SPECIFICATIONS

PARTICLE SENSOR

KS-19F

RION CO., LTD.

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Outline

The KS-19F is a sensor which uses the light scattering method for measuring the particle number concentration in liquid. The particle count is determined for various sizes. Sample fluid contacting parts are made of sapphire and PFA, allowing direct measurement of hydrofluoric acid.

By connecting the KS-19F to the optional 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 0.03 µm to 0.13 µm for particle detection. The factory default setting is four channels (≥0.03 µm, ≥0.06 µm, ≥0.1 µm, ≥0.13 µm).

The flow rate is 10 mL per minute, and counting efficiency is 5%. The effective flow rate at which particles are detected and measured is the flow rate multiplied by the counting efficiency, i.e. 0.5 mL per minute.

The KS-19F 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-19F.
The KS-19F incorporates a leak sensor. If a leak is detected, an alarm output can be activated.
As the KS-19F does not incorporate a flow control circuit for the sample fluid, the flow rate of the sample fluid must be controlled by external means.

Specifications

Optical system	90° sideway light scattering method
Light source	Diode pumped solid state laser (rated output 800 mW; wave length 532 nm)
Laser product class	Class 1, IEC 60825-1 (2014) Internal particle detection mechanism uses Class 4 laser
Collecting optics	Spherical lens
Light detector	Silicon photodiode
Materials of parts exposed to sample	Sapphire, 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 (National Institute of Standards and Technology) standard
Minimum detectable particle size	0.03 µm (with spherical particles of refractive index 1.6 in pure water)

Measurable particle size range

0.03 µm to 0.13 µm (with spherical particles of refractive index 1.6 in pure water)

Size range — Freely settable to 0.03 µm to 0.13 µm
(Up to 10 channels in 0.01 µm steps can be set with controller KE-40B1. Upper limit for smallest particle size channel [CH 1] is 0.06 µm)
*The factory default setting is four channels
(≥0.03 µm, ≥0.06 µm, ≥0.1 µm, ≥0.13 µm)

Flow rate — 10 mL/min

Counting efficiency — 5% ±1.5%

Effective sampling flow rate

0.5 mL/min ± 0.15 mL/min

Sample inlet (INLET) / sample outlet (OUTLET)

2 mm × 4 mm dia. flared tube joint

PURGE — Purge air port, one-touch type joint for 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 fluid 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 fluid may permeate through the internal tube

Purge gas requirements

Clean dry air: CDA

- Temperature +15°C to +35°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

Sample pressure range	300 kPa or less (gauge pressure)
Sample temperature range	+15°C to +35°C (no moisture condensation on flow cell)
Refractive index range	1.26 to 1.43 (light source wave length 532 nm)
Maximum particle number concentration	40,000 particles/mL (coincidence loss is 10% or less)
False count rate	Average 0.1 particles/mL or less (measured with light source off)
Warm-up time	Max. 15 minutes (after power-on) Max. 5 minutes (from receiving laser-on command in measurement pause/laser off condition, or relight the light source after turning the light source off by pressing the LASER OFF switch)
Indicators	Two color light emitting diode
PARTICLE MONITOR	Briefly flashes green when particles of minimum detectable particle size or above 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) when flow cell is contaminated, condensation occurs or particle number concentration in sample fluid exceeded maximum particle number concentration Off when light source is off
LASER	Lit (green) during normal operation Flashing (green) when laser current has increased above a certain threshold (light source nearing end of service life; maintenance within 1 month recommended) 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
POWER	Lit (green) while power to unit is on Flashing (red) when internal program is not normal

Controls

LASER OFF switch — Changes ON/OFF of a light source by pressing for 2 seconds when the measurement is stopped
No effect when the measurement is in progress
No effect when there is a serious problem in the sensor

Input/output connectors

CONTROLLER — For connection of controller KE-40B1

LIQUID LEAK ALARM

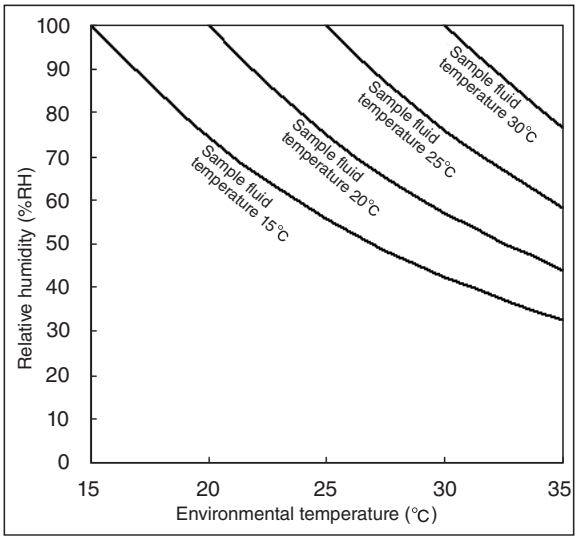
Shorted during normal operation, open when internal leak is detected (accepts electric wire with a 1.25 mm^2 cross section [AWG16])
Maximum load: 30 V DC, 1 A

