

OUTLINE

RF2000 is a system that measures the air flow velocity to the engine radiator. The rotation frequency of a propeller sensor is measured by an infrared sensor attached to the propeller sensor. The signal from the infrared sensor is transmitted via an electrical cable to a converter for measuring the radiator air flow velocity and then converted to air flow velocity. A single converter can measure air flow velocity at 16 channels. The converter is also equipped with functions for displaying the air flow velocity and frequency, outputting an analog voltage, and performing RS-485 and CAN communication.

For RS-485 communication, up to four converters can be connected to enable simultaneous data collection on a maximum of 64 channels. Furthermore, the dedicated measurement software TIC Wind-LV can be used to set the measurement interval and number of measurements, to collect air flow velocity data, and to output an average value for the air flow velocity. Converter settings can be changed from a computer.

For CAN communication, up to four converters can be connected to enable collection of air flow velocity data. Also, driving tests can be performed by mounting the entire system in a vehicle.

FEATURES

□ Compact sensors

A thin and light-weight sensor with thickness of only 10 mm can be installed at a narrow space such as between a radiator and condenser.

□ Accurate directional measurement

The propeller sensor with its axis aligned parallel to the air flow direction, allows accurate measurement of the flow velocity along the perpendicular to the radiator, neglecting the flow from the other directions. Other types of sensor such as thermal type or pressure type tends to measure flow from all other directions.

□ Low pressure loss

The pressure loss caused by the propeller is approximately 0.1 kPa (at the velocity of 20 m/s). This is very small when compared to the pressure loss of the radiator.

□ Connected to electric cables

Electric cables used to connect the propeller sensors and converter are flexible, resistant to low temperatures, and are easier to handle compared to optical fiber cables.

□ More channels

One unit of the RR5000D/RR5100D is capable of measuring 16 channels.

□ RS-485

Four converters connected in a daisy chain can simultaneously collect data from up to 64 channels. The settings of the converters can be changed from a PC.

□ CAN communication

Four converters connected in a daisy chain can simultaneously collect data from up to 64 channels. The communication data are transformed to air flow velocity values based on the DBC file.



RF2000 SYSTEM SPECIFICATIONS

(1) Converter

RR5000D/RR5100D converter for infrared sensors

Power supply	12 to 24 V DC $\pm 10\%$
Display	2 lines in a LCD Measuring channel, air flow velocity and frequency
Operation key	CH UP, CH DOWN, SHIFT, INC., ENT., and MOVE total 6
Setting function	Low level cut-off, Moving average, Air-flow conversion factors, Full scale air flow velocity, Linearize setting, Start channel setting, End channel setting, Display update cycle, RS-485 communication unit address/ID address, CAN communication speed
Analog output	0 to 5 VDC, 16 channels Load resistance 100 k Ω or more
Accuracy	Frequency conversion accuracy: ± 1 Hz Analog output accuracy: $\pm 0.6\%$ of the reading ± 0.01 V (Based on display value)
Communication	RS-485 and CAN communication functions
Temperature range	5 to 60°C

(2) Vane anemometer (propeller sensor)

RS-1050-IR/RS-1150-IR infrared sensor

Form	Dimension : Approx. 69 mm including lugs for installation, Five vanes Cable length : 6 m
Measuring range	0.4 to 30 m/s
Accuracy	$\pm 1\%$ of reading + 0.05 m/s) at the range of 0.4 to 20 m/s
Temperature range	-40 to 120°C Without condensation of moisture or freezing (Maximum continuous operating temperature is 100°C)

RS-1038-IR/RS-1138-IR infrared sensor

Form	Dimension : Approx. 42 mm including lugs for installation, Five vanes Cable length : 6 m
Measuring range	0.5 to 30 m/s
Accuracy	$\pm 1.5\%$ of reading + 0.05 m/s) at the range of 0.5 to 20 m/s
Temperature range	-40 to 120°C Without condensation of moisture or freezing (Maximum continuous operating temperature is 100°C)

(3) Communication and data processing software "TIC Wind-LV" RW2000 (Dedicated for the RF2000)

System requirement	Windows 7 SP1 or later operation systems
Communication	RS-485
Function	The air flow data for each channel is collected. Data are measured multiple times (1 to 99999 times) at a fixed time interval (1 to 9999 seconds) and recorded in a CSV file. Parameter settings in the converter are changed.

MODEL CODE

Converter for radiator air flow measurement system using infrared sensors

RR	□□□□□	Contents
	5000D	A maximum of 16 pieces of propeller sensors can be connected per unit. Used in conjunction with RS-1050-IR/RS-1038-IR.
	5100D	A maximum of 16 pieces of propeller sensors can be connected per unit. Connected to sensors via connectors with locks. Used in conjunction with RS-1150-IR/RS-1138-IR.

