INST.No.INE-555-P5

CHINO

IR-CZ Series
HIGH TEMPERATURE TYPE INFRARED RADIATION THERMOMETER (2-color type)
[Hardware volume]
Model: IR-CZQH7□

INSTRUCTIONS

Always keep this instruction manual with the unit.

Please be sure to deliver this instruction manual with the unit to the end user.

CHINO

CONTENTS

1. Introduction

The IR-CZ series is a high temperature type infrared radiation thermometer (2-color type) using a hybrid element converting functions enabling digital temperature display and parameter programming are built-in. The thermometer is focusable and has long-distance factor for free installation. The response time is 20ms suitable to on-line measurement.

The radiation energy collected through the objective lens is transmitted to the element is converted into an electrical signal. The element output is digitally converted and processed through emissivity compensation, linearizer and modulation. The standardized final output is 4 to 20mA DC. Functional keys make programming or selection of emissivity, signal modulation and alarm function easy.
2 types of connection by terminals or a connector are available in this thermometer depending on a connection cable. Various options and accessories are prepared for every kind of applications.
This instruction manual is explaining only "Hardware volume" for using high temperature type infrared radiation thermometer (2-color type) Model : IR-CZQH correctly and safely, read the separate instruction manual [IR-CZ series Software volume].

◆Request to the operator of the thermometer

This instruction manual describes the maintenance of the thermometer, too.
Keep this instruction manual with the thermometer.
If you have unclear points or need technical assistance, please contact your sales agent of CHINO Corporation.

▣ Preface

1. The information in this manual is subject to change without notice and does not represent a commitment on the part of CHINO Corporation.
2. No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, for any purpose other than the purchaser's personal use without permission of CHINO Corporation.
3. CHINO Corporation shall not be liable for any operation results.

◆Confirmation after the packing box opening a letter

Please confirm the following before use after opening a letter with this product by all means.
Please contact purchase or our nearest office by any chance if there are doubts.

1.1 Confirmation of the appearance

In the appearance, please confirm that a product does not have damage.

1.2 Confirmation of the model number

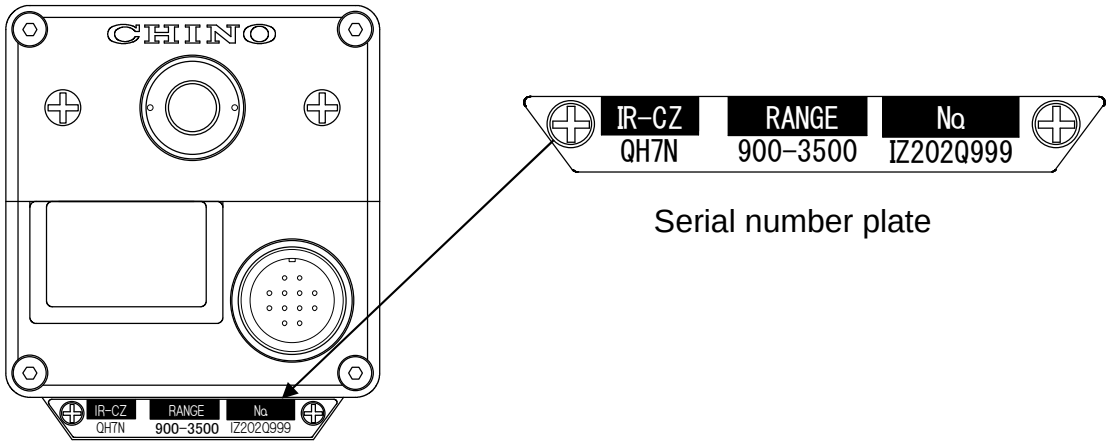
Please confirm that the form cord (serial number plate) of the product which had you purchase it does not have a mistake.

Model number : IR-CZQH 7 □

IR-CZQH : High temperature type infrared radiation thermometer (2-color type)
7 : Distance factor L/D
7 : 200 with field diaphragm ø10
□ : Connection type
N : Connector connection type
T : Terminal connection type

Serial number plate and pasting place

The serial number plate is attached on the position of the chart below.



1.3 Confirmation of accessories

Because it is attached the following accessories to a product, please confirm it.

Article name	Quantity	Remarks
IR-CZ Series HIGH TEMPERATURE TYPE INFRARED RADIATION THERMOMETER (2-color type) [Hardware volume]	1book	This book
IR-CZ Series HIGH TEMPERATURE TYPE INFRARED RADIATION THERMOMETER (2-color type) [Software volume]	1book	Separate volume

◆Notice

1. When you take this product out of a packing box, please be careful not to drop it.
2. When you transport this product, enter the packing box for this product, and you put it in the outer box which spread a cushion all more, and please transport it.
   In consideration of such a case, please keep the packing box for this product.
3. When you do not use this product for a long term, pleas avoid direct rays of the sun, and keep it at normal temperature and at a place with a little dust.

2. For using safely

Please read and understand the following instructions to have you use this product safely.

2.1 Precondition for use

1) The working temperature range of this product is -10 to 60 ºC. (no condense dew)
2) Do not use the thermometer in dusty places, etc. Remove the dust after using it.
3) Please avoid the use in atmospheres such as a dust, garbage, the corrosive gas.
4) This product is a precision instrument. Please avoid the use in the place as follows.
   Use at the place that a temperature change has a big.
   Use at the humid place.
   Use at near the heavy electric appliance circuit or the place of the big instruction disorder.
   Use at the place with the mechanical vibration and impact.
5) The person to use, please really read this instruction manual. In addition, please keep it carefully in the place that you can read it anytime. There is need to have you understand the instructions of this product, basic operation enough.

2.2 Storage

1. Do not store the thermometer in hot and humid places.
2. For failures of the thermometer, don't overhaul it by yourself, and contact your sales agent of CHINO Corporation.

2.3 Symbols in this instruction manual

The symbols shown below are used depending on important degrees for using the thermometer safely and avoiding unexpected situations.

Important degree	Symbols	Contents
1		This symbol is indicated with a title for an explanation with Warning.
2	Warning	Indicates important information that must be observed to avoid the risk of fire or electric shock or other dangers that may result in serious personal injury or death, or damage to this product.
3	Caution	Indicates important information that must be observed to avoid the risk of personal injury or malfunctions of this product.
4	Remarks	Indicates supplementary information that the operator is recommended to understand.
5	Reference	Indicates supplementary information or a reference to an operation.
6		It is a grounding terminal. Please connect the grounding terminal to protection grounding by all means.

2.4 Important explanation

Warning

For serious accident prevention, please read and understand these contents by all means.

1) Confirmation of the power supply voltage and the connection
Please confirm it about the following before supplying a power supply.
The power supply voltage matches the rating voltage.
Connection is right.
Grounding is carried out, and so on.

