For use with Infrared Thermocouple
(RD-300, RD-401 types)

FCS-23A-□/I

FCD-13A-□/I **FCR-13A-□/I**

FCD-15A-□/I **FCR-15A-□/I**

FCS

FCR

FCD

Features

- Instruments for use with Infrared Thermocouple, accordingly, **RD-300** type or **RD-401** type of Thermocouple is directly connectable without converter.
- As the input sampling period of these instruments is 125ms, this allows the instrument to correspond easily to 200ms of response time of the Infrared Thermocouple.
- Instruments provide a emissivity compensating function for easy use.
- Wide scale range (−50 to 500℃ or −50 to 1000˚F)
- Reading of the PV(process variable) is easy using the PV filter function.
- Simplified program control
- Various systems can be made up with many optional functions.
- CE marking conformity

Uses

●Non-contact type is applicable in cases where:

- Bearing for shaft
- Vehicle tire
- Semiconductor device during manufacturing process
- Object being moved by conveyor
- Roller and film for the laminater
- Drying process for such as wood, paper or fiber
- Hot melt adhesive
- Roller for weaving machine
- Culture petridish
- Vacuum forming
- Vacuum furnace
- Printed circuit board during manufacturing process
- Dough kneading process for bread and cake
- Printing ink, Roller for printing machine
- Environmental (heat) control for hazardous material
- Glass during manufacturing process
- Asphalt
- Food, Medicine
- Other objects which require non-contact temperature measurement

●Characteristics of infrared measurement

- Non-problematic objects (Most of the nonmetal surface)
  Food, Paper, Plastic, Coated metal, Stone, Soil, Glass, Liquid, Textile, etc.
- Somewhat problematic objects＊
  Dimly lustrous metal, Thin transparent plastic, etc.
- Problematic objects＊
  Plated lustrous metal, Non-coated metal, etc.

＊ In cases where measurement is difficult, it can be made easier if the black body tape is used to raise the emmisivity.

Emissivity

●Emissivity should be compensated when using the controller for the first time, or every time when the color or material of the control target has changed.

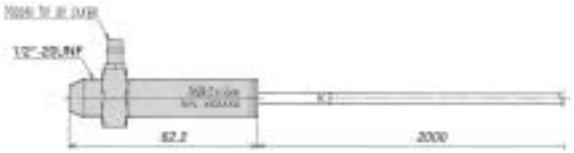
How to compensate the emissivity

1. Fix the contact type temperature sensor to the object and set common value of temperature to the controller and keep the temperature of the object constantly.
2. Check the temperature difference of indications between the contact type temperature sensor and the non-contact type temperature sensor (**RD-300** type or **RD-401** type).
3. Using emissivity compensating function of the instrument for infrared thermocouple, compensate the emissivity so as to be the same value between the contact type and the non-contact type.

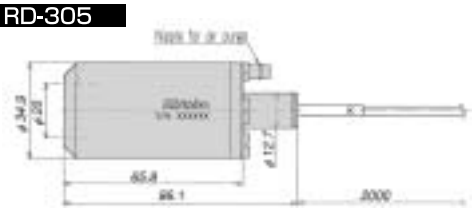
External dimensions (unit: mm)

RD-301

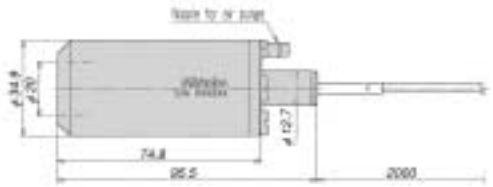
RD-302



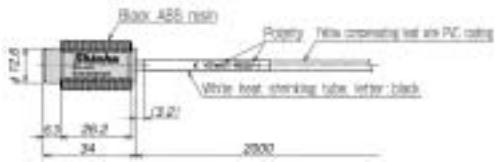
RD-305



RD-310



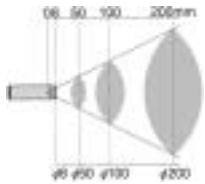
RD-401



Measuring distance: Visual field diameter (unit: mm)

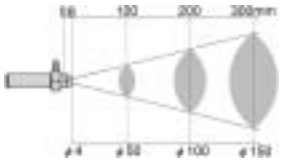
1 : 1

● Visual field diameter is the same measure as the distance



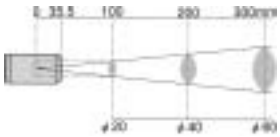
2 : 1

● Visual field diameter is approx. 1/2 of the distance



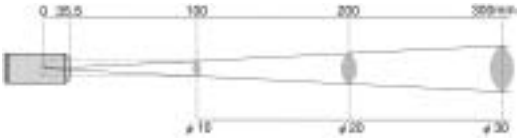
5 : 1

● Visual field diameter is approx. 1/5 of the distance



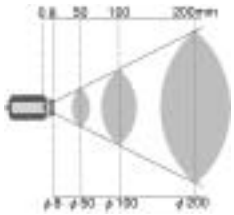
10 : 1

● Visual field diameter is approx. 1/10 of the distance



1 : 1

● Visual field diameter is the same measure as the distance



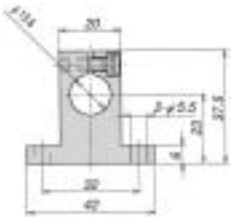
Standard specification (Sensors)