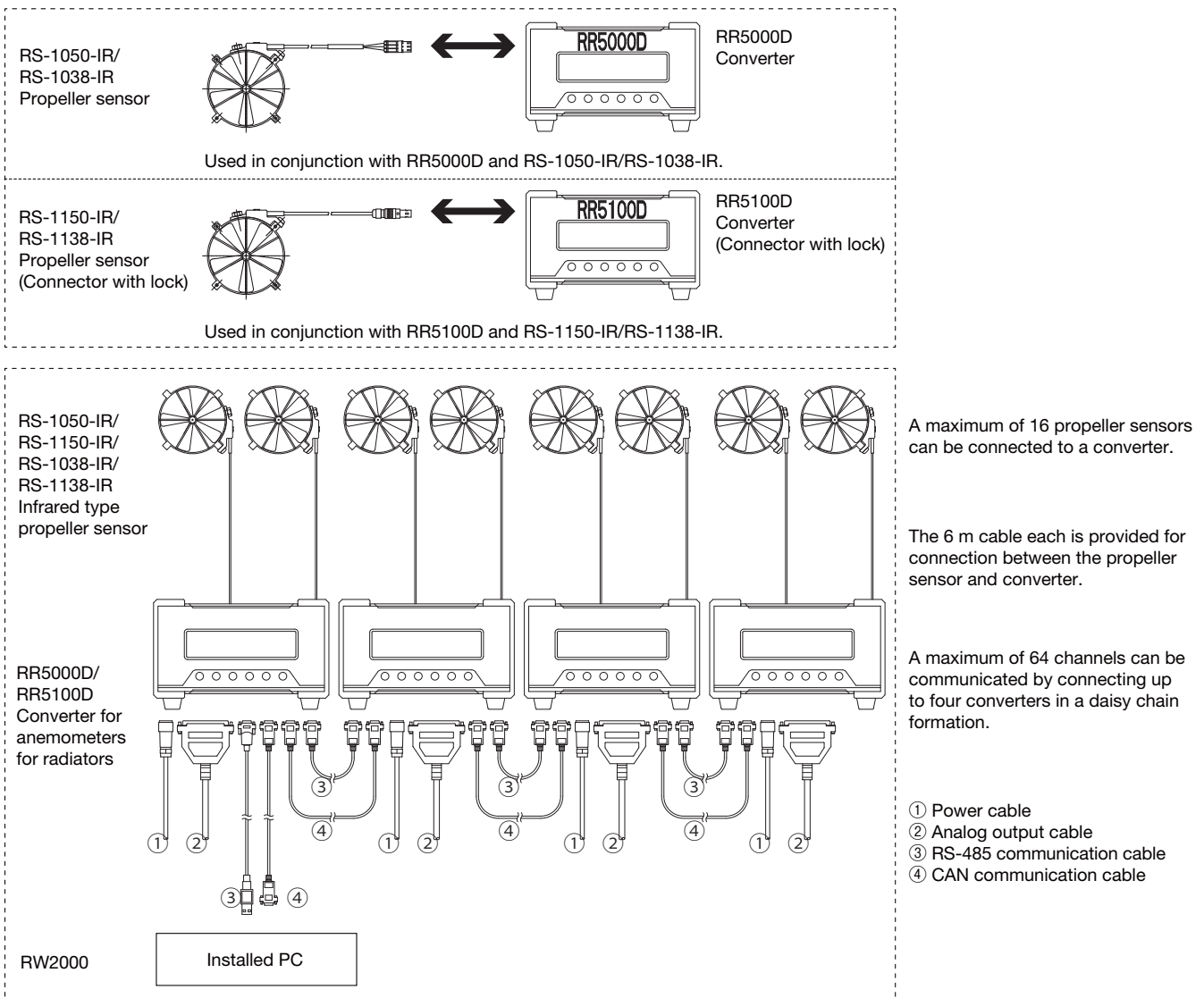
Propeller sensor with an infrared sensor

RS	- □□□□ - □□	Contents
	1050-IR	Propeller diameter: 50 mm. Air flow velocity: 0.4 to 30 m/s. Used in conjunction with RR5000D.
	1150-IR	Propeller diameter: 50 mm. Air flow velocity: 0.4 to 30 m/s. Connected to converter via connectors with locks. Used in conjunction with RR5100D.
	1038-IR	Propeller diameter: 30 mm. Air flow velocity: 0.5 to 30 m/s. Used in conjunction with RR5000D.
	1138-IR	Propeller diameter: 30 mm. Air flow velocity: 0.5 to 30 m/s. Connected to converter via connectors with locks. Used in conjunction with RR5100D.

