

Apiste

Precision Air Conditioner

Printing machines, solar cell manufacturing process,
precision measuring equipment

Temperature accuracy $\pm 0.1^{\circ}\text{C}$ ~

Humidity accuracy $\pm 1\%$ ~

Air-cooled type

Temperature control type

PAU-300S
PAU-AR800S
PAU-AR1400S
PAU-AR2600S

Temperature control type (Energy-saving type)

PAU-AN1700SE
PAU-AN2800SE
PAU-A5000S

Temperature & humidification control type

PAU-300S-HC
PAU-A920S-HC
PAU-A1400S-HC
PAU-A2600S-HC
PAU-A3500S-HC

Hot air & humidification control type

PAU-H3200-6KHC

Temperature & dehumidification control type (Super dehumidification type)

PAU-1300S-DR

Hot air & humidification control type

PAU-AZ2000SE-DR

Temperature control type (Wide-range temperature control type)

PAU-800RW

Temperature control type (International standard compliant type)

PAU-820S-CU
PAU-1300S-CU
PAU-A820S-CE
PAU-1300S-CE
PAU-AR2623-CE



Thermal management of
3-D measuring equipment



Thermal management of
printing machine

<http://pau.apiste.co.jp>

<http://pau.apiste.co.jp>

■ For details of the products, contact Apiste head office.
The models, specifications, and other descriptions are subject to change without prior notice.

Apiste

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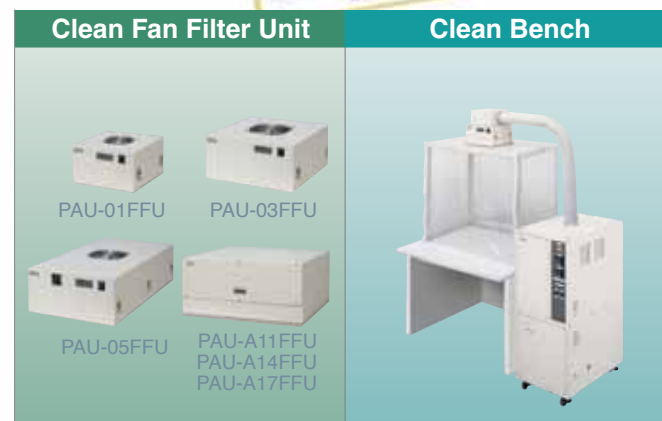
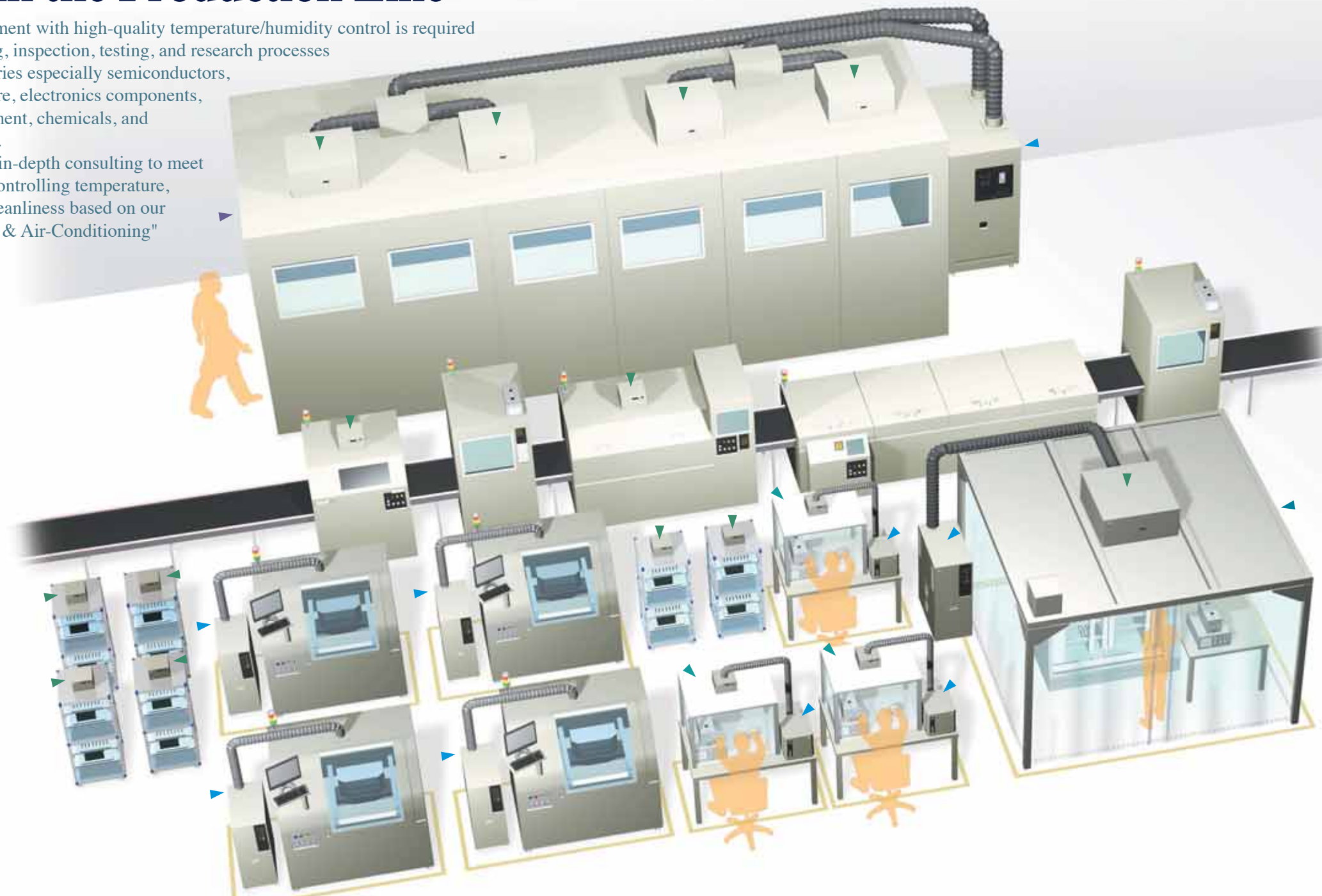


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Apiste's Cleaning & Precision Air-Conditioning System Plays Important Roles in the Production Line

A clean environment with high-quality temperature/humidity control is required in manufacturing, inspection, testing, and research processes in certain industries especially semiconductors, LCD manufacture, electronics components, precision equipment, chemicals, and pharmaceuticals.

Apiste provides in-depth consulting to meet your needs for controlling temperature, humidity, and cleanliness based on our "Local Cleaning & Air-Conditioning" concept.



Temperature control

± 0.1°C and up

The high-precision air-conditioning system PAU unit offers advanced temperature control.

Humidity control

± 1% and up

The PAU unit is also capable of ultra-precise humidity control, previously thought to be incredibly demanding. A selection of units is available to meet any requirements, from low-humidity to high-humidity environments.

Cleanliness control

Class 10000 – Class 10

The fan filter unit, which comes with an integrated HEPA filter, captures 99.97% of particles even as miniscule as 0.3μ, producing an improved level of cleanliness in any environment.

Precision Air-Conditioning Unit

Temperature control type



Temperature & humidity control type



PAU-Air Cooling Series Air-cooled precision air-conditioning unit

Outside air is used for the heat exchange in the cooling cycle. The fan motor for the heat radiating coil discharges hot air to the outside. Since there is no need to install cooling water piping for heat exchange, the installation work is relatively easy. (*Models with humidifiers require piping for the humidifying water.)



Why Apiste Insists on Local Cleaning & Local Air-Conditioning

General air-conditioning

Clean, high-quality air-conditioning is essential for current manufacturing processes.

