

AIR+PLUS

Air Conditioning Technologies



AP-IGK-A Heat Recovery Air
Handling Unit

51



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Plug & Play

AP-IGK-A Heat Recovery Air Handling Unit

AP-IGK-A Series air handling units are used for refreshing and discharging the ambient air in places where the outdoor air relative humidity is low in summer. In this series, there are aluminum plate heat recovery with by-pass damper, a mixture cell, a natural gas-fired heater, and a adiabatic cooler. Apart from the natural gas-fired heater, hot oil coil or water heater coil can be used. Unlike AP-IGK-A series units, AP-IGK-AE series air handling units include a package evaporator, a condenser and a cooling cycle in the shape of compressor.

Under the cells, there are full-length frame feet with 180 mm height made of 3 mm galvanized sheet. There are eyebolts for crane transport and blade slots for forklift transport on the corners of the frame feet. All the automation holes required on air handling units are drilled during the production phase (differential pressure switch, NTC temperature sensor, humidity sensor, etc.). The motor leads were taken into the switch box outside the cell. According to customer request, all automation can be placed on the panel and the device can be delivered after all settings can be made.



► Structure of the Cell Construction

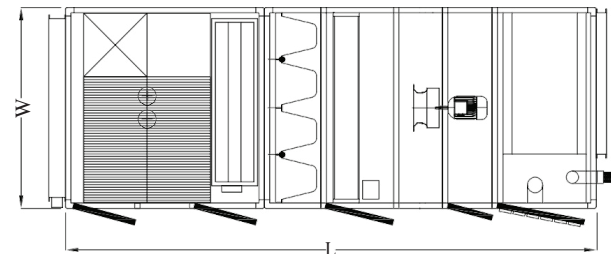
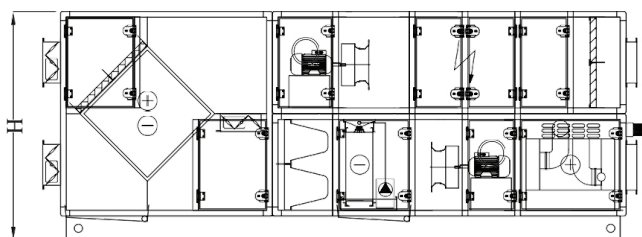
Casing of module cells of AP-IGK-A Air handling units are manufactured from natural anodized aluminum profile and plastic corner elements. Thickness of cell panel is 42 mm or 50 mm, outer wall is electrostatic powder coated and inner wall is manufactured from galvanized sheet. AP-IGK-A Air handling units have panels, which are filled with rockwool having a density of 70 kg/m³, and provide high efficiency and energy saving, a modern casing structure, efficient plug-in fans, G4+F7 filters heat recovery with aluminum plate, a natural gas-fired heater, and a adiabatic cooler. Service and inspection covers as the standard, having an air-handling unit lock with zero gap rigid hinges, which does not protrude inside the cell, having compression feature that does not allow air leakage.

► Usage Features

Due to the fact that AP-IGK-A air handling units operate with fresh air, and have adiabatic cooler function, they are preferred in places where the humidity is low in outdoor air, and natural gas is available (optionally, water heater, hot oil coil coil, or steam coil can be used).



General Features of AP-IGK-A Series Devices



Cross-Flow Heat Recovery, By-Pass Damper, Mixture Cell, G4 Panel and F7 Bag Filter, Adiabatic Cooler, Natural Gas-Fired Heater

NOTE: T_m °C=Room Temperature, T_d °C=Outdoor Temperature, RH=Relative Humidity T_g °C=Input Temperature of the Coil and the Natural Gas Unit, T_c °C=Output Temperature of the Coil and the Natural Gas Unit RH=Relative Humidity

