SPECIFICATIONS

PARTICLE SENSOR

KS-20F

RION CO., LTD.

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Overview

The KS-20F sensor relies on the light scattering method to measure particle concentrations in liquids. Particle counts are determined for various particle sizes. Parts that come into contact with the sample fluid are made of sapphire and PFA, allowing direct measurement of hydrofluoric acid.

The KS-20F can be connected to the optional KE-40B1 controller to configure a liquid-borne particle counter system that detects particle sizes in up to seven range. The KE-40B1 allows wide latitude in specifying particle sizes for particle detection: from 0.02 µm to 0.08 µm. The factory default setting is four channels (≥0.02 µm, ≥0.03 µm, ≥0.04 µm, ≥0.06 µm).

The sample flow rate is 10 mL/min. Counting efficiency is 3%. The effective sample flow rate at which particles are detected and measured is the sample flow rate multiplied by the counting efficiency: 0.3 mL/min.

The KS-20F lacks measurement controls or a display for measurement results. It is designed to be used with a separate KE-40B1 controller. The KS-20F also incorporates a leak sensor. On detecting a leak, the unit can be set to issue an alarm. Since the KS-20F does not incorporate a flow control circuit for the sample fluid, the flow rate of the sample fluid must be controlled externally.

Specifications

Optical system	90-degree sideways light scattering method
Light source	Diode-pumped solid-state laser (wavelength 532 nm; rated output 1.5 W)
Laser product class	Class 1, IEC 60825-1:2014 Internal particle detection mechanism incorporating Class 4 laser
Light detector	Photodiode
Composition 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 of 1.6 in pure water The calibration particles are traceable to the NIST (National Institute of Standards and Technology) standard
Minimum detectable particle size	0.02 µm (with spherical particles of refractive index of 1.6 in pure water)

Measurable particle size range

0.02 µm to 0.08 µm (with spherical particles of refractive index 1.6 in pure water)

Size range — Set from 0.02 µm to 0.08 µm
(Up to 7 channels in 0.01 µm steps can be set with the KE-40B1 controller. The upper limit for smallest particle size channel [CH 1] is 0.04 µm)
*The factory default setting is four channels
(≥0.02 µm, ≥0.03 µm, ≥0.04 µm, ≥0.06 µm)

Flow rate — 10 mL/min

Counting efficiency — 3% ± 0.9%

Effective sampling flow rate

0.3 mL/min ± 0.09 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, clean the unit interior with purge gas to prevent adverse effects on the optical system and electrical circuitry.

- The cleanliness of the usage environment does not meet air cleanliness Class 6 as defined by ISO 14644-1
- The temperature of the sample fluid is below the ambient temperature, resulting in potential condensation on the flow cell
- Corrosive gases in the vicinity may infiltrate the unit
- Corrosive gases in the sample fluid may permeate through the internal PFA tube

Purge gas requirements

Clean dry air: CDA

- Temperature +15°C to +35°C
- Relative humidity at which no condensation occurs
- 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 1.45 (light source wavelength 532 nm)

Maximum particle number concentrations

50,000 particles/mL (coincidence loss is 10% or less)

False count rate	Average 0.1 particles/mL or less
Warm-up time	Max. 5 minutes (after power-on)
Indicators	Bi-color light emitting diode
PARTICLE MONITOR	Indicates the state of the particle counting Briefly flashes green on detecting particles of minimum detectable particle size or larger
LIQUID LEAK	Indicates the state of liquid leak in the unit Illuminated (green) when no leak is detected within chassis Illuminated (red) when leak is detected within chassis
CELL	Indicates the state of the flow cell and the state of the sample fluid particle concentrations Illuminated (green) during normal operation Illuminated (red) when flow cell is contaminated, condensation occurs, or particle concentrations in sample fluid exceeded maximum particle concentrations Off when light source is off
LASER	Indicates the state of the light source Illuminated (green) during normal operation Flashing (green) when laser current has increased above a certain threshold (light source nearing end of service life) Illuminated (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	Indicates the state of the power and internal status Illuminated (green) while power to unit is on Flashing (red) when internal program is not normal
FLOW	Indicates the sample flow rate and the connection status of the flow meter Illuminated (green) while receiving a signal from the flow controller and the sample flow rate is within ±3% of 10 mL/min Flashing (green) when sample flow rate is within –3% to –5% or +3% to +5% Flashing (red) when sample flow rate is outside ±5% or the flow controller is not connected Turns off when the flow indicator function (factory option) is not selected The output signal of CLFC300 series flow controller (Tokyo Keiso Co., Ltd.) is used for flow rate judgment

SETUP — Indicates the state of measurement preparation of this unit
Illuminated (green) when ready for measurement
Flashing (green) while preparing for measurement after pressing the SETUP switch
Flashing (red) when preheating after turning on the power

Controls

SETUP switch — Used to ensure proper functioning of the KS-20F during batch system measurement

LASER OFF switch — Press for 2 seconds after measurement to turn the light source ON/OFF
Has no effect when measurement is underway
Has no effect if the sensor has serious problems