The requirements of maintaining high quality for all products and materials are increasing in all processes in all industries, especially electronic components, LCDs, semiconductors, and precision equipment. Consequently, ever higher levels of process control and environment improvement are required.



Weak points of conventional cleanrooms

- **Excessive cleaning and heavy investment**
A cleanroom is designed to control all air within that room. As a result, the same air-conditioning level is maintained for all production processes in that space. The result, however, is sometimes excessive cleaning because the standard must be set for the equipment or process requiring the highest cleanroom class in that space. In reality, some equipment or processes in a cleanroom require higher, and some lower, classes of cleanroom. Therefore, total air-conditioning of a production space requires unnecessarily heavy investment.
- **Outside air condition**
In general, a cleanroom takes fresh air in from the outside to the amount of at least 15 to 20% of the entire air volume. Consequently, the air-conditioning conditions in the room greatly depend on the outside air conditions, i.e. the ambient temperature and humidity in the factory. The larger the space is, the more difficult it is to maintain the same temperature and humidity as the seasons change. Even in a cleanroom, the temperature and humidity control may not be reliable enough to satisfy the requirements of some equipment or processes.
- **Operating cost**
A cleanroom requires significant labor cost for continuous maintenance as well as various operating costs such as electrical power and HEPA filters.

Significant reinvestment is required to match rapid changes

Generally, products and materials in leading edge industries are replaced every two to three years. Such improvements in the quality of products and manufacturing pose a double risk to companies: high repeated investment and increased manufacturing costs. It is a fact that full-scale general air-conditioning systems such as cleanrooms incur significant costs for their installation, construction, and renovation.

Local air-conditioning

Air-conditioning in necessary spaces only: Lower investment

With the "PAU Series" local air-conditioning unit, Apiste provides an air-conditioning system suitable for your specific applications. You pick out the equipment, processes, and spaces for which high-quality and precise temperature/humidity control is really required. Air-conditioning is implemented only for those spaces which need it, eliminating excessive investment and maintenance. Changes can be made to only the spaces which require it, instead of the entire area. As a result, both the installation and construction costs can be significantly reduced.

Air-conditioning in limited spaces: More accurate and reliable operation

Naturally, the more the air-conditioned space is limited, the higher the accuracy of temperature/humidity control in the space is achieved. Moreover, the influence of outside air and ambient temperature/humidity is minimized, so Apiste makes it easy to create a space with extremely stable and reliable air-conditioning.

Flexible system makes it easy to manage change demands

The manufacturing environment around equipment and processes needs to be flexible to satisfy the fast-changing production line demands for manufacturing quality. With a local air-conditioning system, a range of changes and needs can be addressed easily and quickly, from cleaning and temperature control to system expansion, increased quality temperature/humidity control, and stricter cleanliness.

Easy disassembly, transportation, and installation

Since every item is an independent unit for a specific purpose, such as temperature/humidity/cleanliness or clean space, it can be easily disassembled, transported, and reinstalled anywhere as necessary. Anyone can establish a precision cleaning and air-conditioning system anytime without the need for expert knowledge.

Minimum maintenance and utility costs

Electricity charges are less compared with a cleanroom or general air-conditioning system. The maintenance costs for replacing expensive HEPA filters can also be reduced. Furthermore, the maintenance and operating costs for air-conditioning and other units can be reduced.

Necessary
space only

Lower
initial cost

High accuracy
and
quality

Temperature/
humidity/
cleanliness

Flexible
system
expansion

Quick
implementation

Easy
installation

Disassembly/
transportation
possible

Lower
operating
costs

PAU Series product line up



Precise local air-conditioning unit

The PAU Series air-conditioning unit offers two product lines: the PAU-S Series, a compact and lightweight air-cooled type refrigeration system for easy installation; and the PAU-W Series, a water-cooled type refrigeration system intended for medium-to-large spaces offering silent and clean operation without discharging air or heat immediately outside the controlled zone.

The models can also be divided into two types according to control target: Temperature control only or temperature and humidity control. The humidity controlling model can further be divided into humidifying, dehumidifying, and both. Wide range of models are available according to the application and environment, from a compact, small air volume model (1 m³/min) to a large-sized, large air volume model (120 m³/min).



Clean fan unit

The PAU-FFU Series clean fan unit is available in a range of sizes from compact, small air volume models (1 to 5 m³/min) to bigger, large air volume models (11 to 17 m³/min). The PAU-FFU Series includes a newly developed, special wind speed sensor for the clean fan unit as well as a microcomputer PCB with clogging alarm.

The user-friendly design allows easy replacement of HEPA filters. Of course, these fan units can be easily connected with the precision air-conditioning unit.



Clean booth & clean bench

Apiste's original standard clean booth is available in various sizes in multiples of 50 cm². Custom sizes are also available for special needs. We also offer different types of clean benches and air showers on a custom order basis. In addition, there are essential peripheral parts such as sets of flexible ducts, connection boxes, discharge chamber, return chamber, and diffuser.

Notice the differences!

PAU Unit vs. General Air-conditioning

	PAU unit	General air-conditioning
Temperature control error	Approx. ±0.05 to 0.5°C	±2 to 5°C
Humidity control error	±2% RH or less	±5 to 10% RH
Initial cost	Low	High
Running cost	Low	High
Maintenance	Easy	Intensive
Individual unit control	Possible	Impossible

PAU Unit vs. Home Air-conditioner

	PAU unit	Home air-conditioner
Refrigeration cycle	Low-pressure refrigeration cycle	High-pressure refrigeration cycle
Control method	PID control	Simplified inverter control
Defrosting *1	Not provided	Provided
Temperature control	Warm/cool air simultaneous control	Manual switching between cooling and heating
Temperature control error	±0.05 to 0.5°C	±2 to 3°C
Installation	Easy	Difficult
Fan replacement	Possible	Impossible

*1: Defrosting
When a refrigerator is continuously operated for a certain amount of time, the cooling coil may freeze. To prevent this, a typical air-conditioner includes a circuit to prevent frost.

PAU Unit vs. Home Humidifier

	PAU unit	Home humidifier
Control method	PID control	ON/OFF control
Vaporization method	Electrical	Ultrasonic/electrical
Humidity control	Fine vapor	Condensation, temperature fluctuation
Water particle size	Small	Large
Humidity control error	±2% RH or less	±10 to 20% RH or less
Capacity setting	As desired	No or limited setting
Installation	Direct installation	Direct installation impossible
Water supply	Automatic	Manual
Fan replacement	Possible	Impossible
Anti-scaling measures	Automatic drainage	No drainage mechanism

* These tables show approximate comparisons for your reference. Details vary depending on the individual model.

Application Examples 1

Electric machinery/
LCD/Semiconductor



Temperature and humidity control for cream soldering printers

Cream solder is greatly affected by the fluctuation in temperature and humidity, resulting in changes in viscosity. Improperly controlled temperature may cause smears, drip, or fade; and improperly controlled humidity may cause splash or static electricity charges to build up. The air in the system must be precisely controlled throughout the year.



Temperature and humidity control for spin coaters or other coating systems

If the inside temperature or humidity fluctuates in a coating or bonding system used for the manufacturing line of DVD, CD-R/RW, or other recording medium, the application of resist material or adhesive and the viscosity of coating material change accordingly. Year-round high-quality air-conditioning is required to ensure uniform and stable film thickness.

