SPECIFICATIONS

PARTICLE COUNTER

KL-30B

RION CO., LTD.

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

No. 15013-6E 22-09 Printed in Japan

Outline

The particle counter KL-30B is designed to measure the size and number concentration of particles in pure water, using the light scattering method. It is a standalone unit comprising the sensor, processing section, control section, display, flow control section, and a printer.

The count for up to ten particle sizes can be determined in a single measurement.
It is possible to freely specify the size ranges 0.05 µm to 0.2 µm for particle detection.
The factory default setting is four channels (≥0.05 µm, ≥0.1 µm, ≥0.15 µm, ≥0.2 µm).

The rated flow rate is 10 mL per minute, and counting efficiency is 1%. The effective flow rate at which particles are detected and measured is the rated flow rate multiplied by the counting efficiency, i.e. 0.1 mL per minute.

The display is a touch panel, so that buttons on the display can be selected and operated using the touch pen, or another suitable implement.

The unit incorporates a leak sensor. If a leak is detected within the unit, an alarm output can be activated.

Printout of measurement results on an internal thermal printer is also possible.
An internal serial interface allows for communication with a computer.
The unit can output the measurement results converted into an analog signal with a range of 4 mA to 20 mA using an internal D/A converter interface, so it can be connected directly to an instrumentation system.

Adding an optional CF card allows automatic saving measurement data in text format (as Tab-Separated Values (TSV)).

Specifications

Optical system	90° sideway light scattering method
Light source	Laser diode (rated output 200 mW; wave length 830 nm)
Laser product class	Class 1, IEC 60825-1:2014 Internal particle detection mechanism uses Class 3B laser
Collecting optics	Spherical lens (condensing half-angle 40 degrees)
Light detector	Multi channel silicon photodiode
Measurable sample types	Pure water (For cleaning purposes, fluids which do not corrode the fluid-contacting parts may be passed through the system)

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	0.05 µm (with PSL particles of refractive index 1.6 in pure water)
Size range	Freely settable to 0.05 µm to 0.2 µm (Up to 10 channels in 0.01 µm steps can be set) The factory default setting is four channels (≥0.05 µm, ≥0.10 µm, ≥0.15 µm, ≥0.20 µm)
Flow rate	Total of sensor flow rate (10 mL/min) and purge flow rate (0.1 L/min to 1 L/min) Purge flow rate fluctuates with sample pressure
Flow rate for sensor	10 mL/min
Sensor flow rate control	Diaphragm type flow controller keeps flow rate constant, regardless of sample pressure fluctuations (10 mL/min, tolerance ±5%) Flow controller equipped with bypass open/close valve
Bypass connection (purge flow)	Sensor bypass flow can be set by needle valve to 0.1 L/min to 1 L/min (fluctuates with sample pressure)
Sample inlet (INLET) / sample outlet (OUTLET)	4 mm × 6 mm dia. or 3.96 mm × 6.35 mm dia. flared tube joint
Sample pressure range	100 kPa to 500 kPa (gauge pressure)
Sample temperature range	+15°C to +30°C (no moisture condensation on flow cell)
Materials of parts exposed to sample	Synthetic quartz, fluororubber, fluororesin, poly phenylene sulfide, Pyrex glass, SUS304/316 and polyacetal Poly phenylene sulfide is unused by the high pressure-resistant specification (factory option)
Counting efficiency	1% ±0.3% (ambient temperature +20ºC to +25ºC, relative humidity below 85%) 1% ±0.5% (ambient temperature +15ºC to +30ºC, relative humidity below 85%) (Determined by comparative measurement with suspension of 0.15 µm range PSL particles in fluid, using ≥0.1 µm range of reference unit)

Effective flow rate
0.1 mL/min ±0.03 mL/min (ambient temperature +20ºC to +25ºC, relative humidity below 85%)
0.1 mL/min ±0.05 mL/min (ambient temperature +15ºC to +30ºC, relative humidity below 85%)
(Determined by comparative measurement with suspension of 0.15 µm range PSL particles in fluid, using ≥0.1 µm range of reference unit)

Maximum particle number concentration
200,000 particles/mL
(coincidence loss 10% or less for 0.05 µm particles)
Maximum particle concentration depends on particle size. In the vicinity of 0.2 µm (maximum measurable particle), it is on the order of 6,000 particles/mL (coincidence loss 10% or less)

False count rate
Average 0.05 particles/mL or less (measured with light source off, in order to limit measurement to noise from sources other than particles)

Warm-up time
10 minutes

Display

Display
640 × 480 pixel color LCD (with backlight)

Display language
English

Display items

Measurement screen
This screen displays particle counts (up to 8 digits (one decimal place), one channel or up to ten channels on simultaneous display), date and time, remaining measurement time, error information, measurement parameter setting and display, etc.