2) Setting of the overcurrent protection device
This product does not have power switch. Please install an overcurrent protection device (including the breaker) in accord with rating specifications in the power supply to supply to this product.

3) Protection of the terminal part
Particularly in the case of a terminal connection type (model : IR-CZQH7T), for prevention of electric shock, please put safe measures that prevent touching the terminal part of this product directly.

4) Setting of the safety device
About the use to the facilities that a serious loss is predicted by this product and peripheral device breaking down, please put a fail-safe design on the setting of the safety device to evade those losses by all means and end product side.
In addition, please never use it for important facilities affecting human life, atomic energy, aviation, the space.

5) Do not touch the product inside
Please do not touch the inside of this product, and do not put tools. There might be an electric shock and the injury.

6) Power supply block at the time of the doubt
When this product generates bad smell, abnormal noise, smoke, and it becomes the abnormal high temperature, it is dangerous at all. You intercept a power supply promptly, and please contact purchase or our nearest office.

7) Prohibition of repair, the remodeling
Repair and the remodeling such as the parts exchange by other than the serviceman whom we authorized are prohibited. When repair and remodeling are necessary, please contact purchase or our nearest office.

8) Strict observance of the instruction manual
Please follow this instruction manual to have you use this product safely definitely.
About any request including an injury, the damage and the loss that occurred by wrong use, we do not take responsibility at all. Thank you for your understanding beforehand.

9) Disposal of this product
When you discard this product, please obey the regulation of each local government.

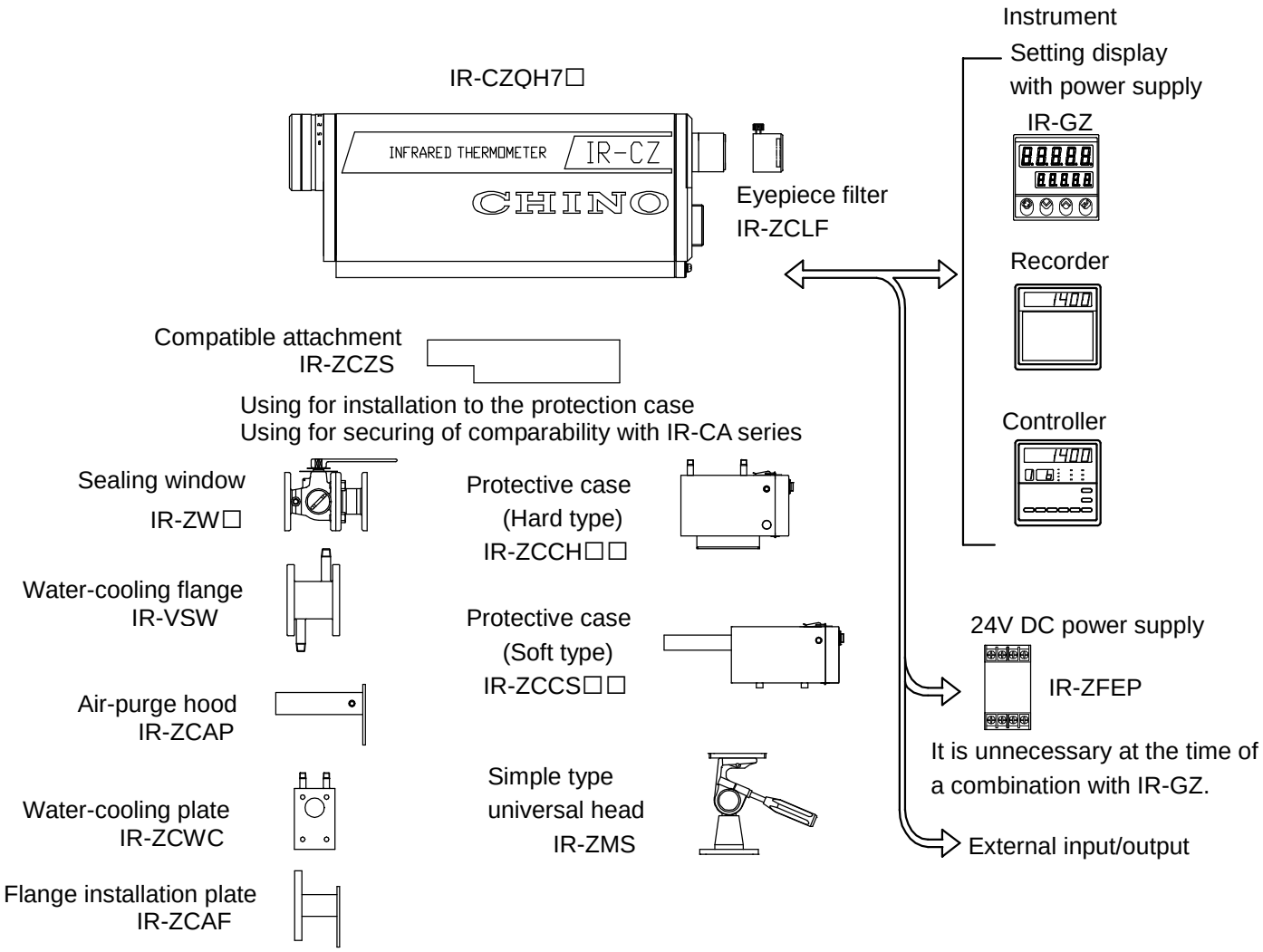
2.5 Warning and attention for the security

When you use this product, you follow the following matters by all means, and please use it definitely. In addition, please keep this instruction manual carefully in the place that you can read anytime.
shows an act of the prohibition.

	**Warning (May cause death or serious injury)**
	Don't operate this thermometer in places where combustible or volatile gas is existed. It is extremely dangerous to use the thermometer in such environment.
	For the measurement of object exceeding 1500ºC, make sure to use the eyepiece filter. However, when you feel glare on the measurement of objects lower than 1500ºC, use the eyepiece filter (Model: IR-ZCLF).
	When connecting power to the power terminals, make sure that all mains is turned off to prevent an electric shock.
	Don't use the thermometer if it was broken, smoking or nasty smelling. These may cause fire. For such abnormal condition, turn off the power switch at once and contact your sales agent of CHINO Corporation.
	Laser may damage your eyes. Don't stare into a laser beam. Make sure to target the laser when you want to decide the center of the measuring object only and to go off it after the center of the measuring object is decided.
	Never take the thermometer apart or convert it. These may cause trouble and danger.