Communication and data processing software "TIC Wind-LV"

RW	□□□□	Contents
	2000	Software dedicated for the RF2000 to collect the air flow velocity data at each channel.

SYSTEM CONFIGURATION



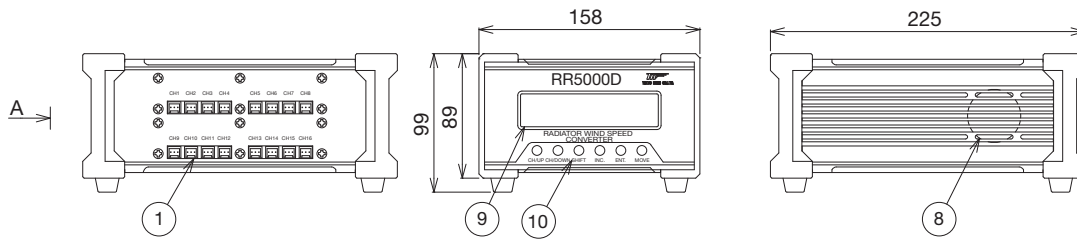
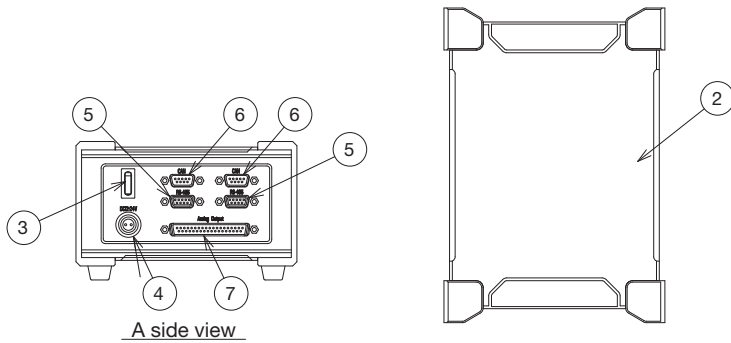
Note : When installing the propeller sensors, do not expose the infrared sensors to the direct sunshine. Select a right place to install considering the direction of them. The infrared sensors may be adversely affected by the direct sunshine in principle.

DIMENSIONS

RR5000D

Converter for anemometers for radiators

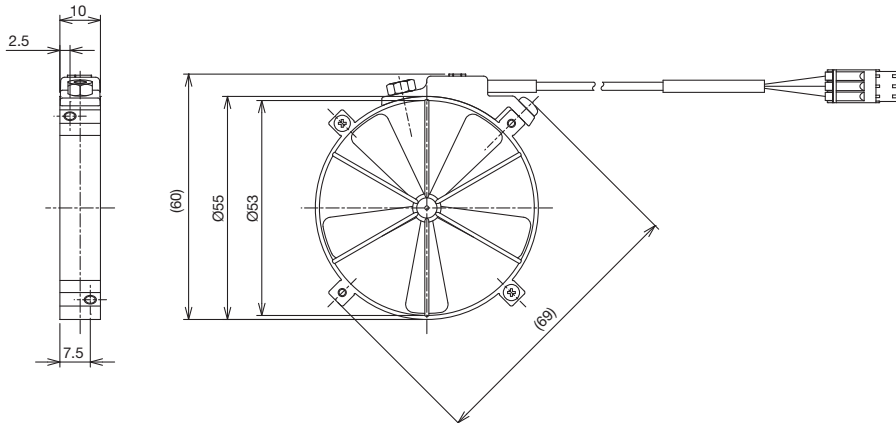
No.	Part name
①	Connectors connecting with propeller sensors
②	Cover
③	Power switch
④	Power connector
⑤	RS-485 Communication connector
⑥	CAN communication connector
⑦	Analog output connector
⑧	Vent hole
⑨	Display
⑩	Key buttons



RS-1050-IR

RR5000D

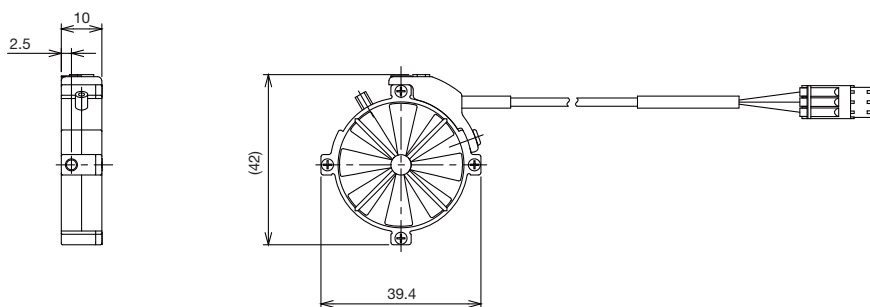
Propeller sensor (50 mm diameter)