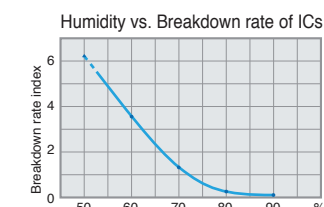
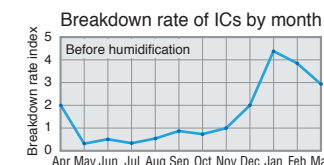
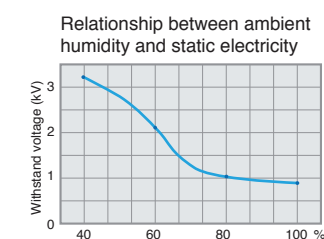
Temperature and humidity control for LCD/PCB stepper and lithography

Fluctuation in the temperature and humidity in the system may cause expansion or contraction of the mask. High-quality, continuous air-conditioning is required.



Preventing static electricity in glass panel process

In the LCD manufacturing process, static electricity may cause serious problems. In processes prone to electrostatic failures, problems can be prevented by maintaining high humidity.



* Static electricity is easily generated in winter when air is dry or in other low humidity environments. These graphs clearly show that breakdown rate, electrostatic discharge (ESD) and related problems can be reduced by keeping humidity at or above a certain level.



Application Examples 2

Electric machinery/
LCD/Semiconductor



Temperature control for developer

When the material expands or contracts due to temperature change, the pattern may become misaligned.

Temperature and humidity control of storage cabinets

In a cabinet which temporarily stores IC or other electronic components and materials, specific levels of temperature and humidity should be maintained according to the contents.



Temperature control for ultra-precision processing machinery

In an ultra-precision process which requires accuracy on the submicron order, minute changes in temperature causes expansion or contraction of the equipment or workpiece, seriously affecting the product quality.

Other



Temperature control for electron microscopes, chromatographs, and other analytical instruments

With normal air-conditioning, the measurement accuracy of a mass/component analyzer, such as an electron microscope or a gas chromatograph, is susceptible to seasonal variations or other disturbances. To ensure higher analytic accuracy, it is necessary to improve the temperature management of the facility environment and to maintain a stable air-conditioned environment year round.

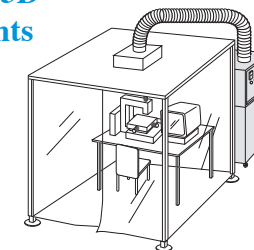


Temperature and humidity control for medicinal pill machines or molding presses

When the powder molding process such as for ceramics or medicines is subject to high humidity, defective products with breaks or cracks may result. It is vital to maintain low humidity inside the system.

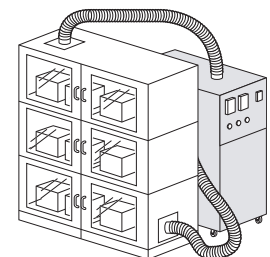
Air-conditioning for 3D measuring instruments

Image processing equipment or 3D measuring instruments are easily affected by changes in ambient temperature, resulting in the expansion or contraction of jigs or fluctuations in measurement accuracy.



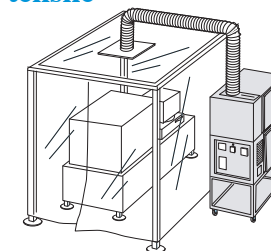
Maintaining constant temperature and low humidity within precision mold storage lockers

The PAU Series is installed in the existing storage locker to prevent molds from rusting.



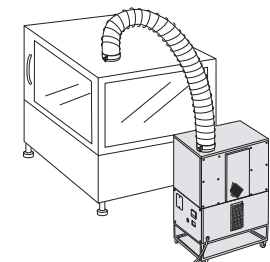
Air-conditioning for tensile testing machines

The material and the measurement conditions may change due to the fluctuation in temperature and humidity.



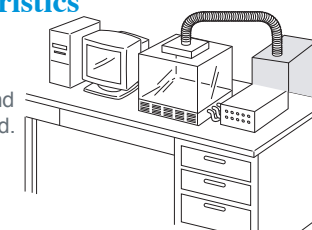
Air-conditioning for laser measuring machines

A characteristic of laser based measuring systems is that they are prone to errors due to temperature changes because the wavelength of the system changes accordingly.



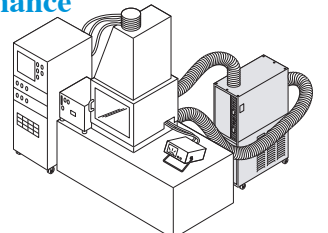
Desktop air-conditioning for testing material characteristics

The change in material characteristics due to the change in temperature and humidity can be prevented.



Air-conditioning during environmental or temperature performance testing of batteries

The life and performance of a battery change depending on temperature. Temperature evaluation can be conducted easily from laboratory to laboratory.



Precision Air-Conditioning & Cleaning Products

Precision Air-Conditioning Unit PAU Series

Most accurate temperature and humidity control in its class

Air-conditioning accuracy, which Apiste values most, has been improved further with a new control PCB and sensors developed by Apiste. Various new and more precise control functions have been added.

Temperature and humidity control accuracy: $\pm 0.1^{\circ}\text{C}$ or $\pm 0.2^{\circ}\text{C}$ and $\pm 2\%$ RH

Newly developed temperature and humidity sensor

A newly developed, compact sensor is incorporated to detect both temperature and humidity. Its small head reliably detects conditions surrounding the target. Even in an environment with high-velocity airflow, with high error rates among conventional models, the innovative body design eliminates detection errors to the greatest extent possible. The design and the advanced sensing circuit incorporating a 12-bit A/D converter have achieved accuracies of $\pm 0.2^{\circ}\text{C}/\pm 2\%$ RH. This sensing circuit also supports a platinum resistance thermometer, enabling control with $\pm 0.1^{\circ}\text{C}$ accuracy.

* The platinum resistance thermometer is optional.



Dual CPU

Newly developed ISC

Intelligent Sensing Control

Newly developed high-speed automatic calibration

First in industry



Various self-diagnosis functions and excellent operability

Newly designed operation panel with "Multi-indicators". More variety of diagnosis functions to ensure safety and reliability

Advanced self-diagnosis functions & alarm functions

Multi LED indicators show operating status at a glance

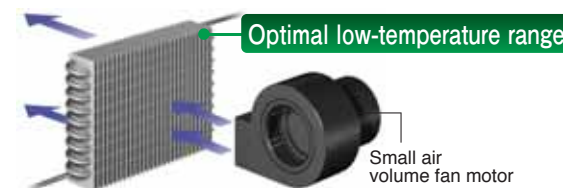
Large LED display with character height of 15 mm

Reliable operation



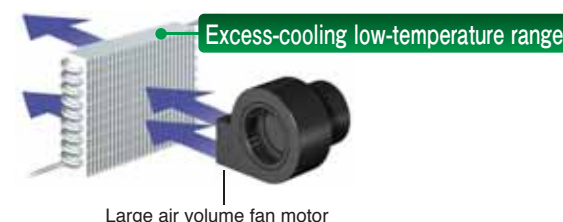
Low-pressure refrigeration method

The low-pressure refrigeration method provides constant stable control because the method is independent of the effects of air volume and ambient temperature changes. This allows the precision air-conditioner to run sequentially via non-defrosting operation (without having to periodically suspend operation to remove frost).



High-pressure refrigeration method

When refrigerant pressure is increased, the temperature inside the refrigeration coil becomes extremely low. Therefore, if the refrigeration coil does not receive large volumes of air, it may freeze up. In addition, ambient temperature change may also cause frosting. The above reasons are generally the cause of necessary down-time (operation suspended) to remove frost.