	**Caution (May cause injury or physical damage)**
	Be careful not to give vibration or impact to the thermometer. Install the thermometer by keeping it as far as possible from an inductive oscillator or electric power line. Do not use the thermometer in dusty places, noisy places and static electricity places.
	Do not wire the connection cable near a noise occurrence resource, relay drive line, high frequency line and power line. Do not bundle the connection cable with the line that noise is doubling, and do not store it into the same duct.
	Read the entire contents in this instruction manual to have the thermometer function perfectly.

3. Configuration



About the external input/output, the model number has 4-20mA DC analog output, the RS485 serial communication built-in.

About digital contact output (DO),

1) The connector connection type (model :IR-CZQH7N) has one point of contact output (DO) built-in.
2) The terminal connection type (model :IR-CZQH7T) does not have it built-in with contact output (DO) .

Reference

The accessories are put together depending on a use variously.
Please refer to the instruction manual of each accessory.

4. Model number

4.1 Model number of the main body

IR-CZ QH 7 □

- Series
  - IR-CZ Series
- Model
  - QH : High temperature type infrared radiation thermometer (2-color type)
    - ・4 to 20mA DC　Analog output
    - ・RS485 Serial communication
    - ・One point of contact output (Connector connection type only)
- Distance factor L/D (Measuring distance/Measuring diameter)
  - 7 : 200 with field diaphragm ø10
- Connection type
  - N : Connector connection type
  - T : Terminal connection type

Remarks

・The terminal connection type (model :IR-CZQH7T) does not have a contact output (DO) built-in.

4.2 Model number of accessories

Accessories	**Model**	**Reference**
Compatible attachment	IR-ZCZS	Used for Protective case (Hard type, Soft type)
Protective case(Hard type)	IR-ZCCH□□	CZ: Connector T: Terminal
Protective case(Soft type)	IR-ZCCS□□	CZ: Connector T: Terminal
Sealing window	IR-ZW0	Quartz glass
Water-cooling plate	IR-ZCWC	
Air-purge hood	IR-ZCAP	
Water-cooling flange	IR-VSW	
Flange installation plate	IR-ZCAF	
Eyepiece filter	IR-ZCLF	
Connecting cable (Connector type)	IR-ZZRC□□□	□□□：Designated length (m)
Connecting cable (Terminal type)	IR-ZCRT□□□	□□□：Designated length (m)
Connection cable compatible with IR-CA	IR-ZZCC	Used for conversion to IR-CZ of the connection cable for IR-CA
Simple type universal head	IR-ZMS	

Remarks

・Compatible attachment (model: IR-ZCZS) is used at the time of the installation of the main body to a protective case (software type (model: IR-ZCCS□□, hardware type (model: IR-ZCCH□□).
・Setting compatibility (the amount of optical axis, installation hole position, etc.) with the IR-CA series is secured by using compatible attachment (model: IR-ZCZS).

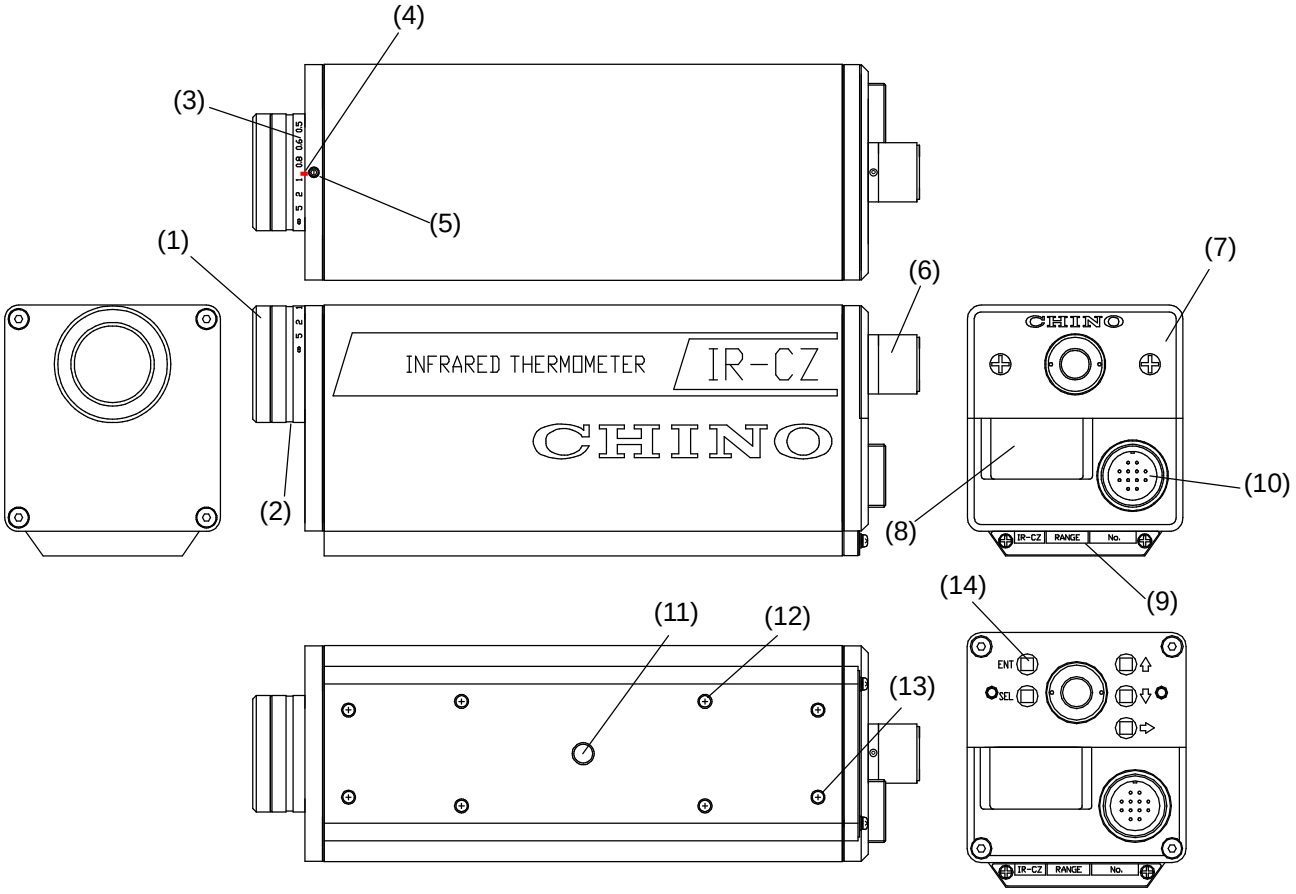
4.3 Measuring temperature

Name	Distance factor L/D	Model	Measuring temperature range
High temperature type infrared radiation thermometer (2-color type)	Distance factor L/D is 200, with field diaphragm ø10	IR-CZQH7□	900 to 3500 ºC (Single-color type : 500 to 1400 ºC)