System Configuration screen
Date, time, communication parameters, auto print and other system settings

LASER icon
Lit green during normal operation
Lit red when light source temperature is out of range
Flashing red when light source output is out of range
Flashing green when light source output has decreased above a certain value in the rated range (light source nearing end of service life)
Off when light source is off

CELL icon	Lit green during normal operation Lit red when particle detector assembly is contaminated, condensation occurs or particle number concentration in sample exceeded maximum particle number concentration Off when light source is off
LED indicators	
START	Lights green to indicate measurement operation Lights when measurement starts Flashes when periodic measurement or preset-time measurement is paused (during measurement operation) Otherwise, switched off
STOP	Lights green to indicate that measurement has stopped Lights when measurement has stopped Otherwise, switched off
Controls	
Touch panel	Resistance sensitive
Buttons	
START	Starts measurement
STOP	Stops measurement
Measurement time	10 seconds to 2 hours, and manual In Remote status, 1 minute or 10 minutes can be selected, in addition to the above.
Measurement modes	
Manual measurement	Measurement controlled with START and STOP buttons
Automatic measurement	
Averaging measurement	Repeated measurement of preset time or volume, up to 99 times, with average value of results (when function for cancelling erroneous count is invalid)
Periodic measurement	Repeated measurement can be performed automatically, specifying the time intervals (10 seconds to 24 hours)
Moving average measurement	During periodic measurement, moving average for 10, 60, or 100 measurements is calculated and results are output via printer, serial link, and D/A converter Processing results are not shown on the screen
Preset-time measurement	Starts/Stops measurement at the set time

Function for cancelling erroneous count

During automatic measurement, cancelling erroneous count is processed on the measurement ends and results are output via printer, serial link, and D/A converter

Processing results are not shown on the screen

(Selectable valid (factory default setting) or invalid)

Count display modes: Cumulative value, differential value, number concentration (units: /mL, /L)

Alarm

Count alarm: Buzzer sounds and ALARM terminals are closed by relay when particle count in the specified particle size range exceeds the specified alarm level

When moving average measurement is carried out, buzzer sounds and ALARM terminals are closed by relay at end of measurement

Alarm level: 1 to 9999999, or alarm is off

0.1 to 9999999.0, or alarm is off (at the time of moving average calculation)

Additional settings in remote mode: Select from 10, 100, 1,000, 10,000, 100,000

Maximum load: 30 V DC, 1 A

Liquid leak alarm: LIQUID LEAK ALARM terminals are closed during normal operation, and opened when internal leak is detected

Maximum load: 30 V DC, 1 A

Clock: Auto calendar for year, month, day, hour, minute, second (adjusts for leap years until 2037)

- Accuracy: ±2 minutes/month or better (at normal temperature)

Input/output terminals

SERIAL: Connect a control equipment compatible with the internal interface.

ALARM: Alarm output terminals

LIQUID LEAK ALARM

Closed during normal operation, opened when internal leak is detected

D/A converter interface output terminals

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

Internal interfaces

Serial interface

Communications parameters

	Electrical characteristics	Conforming to JIS X 5101:1982 (JIS X 5101 corresponds to TIA/EIA-232)
	Transmission configuration	Full-duplex, asynchronous
	Baud rate	4,800 bps
	Data word length	7 bits
	Parity	Even
	Stop bits	2 bits
	Connector type	9-pin male D-sub connector

D/A converter interface

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

Output range	0 to 1, 0 to 10, 0 to 100, 0 to 1,000, 0 to 10,000, 0 to 100,000, 0 to 16, 0 to 256, 0 to 4,096, 0 to 40,960, 0 to 409,600 (selectable)	
	Load resistance	0 Ω to 500 Ω (including the resistance of the connection cable)
	Output precision	±1%

Internal printer

Printout content	Measurement results, date and time, etc.
Printing method	Thermal printer, 48 mm print width
Printer paper	Thermal paper TP-08 or lint-free thermal paper TP-10

Memory functions: Measurement data or others are automatically saved to CF cards in text (TSV) form

Purge air unit: Internal equipment designed to prevent contamination of the sensor by particles in external air by filtering the air before it is supplied to the sensor.

Installation inclination angle

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

Environmental conditions for operation

+15°C to +30°C, 85% RH max. (no condensation)
Must be in the range 30% to 80% RH when using the printer

Environmental conditions for storage

−10°C to +50°C, 85% RH max. (no condensation and no freezing in internal piping)

Power	100 V to 240 V AC, 50/60 Hz	
Electric power consumption		
	Approx. 80 VA	
Environmental Requirements		
Operation Environments		
	Indoor Use Only	
Altitude	Up to 2000 m	
Overvoltage Category	Ⅱ	
Pollution Degree	2	
Protection Class	Ⅰ	
Dimensions	Approx. 280 mm (H) × 336 mm (W) × 584 mm (D) (maximum)	
	Approx. 230 mm (H) × 330 mm (W) × 569 mm (D) (without protruding parts)	
Weight	Approx. 19.8 kg	
Supplied Accessories	Power cord	1
	Thermal paper TP-08	2
	CF dummy card	1
	Instruction manual	1
	Liquid-borne particle counter usage precautions	1
	Instruction sheet for “Transport and Installation”	1
	Inspection certificate	1
Factory option		
Purge air switching unit (installed)		KL-30-S43
PURGE	Purge air port, one-touch type for dia. 6 mm tube	
Purge gas requirements		
	- Dry clean air or nitrogen gas	
	- Temperature +15°C to +30°C	
	- Flow rate 2.5 L/min to 10 L/min	
High pressure-resistance specification		KL-30-S45
Sample pressure range		
	100 kPa to 700 kPa (gauge pressure)	
Weight	Approx. 20.8 kg	

