SPECIFICATIONS

PARTICLE SENSOR

KS-41B

RION CO., LTD.

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No. 11025-4E 18-01 Printed in Japan

Outline

The KS-41B is a sensor which uses the light scattering method for measuring the particle number concentration in photoresist solutions. The particle count is determined for various sizes. Sample fluid contacting parts are made of synthetic quartz and PFA.

By connecting the KS-41B to the controller KE-40B1, a liquid-borne particle counter system with up to ten size ranges can be created.

Using the KE-40B1, it is also possible to freely specify the size ranges 0.1 µm to 0.5 µm for particle detection. The factory default setting is five channels (≥0.1 µm, ≥0.15 µm, ≥0.2 µm, ≥0.3 µm, ≥0.5 µm).

The KS-41B does not have measurement controls or a display for measurement results. It is designed to be used under control of a separate controller KE-40B1 which also supplies power to the KS-41B.

The KS-41B can be connected to the Rion multi-point monitoring system with a multi-point unit KZ-51.

The KS-41B incorporates a leak sensor. If a leak is detected, an alarm output can be activated.

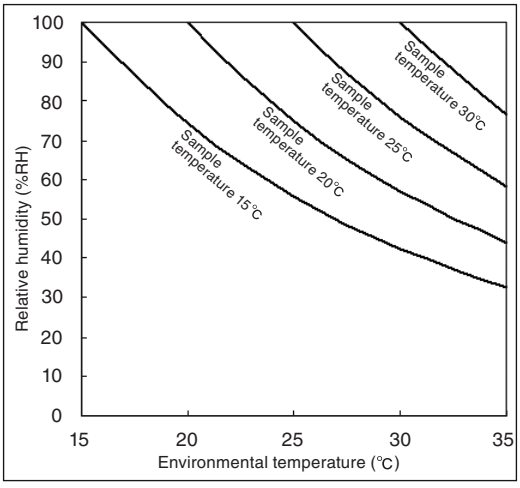
As the KS-41B does not incorporate a flow control circuit for the sample fluid, the flow rate of the sample fluid must be controlled by external means.

The rated sample fluid flow is 5 mL per minute.

Specifications

Optical system	90° sideway light scattering method
Light source	Diode pumped solid state laser (wave length 532 nm; rated output 500 mW)
Laser product class	Class 1, IEC 60825-1 (2014) Internal particle detection mechanism uses Class 4 laser
Light detector	Multi-channel silicon photodiode
Materials of parts exposed to sample	Synthetic quartz, PFA
Allowable sample type	Fluids which do not corrode the fluid contact materials
Calibration	By polystyrene latex (PSL) particles with refractive index 1.6 in pure water The particles for calibration are traceable to the NIST standard
Measurable particle size range	0.1 µm to 0.5 µm (with PSL particles in pure water)

Size range	Freely specify from 0.1 µm to 0.5 µm and up to 10 channels can be set with controller. Channels can be set by 0.01 µm steps. Upper limit for smallest particle size channel: 0.15 µm The factory default setting is five channels (≥0.1 µm, ≥0.15 µm, ≥0.2 µm, ≥0.3 µm, ≥0.5 µm)
Counting efficiency	50% ±10% (The test is compared with the reference device using PSL particles in pure water which sizes are 1.5 to 3 times minimum detectable particle size. Using the count data of reference device obtained by correcting the counting efficiency to 100%.)
Size resolution	10% or less (in the vicinity of 0.1 µm PSL particles)
Flow rate	5 mL / min
Effective sampling flow rate	2.5 mL/min ± 0.5 mL/min
Maximum particle number concentration	9,600 particles / mL (coincidence loss 10%)
False count rate	Average 0.1 particles / mL or less (measured with light source off)
Sample pressure range	300 kPa or less (gauge pressure)
Sample temperature range	+15°C to +30°C (no condensation in the sample system. The graph below plots environmental temperature and relative humidity for different sample temperatures. In the region to the top right of the respective curve, condensation on the flow cell may occur)



Warm-up time: About 15 minutes (after power was turned on)
5 minutes or less (from receiving laser-on command in measurement pause/laser off condition)

Sample port

INLET: Sample inlet, 2 mm × 4 mm dia. flared joint for tube

OUTLET: Sample outlet, 2 mm × 4 mm dia. flared joint for tube

Purge gas: Purge air port: One-touch type joint for outer dia. 6 mm tube

In the cases listed below, the interior of the unit should be cleaned with purge gas to prevent adverse effects on the optical system and electrical circuitry.

- If the cleanliness of usage environment is lower than classification of air cleanliness class 6 defined by ISO 14644-1
- If the temperature of the sample is lower than the environmental temperature, so that moisture condensation may occur on the flow cell
- If there is the possibility that corrosive gases in the vicinity may intrude into the unit
- If there is the possibility that corrosive gases in the sample may permeate through the internal PFA tube

Purge gas requirements

Clean dry air: CDA

- Temperature +15°C to +30°C
- Relative humidity not causing condensation
- Flow rate 3 L/min to 10 L/min
- Other: Under special conditions, nitrogen gas or other gases may also be used

Input/output connectors

CONTROLLER: For connection of controller KE-40B1 or multi-point unit KZ-51

LIQUID LEAK ALARM

Shorted during normal operation, open when internal leak is detected (accepts electric wire with a 1.25 mm^2 cross section (AWG16))

Maximum load: 30 V DC, 1 A

ALARM1, ALARM2 terminals

Terminals are closed by relay when the instruction of alarm output is conveyed via the controller of multi-point monitoring system (accepts electric wire with a 1.25 mm^2 cross section (AWG16))

Maximum load: 30 V DC, 1 A

Indicators — Two color light emitting diode

PARTICLE MONITOR
Briefly flashes green when particles above minimum detectable particle size are detected