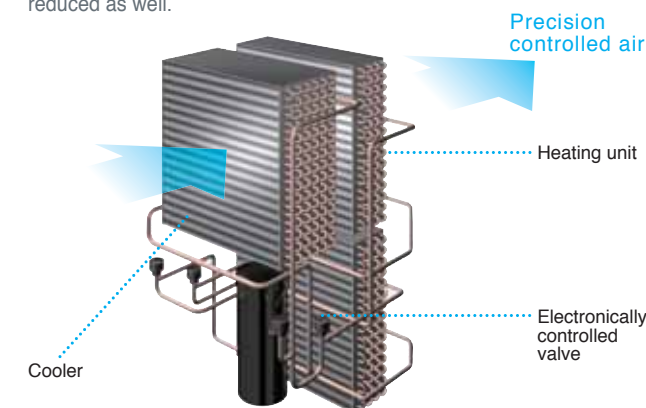


Innovative heater-free heating coil

Reuses exhaust heat produced during the cooling cycle

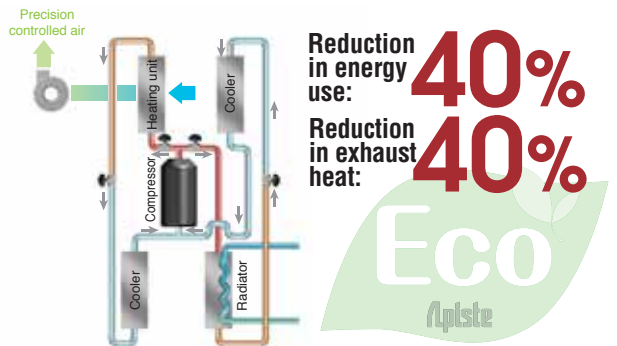
Heater-free design significantly reduces energy consumption by up to 40% when compared with conventional models

While conventional precision air-conditioning systems use a heater to control temperature during reheating, the PAU-AZ2000SE-DR reuses the exhaust heat produced during heat exchange in the cooling cycle. This fully heater-free design achieves a significant 40% reduction in energy consumption when compared to conventional models. Not only is it eco-friendly, but the running costs are significantly reduced as well.



Significantly reduces exhaust heat by 40% compared with conventional models

By using waste heat for temperature control, the PAU-AZ2000SE-DR reduces heat exhaust from the condenser by up to 40%. The PAU-AZ2000SE-DR reduces the influence on surrounding manufacturing conditions and test environments, and is able to suit any environment.



Real-time arithmetic processing

Dual CPU

Multitasking that utilizes a complete 32-bit CPU with built-in DSP and a high-speed co-processor to perform arithmetic processing of large volumes of data immediately in real time. The latest technologies required for high-precision and high stability, such as newly developed high-speed auto-tuning and Intelligent Sensing Control, can be processed at extremely high speed.

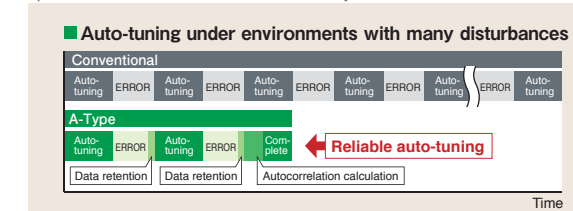


10 times the arithmetic processing speed of conventional models

First in industry

Newly developed high-speed auto-tuning

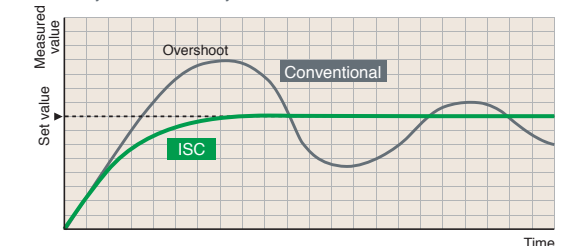
Dual processor configuration, containing both a CPU with built-in 32-bit DSP and a high-speed co-processor. Configured to perform arithmetic processing by several hundred steps at once to dramatically reduce the time required for auto-tuning. Even if sample data is unstable due to outside disturbances, the optimal PID value is determined immediately based on the observed waveform.



High stability and reliable controllability

Newly developed ISC

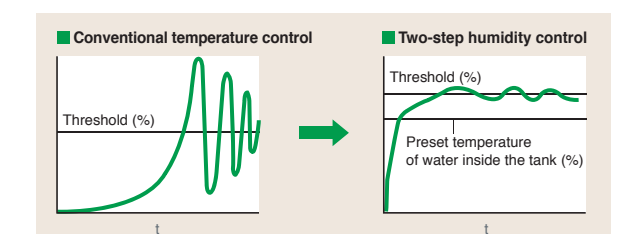
ISC (Intelligent Sensing Control) is our newly developed original product which uses dedicated PID control (a basic program for general-purpose temperature control) for precision air-conditioning. Algorithms for the control system have been developed based on a huge amount of accumulated data. The overshoot pattern of the conventional PID control is dramatically enhanced, and provides more stability and controllability than ever before.



Prevented excess overshoot

Newly developed two-step humidity control

Water temperature inside the humidifier is monitored constantly. If the water temperature reaches a certain temperature, the PID control starts. Unlike with general methods, this prevents excess overshoot and provides stable humidity control.