Model	AP-IGK-A-4500	AP-IGK-A-6000	AP-IGK-A-7500	AP-IGK-A-10500	AP-IGK-A-13500	AP-IGK-A-16000	AP-IGK-A-21500	AP-IGK-A-28000	IGK-A-33000
Tm °C-RH	Td °C-RH		HEAT RECOVERY COOLING CAPACITY (kW)						
26 - 50%	5,28	7,73	10,5	15,65	21,82	28,28	39,11	45,18	58,26
Tm °C-RH	Td °C-RH		HEAT RECOVERY HEATING CAPACITY (kW)						
20 - 50%	17,31	25,4	34,53	51,5	71,89	93,24	128,94	148,82	192,04
Tg °C-RH	Tç °C-RH		EVAPORATIVE COOLING CAPACITY (kW) NOTE: Blowing temperature 23 °C						
30 - 40%	12,1	15,4	18,6	24,9	30,6	34,5	41,2	62,8	70,1
Tg °C-RH	Tç °C-RH		NATURAL GAS HEATING CAPACITY (kW) NOTE: Blowing temperature 31 °C						
8 - 22%	43	55	63	86	107	121	172	214	242
TOTAL COOLING CAPACITY (kW)									
TOTAL HEATING CAPACITY (kW)									
OPTIONAL WATER HEATING CAPACITY (kW)									
OPTIONAL EVAPORATION CAPACITY 3 BAR (kW)									
OPTIONAL EVAPORATION CAPACITY 6 BAR (kW)									
OPTIONAL HOT OIL HEATING CAPACITY (kW)									
Ventilator/Aspirator Device Flow Rate (m³/h)									
External Static Pressure Loss (Pa)									
Filter									
Ventilator and Aspirator Motor Power (kW)									
Installed Power of the Device (kW)									
Device Width (W) (mm)									
Device Height (H) (mm)									
Device Length (L) (mm)									
Device Weight (kg)									

General Features of AP-IGK-AE Series Devices

Cross-Flow Heat Recovery, By-Pass Damper, Mixture Cell, G4 Panel and F7 Bag Filter, Adiabatic Cooler, Evaporator Coil, Condenser Coil, Invertor Compressor, Natural Gas-Fired Heater.

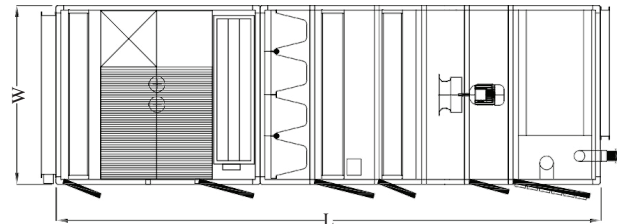
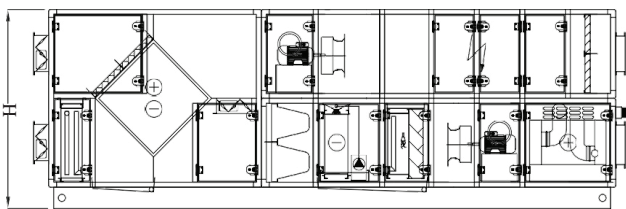
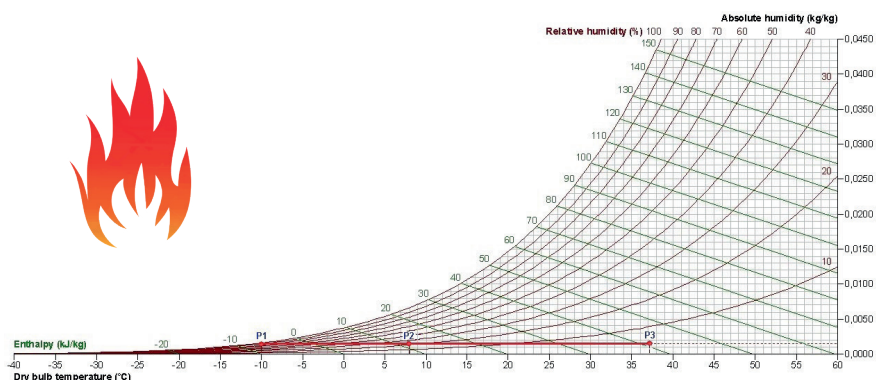