5. Names and functions of component parts

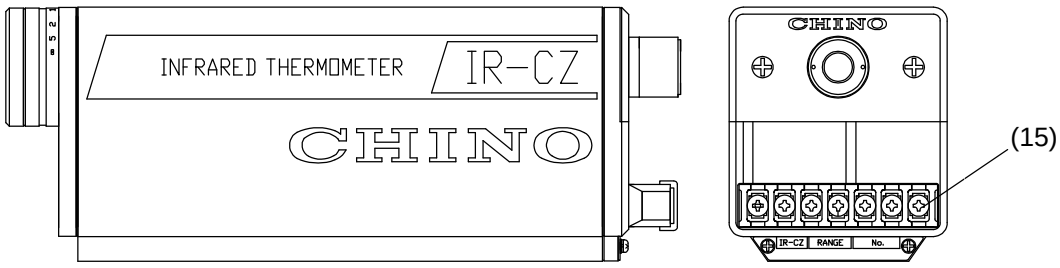
5.1 Overview

5.1.1 Connector connection type (Model: IR-CZQH7N)



Function part cover disassembly

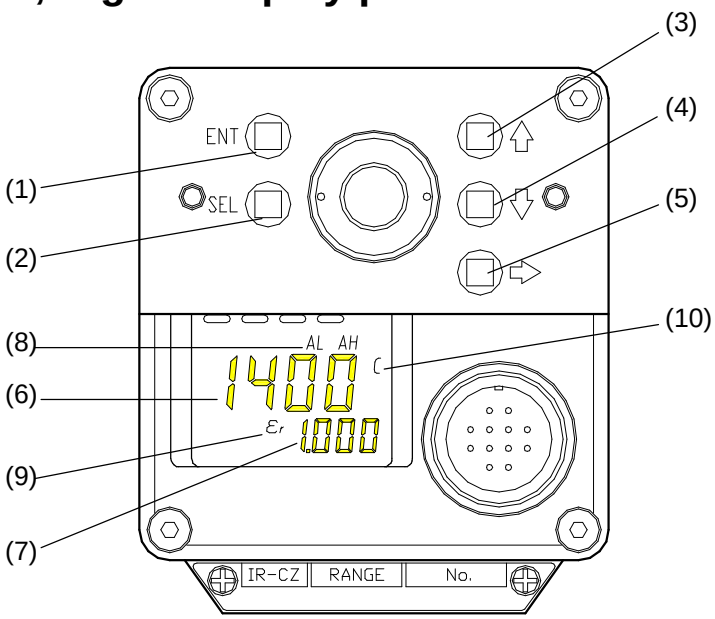
5.1.2 Terminal connection type (Model: IR-CZQH7T)



5.1.3 Name and function of the parts

Name	Function
(1)Cover Glass	An optical glass for protecting the objective lens from scratches, smudges, etc.
(2)Objective lens tube	For focusing in a measuring area. This tube has the indication of distance.
(3)Distance indication plate	For indication of distance (0.5, 0.6, 0.8, 1.25mm, ∞)
(4)Distance marker	For marking the distance indicated on the above plate.
(5)Screw of objective lens tube	For fixation of the objective lens tube.
(6)Eyepiece lens tube	For focusing in the target mark inside the viewfinder.
(7)Function part cover	The cover of the function keys. Because it is fixed with upper part M3 fixation screw, when a setting change is necessary, you take it off, and please setting-change it.
(8)Digital display panel	Main display: LCD 4 digits, Sub display: LCD 4 digits, Status marker: Alarm status, Sub marker: Emissivity (Emissivity ratio), Measuring unit: ºC or ºF
(9)Serial number plate	Manufacturing plate of displayed Model No., measuring temperature range and manufacturing serial No. In the case of an inquiry, please tell me each item by all means.
(10)Connecter	Connect the thermometer by using the exclusive cable (IR-ZZRC or IR-ZCRL)
(11)Screw hole for tripod	A 1/4-20UNC screw hole for fixing a tripod or a simple type universal head.
(12)Screw holes for installation of thermometer	M4 (depth 4mm) screw holes for installation of the thermometer Use these screw holes for housing the thermometer in a protective case.
(13)Screw holes for installation of compatible attachment	M4 (depth 4mm) screw holes of four place for installation the compatible attachment.
(14)Function keys	5 function keys for programming parameters.
(15)Terminal board	Connect the thermometer by using the exclusive cable (IR-ZCRT) or the recommended cable.

5.2 Function part, Digital display panel



5.2.1 Function part

Name	Function	Indications
(1)Entry key	Used to store the selected or programmed parameter.	ENT
(2)Select key	Used to select a parameter menu in the operating mode or the engineering mode.	SEL
(3)Up key	Used to select a parameter in the parameter selection mode or to scroll numeric characters in the parameters programming mode.	↑
(4)Down key		↓
(5)Next key	Used to select a parameter in the parameter selection mode or to shift a digit for numeric entries to the right in the parameters programming mode.	→

5.2.2 Markers of digital display panel

Name	Function	Marker	Indications
(6)Main display	At the time of the measurement, measurement value of the thermometer is displayed, at the time of setting, a setting item, a choice level, choice item is displayed with LCD 4 figure.	———	———
(7)Sub display	At the time of the measurement, a menu chosen with SEL key is displayed, at the time of the setting, a setting item is displayed with LCD 4 figure.	———	———
(8)Status marker	It is turned on at the time of lower limit temperature alarm outbreak.	AL	“AL”
	It is turned on at the time of upper limit temperature alarm outbreak.	AH	“AH”
(9)Sub marker	Will light when the sub display shows an emissivity (ratio). Single color type is the emissivity (ε) and 2-color type is the emissivity ratio (εr).	ε（εr）	“ε” “εr”
(10)Temperature unit	Temperature unit of ℃ or ° F is displayed.	C F	“C” “F”