Specific

Air-cooled precision air-conditioning unit

Air-cooled precision air-conditioning unit			Temperature control type					Temperature control type (Energy-saving type)			Temperature & humidification control type				
Specific			PAU-300S	PAU-AR800S	PAU-AR1400S	PAU-AR2600S		PAU-AN1700SE	PAU-AN2800SE	PAU-A5000S	PAU-300S-HC	PAU-A920S-HC	PAU-A1400S-HC		
Performance	Temperature control range [°C]*1		20 ~ 30	20 ~ 30	20 ~ 30	20 ~ 30		20 ~ 30	20 ~ 30	20 ~ 30	20 ~ 30	20 ~ 30	20 ~ 30		
	Temperature control accuracy [°C]*1		±0.5	±0.1	±0.1	±0.1		±0.1	±0.1	±0.2	±0.5	±0.2	±0.2		
	Humidity control range [%]*1		—	—	—	—		—	—	—	40 ~ 60	40 ~ 80	40 ~ 80		
	Humidity control accuracy [%]*1		—	—	—	—		—	—	—	±2.0	±1.0	±1.0		
	Process airflow rate [m³/min]*2		0.8/1.0	1.8/2.0	4.2/4.6	9.0/9.1		5.5/5.8	11/11	18/20	0.8/1.0	2.1/2.3	3.7/4.8		
	Cooling capacity [W]*3		230/280	550/650	1200/1400	2000/2300		1200/1400	2150/2450	3500/4000	230/280	550/650	1200/1400		
	Humidification capacity [kg/h]		—	—	—	—		—	—	—	0.8	2.6	5.2		
	Dehumidification capacity [kg/h]		—	—	—	—		—	—	—	—	—	—		
	Allowable ambient temperature [°C]*4		20 ~ 35	20 ~ 35	20 ~ 35	20 ~ 35		20 ~ 35	20 ~ 35	20 ~ 35	20 ~ 35	20 ~ 35	20 ~ 35		
Allowable ambient humidity [%]*5		10 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85 (no condensation)		40 ~ 85	40 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85 (no condensation)	10 ~ 85 (no condensation)	10 ~ 85 (no condensation)			
Appearance	External dimension (H×W×D) [mm]*6		350×350×400	965×400×400	1065×400×600	1065×450×700		1065×400×650	1065×450×700	1640×652×800	350×350×600	965×400×615	1065×400×715		
	Mass [kg]		Approx. 29	Approx. 54	Approx. 74	Approx. 100		85	Approx. 108	Approx. 200	Approx. 44	Approx. 80	Approx. 98		
	Paint color	Main unit	Ivory (JPMA: Y22-85B eggshell)	Ivory (JPMA: Y22-85B eggshell)	Ivory (JPMA: Y22-85B eggshell)	Ivory (JPMA: Y22-85B eggshell)		Ivory (JPMA: Y22-85B eggshell)	Ivory (JPMA: Y22-85B eggshell)	Ivory (JPMA: Y22-85B eggshell)	Ivory (JPMA: Y22-85B eggshell)	Ivory (JPMA: Y22-85B eggshell)	Ivory (JPMA: Y22-85B eggshell)		
		Operating section	Dark gray (JPMA: Y55-40B eggshell)	Dark gray (JPMA: Y55-40B eggshell)	Dark gray (JPMA: Y55-40B eggshell)	Dark gray (JPMA: Y55-40B eggshell)		Dark gray (JPMA: Y55-40B eggshell)	Dark gray (JPMA: Y55-40B eggshell)	Dark gray (JPMA: Y55-40B eggshell)	Dark gray (JPMA: Y55-40B eggshell)	Dark gray (JPMA: Y55-40B eggshell)	Dark gray (JPMA: Y55-40B eggshell)		
Power supply	Air duct connection diameter [mm]		φ75	φ75	φ100	φ150		φ100	φ150	φ200	φ75	φ75	φ100		
	Power supply voltage [V]		Single phase AC100(50/60Hz)	Single phase AC100(50/60Hz)	3 phase AC200(50/60Hz)	3 phase AC200(50/60Hz)		3 phase AC200(50/60Hz)	Single phase AC200(50/60Hz)	3 phase AC200(50/60Hz)	Single phase AC100(50/60Hz)	3 phase AC200(50/60Hz)	3 phase AC200(50/60Hz)		
	Consumption current [A]		8/9	14.1/14.6	11.1/10.9	15.7/16.0		4.7/4.4	6.5/7.6	23/25	12/12	9.6/9.8	21.8/21.4		
	Electric power consumption [kW]		0.82/0.85	1.37/1.46	2.5/2.4	5.3/5.4		1.1/1.25	2.0/2.5	7.8/8.4	1.2/1.2	3.2/3.3	6.3/6.3		
Water section	Humidifier *7	Water supply volume [l/h]	—	—	—	—		—	—	—	0.9	3	6		
		Water supply pressure [MPa]	—	—	—	—		—	—	—	—	0.03 ~ 0.5	0.03 ~ 0.5		
		Water supply temperature [°C]	—	—	—	—		—	—	—	0 ~ 50	0 ~ 50	0 ~ 50		
		Water supply connection diameter	—	—	—	—		—	—	—	Manual type	15A female (Rc : 1/2 inches)	15A female (Rc : 1/2 inches)		
	Cooling water *7	Water volume	City water (20°C) [l/min]	—	—	—	—		—	—	—	—	—	—	
			Tower water (32°C) [l/min]	—	—	—	—		—	—	—	—	—	—	
		Cooling water pressure [MPa]	—	—	—	—		—	—	—	—	—	—	—	
			Cooling water temperature [°C]	—	—	—	—		—	—	—	—	—	—	—
				Cooling water connection diameter	—	—	—	—		—	—	—	—	—	—
Drainage connection diameter		Outer diameter φ16	Outer diameter φ16	Outer diameter φ16	Outer diameter φ16		Outer diameter φ16	—	Outer diameter φ16	Outer diameter φ16	20A female (Rc : 3/4 inches)	20A female (Rc : 3/4 inches)			
Component	Compressor		Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type		Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type		
	Refrigerant		R-134a	R-134a	R-134a	R-134a		R-134a	R-407c	R-407c	R-134a	R-134a	R-134a		
	Condenser		Fin and tube	Fin and tube	Fin and tube	Fin and tube		Fin and tube	Fin and tube	Fin and tube	Fin and tube	Fin and tube	Fin and tube		
	Cooler		Fin and tube	Fin and tube	Fin and tube	Fin and tube		Fin and tube	Fin and tube	Fin and tube	Fin and tube	Fin and tube	Fin and tube		
	Heating capacity [kW]		0.6	1.0	2.0	4.5		—	—	6.0	0.9	1.0	2.0		
	Humidifier		—	—	—	—		—	Fin and tube	—	Supersonic wave type	Closed-pan type(2.0kW)	Closed-pan type(4.0kW)		
	Dehumidifier		—	—	—	—		—	—	—	—	—	—		
	Condenser-specific blower [m³/min]		4.8/5.4	10.0/12.0	10.0/12.0	16.0/18.8		10/12	4.0/4.7×4	36/43	4.8/5.4	8.0/9.4	10.0/12.0		
	Refrigerant control		Capillary tube	Capillary tube	Capillary tube	Capillary tube		Capillary tube・Electronic liner control value	Capillary tube・Electronic liner control value	Capillary tube	Capillary tube	Capillary tube	Capillary tube		
	Cooling water control		—	—	—	—		—	—	—	—	—	—		
	Temperature sensor		Thermocouple (type K)	IC temperature sensor	IC temperature sensor	IC temperature sensor		IC temperature sensor	IC temperature sensor	IC temperature sensor	Thermocouple (type K)	IC temperature sensor	IC temperature sensor		
	Humidity sensor		—	—	—	—		—	—	—	Polymer resistor	Polymer resistor	Polymer resistor		
	Temperature control		PID control, digital indication	PID control, digital indication	PID control, digital indication	PID control, digital indication		PID control, digital indication	PID control, digital indication	PID control, digital indication	PID control, digital indication	PID control, digital indication	PID control, digital indication		
Humidity control		—	—	—	—		—	—	—	PID control, digital indication	PID control, digital indication	PID control, digital indication			
Display and output	Lamp display	Power supply	○	○	○	○		○	○	○	○	○	○		
		Warning	○	○	○	○		○	○	○	○	○	○		
		Blower	—	○	○	○		○	○	○	—	○	○		
		Compressor	—	○	○	○		○	○	○	—	○	○		
		Heater	—	○	○	○		—	○	○	—	○	○		
		Water supply	—	—	—	—		—	—	—	○	—	—		
		Humidifier	—	—	—	—		○	—	—	—	○	○		
		Humidity	—	—	—	—		—	—	—	—	—	—		
		Airflow rate warning	—	—	—	—		○	—	—	—	—	—		
	Error code displays	—	○	○	○		○	—	○	—	○	○			
Abnormality and judgment output	Main unit	—	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)		Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)	—	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)			
	Temperature	—	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)		Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)	—	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)			
	Humidity	—	—	—	—		—	—	—	—	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)			
Remarks			* Low temperature overheat protection circuit operates when the ambient temperature reaches 18°C or lower. (It is reset when the temperature reaches increases to 20°C.)				* Low temperature overheat protection circuit operates when the ambient temperature reaches 18°C or lower. (It is reset when the temperature reaches increases to 20°C.)			* Startup time of humidifying device varies slightly depending on the temperature of water to be supplied.					
	*1 These values are obtained at the air discharge port of the PAU unit in a surrounding environment of 25°C/40% RH. The PAU unit may not offer the rated temperature control accuracy depending on the ambient temperature/humidity. *2 Make sure that you do not excessively reduce the volume of the evolving airflow to prevent freezing. (Please contact us for more information.) *3 These values are obtained in a surrounding environment of 25°C/40% RH. *4 Performance does not cover all temperature control ranges. *5 Performance does not cover all humidity control ranges. *6 It excludes flange at the air discharge port. *7 It cannot be used with extra pure water.														