Table of Natural Gas-fired Model

Model	AP-IGK-AE-4500	AP-IGK-AE-6000	AP-IGK-AE-7500	AP-IGK-AE-10500	AP-IGK-AE-13500	AP-IGK-AE-16000	AP-IGK-AE-21500	AP-IGK-AE-28000	AP-IGK-AE-33000
Tm °C-RH	Td °C-RH		HEAT RECOVERY COOLING CAPACITY (kW)						
26 - 50%	5,28	7,73	10,5	15,65	21,82	28,28	39,11	45,18	58,26
Tm °C-RH	Td °C-RH		HEAT RECOVERY HEATING CAPACITY (kW)						
20 - 50%	17,31	25,4	34,53	51,5	71,89	93,24	128,94	148,82	192,04
Tg °C-RH	Tç °C-RH		EVAPORATIVE COOLING CAPACITY (kW) NOTE: Blowing temperature 23 °C						
30 - 40%	12,1	15,4	18,6	24,9	30,6	34,5	41,2	62,8	70,1
Tg °C-RH	Tç °C-RH		EVAPORATOR COOLING CAPACITY (kW) NOTE: Blowing temperature 21,5 °C						
30 - 40%	13,2	16,8	21,9	29,1	39,2	46,5	59,7	79,8	92,5
Tg °C-RH	Tç °C-RH		NATURAL GAS HEATING CAPACITY (kW) NOTE: Blowing temperature 31 °C						
8 - 22%	43	55	63	86	107	121	172	214	242
TOTAL COOLING CAPACITY (kW)									
TOTAL HEATING CAPACITY (kW)									
OPTIONAL WATER HEATING CAPACITY (kW)									
OPTIONAL STEAM HEATING CAPACITY 3 BAR (kW)									
OPTIONAL STEAM HEATING CAPACITY 6 BAR (kW)									
OPTIONAL HOT OIL HEATING CAPACITY (kW)									
Ventilator/Aspirator Device Flow Rate (m³/h)									
External Static Pressure Loss (Pa)									
Filter									
Compressor Power (kW)									
Ventilator and Aspirator Motor Power (kW)									
Installed Power of the Device (kW)									
Device Width (W) (mm)									
Device Height (H) (mm)									
Device Length (L) (mm)									
Device Weight (kg)									

Water Heater Coil Module

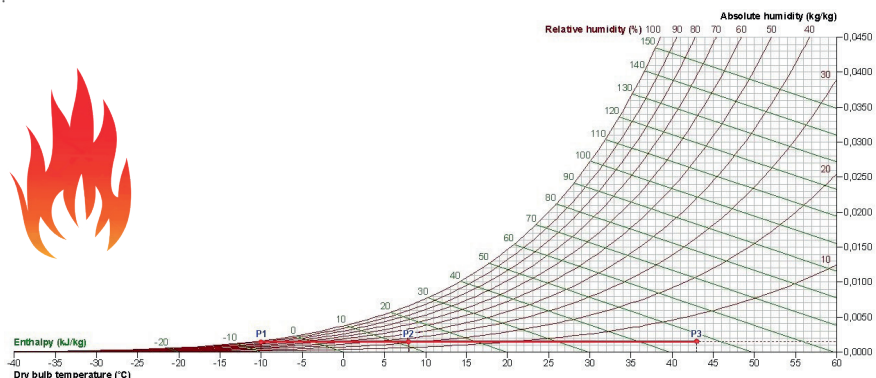
The collectors in the water heater coils are made of steel pipe. The connections are with exterior thread as the standard, and can be manufactured flanged optionally. The air vent and drainage connections on the collector are standard. In the mirrors, the combination of back sloping collars and free mirror system is implemented.



	Heat Recovery Heating		Water Heater Coil
	P1	P2	P3
t (dry bulb)	-10,0°C	8,0°C	37,0°C
t (wet bulb)	-10,3°C	1,3°C	14,6°C
t (dew point)	-11,2°C	-11,1°C	-11,7°C
Pressure	101325,0Pa	101325,0Pa	101325,0Pa
RH	90,0%	22,0%	3,5%
g	0,0015kg/kg	0,0015kg/kg	0,0015kg/kg
Enthalpy	-6,5kJ/kg	11,7kJ/kg	40,8kJ/kg
Density	1,340kg/m³	1,254kg/m³	1,137kg/m³
Airflow	X m³/h	X m³/h	X m³/h