6. Installation

6.1 Precautions in installation

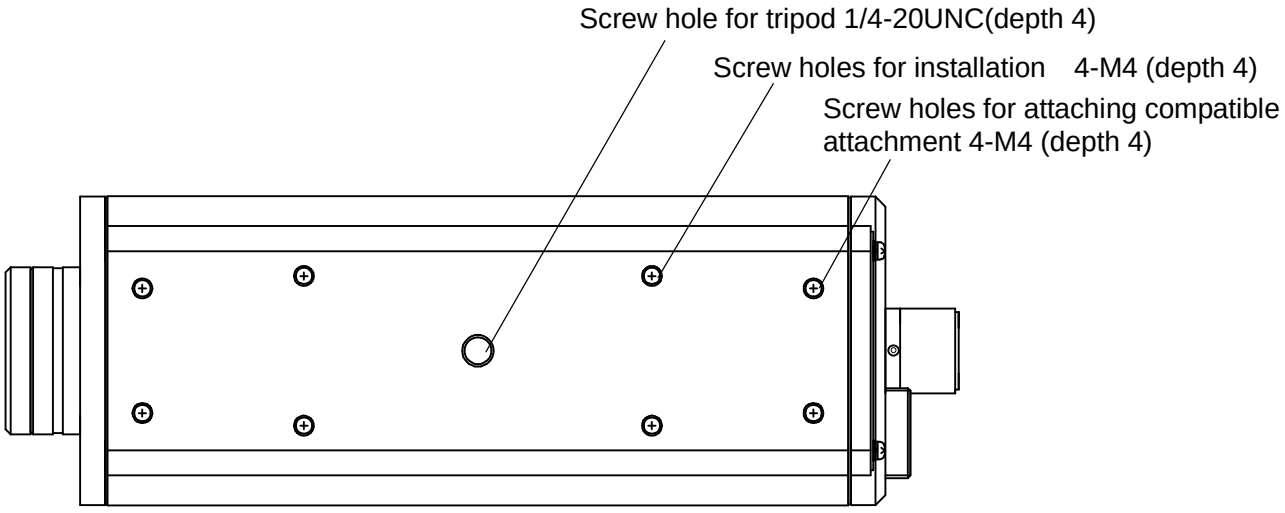
This product IR-CZQH7□ is a precision instrument. Please install it on the occasion of setting with care to the following item.

Caution

Vibration and impacts Vibration or impacts reduces the liability of the thermometer and causes an unstable measurement by the targeting shake to a measuring surface. If you install the thermometer in the place where vibration or impacts exist, its careful periodic inspection is requested.
Induction The thermometer is designed for anti-induction but install it as far as possible from an induction heating generator or power line.
Working temperature The working temperature of the thermometer is -10 to 60ºC. If the ambient temperature is high or if the temperature of the thermometer exceeds the maximum working temperature by reflection from a high temperature substance, etc., water-cooling of the thermometer is absolutely necessary. When the temperature of the thermometer does not exceed but closely reaches to the maximum working temperature, water-cooling of the thermometer is recommended for maintaining of the reliability of the thermometer.
Optical path Select a place for installation of the thermometer, where water-drops, dust, smoke, steam, etc. would not enter between the thermometer and a measuring surface. If such place cannot be selected and the affection by existence of such substances cannot be ignored, blowing-out of such substance with air-purge is necessary.
Disturbances to make indication of measured value higher Select a place for installation of the thermometer, where sunlight, light of incandescent lamp, flame, heat radiation from a high temperature substance, etc. is not reflected to the measured surface and the cover glass of the thermometer. When such light is reflected, higher temperature than the exact one will be indicated. (The affect by such reflection will be great for the measurement of low temperature.) If such place cannot be selected, shade the thermometer or take similar precautionary measures.

6.2 Installation

Install the thermometer to a tripod, universal head, protection case, or mounting plate etc., by using screw holes for tripod (1/4-20UNC) or screw holes for installation (4-M4) at the bottom side.
When you install it in the protective cases of exclusive accessories, it is necessary to install it in the protection case after having attached a compatible attachment (model: IR-ZCZS).
Please read the operation manual for an accessory when instilling it by using the exclusive accessories.



Caution

Don’t use the thermometer in the following places.
1) Dusty place or a corrosive gas atmosphere.
2) Noisy and static electricity
3) Places where the ambient temperature is higher than 60°C or lower than -10°C.
4) Places where the ambient temperature changes abruptly, or high humid places.
5) Places where there are inductive oscillator or electric power line
6) Places where there are mechanical vibrations and impacts.
7) Places where combustible or volatile gas is existed.

7. Targeting

7.1 Measuring distance and measuring diameter

The relation of the measuring distance and the measuring diameter is defined by the distance factor as shown in the following formula.

Measuring distance (mm) = Distance factor x measuring diameter (mm)

Place the thermometer at the measuring distance computed by the above formula.
Considering the dislocation of the optical axis, take the measuring area more than 1.5 times the measuring diameter.

Reference

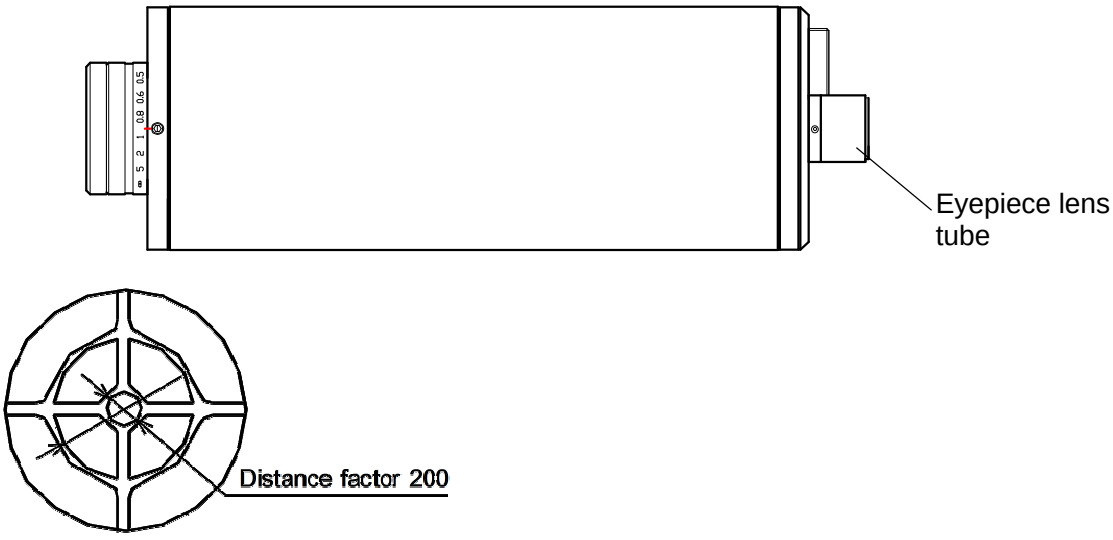
Rough standard for measuring distance and measuring diameter (With field diaphragm Ø10)

Distance factor	Measuring distance (mm)		
	500	1000	2000
200	Ø2.5	Ø5	Ø10

7.2 Targeting of finder type ⚠

Look into the eyepiece lens and turn the eyepiece lens tube to focus the following targeting mark.