Air-cooled precision
air-conditioning unit

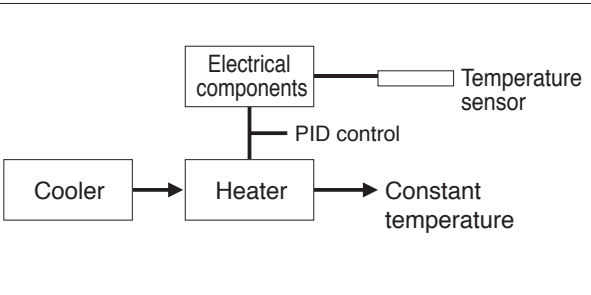
Air-conditioning precision air-conditioning unit			Temperature & humidification control type		Hot air & humidification control type	Temperature & dehumidification control type (Super dehumidification type)	Hot air & humidification control type		Temperature control type (Wide-range temperature control type)	Temperature control type (International standard compliant type)					
Specific			PAU-A2600S-HC	PAU-A3500S-HC	PAU-H3200-6KHC	PAU-1300S-DR	PAU-AZ2000SE-DR		PAU-800RW	PAU-820S-CU	PAU-1300S-CU	PAU-A820S-CE	PAU-1300S-CE	PAU-AR2623-CE	
Performance	Temperature control range [°C]*1		20 ~ 30	20 ~ 30	0 ~ 55	20 ~ 30	20 ~ 50		-5 ~ 65	20 ~ 30	20 ~ 30	20 ~ 30	20 ~ 30	20 ~ 30	
	Temperature control accuracy [°C]*1		±0.2	±0.2	±0.5	±0.5	±0.1		±0.5	±0.5	±0.5	±0.2	±0.5	±0.1	
	Humidity control range [%]*1		40 ~ 80	40 ~ 80	0 ~ 85	Less than 30	Below Twb 4°C - OA		-	-	-	-	-	-	
	Humidity control accuracy [%]*1		±1.0	±1.0	±2.0	No specific control	±0.5		-	-	-	-	-	-	
	Process airflow rate [m³/min]*2		8.0/8.5	21/24	5.3/6.1	5.8/6.0	5.0/6.0 ~ 20.0/22.0		1.2/1.4	1.9/2.1	3.3/4.0	2.0/2.3	3.3/4.0	10.7/11.0	
	Cooling capacity [W]*3		2100/2450	3500/4500	-	3400/4100	4200/4800		600	550/650	1200/1400	550/650	1200/1400	2000/2300	
	Humidification capacity [kg/h]		11.7	15.6	5.2	-	-		-	-	-	-	-	-	
	Dehumidification capacity [kg/h]		-	-	-	-	-		-	-	-	-	-	-	
	Allowable ambient temperature [°C]*4		20 ~ 35	20 ~ 35	0 ~ 40	20 ~ 30(23 ~ 27)	15-35 (Temperature gradient: within 1°C /hour) 15 ~ 85 (Temperature gradient: within 5% RH /hour) (No condensation)		20 ~ 30	20 ~ 35	20 ~ 35	20 ~ 35	20 ~ 35	20 ~ 35	20 ~ 35
Allowable ambient humidity [%]*5		10 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85(30 ~ 70) (no condensation)			10 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85(no condensation)	10 ~ 85(no condensation)	
Appearance	External dimension (H×W×D) [mm]*6		1065×450×900	1481×650×115	1065×400×900	1481×650×800	1631×650×800		1065×400×700	865×400×400	1065×400×700	965×400×400	1065×400×700	1065×450×700	
	Mass [kg]		Approx. 120	Approx. 260	95	Approx. 180	220		85	50	80	52	80	100	
	Paint color	Main unit Operating section	Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	Ivory (JPMA: Y22-85B eggshell) -		Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	Ivory (JPMA: Y22-85B eggshell) Dark gray (JPMA: Y55-40B eggshell)	
Air duct connection diameter [mm]			φ150	φ200	φ150	φ150	Φ200 (with damper)		φ75	φ75	φ100	φ75	φ100	φ100	
Power supply	Power supply voltage [V]		3 phase AC200(50/60Hz)	3 phase AC200(50/60Hz)	3 phase AC200(50/60Hz)	3 phase AC200(50/60Hz)	3 phase AC200(50/60Hz)		Single phase AC100(50/60Hz)	3 phase AC200(50/60Hz)	3 phase AC200(50/60Hz)	Single phase AC200(50/60Hz)	3 phase AC200(50/60Hz)	3 phase AC200(50/60Hz)	
	Consumption current [A]		41.5/41.9	63.2/64.6	30	17/20	12/12		19/19	5.6/5.6	13.2/12.9	6.9/6.8	11.9/11.5	23.1/24.3	
	Electric power consumption [kW]		15/15	21.8/22.3	10.2	5.7/6.7	3.3/3.9		1.9/2.0	1.2/1.2	2.4/2.4	1.4/1.4	2.4/2.4	1.13/1.4	
Water section	Humidifier *7	Water supply volume [l/h]	13.5	18	6	-	-		-	-	-	-	-	-	
		Water supply pressure [MPa]	0.03 ~ 0.5	0.03 ~ 0.5	0.03 ~ 0.5	-	-		-	-	-	-	-	-	
		Water supply temperature [°C]	0 ~ 50	0 ~ 50	0 ~ 50	-	-		-	-	-	-	-	-	
		Water supply connection diameter	15A female (Rc : 1/2 inches)	15A female (Rc : 1/2 inches)	15A female (Rc : 1/2 inches)×1	-	-		-	-	-	-	-	-	
	Cooling water *7	Water volume	City water (20°C) [l/min] Tower water (32°C) [l/min]	- -	- -	- -	- -	- -		- -	- -	- -	- -	- -	- -
		Cooling water pressure [MPa]	-	-	-	-	-		-	-	-	-	-	-	
		Cooling water temperature [°C]	-	-	-	-	-		-	-	-	-	-	-	
		Cooling water connection diameter	-	-	-	-	-		-	-	-	-	-	-	
	Drainage connection diameter			20A female (Rc : 3/4 inches)	20A female (Rc : 3/4 inches)	20A female (Rc : 3/4 inches)	Outer diameter φ16	Outer diameter Φ16		Outer diameter φ16	Outer diameter φ16	Outer diameter φ16	Outer diameter φ16	Outer diameter φ16	Outer diameter φ16
	Component	Compressor		Rolling piston rotating type	Rolling piston rotating type	-	Rolling piston rotating type	-		Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type	Rolling piston rotating type
Refrigerant		HFC-134a	R-407c	-	R-407c	R-407c 1600g		R-134a	R-134a	R-134a	R-134a	R-134a	R-134a		
Condenser		Fin and tube	Fin and tube	-	Fin and tube	-		Fin and tube	Fin and tube	Fin and tube	Fin and tube	Fin and tube	Fin and tube		
Cooler		Fin and tube	Fin and tube	-	Fin and tube	-		Fin and tube	Fin and tube	Fin and tube	Fin and tube	Fin and tube	Fin and tube		
Heating capacity [kW]		4.5	7.8	6.0	3.0	7.2/7.8		1.6	1.0	2.0	1.0	2.0	4.5		
Humidifier		Closed-pan type(9.0kW)	Closed-pan type(12.0kW)	Closed-pan type(4.0kW)	-	-		-	-	-	-	-	-		
Dehumidifier		-	-	-	-	-		-	-	-	-	-	-		
Condenser-specific blower [m³/min]		16.0/18.8	32.5/41.5 (Inverter control)	-	32.5/41.5	33.4/39.2		8.0/9.4	8.0/9.4	10.0/12.0	8.0/9.4	10.0/12.0	16.0/18.8		
Refrigerant control		Capillary tube	Capillary tube	-	Capillary tube	-		Capillary tube	Capillary tube	Capillary tube	Capillary tube	Capillary tube	Capillary tube		
Cooling water control		-	-	-	-	-		-	-	-	-	-	-		
Temperature sensor		IC temperature sensor	IC temperature sensor	Thermocouple (type K)	Thermocouple (type K)	-		Thermocouple (type K)	Thermocouple (type K)	Thermocouple (type K)	Thermocouple (type K)	IC temperature sensor	Thermocouple (type K)	IC temperature sensor	
Humidity sensor		Polymer resistor	Polymer resistor	Polymer resistor	Polymer resistor	-		-	-	-	-	-	-		
Temperature control		PID control, digital indication	PID control, digital indication	PID control, digital indication	PID control, digital indication	-		PID control, digital indication	PID control, digital indication	PID control, digital indication	PID control, digital indication	PID control, digital indication	PID control, digital indication	PID control, digital indication	
Humidity control		PID control, digital indication	PID control, digital indication	PID control, digital indication	PIDInverter control digital indication	-		-	-	-	-	-	-	-	
Display and output	Lamp display	Power supply	○	○	○	○	○		○	○	○	○	○	○	
		Warning	○	○	○	○	○		○	○	○	○	○	○	
		Blower	○	○	○	○	○		○	○	○	○	○	○	
		Compressor	○	○	-	○	○		○	○	○	○	○	○	
		Heater	○	○	○	○	○		○	○	○	○	○	○	
		Water supply	-	-	○	-	-		-	-	-	-	-	-	
		Humidifier	○	○	○	-	-		-	-	-	-	-	-	
		Humidity	-	-	-	○	○		-	-	-	-	-	-	
		Airflow rate warning	-	-	-	-	-		-	-	-	-	-	-	
	Error code displays		○	○	-	○	○		-	-	-	○	-	-	
Abnormality and judgment output	Main unit	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)	a contact no voltage(AC250V/5A/load resistance)	a contact no voltage(AC250V/1A/load resistance)	B contact no voltage (AC250V/5A/load resistance)		Contact output (no-voltage a contact: 250V 5A)	Contact output (no-voltage a contact: 250V 5A)	Contact output (no-voltage a contact: 250V 5A)	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 5A)	Contact output (no-voltage a contact: 250V 5A)		
	Temperature	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)	a contact no voltage(AC250V/1A/load resistance)	a contact no voltage(AC250V/1A/load resistance)	B contact no voltage (AC250V/1A/load resistance)		Contact output (no-voltage a contact: 250V1A)	-	Contact output (no-voltage a contact: 250V1A)	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V1A)	Contact output (no-voltage a contact: 250V1A)		
	Humidity	Contact output (no-voltage a contact: 250V 3A)	Contact output (no-voltage a contact: 250V 3A)	a contact no voltage(AC250V/1A/load resistance)	a contact no voltage(AC250V/1A/load resistance)	-		-	-	-	-	-	-		
Remarks			* Startup time of humidifying device varies slightly depending on the temperature of water to be supplied.		* High-humidity control of temperature and humidity of a space that has not been insulated at low temperature may cause dew condensation on the inner wall surface of the space. Please provide a measure for heat insulation.		* Low temperature overheat protection circuit operates when the ambient temperature reaches 18°C or lower. (It is reset when the temperature reaches increases to 20°C.)		* Please provide the enclosure with a measure for heat insulation as well, based on insulation hose and internal circulation as a standard set. * Cooler is switched over every 30 minutes for dehumidification.		* Low temperature overheat protection circuit operates when the ambient temperature reaches 18°C or lower. (It is reset when the temperature reaches increases to 20°C.)				
			*1 These values are obtained at the air discharge port of the PAU unit in a surrounding environment of 25°C/40% RH. The PAU unit may not offer the rated temperature control accuracy depending on the ambient temperature/humidity. *2 Make sure that you do not excessively reduce the volume of the evolving airflow to prevent freezing. (Please contact us for more information.) *3 These values are obtained in a surrounding environment of 25°C/40% RH. *4 Performance does not cover all temperature control ranges. *5 Performance does not cover all humidity control ranges. *6 It excludes flange at the air discharge port. *7 It cannot be used with extra pure water.						*1 These values are obtained at the air discharge port of the PAU unit in a surrounding environment of 25°C/40% RH. The PAU unit may not offer the rated temperature control accuracy depending on the ambient temperature/humidity. *2 Make sure that you do not excessively reduce the volume of the evolving airflow to prevent freezing. (Please contact us for more information.) *3 These values are obtained in a surrounding environment of 25°C/40% RH. *4 Performance does not cover all temperature control ranges. *5 Performance does not cover all humidity control ranges. *6 It excludes flange at the air discharge port. *7 It cannot be used with extra pure water.						

