

SPECIFICATIONS
PARTICLE COUNTER
KC-24



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Outline

The light-scattering type airborne particle counter KC-24 is designed to measure the size and number of air-borne particles using the light-scattering method, to determine the particle number concentration.

This unit conforms to ISO 21501-4:2007 “Determination of particle size distribution - Single particle light interaction methods - Part 4: Light scattering airborne particle counter of clean spaces”.

In a single measurement, the KC-24 can determine the particle count in five size ranges ($\geq 0.1 \mu\text{m}$, $\geq 0.15 \mu\text{m}$, $\geq 0.2 \mu\text{m}$, $\geq 0.3 \mu\text{m}$, and $\geq 0.5 \mu\text{m}$) which is useful for example to manage particle number concentration zones in cleanrooms and similar. The air flow rate is 28.3 L/min.

The measurement result can be displayed as cumulative particle count for the measurement time, differential count between particle channels, or number concentration (particle count per sample volume). When the number concentration is displayed, selectable sample volume are 1 L, 28.3 L or 1000 L. Switching between different display settings during measurement is possible.

When a CompactFlash™ card is inserted in the unit, measurement data can be stored automatically as CSV (Comma Separated Value) format. Printout of measurement results on a thermal printer (factory option) is also possible.

The built-in serial interface (RS-232C and RS-485) allows for communication with a computer.

The built-in manifold connector supports connection of a manifold controller for configuration of a tube multi-point monitoring system.

Cleanroom air cleanliness evaluation is possible in compliance with ISO 14644-1:1999 “Cleanrooms and associated controlled environments - Part 1: Classification of air cleanliness”. Measurement parameter settings and measurement data as well as evaluation results are stored automatically on an inserted CompactFlash™ card as CSV format.

While the power is off, the measurement parameter settings is memorised automatically. The unit starts up with the same settings as power-off.

An alarm level can be set to sound a warning tone and control external equipment such as a fan when the particle count exceeds a preset threshold.

- * This product shall not be brought into and/or used in the U.S.A.
- * All company names and product names mentioned in this specifications are trademarks or registered trademarks of their respective owners.

Specifications

Sensor

Optical system	90° sideways light-scattering method
Light source	Laser-diode pumped solid state laser (wavelength 1064 nm), open-cavity type
	Laser diode: Wavelength 808 nm, rated output power 1 W
	Laser medium: Nd:YVO4

Laser product classification

Class 1, IEC 60825-1 (2001)
Internal particle detection mechanism uses Class 3B and Class 4 lasers

Collecting optics Spherical lenses (condensing half-angle 40 degrees)

Light detector Photodiode

Fluid system Planar sample nozzle, sheath, purge air principle

Main unit

Sample flow rate 28.3 L/min (standard uncertainty: less than or equal to 5%)

Pump Rotary carbon vane type (DC brushless motor)

Flow control Pressure-sensitive automatic control (-6 kPa to +2 kPa)

Accuracy of measurement time

Standard uncertainty: less than or equal to 1%

Calibration

Conform to ISO 21501-4:2007

By polystyrene latex (PSL) particles (refractive index 1.6, standard uncertainty: less than or equal to 2.5%)

Calibration cycle: within one year after calibration

Minimum detectable particle size

0.1 μm (for spherical particles with refractive index 1.6)

For calibration, PSL particles from JSR Corporation weighted according to the DMA (Differential Mobility Analysis) method were used.

Particle size ranges

Five channels ($\geq 0.1 \mu\text{m}$, $\geq 0.15 \mu\text{m}$, $\geq 0.2 \mu\text{m}$, $\geq 0.3 \mu\text{m}$, $\geq 0.5 \mu\text{m}$)

Accuracy of particle size ranges: $\pm 10\%$ for three channels ($\geq 0.1 \mu\text{m}$, $\geq 0.15 \mu\text{m}$, $\geq 0.3 \mu\text{m}$)