Input/Output connectors

FLOW METER — Used to connect a flow controller

CONTROLLER — For connecting KE-40B1 controller

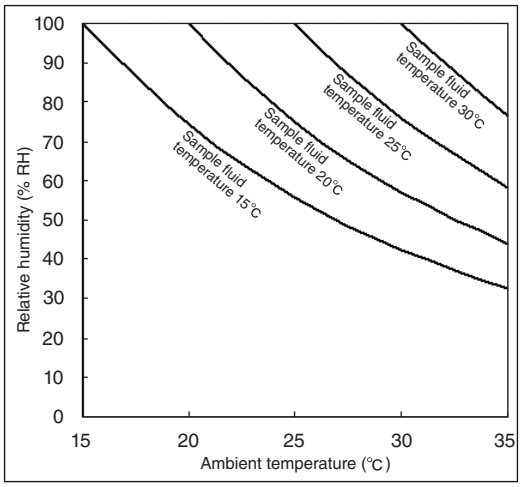
LIQUID LEAK ALARM
Shorted during normal operation, open when internal leak is detected (accepts electric wire with a 1.25 mm² cross-section [AWG16])
Maximum load: 30 V DC, 1 A

Installation inclination angle

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

Ambient operating conditions

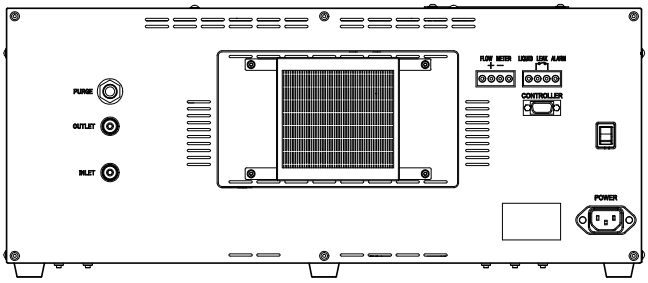
+15°C to +35°C, 80% RH or less (no condensation)
The following graph plots ambient temperature and relative humidity for different sample fluid temperatures. Condensation may occur on the flow cell in the region to the top right of the curve.



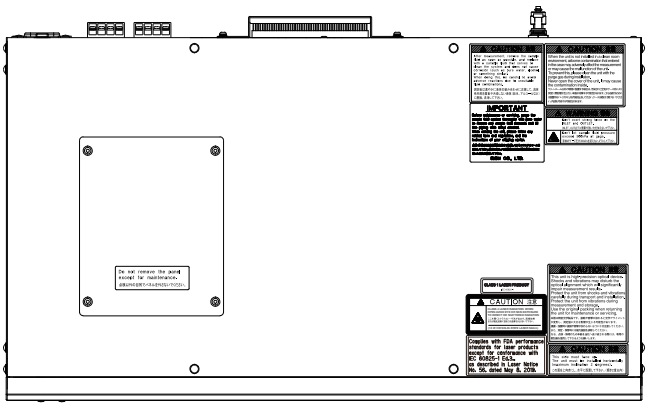
Ambient storage conditions

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

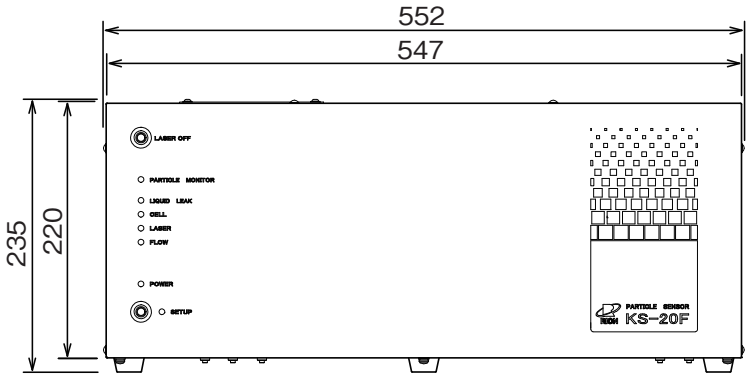
Power	100 V to 240 V AC, 50/60 Hz		
Electric power consumption	Approx. 150 VA		
Dimensions	220 mm (H) × 547 mm (W) × 312 mm (D) (excluding protruding parts) 235 mm (H) × 552 mm (W) × 340 mm (D) (maximum)		
Weight	Approx. 18 kg		
Supplied Accessories	Tube A vacuum pack	KL-24-S09	1
	(2 mm × 4 mm dia., 1.5 m flared PFA tube 2, union joint 1)		
	Connection cable A (1 m)	KS-42-125	1
	Power cord (2.5 m)		1
	Instruction manual		1
	Instruction sheet for “Transport and Installation”		1
	Liquid-borne particle counter usage precautions		1
	Inspection certificate		1
Factory option	Flow indicator function		
Options	All-in-one Ultrasonic Flowmeter for Closed-Loop Control (manufactured by Tokyo Keiso Co., Ltd.)		
			CLFC300
	Controller		KE-40B1
	Purge air unit		KX-33A/KX-33B
	(This unit does not prevent condensation or remove corrosive gases.)		
	Syringe sampler		KZ-31W
	Bellows sampler		K9904A
	Pulse height analysis software		KF-50A
	Mass flow controller		MFC (CVR)
	RP Monitor Evo10 (monitoring software)		K1701
Replacing spare parts	Laser, flow cell, INLET nozzle, OUTLET nozzle, air packing for the case, buffer material for the sensor		
Calibration interval	One year		



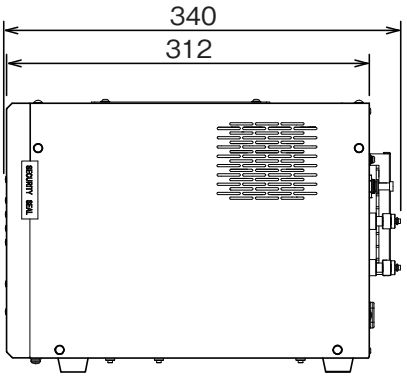
Rear view



Top view



Front view



Right side view

Unit: mm

Dimensional Drawings