Technical References

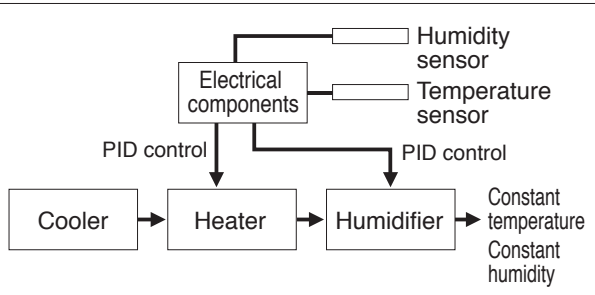
1. Operating principle of the PAU unit

The PAU unit consists of electrical components, a cooler, and a heater.
(The humidity control type also includes a humidifier.)

■ Temperature control type



■ Temperature and humidity control type



2. Cooling method

The PAU unit uses two cooling methods. The air-cooled type is a method commonly used in home air-conditioners. It exchanges heat using outside air. The water-cooled type exchanges heat using water.

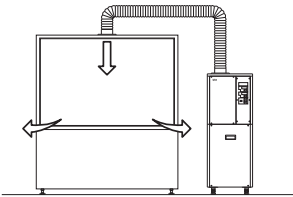
	Air-cooled type	Water-cooled type
Operating principle	Heat is exchanged using outside air.	Heat is exchanged using water supplied externally.
Heat discharge	Hot air is discharged to the outside.	Hot air is not discharged to the outside.
Unit size	Small	Large
Applicable space	Small to medium space	Small to large space
Installation	Easy	Cooling water piping must be installed.
Incidental systems	None required	Tower water Tap water or purified water

1. Chiller facility: A cooling water circulating system equipped with a tank pump which can control water temperature.

3. Connection method

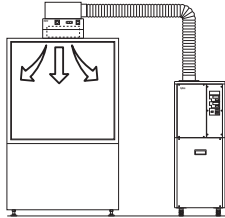
(1) One-pass method

The controlled air from the precision air-conditioning unit passes through the system only once.



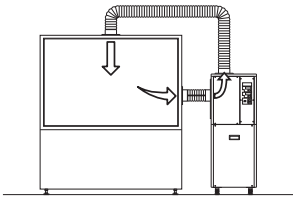
(3) Combination with the clean fan filter unit

The temperature and humidity controlled air is sent through the fan filter unit incorporating the HEPA filter, which then provides cleaned air.



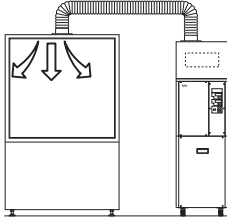
(2) Internal circulation method

The air supplied into the enclosure is returned to the precision air-conditioning unit.



(4) Built-in HEPA filter

The HEPA filter is built into the precision air-conditioning unit. The air can be cleaned without installing the fan filter unit.



4. Cleanroom standards

(1) U.S. Federal Standard 209

Cleanroom class

The class limit is used as the class name. The limit is shown as the concentration of particles (number of particles in a volume unit) which have the specified diameter or larger.