Model name	RD-301	RD-302	RD-305	RD-310	RD-401
Measuring range	−50 to 500℃ (−50 to 1000˚F)				
Accuracy	Within 0.5% of the indicated value when the emissivity of the object is 0.9.				
Angle of visibility	Approx.53˚	Approx.28˚	Approx.11˚	Approx.6˚	Approx.53˚
Minimum measuring diameter	φ8mm	φ4mm	φ20mm	φ20mm	φ8mm
Measuring distance: Visual field diameter	1 : 1	2 : 1	5 : 1	10 : 1	1 : 1
Repeatability	±1% of the measured value or 1℃, whichever is greater.				
Temperature coefficient	0.04% of the indicated value per ambient temperature change 1℃ (for RD-401: 0.3℃)				
Measuring wave length	6.5 to 14.0μm				
Detection element	Thermopile				
Output	Electromotive force of the thermocouple K				
Response time	200ms (at 63.2% response)				
Output impedance	Approx.3kΩ	Approx.4 to 8kΩ	Approx.4 to 8kΩ	Approx.4 to 8kΩ	Approx.2kΩ
Allowable ambient temperature	−18 to 100℃ (RD-401: 18 to 70℃)				
Air purge	Not applicable	Applicable	Applicable	Applicable	Not applicable
Housing	Closed structure, Water-proof structure, IP67 (for RD-401: IP65)				
Material of light receiving opening	Silicone lens				
Case material	SUS303 equivalent (for RD-401: Hard ABS resin)				
Output cable	Length of compensating lead wire: 2m Teflon coating, heat resistance 200℃ (for RD-401: PVC coating, heat resistance 70℃)				
Weight (Body)	Approx.40g	Approx.47g	Approx.187g	Approx.197g	Approx.50g *
External dimension	φ12.7x44.5mm	φ12.7x62.2mm	φ34.9x86.1mm	φ34.9x95.5mm	φ18.4x32.5mm

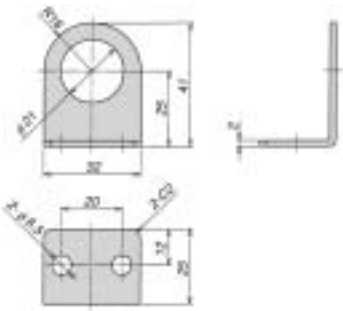
* Including mounting bracket
Note : Output cables are to be connected Yellow to (+) and Red to (−).

Mounting bracket (unit: mm)

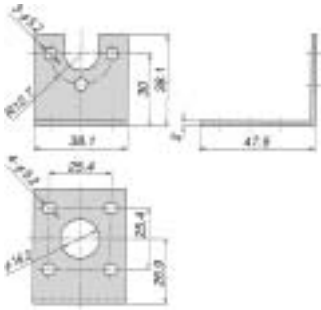
● T type small (for RD-301, 302)



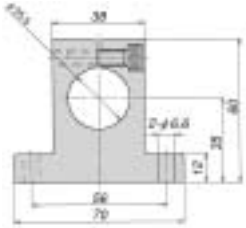
● MZB20 (for RD-401)



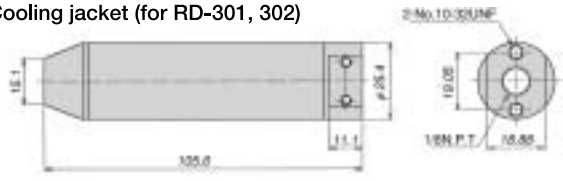
● MB-1 (for RD-305, 310)



● T type large (for cooling jacket)



● Cooling jacket (for RD-301, 302)



■Standard specification (Common to the FCD, FCR and FCS)