Installation inclination angle

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

Environmental conditions for operation

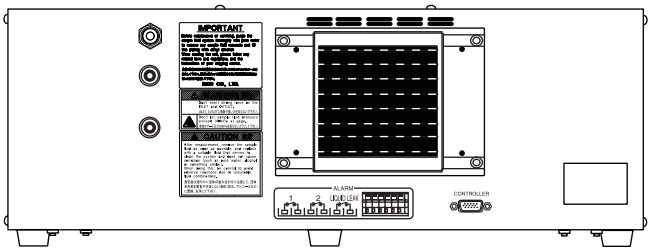
+15°C to +35°C, 80% RH or less (no condensation)
The graph below plots environmental temperature and relative humidity for different sample fluid temperatures. In the region to the top right of the respective curve, condensation on the flow cell may occur.



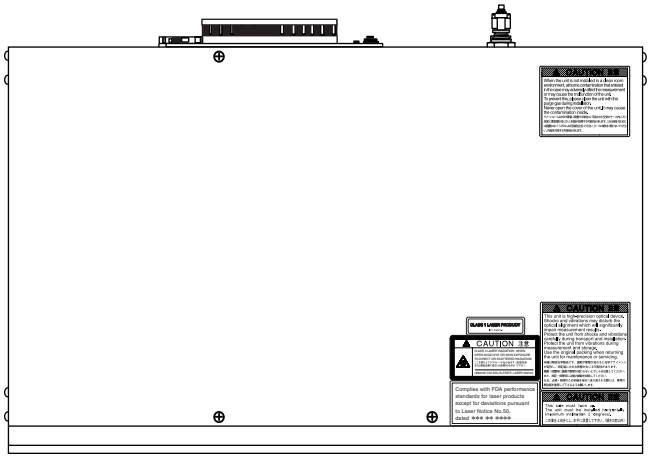
Environmental conditions for storage

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

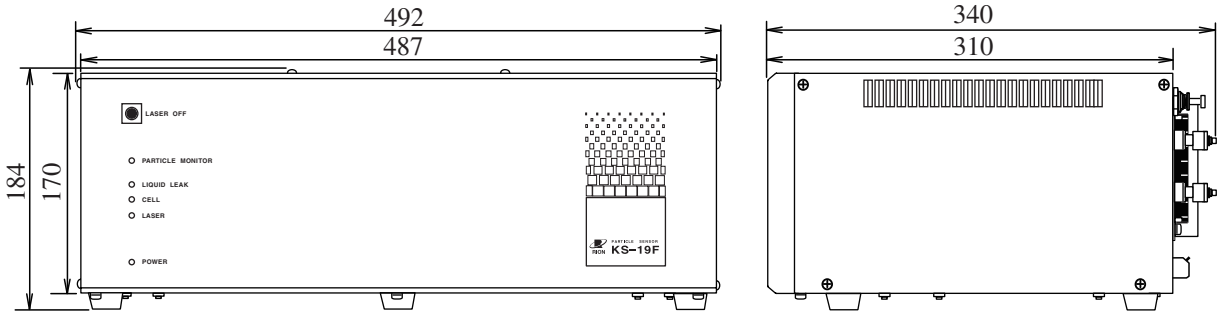
Power	12 V DC (supplied via controller KE-40B1)		
Electric power consumption	80 VA		
Environmental Requirements			
Operation Environments	Indoor Use Only		
Altitude	Up to 2000 m		
Overvoltage Category	Ⅱ (when connected to controller KE-40B1)		
Pollution Degree	2		
Protection Class	Ⅰ		
Dimensions	184 mm (H) × 492 mm (W) × 340 mm (D) (maximum) 170 mm (H) × 487 mm (W) × 310 mm (D) (excluding protruding parts)		
Weight	Approx. 13.5 kg		
Supplied Accessories	Tube A vacuum pack	KL-24-S09	1
	(2 mm × 4 mm dia., 1.5 m flared PFA tube 2, union joint 1)		
	Connection cable A (1 m)	KS-42-125	1
	Instruction manual		1
	Instruction sheet for “Transport and Installation”		1
	Liquid-borne particle counter usage precautions		1
	Inspection certificate		1
Options	Controller	KE-40B1	
	Purge air unit	KX-33A/KX-33B	
	(The prevention of moisture condensation and the removal of corrosive gases are impossible)		
	Syringe sampler	KZ-30W2	
	Bellows sampler	K9904A	
	Pulse height analysis software	KF-50A	
	Mass flow controller	MFC (CVR)	
	RP Monitor EVO (monitoring software)	K0505	
Consumables	Laser, Flow cell, INLET nozzle, OUTLET nozzle, Air packing for the case, Shock-absorbing material for the sensor		
Calibration interval	One year		



Rear view



Top view



Front view

Right side view

Unit: mm

Dimensional Drawings

Specifications subject to change without notice