Class limits	0.1 μm	0.2 μm	0.3 μm	0.5 μm	5 μm
Class name	Volume units	Volume units	Volume units	Volume units	Volume units
U.S. FED. STD. 209E, 1992	m ³ ft ³	m ³ ft ³	m ³ ft ³	m ³ ft ³	m ³ ft ³
1	350 9.91 1,240 35.0 3,500 99.1	75.7 2.14 265 7.5 757 21.4	30.9 0.875 106 3.00 309 8.75	10 0.283 35.3 1 100 2.83	— — — — — —
10	12,400 350 35,000 991	2,650 75 7,570 214.4	1,060 30 3,090 87.5	353 10 1,000 28.3	— — — —
100	— —	26,500 750.4 75,700 2140.4	10,600 300 30,900 875	3,530 100 10,000 283	— — — —
1000	— —	— —	— —	35,300 1,000 100,000 2,830	247 7.00 618 17.5
10000	— —	— —	— —	353,000 10,000 1,000,000 28,300	2,470 70.0 6,180 175
100000	— —	— —	— —	3,530,000 100,000 10,000,000 283,000	24,700 700 61,800 1,750

(2) ISO Standard

ISO/TC209 cleanroom class

	0.1 μm	0.2 μm	0.3 μm	0.5 μm	1 μm	5 μm
ISO1	10	2				
ISO2	100	24	10	4		
ISO3	1,000	237	102	35	8	
ISO4	10,000	2,365	1,018	352	83	
ISO5	100,000	23,651	10,176	3,517	832	29
ISO6	1,000,000	236,514	101,763	35,168	8,318	293
ISO7				651,676	83,176	2,925
ISO8				3,516,757	831,764	29,251
ISO9				35,167,572	8,317,638	292,511

5. Typical ventilation method

	Down-flow method	Turbulent flow method	Other common method
Overview			
Remark	Uniform distribution of temperature, humidity, and cleanliness can be achieved.	There are non-uniform areas at the four corners of the booth.	The areas close to the air outlets are fine, but uniformity decreases with the distance from the air outlets.
Cost	High	Rather high	Relatively low
Cleanroom class	Class 1 to 100	Class 1,000 to 100,000	Class 1,000 to 100,000
Cleanroom class during operation	Little operator influence	Operator influence in certain circumstances	Significant operator influence depending on the layout
Operating cost	High	Rather high	Low
Equipment cost	High	Relatively low	Lowest
Maintainability	Many man-hours	Some man-hours	Easy
Non-uniform control	Little	Four corners	Farthest end from the air outlet

Selection and Details

Determine factors appropriate to your situation before selecting the PAU unit.

Condition	Item	Requirement/Current Status
Installation	1 Target space	H () x W () x D () m
	2 Space volume	() m ³
	3 Target temperature	() °C ± () °C
	4 Target humidity	() % ± () %
	5 Required cleanroom class	Class ()
	6 Required ventilation cycle	() times/hour
	7 Ventilation method	All fresh or Return
	8 Refrigeration method	Air-cooled or Water-cooled
	9 Estimated heat generation within the target space	() W
Environment	10 Ambient temperature	() °C ± () °C
	11 Ambient humidity	() % ± () %
	12 Ambient cleanroom class	Class ()
Utility	13 Power supply/phase	() VAC, () -phase
	14 Supply water	Tap water or Purified water
	15 Water drain	Possible or Not possible

Read the following carefully before determining the conditions above.

a) Target space and space volume (1, 2)

Specifying an unnecessarily large space may apply greater load on the precision air-conditioning unit, resulting in the need for higher capacity than expected. It may also cause fluctuation in temperature, humidity, and cleanliness. It is important to determine the exact space and size you require.

If equipment installed inside the space occupies a large volume, you can subtract it from the target space. Air-conditioning is possible even when the space is not perfectly airtight, however, some efficiency will be lost. Contact Apiste for details.

b) Target temperature and target humidity (3, 4)

If you specify a strict control range (i.e. air-conditioning accuracy) for the target temperature and humidity, you also need to consider potential disturbances inside and outside the target space as well as the control method and stability of the air-conditioning unit. These may lead to cost increase. It is recommended to provide allowances for the temperature and humidity conditions as much as you can. Since the temperature and humidity conditions in the target space are greatly affected by the ambient environment, you should examine the ambient environment thoroughly.

c) Ambient temperature and ambient humidity (10, 11)

As for the ambient temperature and humidity outside the target space, there may be differences between your control values and actual values. If the air-conditioning ability or heat-insulating measures of the surrounding space are insufficient, or of production lines or production volume is expanded, the cooling/heating ability may be insufficient, causing an unexpected rise or fall in the room temperature, or irregular room temperature and humidity. Low surrounding room temperature in winter may prevent proper operation of the air-conditioning unit. Consequently, be sure to check the maximum and minimum values throughout the year. You need to fully confirm the ambient temperature and humidity because they will affect the unit installation conditions greatly.

d) Required cleanroom class in the target space (5)

The cleanroom class in the target space varies depending on ventilation method, ventilation type, wind speed, filter performance, airtightness of the space, etc. When a stricter cleanroom class is required, down-flow ventilation is necessary to provide uniform and stable wind volume. When typical turbulent flow ventilation is used, non-uniform areas occur in the upper region of the space. The higher the requirement, the greater the filter performance required, and the higher the maintenance costs.

e) Ambient cleanroom class (12)

It is ideal that the ambient cleanroom class be close to the required cleanroom class. Although the ambient class is low, the required class may be achieved within the target space by setting higher wind volume and using higher performance filters. Note that, in such a case, the higher performance filters become dirty faster, resulting in more frequent maintenance.

f) Required ventilation cycle (6)

The required ventilation cycle depends on the required cleanroom class within the target space. If a stricter class is required, clean air must be supplied more frequently.

g) Ventilation method (7)

There are two ventilation methods: All fresh (one-pass) and return (circulation). Refer to the comparison table below for details.

	All fresh	Circulation
Cost	High	Low
Operating cost	High	Low
Air-conditioning accuracy	High	Some nonuniform areas
Maintenance cost	Frequent filter replacement	Less filter replacement when no dust is generated inside
Organic solvent generation ^{*1}	No problem	Inapplicable
Door opening	Can restore the status properly when the door is opened frequently	Cannot restore the status properly when the door is opened frequently
Diagram		

^{*1}: Where a machine generating gases or organic solvent exists inside the booth.

h) Refrigeration method (8)

Precision air-conditioning units are broadly categorized into two types based on their cooling method: air-cooled and water-cooled. In general, air-cooled units can be installed extremely easily, so that a precisely air-conditioned space can be achieved easily and quickly. Water-cooled units are used when higher refrigerating capacity is required for a larger space. Since water-cooled units are less affected by external disturbances, they are also suitable for spaces requiring high accuracy. Water-cooled units offer clean air-conditioning without discharging air or heat to the space outside the targeted zone.

i) Estimated heat generation within the target space (9)

If any heat source exists inside the target space, cooling ability must be commensurate with the heat generation. To determine the estimated heat generation from various control devices, refer to the list detailing heat generation from devices.

Precise Air-Conditioning Consultation Sheet

If you have any problems or questions, copy this page, fill it out, and fax it to us.

FAX 81-6-6343-0729

To Apiste technical support

Q1 Do you need temperature control? ☐ Yes ☐ No

➡ Target temperature: _____ °C ± _____ °C
Ambient temperature: _____ °C ± _____ °C

Q2 Do you need humidity control? ☐ Yes ☐ No

➡ Target temperature: _____ % ± _____ %
Ambient temperature: _____ % ± _____ %

Q3 What is the size of the target space?

➡ H= _____ mm W= _____ mm D= _____ mm

Q4 Do you need to meet a cleanroom class? ☐ Yes ☐ No

➡ ☐ Class 100 ☐ Class 1,000 ☐ Class 10,000 ☐ Class 100,000

Q5 Describe your problem, question, or requirement.

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Address	Zip code		
Company	Department		
Name	Telephone		

Apiste complies with laws and regulations for protecting personal information. Your address, department, name, and other personal information will be used only for purposes of presenting information about improving efficiency or suggestions for improvement which may be useful for production sites or R&D operations.



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