

**SPECIFICATIONS**  
**PARTICLE COUNTER**  
**KC-31**



3-20-41 Higashimotomachi, Kokubunji, Tokyo 185-8533, Japan

# Outline

The particle counter KC-31 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 and JIS B 9921:2010.

The unit can display a particle count for six size ranges:  $\geq 0.3 \mu\text{m}$ ,  $\geq 0.5 \mu\text{m}$ ,  $\geq 1.0 \mu\text{m}$ ,  $\geq 2.0 \mu\text{m}$ ,  $\geq 5.0 \mu\text{m}$ , and  $\geq 10.0 \mu\text{m}$ .

The flow rate is 28.3 L/min, adjusted by an automatic flow rate control function.

The measurement result can be displayed as cumulative particle count for the measurement time, differential count between particle channels, or particle number concentration (particle count per sample volume). When the particle 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.

And the measurement can be repeated up to 99 times of preset time or volume and calculated average of results.

The unit is equipped with a USB connector, allowing communication with a computer via a serial interface implemented as a virtual COM port. And the unit is equipped with Ethernet connector.

Printout of measurement results on an internal thermal printer is also possible.

The password function is available. This is suitable to prevent unauthorized users from making changes to measurement parameters.

The unit operates on a rechargeable battery, allowing hand-held use for measurement.

While the power is off, the measurement parameter settings is memorised automatically. Measurement to be continued with the same settings the next time power is on.

An alarm level can be set to sound a warning buzzer when the particle count exceeds a preset threshold.

The internal memory of the unit stores about 5000 measurements data, and data can be exported using an optional USB flash drive.

Cleanroom air cleanliness evaluation is possible in compliance with ISO 14644-1:1999 "Cleanrooms and associated controlled environments - Part 1: Classification of air cleanliness".

All major operations affecting electronic records such as start and stop of measurement, change of measurement parameter, and deletion of measurement data are recorded as audit trail information which can be viewed and printed.

The unit can output the measurement results converted into an analog signal with a range of 4 mA to 20 mA using a factory option D/A converter interface, so it can be connected directly to an instrumentation system.

\* All company names and product names mentioned in this specifications are trademarks or registered trademarks of their respective owners.

## Specifications

Optical system	60° sideways light scattering method
Light source	Laser diode (wavelength 780 nm, rated output 100 mW)
Laser product class	Class 1, IEC 60825-1 (2014)
	Internal particle detection mechanism uses Class 3B laser
Light detector	Photodiode
Allowable measurement sample types	Air
Calibration	By polystyrene latex (PSL) particles with refractive index 1.6 in clean air
Minimum detectable particle size	0.3 $\mu\text{m}$ (for spherical particles with refractive index 1.6)
Measurable particle size ranges	Six channels ( $\geq 0.3 \mu\text{m}$ , $\geq 0.5 \mu\text{m}$ , $\geq 1.0 \mu\text{m}$ , $\geq 2.0 \mu\text{m}$ , $5.0 \mu\text{m}$ , and $\geq 10.0 \mu\text{m}$ )
Counting efficiency	50% $\pm$ 20% (measuring PSL particles in the range of minimum detectable particle size) 100% $\pm$ 10% (measuring PSL particles in the range with 1.5 to 2 times larger than minimum detectable particle size)
Size resolution	15% or less (in the vicinity of 0.3 $\mu\text{m}$ PSL particles)
Responsivity	0.5% or less
Maximum particle number concentration	28,000,000 particles/ $\text{m}^3$ (coincidence loss within 10%)
False count rate	7 particles/ $\text{m}^3$ or less (95% confidence interval)
Flow rate	28.3 L/min (Pressure sensing automatic control)
Maximum tube length	10 m (when connecting 12 mm inner diameter tube)
Warm-up time	3 minute or less
Measurement time accuracy	$\pm 1\%$ or less
Display	
LED	START, STOP, printer status, Ethernet $\times$ 2, battery charging status
LCD	5.7 inches TFT color QVGA, with backlight

