SPECIFICATIONS

PARTICLE COUNTER

KC-24

RION CO., LTD.

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No. 24241E 24-12 Printed in Japan

Outline

The light scattering type airborne particle counter KC-24 is designed to measure the size and number of airborne 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 for clean spaces”, JIS B 9921:2010 “Light scattering airborne particle counter for clean spaces”, and ISO 21501-4:2018 “Determination of particle size distribution-Single particle light interaction methods-Part 4: Light scattering airborne particle counter for clean spaces” (factory option).

In a single measurement, the KC-24 can determine the particle count in five size ranges (≥0.1 μm, ≥0.15 μm, ≥0.2 μm, ≥0.3 μm, and ≥0.5 μm) 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 memorized 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.

Specifications

Sensor

Optical system	90° sideway 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: $Nd:YVO_4$
Laser product class	Class 1, IEC 60825-1:2014 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

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, JIS B 9921:2010, and ISO 21501-4:2018 (factory option) 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)
Size ranges	Five channels (≥0.1 μm, ≥0.15 μm, ≥0.2 μm, ≥0.3 μm, ≥0.5 μm) Accuracy of size ranges: ±10% for three channels (≥0.1 μm, ≥0.15 μm, ≥0.3 μm)

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	7 particles/m^3 or less (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
  - 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
  - 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 size ranges 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 bps 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 — Not for use with the Manifold K1402

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 ISO 21501-4:2018 (factory option) JIS B 9921:2010
Power	100 V to 240 V AC, 50/60 Hz 300 VA (environmental 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 V to 240 V AC ± 10%
Overvoltage Category	Ⅱ
Pollution Degree	2
Protection Class	Ⅰ
Environmental conditions for storage	
	−10°C to +50°C, 90%RH or less (no condensation)
Environmental 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 environmental temperature for operation) 20% to 85%RH (no condensation)
Warm-up time	30 minutes (15 minutes at environmental temperature 25°C)
Dimensions	344 mm (H) × 323 mm (W) × 460 mm (D) (max.) 280 mm (H) × 320 mm (W) × 450 mm (D) (without protruding parts)
Weight	Approx. 19.4 kg

Supplied accessories

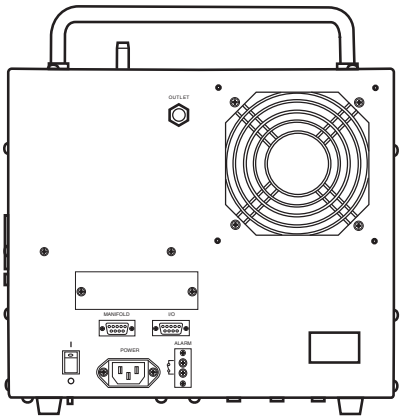
Sampling tube (plastic tube with 11 mm × 7 mm dia., 2 m)		1
Filter		1
256 MB CompactFlash™ card	MC-25CF2	1
Power cord (for use in Japan with 100 V AC, 2.5 m)		1
Instruction manual		1
Concise manual		1
Instruction sheet for “Transport and Installation”		1
Inspection certificate		1

Factory options

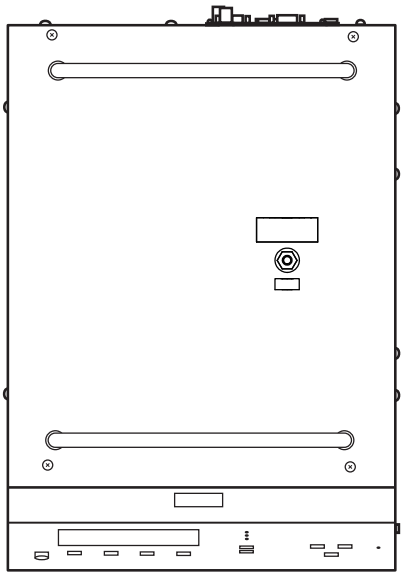
Thermal printer (thermal paper (2 rolls) supplied)
EXT START/STOP (for external measurement start/stop control)
ISO 21501-4:2018 Calibration compliant

Options

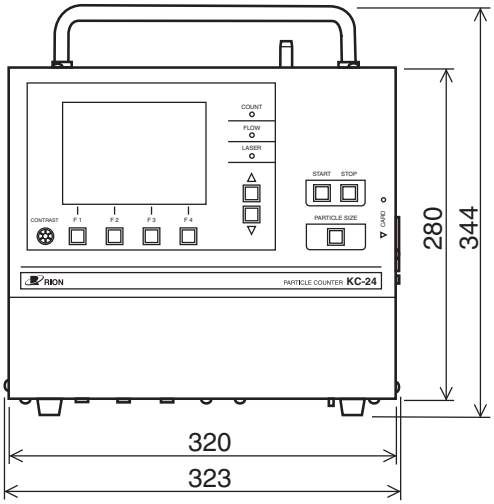
256 MB CompactFlash™ card (formatted)	MC-25CF2
Interface cable	CC-62DA
(For connection to DTE with 9-pin male D-sub connector)	
Printer paper	
Thermal paper (6 rolls set)	TP-08
Lint-free thermal paper (6 rolls set)	TP-10
Instruction manual (Manifold A2432)	



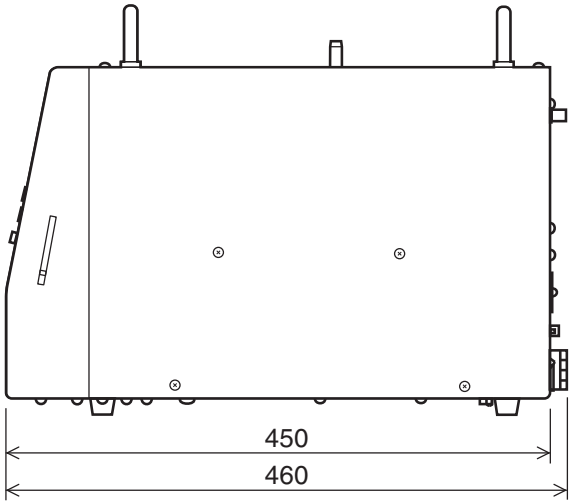
Rear view



Top view



Front view



Right side view

Unit: mm

Dimensional Drawings

Specifications subject to change without notice