◆Upper view of main body



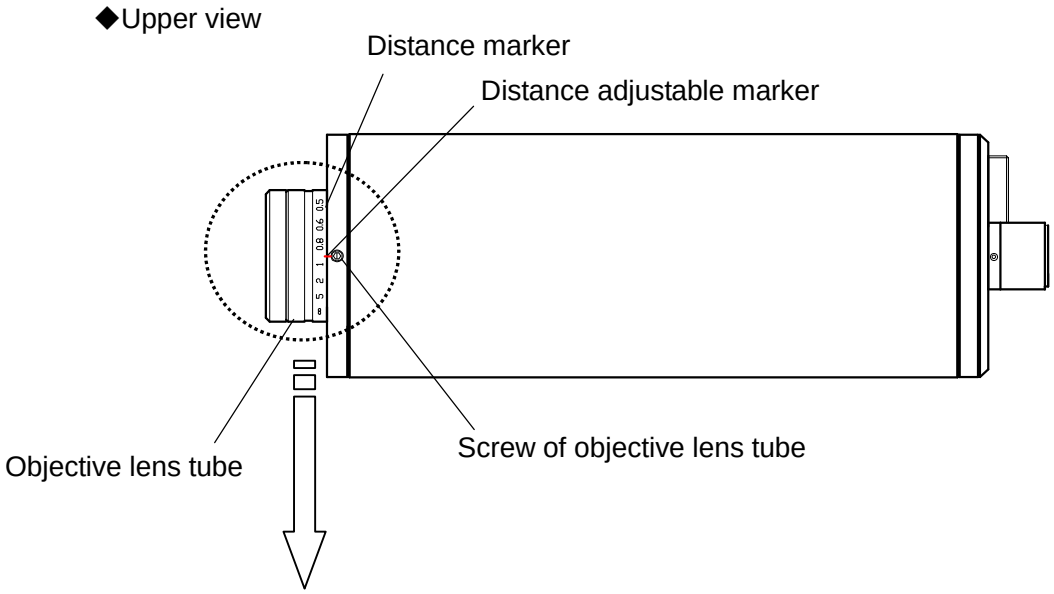
Measuring diameter of distance factor 200 is inner circle inside.

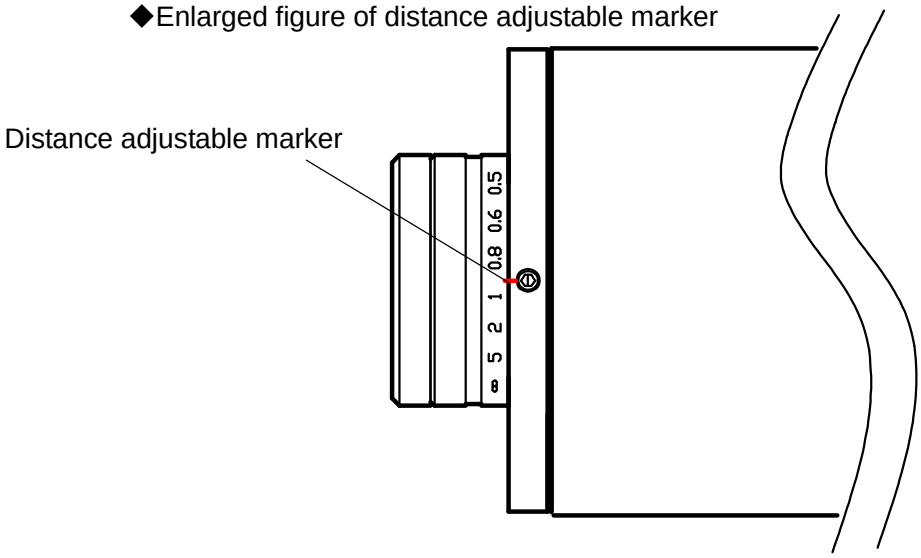
⚠ Warning

For the measurement of object exceeding 1500ºC, make sure to use the eyepiece filter (Model: IR-ZCLF). However, when you feel glare on the measurement of objects lower than 1500ºC, use the eyepiece filter (Model: IR-ZCLF).

7.3 Focusing of finder type

Focus a measuring object by turning the objective lens tube by its distance indication plate and the distance marker.
When an objective lens tube does not turn around, you should confirm a screw for objective lens tube, and please turn it after having loosened it when it closes.
Make sure that the measuring area should be larger than the targeting mark (Recommended area: For the distance factor of 200 - More than 1.5 times the targeting mark), and then fix the objective lens tube by screwing the attached screw (with a hexagon hole) into the fixing screw hole of the objective lens tube.





Caution

For the installation of the thermometer with a protective case, house the thermometer to the protective case after adjusting the focus of the thermometer.

8. Connections and wirings ⚠

⚠ Warning

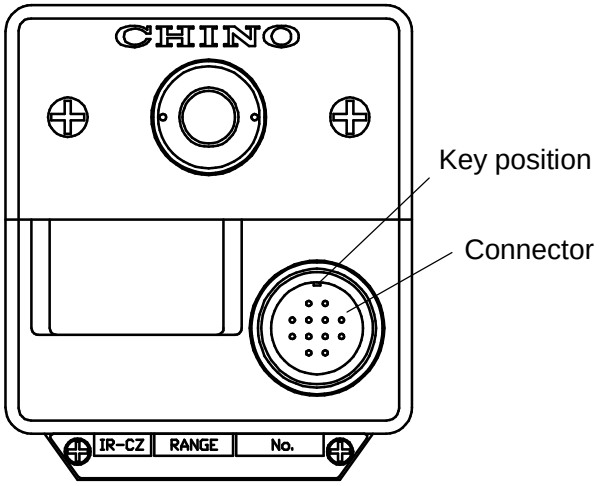
When connecting power to the power terminals, make sure that all mains power is turned off to prevent an electric shock.

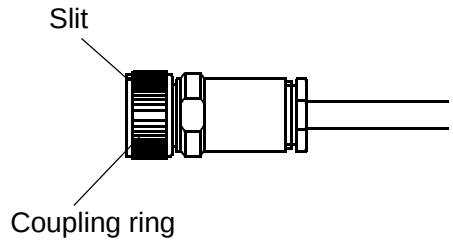
8.1 Connector connections (Model : other than IR-CZQH7N)

◆Connection of the exclusive cable (model : IR-ZCRC□□□)

The connections are completed by simply connecting the connector of the cable (IR-ZCRC) to the connector placed at the rear side of the thermometer.

(1) For the connection, align the slit in the connector of the cable and the key position in the connector of the thermometer and firmly insert the cable connector, and then turn the coupling ring clockwise until it is locked.
(2) For the disconnection, turn the coupling ring counterclockwise for releasing its locked status, and pull the connector of the cable forward.