Measurement screen	Measurement value (99,999,999.9 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, auto print, and other system settings
Display language	English / Japanese
Controls	
Touch panel	Resistance sensitive
Buttons	
START	Starts measurement
STOP	Stops measurement
POWER	Turns the unit on / off
FEED	Feeds the printer paper
Measurement time (Can also be set in remote mode via serial communication)	
Arbitrary	00:00:10 to 01:00:00 (setup at one second bit)
Sample volume	10 L (21 sec), 28.3 L (60 sec), 100 L (212 sec), 283 L (600 sec), 1000 L (2119 sec)
Measurement modes	
Manual measurement	Measurement controlled with “START” and “STOP” buttons
Automatic measurement	
Averaging measurement	Repeated measurement up to 99 times of preset time or fixed volume and averaging of results
Periodic measurement	Averaging measurement carried out at each specified time interval (00:00:10 to 24:00:00, setup at one second bit)
Count display	Cumulative, differential, number concentration (unit: 1 L, 28.3 L, 1000 L)
Delay time	00:00:10 to 24:00:00 (setup at one second bit)
Alarm function	Buzzer sounds and ALARM terminals are closed when particle count in the specified particle size range exceeds the specified alarm level (settable in 2 particle size range)
Alarm level setting	1 to 99,999,999 particles (1 particle step), and off Additional settings in remote mode: 100, 1000, 10000, 100000
Clock	Auto calendar for year, month, day, hour, minute, second (adjusts for leap years until 2099) - Accuracy: $\pm 2$ minutes/month or better (at normal temperature)

## Internal interface

### SERIAL

#### Communication parameters

Data word length: 7 bits

Parity: Even

Stop bits: 2 bits

Protocol KC-01D compatible

#### Ethernet communication interface

Protocol TCP/IP

#### D/A converter interface (factory option)

Converts the particle count in a selected channel into 4 mA to 20 mA DC current

Output range Select one from 0 to 10, 0 to 100, 0 to 1,000, 0 to 10,000, 0 to 100,000

Load impedance 0  $\Omega$  to 400  $\Omega$  (including the impedance of the connection cable)

Output precision  $\pm 1\%$

Internal printer Print measurement result, measurement parameter, etc.

Printing method Thermal print

#### Inputs/outputs

##### USB (A) connector

Connect a USB flash drive

##### USB (B) connector

For connection of control equipment compatible with internal interface

##### Ethernet connector

For Ethernet communication

Power connector Connect an AC adapter which supplies DC power

#### ALARM terminals

Terminals are closed when particle count in the specified particle size range exceeds the specified alarm level

#### D/A converter interface terminals (factory option)

Outputs 4 mA to 20 mA DC current

Memory functions About 5000 measurement data are automatically saved to internal memory in text (TSV) form using rotating deletion

Security 3-stage permissions level management (Administrator/User/Guest)

Administrator can perform all functions

User can only make certain limited settings

Guest can only perform measurement control, operations on Measurement screen, and viewing of measurement parameters

Power	Inserted battery or supplied AC adapter
AC adapter	Rated input: 100 to 240 V AC, 50/60 Hz Rated output: 24 V DC, Maximum power consumption 82 VA
Battery	Lithium-ion Two batteries can be inserted in the unit
Battery life	Approx. 6 hours (one battery is inserted in the unit) Approx. 12 hours (two batteries are inserted in the unit) (at room temperature and continuous measurement; battery life may vary depending on usage environmental conditions, operation status and setting parameters of the unit)
Charging time	Using the KC-31 (no measurement operation): Approx. 3 hours (one battery is inserted in the unit) Approx. 5 hours (two batteries are inserted in the unit) Using an optional battery charger Approx. 4 hours
Power consumption	Approx. 15 VA (no charging) Approx. 68 VA (charging, maximum load)
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
Environmental conditions for operation	+10°C to +35°C, 85% RH or less (no condensation)
Environmental conditions for storage	-10°C to +50°C, 90% RH or less (no condensation)
Dimensions	Approx. 203 (H) $\times$ 260 (W) $\times$ 266 (D) mm (without protruding parts)
Weight	Approx. 5.1 kg (no battery) Approx. 5.5 kg (one battery is inserted in the unit) Approx. 6 kg (two batteries are inserted in the unit)