Options

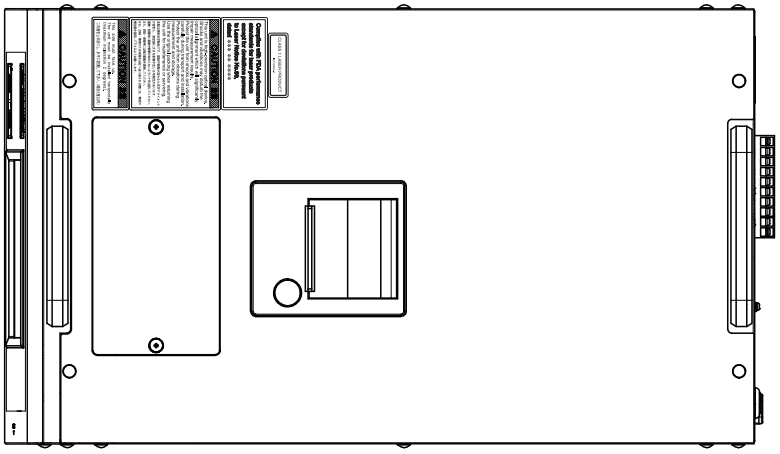
Communication cable	CC-61A/CC-63A
(For connection to DTE with 9-pin male D-sub connector)	
Thermal paper (6 rolls set)	TP-08
Lint-free thermal paper (6 rolls set)	TP-10
Sampling tube 5 m (4 mm × 6 mm dia. both ends flared)	KL-30-S16
Sampling tube 10 m (4 mm × 6 mm dia. both ends flared)	KL-30-S15
Compact Flash card (formatted)	MC-25CF2: 256 MB
Compact Flash-PCMCIA adapter	CFC-ADP03
RP monitor EVO (monitoring software)	K0505

Consumables

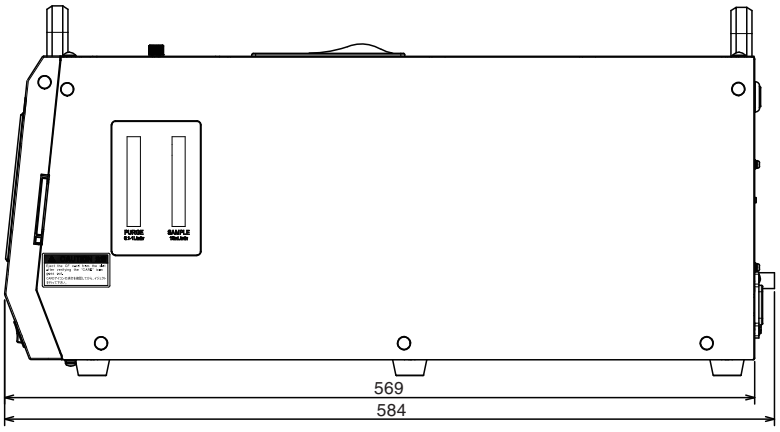
Laser, Flow cell, Inlet/outlet nozzle, Packing, Purge air unit filter, Purge air unit pump/muffler

Calibration interval

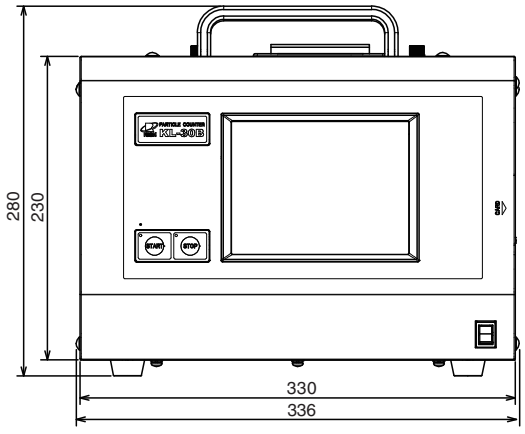
One year



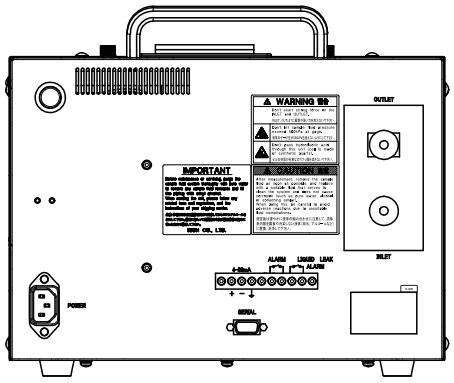
Top view



Right side view



Front view



Rear view

Unit: mm

Dimensional Drawings

Specifications subject to change without notice