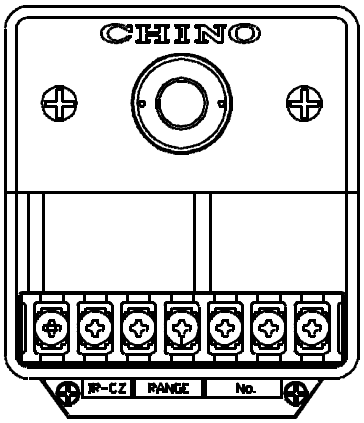


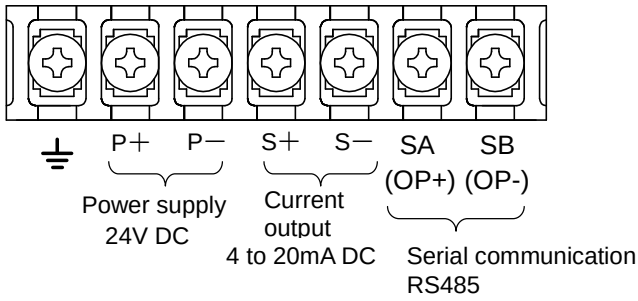
Connector of the exclusive cable IR-ZZRC□□□

Connector pin No.	Signals
A	DC power supply 24V DC (+)
B	DC power supply 24V DC (−)
C	Current output of temperature 4 to 20mA DC (+)
D	Current output of temperature 4 to 20mA DC (−)
E	Serial communication RS485 SA
F	Serial communication RS485 SB
G	Contact output 1 (+)
H	Contact output 1 (−)
J	Option (Do not use it)
K	
L	
M	Ground

8.2 Terminal connections (model : IR-CZQH7T)

Connect the exclusive cable (IR-ZCRT) or a commercially available cable to the terminal board (Terminal screw size: M3) placed at the rear side of the thermometer.





Reference

A terminal connection type (model :IR-CZQH7T) does not have contact output.

8.3 Wirings to power terminals ⚠

⚠ Warning

Make sure to turn off the power supply for preventing an electric shock when connecting and wiring.

8.4 Wirings to ground terminals

Caution

Provide a low impedance earth ground (lower than 100Ω) connection to the ground terminal.

8.5 Wirings to receiving instruments

Reference

The current output is 4 to 20mA DC and isolated.
Connect the signal terminals and a receiving instrument.
The contact output is the open collector output (photo-coupler).
Use a receiving instrument under the ratings (30V, 50mA).

◆IR-ZZRC□□□

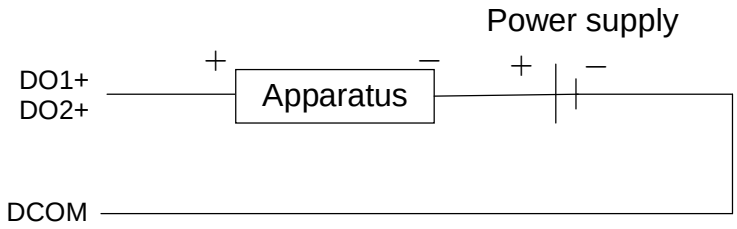
Cable marker	Signals	Remarks
POWER+	Powers supply 24V DC +	Allowable voltage range 22～28V DC
POWER-	Powers supply 24V DC -	
SIGNAL+	Current output 4 to 20mA DC +	―――
SIGNAL-	Current output 4 to 20mA DC -	
RS485 SA	Serial communication RS485 SA	―――
RS485 SB	Serial communication RS485 SB	
DO1+	Contact output 1 +	Open collector
DO COM	Contact output 1 -	
OPTION +	Option (Do not use it)	
OPTION -		
DO2 +		
EARTH	Ground wire	Provide a low impedance earth ground (lower than 100Ω) connection.

◆IR-ZCRT□□□

Cable marker	Signals	Remarks
POWER +	Powers supply 24V DC +	Allowable voltage range 22～28V DC
POWER -	Powers supply 24V DC -	
SIGNAL +	Current output 4 to 20mA DC +	―――
SIGNAL -	Current output 4 to 20mA DC -	
OPTION +	Serial communication RS485 SA	―――
OPTION -	Serial communication RS485 SB	―――
EARTH	Ground wire	Provide a low impedance earth ground (lower than 100Ω) connection.

8.6 Connection example of the contact output

A use example of the contact output is shown below.
The output method is an open collector, and please be careful because it is not the no voltage point of contact.
In addition, the connected apparatus (alarms), please be careful not to be beyond the specifications of the open collector. It causes the trouble.



9. Operation

9.1 Self-diagnostic function

This self-diagnosis function is built-in. An error No will be displayed on abnormal conditions.

Sub display	Contents	Countermeasure	Output (Note*)
Er01	Abnormal ambient Temperature.	Use the thermometer in the environment from 0 to 50ºC.	Yes
Er04	E^2PROM abnormal (Writing and reading impossible.)	Return to factory to us.	Yes
Er05	Analog output correction data abnormal (Same data before correction existed.)	Check the data before correction again.	No
Er06	Zero/span adjustment abnormal (Data at zero > data at span)	Adjust zero and span again.	No
Er09	Remote emissivity programming exceeding the programmable range	Program to 0.001 when the emissivity programming value is overshooting from the minimum value and 1.999 when it is over shooting from the maximum value.	No
Er08	Automatic emissivity calculation exceeding the programmable range.	Program the emissivity value to 1.000. However, this programming is not stored.	No

Caution

On the items with Yes in the output column, the contact signal for the abnormal condition is outputted from the contact output terminals (OFF at abnormal condition).
This output is available when “Self-diagnostic abnormal” is selected in [Contacts output item selection] in the engineering mode.

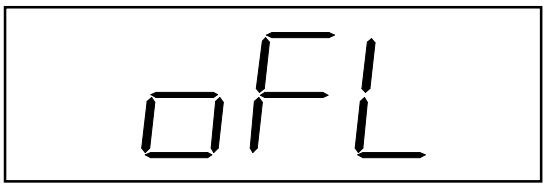
Remarks

When an error is not canceled by the measures mentioned above, please contact purchase or our nearest office.

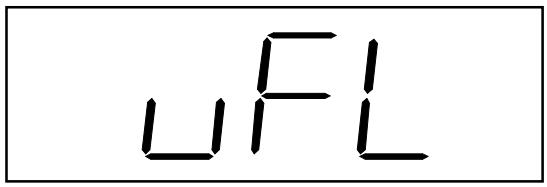
9.2 Overflow/underflow indication

“oFL” is displayed when the measured temperature is higher than the maximum value of measuring range + 20ºC.
“uFL” is displayed when the measured temperature is lower than the minimum value of measuring range − 20℃.