Input	Infrared Thermocouple, **RD-300, RD-401**
Rated scale	−50 to 500℃ (−50 to 1000°F) Resolution: 1℃(°F)
Accuracy (Set, Indication)	Within±0.3% of full scale±1digit (Accuracy on Cold junction temperature compensation, ±1℃ at 25±25℃
Input sampling period	125 ms In the case of FCD, FCR, if option Heater burnout alarm [W] or External setting [EA, EV] is applied, the input sampling period becomes 500ms. In the case of FCS , if option Heater burnout alarm [W] is applied, the input sampling period becomes 250ms.
Control action	Selectable by internal switches **・Fuzzy self-tuning PID(with auto-tuning function)** Proportional band(P)---- Automatic Integral time(I)---------- Automatic Derivative time(D)-------- Automatic Proportional cycle------- 1 to 120s ARW---------- Automatic Output limit---------- 0 to 100% *1 **・PID(with auto-tuning function)** Proportional band(P)---- 0.1 to 999.9% Integral time(I)---------- 0 to 3600s Derivative time(D)-------- 0 to 3600s Proportional cycle------- 1 to 120s ARW---------- Automatic Output limit---------- 0 to 100% *1 **・PD** Proportional band(P)---- 0.1 to 999.9% Derivative time(D)-------- 0 to 3600s Proportional cycle------- 1 to 120s Reset---------- ±Proportional band converted value Output limit---------- 0 to 100% *1 **・ON/OFF** Hysteresis---------- 0.1 to 100.0℃(°F) *1: −5 to 105% for current output.
Control output (OUT1)	Specified when ordering Relay contact : 1a1b (FCS: 1a) 250Vac 3A(resistive load), 250Vac 1A(inductive load cosφ=0.4) Non-contact voltage: For SSR drive 12^{+3}_{0} Vdc maximum 40mA(short circuit protected) Current : 4 to 20mAdc(Isolated type) Load resistance: maximum 550Ω ON/OFF servo : Relay contact, 1a×2, 250Vac 3A(resistive load), 250Vac 1A(inductive load cosφ=0.4) With valve flow rate automatic operating function.
Alarm 1 (A1)	Output action selectable by internal switches ・No alarm ・High limit alarm (Deviation setting): ±Input range span (off when set to 0) ・Low limit alarm (Deviation setting): ±Input range span (off when set to 0) ・High/Low limits alarm (Deviation setting): 0 to input range span (off when set to 0) ・High/Low limit range alarm (Deviation setting): 0 to input range span (off when set to 0) ・Process high alarm : Input range minimum to input range maximum ・Process low alarm : Input range minimum to input range maximum
	Standby function : Selectable Alarm action delayed timer: Applicable (Setting range---- 0 to 9999s) Setting accuracy : Within±0.2% of full scale±1digit (FCD, FCR), Within±0.3% of full scale±1digit (FCS) Control action : ON/OFF action Hysteresis : 0.1 to 100.0℃(°F) Control output : Relay contact 1a, 250Vac 3A(resistive load), 250Vac 1A(inductive load cosφ=0.4)

Infrared emissivity correction	Correction value : 0.100～1.000	Power failure Compensation	In case the time is 30ms or greater, the setting data are backed up by non-volatile memory.
Supply voltage	100 to 240Vac, 50/60Hz 24Vac/dc, 50/60Hz	Dielectric strength	Between input terminal and ground terminal, 1.5kVac for 1 min Between input terminal and power terminal, 1.5kVac for 1 min Between power terminal and ground terminal, 1.5kVac for 1 min Between output terminal and ground terminal, 1.5kVac for 1 min Between output terminal and power terminal, 1.5kVac for 1 min
Allowable voltage fluctuation	In case of 100 to 240Vac, 85 to 264Vac In case of 24Vac/dc, 20 to 28Vac/dc		
Power consumption	FCD, FCR : Approx. 15VA (maximum) FCS : Approx. 8VA (maximum)		
Ambient temperature	0 to 50℃ (32 to 122°F)	Case, Base	Flame resisting resin Color: Light gray
Ambient humidity	35 to 85%RH (non-condensing)	Weight	Approx. 550g (FCD), Approx. 320g (FCR), Approx. 140g (FCS)
External dimension	FCD: 96×96×110mm (W×H×D), FCR: 48×96×110mm (W×H×D), FCS: 48×48×110mm (W×H×D)		
Mounting method	Flush, Fixed by screw type mounting bracket (FCD, FCR), by one-touch type mounting bracket (FCR, FCS)		
Attached function	Control output OFF, Setting value lock, Setting value limit, Sensor correction, Alarm action delayed timer, Multi-function, Simplified program controller, Power failure countermeasure, Self-diagnosis, Automatic cold junction temperature compensation, Warm-up display and Setting value ramp.		

・Optional functions are the same as other Digital indicating controllers FC series.

SAFETY PRECAUTIONS

- To ensure safe and correct use, thoroughly read and understand the manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after consulting purpose of use with our agency or main office.
  (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protection equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Also proper periodic maintenance is required.
- This instrument must be used under the conditions and environment described in the manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in the manual.

Caution with respect to Export Trade Control Ordinance

To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument.
In the case of resale, ensure that this instrument is not illegally exported.

・This catalog is as of July 2004. Specifications and external appearance are subject to change without prior notice.
・If you have any inquiries, please consult our agency or with us directly.