Steam Coil Module

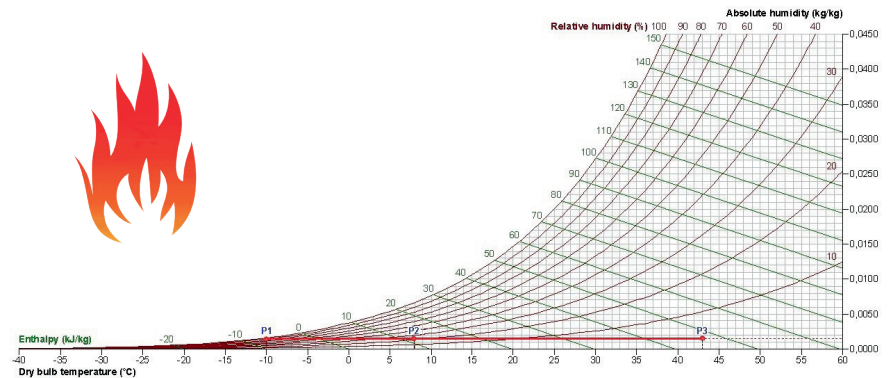
The collector in the steam coils, which are resistant to three bars pressure is made of copper pipe. Manufactured steam coils with copper pipe have 0,7 mm wall thickness. The collector in the steam coils, which are resistant to six bars pressure is made of steel pipe. They are manufactured as steel piped. The connections are with exterior thread as the standard, and can be manufactured flanged optionally. The air vent and drainage connections on the collector are standard. In the mirrors, the combination of back sloping collars and free mirror system is implemented.



	Heat Recovery Heating		Steam Coil
	P1	P2	P3
t (dry bulb)	-10,0°C	8,0°C	43,0°C
t (wet bulb)	-10,3°C	1,3°C	16,7°C
t (dew point)	-11,2°C	-11,1°C	-11,7°C
Pressure	101325,0Pa	101325,0Pa	101325,0Pa
RH	90,0%	22,0%	2,6%
g	0,0015kg/kg	0,0015kg/kg	0,0015kg/kg
Enthalpy	-6,5kJ/kg	11,7kJ/kg	46,8kJ/kg
Density	1,340kg/m³	1,254kg/m³	1,115kg/m³
Airflow	X m³/h	X m³/h	X m³/h

► Hot Oil Coil Module

The material of pipe and blade may be carbon steel, stainless steel, copper and aluminum. Operating pressure: Between 1~200 bar. The working conditions and the kind of material and the other technical conditions are determined according to the customer requirements.

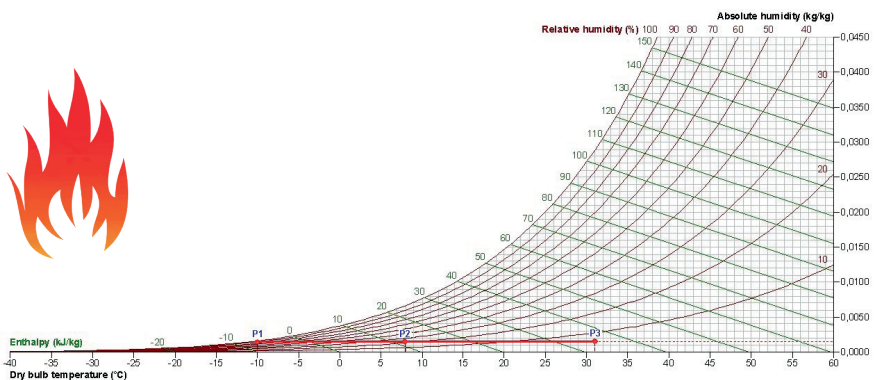


	Heat Recovery Heating		Hot Oil Coil
	P1	P2	P3
t (dry bulb)	-10,0°C	8,0°C	43,0°C
t (wet bulb)	-10,3°C	1,3°C	16,7°C
t (dew point)	-11,2°C	-11,1°C	-11,7°C
Pressure	101325,0Pa	101325,0Pa	101325,0Pa
RH	90,0%	22,0%	2,6%
g	0,0015kg/kg	0,0015kg/kg	0,0015kg/kg
Enthalpy	-6,5kJ/kg	11,7kJ/kg	46,8kJ/kg
Density	1,340kg/m³	1,254kg/m³	1,115kg/m³
Airflow	X m³/h	X m³/h	X m³/h



