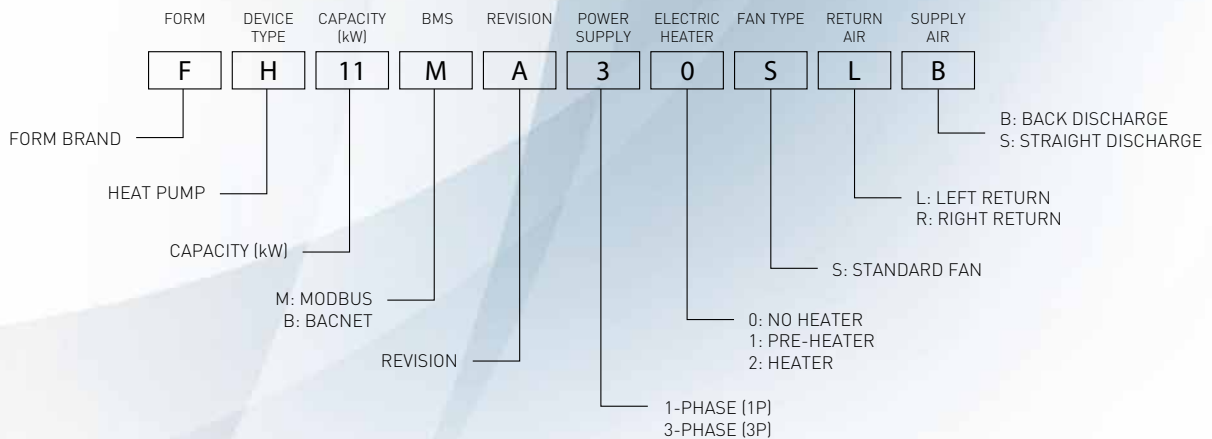


Wide operating limit



Thanks to ergonomic design, quick & easy installation.

## FORM WSHP Nomenclature





# 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.

## Drain Pan



With the electronically controlled overflow sensor on the painted 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;** Horizontal 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.