### Supplied accessories

Sampling tube (Plastic tube with 12 mm × 16 mm dia., 1 m)	1
Isokinetic probe (with tube joint)	1
Zero count filter	1
AC adapter	1
Power cord	1
Battery	1
Thermosensitive paper TP-34	1
Inlet cap	1
USB (A) connector cover	1
USB (B) connector cover	1
Ethernet connector cover	1
CD-ROM (Instruction manual, LogViewer for audit trail)	1
Concise manual	1
Inspection certificate	1

### Options

Battery	
Battery charger	
USB flash drive	
USB cable (A to B)	
Carrying case	
Thermosensitive paper (10 rolls)	TP-34
Lint-free thermosensitive paper (6 rolls)	TP-33

### Factory options

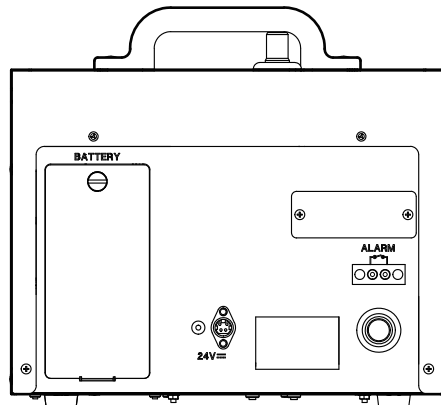
D/A converter interface	
Outlet (9 mm × 13 mm dia.)	Exhaust the cleaned sample air

### Consumable parts

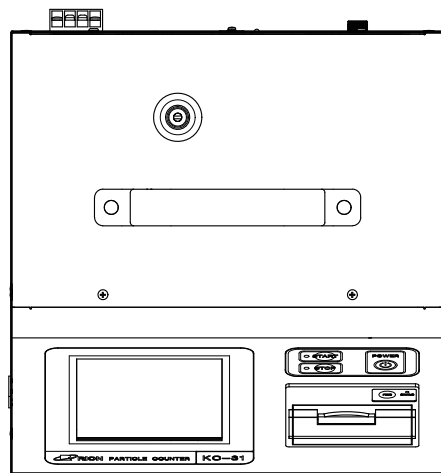
Laser diode, pump, exhaust filter, battery

### Calibration interval

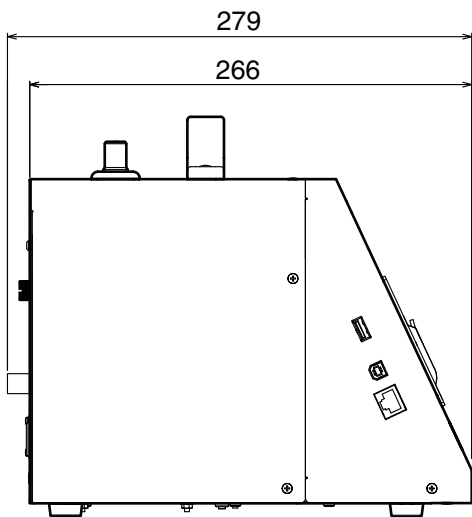
One year



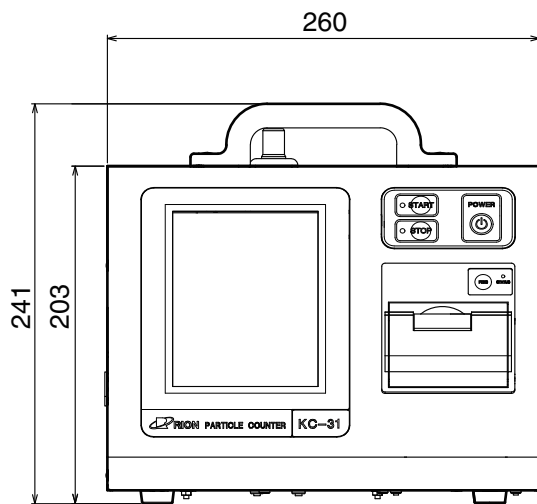
Rear view



Top view



Left side view



Front view

Unit: mm

Dimensional Drawings

Specifications subject to change without notice