► Natural Gas Burning Module

The natural gas burning modules, which are between 43 kW and 100 kW - the natural gas burning modules, which are between the single stage 100 kW and 222 kW - the natural gas burning modules, which are between the two stage 222 kW and 296 kW - three stage

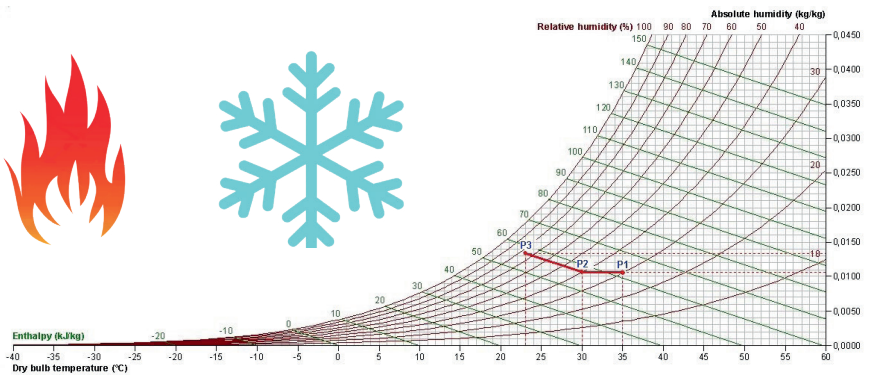


	Heat Recovery Heating		Natural Gas Burning
	P1	P2	P3
t (dry bulb)	-10,0°C	8,0°C	31,0°C
t (wet bulb)	-10,3°C	1,3°C	12,5°C
t (dew point)	-11,2°C	-11,1°C	-9,6°C
Pressure	101325,0Pa	101325,0Pa	101325,0Pa
RH	90,0%	22,0%	6,0%
g	0,0015kg/kg	0,0015kg/kg	0,0015kg/kg
Enthalpy	-6,5kJ/kg	11,7kJ/kg	35,5kJ/kg
Density	1,340kg/m³	1,254kg/m³	1,159kg/m³
Airflow	X m³/h	X m³/h	X m³/h



► Adiabatic Cooling

The process of changing the temperature of air without doing any heat exchange. Decreasing the air temperature by increasing the relative humidity of the air at a certain dry and wet bulb temperature can shortly be defined as adiabatic cooling. The basic reason for the adiabatic cooling principle to be attractive in the sector is the low installation cost. When designing dry coolers, the dry bulb temperature of the air is taken as the reference. The closer the outlet temperature of the process fluid and the dry bulb temperature of the air, the larger the dimension of the unit required for solving the cooling problem will be. It is possible to decrease the dry bulb temperature of the air by using the adiabatic cooling principle in the system, and by conditioning the air. System approach, the difference between the process outlet water temperature and the dry bulb temperature will increase, and it will be made sure that a cooling in the same amount with more economical products will be realized.



	Heat Recovery Heating		Adiabatic Cooling	
	P1	P2	P2	P3
t (dry bulb)	35,0°C	30,0°C	30,0°C	23,0°C
t (wet bulb)	21,4°C	20,0°C	20,0°C	19,9°C
t (dew point)	14,9°C	15,0°C	15,0°C	18,6°C
Pressure	101325,0Pa	101325,0Pa	101325,0Pa	101325,0Pa
RH	30,0%	40,0%	40,0%	75%
g	0,0105kg/kg	0,0106kg/kg	0,0106kg/kg	0,0134kg/kg
Enthalpy	62,2kJ/kg	57,3kJ/kg	57,3kJ/kg	57,3kJ/kg
Density	1,138kg/m³	1,157kg/m³	1,157kg/m³	1,182kg/m³
Airflow	X m³/h	X m³/h	X m³/h	X m³/h

► Adiabatic Cooling Operation Principle

The adiabatic coolers consist of the adiabatic cooling fin, the fan, the electric motor, the water pump, the water reservoir, and water distribution mechanism. The working principle of the system is based on the principle of evaporating and mixing the water to the air owing to the air passing through the wave-shaped fins; it is natural and completely environmentally-friendly, does not contain refrigerant gas and compressor.

1- The water pump wets the cooler fins.

2- Thanks to their unique designs, the cooler fins provide the air and water with a large contact surface area to allow the water to contact the air and evaporate.