Counting efficiency	50% ± 20% (measuring PSL particles in the range of 0.1 µm, using count of 0.1 µm and above for comparison with reference unit) 100% ± 10% (measuring PSL particles in the range with 1.5 to 2 times of 0.1 µm, using count of 0.1 µm and above for comparison with reference unit)
Size resolution	Less than or equal to 15% (in the vicinity of 0.1 µm)
Response rate	Less than or equal to 0.1%
Maximum particle number concentration	1,000 particles/L (coincidence loss within 5%) 2,000 particles/L (coincidence loss within 10%)
False count rate	Less than or equal to 2 particles per m ³ (95% confidence interval)
Measurement time (setting possible in remote mode by command from the computer)	
Arbitrary:	00:00:10 to 02:00:00 (1 sec steps), and manual (up to 48 hours)
Sample volume:	10 L (21 sec), 28.3 L (1 min), 100 L (3 min 32 sec), 283 L (10 min), 1000 L (35 min 20 sec)
Measurement modes	
Manual measurement	Measurement controlled with START and STOP buttons. Continuous measurement is carried out between pressing START and STOP.
Automatic measurement	
Averaging measurement	Repeated measurement up to 99 times of preset time or volume and averaging of results (no averaging if 1 measurement only is specified)
Periodic measurement	Averaging measurement carried out at each specified time interval (00:00:10 to 24:00:00)
Count display	Cumulative, differential, number concentration (unit: 1 L, 28.3 L, 1000 L)
Location number	0 to 31
Memory function	Automatic saving of measurement data as CSV format text on CF card CF card is formatted on external computer Only FAT 16 file system is supported

Air cleanliness evaluation function	Air cleanliness evaluation according to ISO 14644-1 Besides standard evaluation method, sequential sampling method is also available for evaluation. When using this function, measurement parameters, measurement data, and evaluation result data are automatically saved on CompactFlash™ card as CSV format text.
Alarm function	Buzzer sounds and ALARM terminals are closed by relay when particle count in specified channel exceeds specified alarm level.
Alarm level setting	1 to 9,999,999 particles (in 1-particle steps), and off
Maximum load	30 V DC, 1 A
Display	LCD (320 × 240 dot matrix type, with backlight)
Measurement screen	Measurement value (8 digits, 9999999.9 counts max., single-size display or all-size display), date and time, remaining measurement time, error message, setting and displaying of measurement parameters, etc.
System configuration screen	Date, time, communication parameters, auto print, flow rate and other system settings
Air cleanliness evaluation screen	Cleanliness evaluation settings, measurement, evaluation, etc.
LED indicators	
COUNT	Shows measurement status <ul style="list-style-type: none"> • Lit green when counting is in progress • Flashes green when sample air particle number concentration exceeds maximum rating • Off when measurement is stopped
FLOW	Shows sample air flow status <ul style="list-style-type: none"> • Lit green when sample air flow is normal • Flashes green when sample air flow is between -3 to -5% or +3 to +5% outside of rated range • Flashes red when sample air flow is more than ± 5% outside of rated range • Off when pump is stopped

LASER Shows light source and particle sensor status

- Lit green when light source is operating normally
- Flashes red when light source output has fallen below rated level or when internal DC component errors are detected
- Lit red when temperature of light source is outside of rated range
- Off when light source is off

CARD Shows inserted CF card status

- Lit green when CF card is inserted
- Lit red when CF card has been accessing
- Off when CF card is not inserted

Controls

START button Starts measurement

STOP button Stops measurement

PARTICLE SIZE button Switches particle sizes for display

△, ▽ buttons Control the cursor movement

FUNCTION buttons F1 to F4 Perform various functions as indicated on display

CONTRAST volume Adjusts display contrast

Input/output connectors

ALARM Terminals are closed by relay when the alarm occurs

EXT START/STOP (factory option) For external measurement start/stop control

Internal interface

I/O connector Connector for both RS-232C and RS-485 interface
For communication with computer etc.

Connector type: 9-pin male D-sub connector

Communication parameters for RS-232C

Transmission configuration:

Full-duplex, asynchronous

Baud rate: 4800 or 9600 bps

Data word length:

7 bits or 8 bits

Parity: Even, odd, or none

Stop bits: 1 or 2

Terminator: <CR LF> or <CR>

MANIFOLD For connection of manifold controller
(Model A2432: Hach Ultra Analytics)

Thermal printer (factory option)

	Internal printer allows printing of various information
Printing method	Thermal
Print width	48 mm
Inlet	For sample air input
Outlet	For filtered sample air output
Applicable standard	ISO 21501-4:2007
Power requirements	100 to 240 V AC, 50/60 Hz 300 VA (ambient temperature 25°C; 200 VA when manifold is not connected)