LIQUID LEAK
Lit green when leak is not detected within chassis
Lit red when leak is detected within chassis

CELL
Lit green during normal operation
Lit red due to flow cell contamination, condensation or particle number concentration in sample reached or exceeded maximum particle number concentration
Off when light source is off

LASER
Lit green during normal operation
Flashing green when light source is nearing the end of its service life
Lit red when light source temperature is out of range
Flashing red when light source output is not normal
Off when light source is off

DATA LINK

When connected to controller KE-40B1
Always off

When connected to multi-point unit KZ-51
Lit green when communication is possible
Briefly flashes green when communication is being carried out normally
Briefly flashes red when error has occurred during communication
Off when no communication is being carried out, or the unit is not controlled by the controller

POWER
Lit green while power to unit is on
Flashing red when an error occurred in the internal program

Installation inclination angle
Max. 2° (range for normal operation of internal leak sensor)

Environmental Requirements

Operation Environments

Indoor Use Only

Altitude	Up to 2000 m
Overvoltage Category	Ⅱ (when connected to controller KE-40B1 or multi-point unit KZ-51)
Pollution Degree	2
Protection Class	Ⅰ

Environmental conditions for operation

+15°C to +30°C, 80% RH or less (no condensation)

Environmental conditions for storage

–10°C to +50°C, 90% RH or less (no condensation and no freezing in internal piping)

Power

12 V DC
(supplied by controller KE-40B1 or multi-point unit KZ-51 via the interface for connecting particle sensor)

Electric power consumption

70 VA

Dimensions

Approx. 178 mm (H) × 464 mm (W) × 334 mm (D) (maximum dimensions)
Approx. 164 mm (H) × 464 mm (W) × 305 mm (D) (without protruding parts)

Weight

Approx. 12.5 kg

Supplied Accessories

Tube A vacuum pack (2 mm × 4 mm dia., 1.5 m flared PFA tube 2, union joint 1)	1
Connection cable A (KS-42-125) 1 m	1
Cleaning brush set B (KS-41-341)	1
Instruction manual	1
Inspection certificate	1
Instruction sheet for “Transport and Installation”	1
Liquid-borne particle counter usage precautions	1

Factory option

Additional particle size, 0.07 μm (KS-41-S45)

Options

Controller	KE-40B1 (Ver.2.7 or later)
Multi-point unit	KZ-51
Syringe sampler (10 mL syringe version)	KZ-30W1/30W2 (Ver.2.35 or later)
Purge air unit	KX-33A/33B

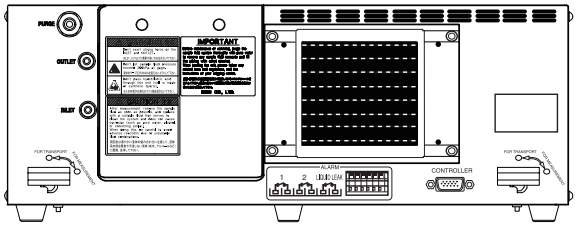
(The prevention of moisture condensation and the removal of corrosive gases are impossible)

Consumables	Laser, Flow cell, Urethane roll stock (air packing for sealing)
Calibration interval	One year

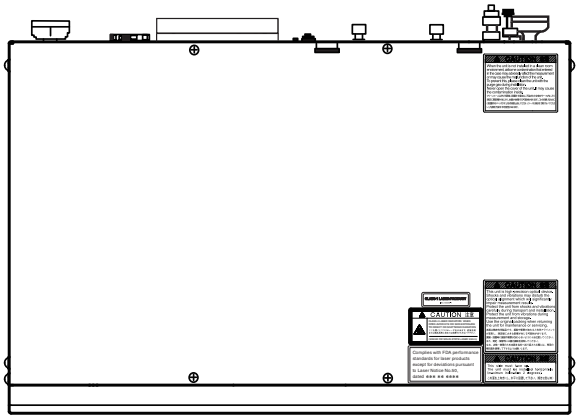
EMC requirements

Test title	EN 61326-1
EMI (Electromagnetic interference)	
Conducted emission	CISPR11: Class A
Radiated emission	CISPR11: Class A
EMS (Electromagnetic susceptibility)	
Electrostatic discharges	EN 61000-4-2 Performance criterion B
Radio-frequency electromagnetic field	EN 61000-4-3 Performance criterion A*
Electrical fast transients/burst	EN 61000-4-4 Performance criterion B
Radio-frequency conducted disturbances	EN 61000-4-6 Performance criterion A

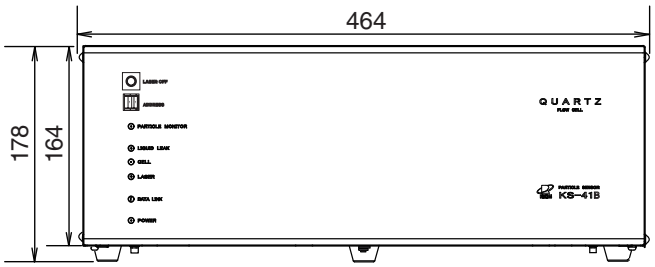
*At the 0.07 μm size range, the electromagnetic waves of about 600 MHz or more may generate the false counts.



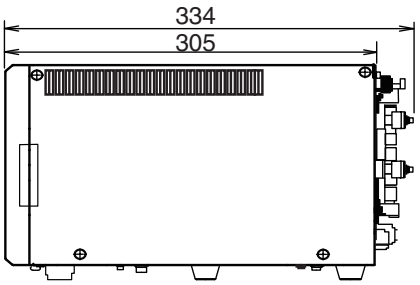
Rear View



Top View



Front View



Right Side View

Unit: mm

Dimensional Drawings

Specifications subject to change without notice