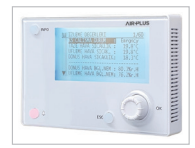
3- And the fan directs the air, which cools as a result of evaporation of the water that spreads onto the fin surface to the interior by getting the hot and fresh air through between the fin pores.

► Advantages of Adiabatic Cooling

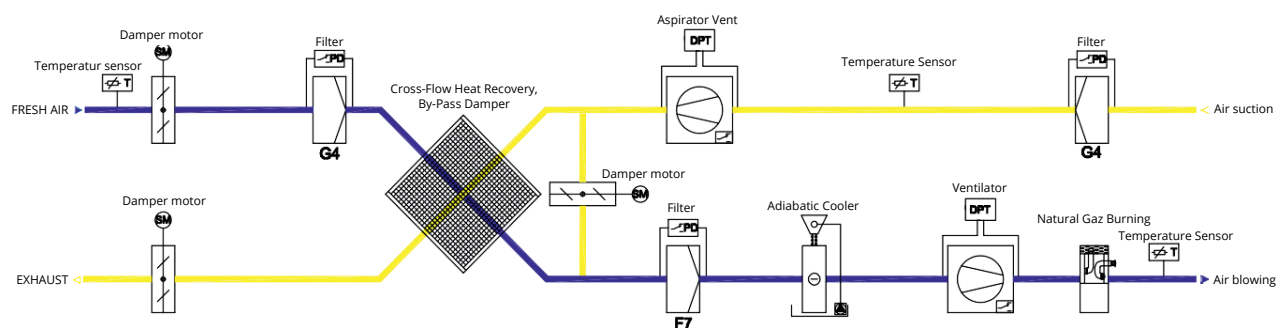
- Up to 75% savings in energy costs compared to the A/Cs with gas compressor.
- Big advantage in investment cost: Up to 80% savings compared to the classical cooling systems.
- Protects the machinery affected by heat.
- Improves working conditions, increases performance of the staff, provides continuity.
- Does not dry the air while cooling, provides for required humidity rate in the business.
- Provides continuous 100% fresh air.
- Filters the fresh air.
- The system pays off rapidly.
- Allows quick and easy installation.
- Doesn't contain refrigerant gas and compressor, which are harmful to the environment.
- Produces high air flow and pressure thanks to it's radial fan, which is more powerful compared to similar coolers.
- Can convey the cold air to required distances via the air channel.
- Has long-lasting cooler fins.

► Optional Equipment

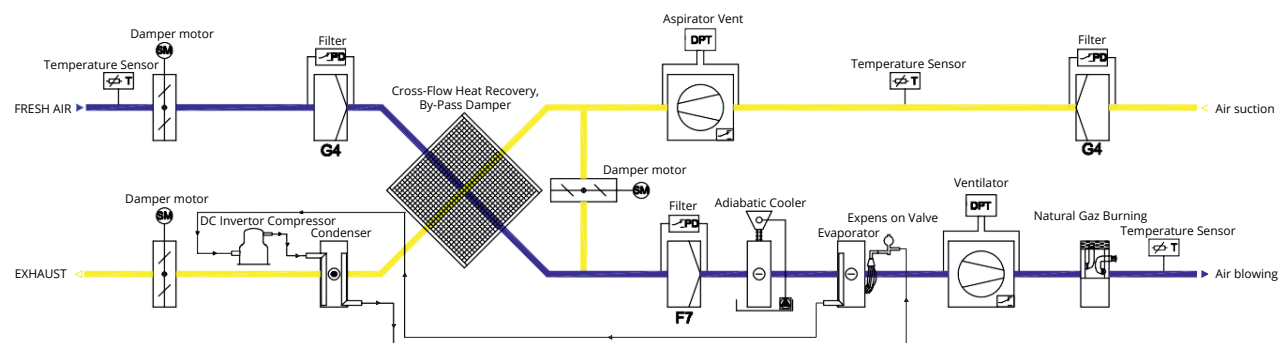
- Inside air quality sensor
- The smoke detector
- The natural gas detector
- Water heater coil
- Hot oil coil
- Steam coil
- Electric heater
- Water cooler coil



► AP-IGK-A Series Device



► AP-IGK-AE Series Device



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