RS-1038-IR

RR5000D

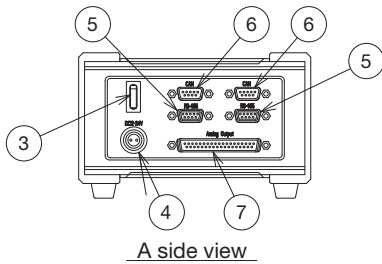
Propeller sensor (30 mm diameter)



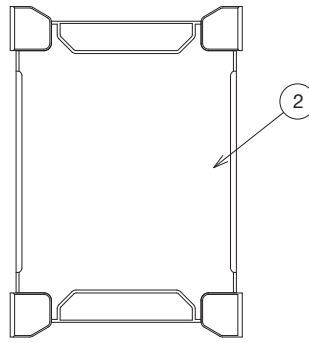
DIMENSIONS

RR5100D

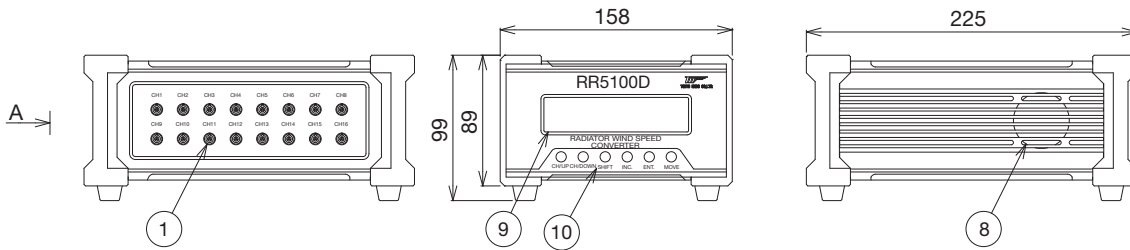
Converter for anemometers for radiators



A side view



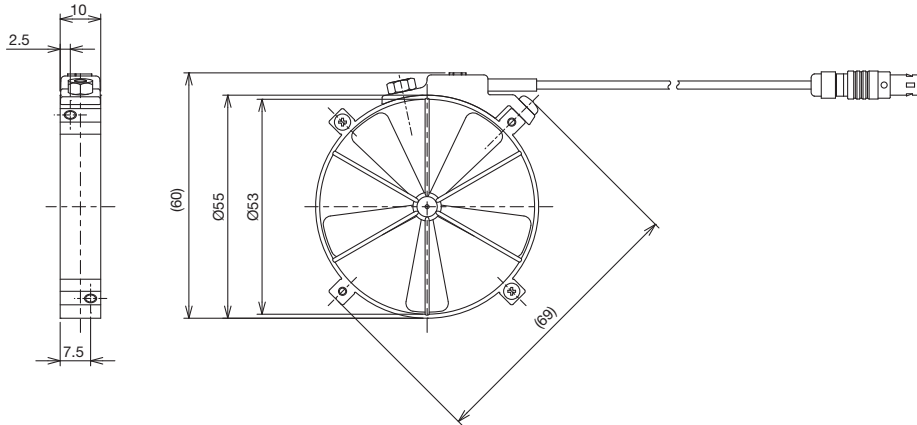
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⑩	Key buttons



RS-1150-IR

RR5100D

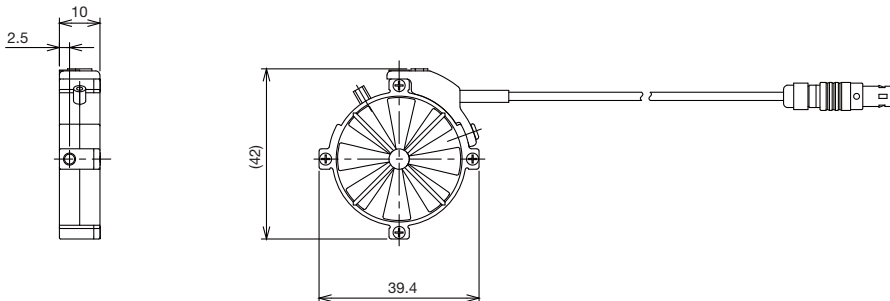
Propeller sensor (50 mm diameter)



RS-1138-IR

RR5100D

Propeller sensor (30 mm diameter)



* Specification is subject to change without notice.

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