Environmental Requirements

Operation Environments

	Indoor Use Only
Altitude	Up to 2000 m
Supply Voltage Fluctuations	100 to 240 V AC \pm 10%
Overvoltage Category	II
Pollution Degree	2
Protection Class	I

Ambient conditions for storage

-10°C to +50°C, 90% RH or less (no condensation)

Ambient conditions for operation

+15°C to +30°C, 20% to 85% RH (no condensation)

Sample air temperature and humidity range

+15°C to +30°C
(within -4°C and +10°C of ambient temperature for operation)
20% to 85% RH (no condensation)

Warm-up time 30 minutes (15 minutes at ambient temperature 25°C)

Dimensions 344 (H) × 323 (W) × 460 (D) mm (max.)
280 (H) × 320 (W) × 450 (D) mm (without protruding parts)

Weight Approx. 19.4 kg

Supplied accessories

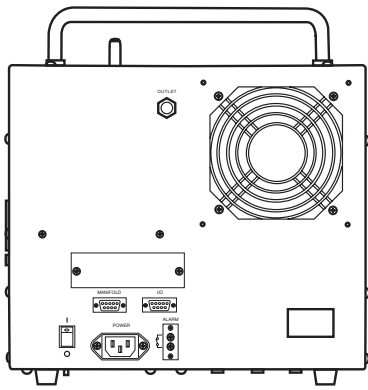
Sampling pipe	1
Sampling tube (vinyl tube with 11 × 7 dia., 2 m)	1
Filter	1
128 MB CompactFlash™ card MC-12CF1	1
Power cord (for use in Japan with 100 V AC, 2.5 m)	1
Instruction manual	1
Concise manual	1
Inspection certificate	1

Factory options

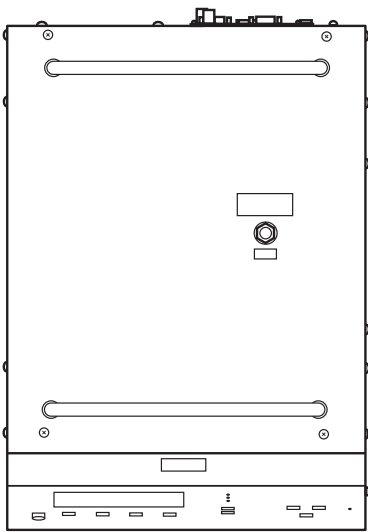
Thermal printer (thermal paper (2 rolls) supplied)
EXT START/STOP

Options

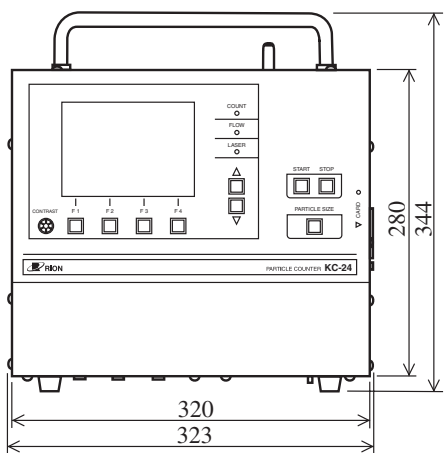
CompactFlash™ card (formatted)	MC-25CF1: 256 MB
CompactFlash™-PCMCIA adapter	MC-CFADP
Interface cable (For connection to DTE with 9-pin male D-sub connector)	CC-62DA
Cart	
Printer paper	
Thermal paper	TP-08 (6 rolls/set)
Lint-free thermal paper	TP-10 (6 rolls/set)



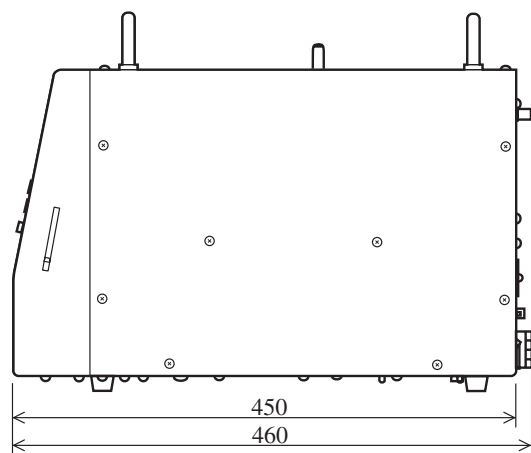
Rear view



Top view



Front view



Right side view

Unit: mm

Dimensional Drawings

Specifications subject to change without notice