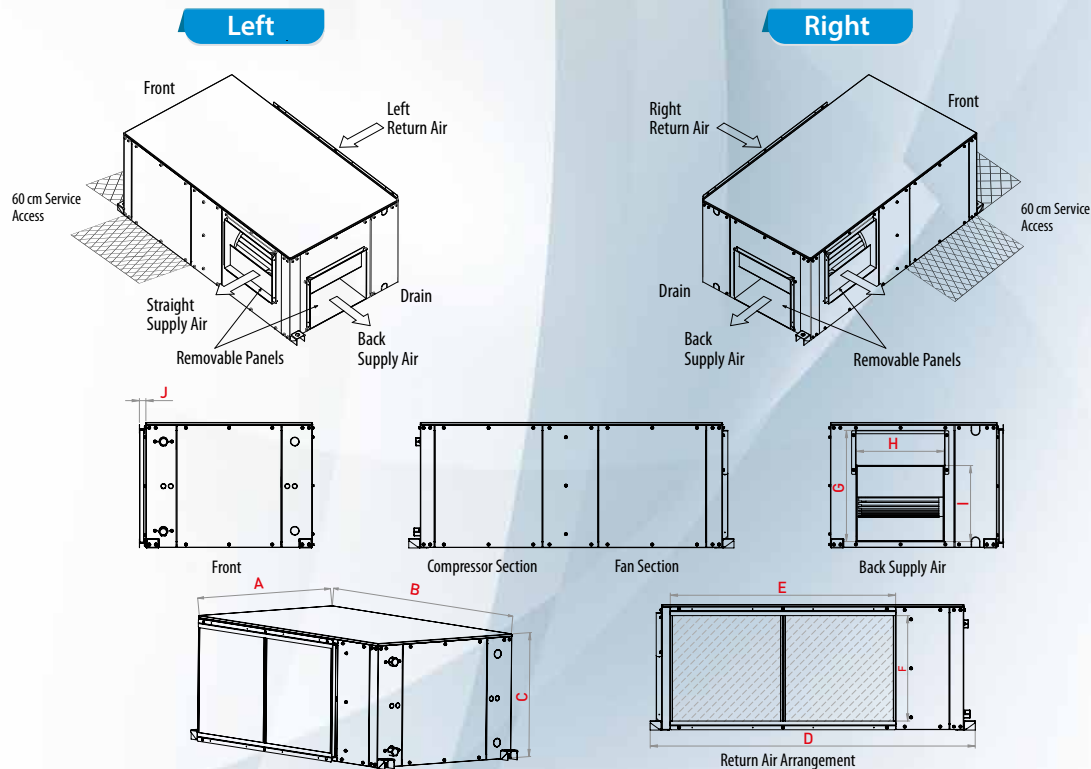
# Technical Specifications

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	3.68	8.90	10.70	14.50	19.90	28.70
Total Power input (Cooling)	kW	0.73	1.80	2.13	2.90	3.90	5.60
EER (3)		3.97	3.89	3.94	3.88	3.90	3.91
COP(3)		4.69	4.52	4.65	4.49	4.50	4.61
Supply Airflow	m <sup>3</sup> /h	720	1,500	1,800	2,350	3,000	4,000
External Static Pressure	Pa	100	100	100	100	100	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	560x945x377	560x1,070x480	590x1,095x480	660x1,330x505	760x1,330x510	905x1,380x560
Weight	kg	61	84	93	135	143	200
Refrigerant Gas		R410A					
Total Refrigerant Gas	kg	0.8	1.1	1.5	2	2.37	2.8
Type of Exchanger ( water)		Co-axial exchanger					
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 & specs of the products due to R&D.



## Dimensions

MODEL	A	B	C	D	Return Air Connection		Discharge Air Connection		I	J
					E	F	G	H		
FH-03	560	945	377	1,050	480	295	301	239	215	30
FH-07	560	1,070	480	1,175	605	398	393	239	269	30
FH-09	590	1,095	480	1,200	680	398	393	239	269	30

MODEL	A	B	C	D	Return Air Connection		Discharge Air Connection		I	J
					E	F	G	H		
FH-11	660	1,330	505	1,435	930	420	405	315	270	30
FH-15	760	1,330	510	1,435	980	425	460	345	300	30
FH-22	905	1,380	560	1,485	1,110	480	510	405	350	30

NOTE: Dimensions in mm.

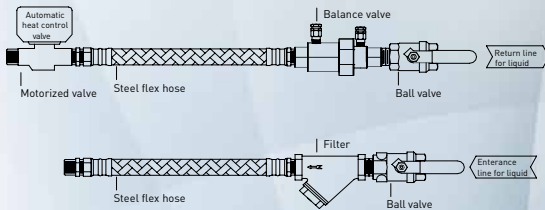
## Standard Accessories

### 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

### Hose Kit



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

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

### 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

### 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

# Water Source Heat Pump Advantages

## Advantages For Investors

- Pre-Investment; cooling tower+boiler+ 2 water pipes without insulation
- The initial investment cost is minimal compared to alternatives to provide independent heating and cooling at the same time
- Wshp Units can be buy from the customers
- Easy installation and save the time
- Heat Recovery between the units
- Unique system
- Top references in World
- Maximum efficiency and suitable for BMS systems

## Advantages For Application and Design

- Smaller capacity for cooling tower and boiler.
- Save spaces / no outside units
- With 2 pipes basic water line = 4 pipes comfort
- Doesn't include copper pipe and insulation problem
- The electric bill can be measured separately for each user

## Advantages For User and Operating

- Individual Control /Same time heating or cooling with 2 pipes system
- Each user will pay the energy consumption as expenditure
- Minimum dependence on outside air
- Capacity increase and reduce
- Low power consumption =minimum operating cost

## Main Applications

- Shopping Centers & Mall
- Office Buildings
- Educational Facilities
- Retail Outlets & Dry Goods
- Hotel / Motel
- Restaurants
- Health Care / Assisted Living
- Government Buildings
- Homes



# Some of our FORM WSHP References



Istinye Park Mall  
Istanbul



Metropol Mall  
Istanbul



Hilltown Mall  
Izmir



Kucukyali Hilltown Mall  
Istanbul



Vega Mall  
Istanbul



Camsan Park Mall  
Istanbul



Korupark Mall  
Bursa



Midtown Mall  
Bodrum



Panora Mall  
Ankara



Cadde 54 Mall  
Sakarya



Atakule Mall  
Ankara



YDA Center  
Ankara



Kent Plaza  
Konya



Batman Park Mall  
Batman



Park Karaman Mall  
Karaman



Vadistanbul Mall  
Istanbul



WestPark Mall  
Izmir



Tekira Mall  
Tekirdag



Enntepe Mall  
Konya



Bingol Park Mall  
Bingol



Akasya Mall  
Istanbul



Watergarden Mall  
Istanbul



Trump Tower  
Istanbul



Meydan Mall  
Istanbul



Petrol City Mall  
Batman



Piazza Mall  
Istanbul-Samsun-S.Urfa



Adana Park Mall  
Adana



Novamall  
Antalya



Markantalya Mall  
Antalya



Beo Shopping Mall  
Serbia