Overflow indication



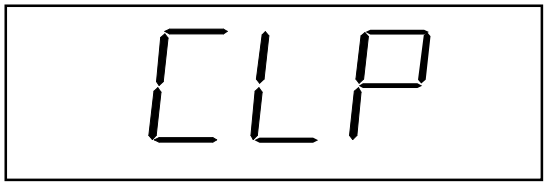
Underflow indication



9.3 Clamp indication

In the case of 2 color radiation thermometer, a temperature indication department becomes "CLP", if it becomes lower than approximately 10% of radiant energy at the measurement scale lower limit temperature. In this case, the current output is 3.8mA.
This phenomenon occurs to etc. (1) View lacking (2) Measuring with lens cap

Clamp indication



Reference

When measured temperature has not reached to the minimum value of measuring range at the post period of measurement start, 'CLP' or 'UFL' are displayed.
The view lacking is expected, in the case that this phenomenon occurred although the temperature of the measurement objects is rising.

10. Maintenance and check ⚠

10.1 Periodical checking…Check the followings periodically or if required. ⚠

Lens: Check the objective lens for dust or dirty.
If dirt is present, remove it with a blower for camera lens. If the dirt cannot be removed with the blower, wipe the lens gently with cotton ball soaked in alcohol.
Connections and wirings: Check all connections and wiring

⚠ Warning | Do not disassemble this thermometer.

10.2 Trouble shooting

At time when a trouble was accepted, please give appropriate treatment in checking the following.

10.2.1 Measuring value not displayed or displayed lower

Checking item	Countermeasure
1) The power voltage is not in the allowable range.	Supply the power with the correct voltage.
2) The Connection cable is not connected firmly.	For the disconnection of the cable, replace it.
3) The view field is interfered.	Make the view field not interfered by referring to [7.Targeting].
4) The measured temperature is lower than the minimum value of the measuring range.	It is necessary to use a thermometer with the measuring range covering the measured temperature.
5) The emissivity value programmed is too high.	Program the emissivity value by referring to [Emissivity programming]. (*)
6) The atmosphere temperature is low, the optic system is doing no dew .	It uses it in the place where does not do dew.

10.2.2 Measuring value displayed higher

Checking items	Countermeasure
1) The measured temperature is higher than the maximum value of the measuring range.	It is necessary to use a thermometer with the measuring range covering the measured temperature.
2) The emissivity value programmed is too low.	Program the emissivity value by referring to [Emissivity programming]. (*)
3) The heat radiation of the high temperature is shining to the measurement face or thermometer from the outside.	Heat is prevented with the board that does not pass the change or light of the place.

10.2.3 Display fluctuated

Checking items	Countermeasure
1) The radiation thermometer is not fixed firmly or vibrated.	Fix the radiation thermometer firmly and install it in a place not vibrated.
2) The connector and terminal are not connected firmly.	Connect the connector and terminal firmly.
3) The power voltage is not in the allowable rang	Supply the power with the correct voltage.
4) The view field is interfered by steam.	Purge the steam by air.
5) The measured temperature is fluctuated exactly.	Program the emissivity value and the modulation degree by referring to the following paragraphs. [Emissivity programming](*) [Automatic emissivity calculation] (*) [Signal modulation mode selection] (*) [Modulation degree programming] (*)
6) Emissivity value is changed.	

(*) : Refer to separate instruction manual [IR-CZQH Series software volume.]

11. Reference

The emissivity are values determined by the material of object, profile of its surface, surface roughness, oxidized or not, measuring temperature, measuring wavelength and other factors.
They are represented by the thermal radiation ratio "ε" when a black body furnace at the same temperature is measured in the same wavelength band.
The emissivity "ε" is generally known by a value at the wavelength of 0.65μm when an optical pyrometer is used. The emissivity changes according to the above factors even in case of the same material. Please use the following table as a reference.

11.1 Emissivity table

11.1.1 Emissivity table (λ = 0.65μm)

Metal	Emissivity		Oxide	Emissivity
	Solid	Liquid		
Zinc	0.42	—	Alumel（*）	0.87
Alumel	0.37	—	Chromel(*)	0.87
Aluminum	0.17	0.12	Constantan（*）	0.84
Antimony	0.32	—	Ceramics	0.25 to 0.5
Iridium	0.30	—	Cast iron（*）	0.70
Yttrium	0.35	0.35	55Fe. 37.5Cr. 7.5Al（*）	0.78
Uranium	0.54	0.34	70Fe. 23Cr. 5Al. 2Co（*）	0.75
Gold	0.14	0.22	80Ni. 20Cr（*）	0.90
Silver	0.07	0.07	60Ni. 24Fe. 16Cr（*）	0.83
Chromium	0.34	0.39	Stainless steel（*）	0.85
Chromel P	0.35	—	Aluminum oxide	0.22 to 0.4
Cobalt	0.36	0.37	Yttrium oxide	0.60
Constantan	0.35	—	Uranium oxide	0.30
Zirconium	0.32	0.30	Cobalt oxide	0.75
Mercury	—	0.23	Columbium oxide	0.55 to 0.71
Tin	0.18	—	Zirconium oxide	0.18 to 0.43
Carbon	0.8 to 0.9	—	Tin oxide	0.32 to 0.60
Tungsten	0.43	—	Cerium oxide	0.58 to 0.82
Tantalum	0.49	—	Titanium oxide	0.50
Cast iron	0.37	0.40	Iron oxide	0.63 to 0.98
Titanium	0.63	0.65	Copper oxide	0.60 to 0.80
Iron	0.35	0.37	Thorium oxide	0.20 to 0.57
Copper	0.10	0.15	Vanadium oxide	0.70
Thorium	0.54	0.34	Beryllium oxide	0.07 to 0.37
Nickel	0.36	0.37	Magnesium oxide	0.10 to 0.43
80Ni /20Cr	0.35	—	Bismuth	0.29
60Ni / 024Fe / 16Cr	0.36	—	Beryllium	0.61
Platinum	0.30	0.38	Manganese	0.59
90Pt / 10Rh	0.27	—	Molybdenum	0.37
Palladium	0.33	0.38	Rhodium	0.24
Vanadium	0.35	0.35	(*) : Oxidized on surfaces	

11.1.2 Emissivity table (λ= 0.9μm)

Metal	Emissivity
Aluminum	0.10 to 0.23
Gold	0.015 to 0.02
Chrome	0.36
Cobalt	0.28 to 0.30
Iron	0.33 to 0.36
Copper	0.03 to 0.06
Tungsten	0.38 to 0.42
Titanium	0.50 to 0.62
Nickel	0.26 to 0.35
Platinum	0.25 to 0.30
Molybdenum	0.28to 0.36

Alloy	Emissivity
Inconel X	0.40 to 0.60
Inconel 600	0.28
Inconel 617	0.29
Inconel	0.85 to 0.93
Incoloy 800	0.29
Kanthal	0.80 to 0.90
Stainless steel	0.30
Hastelloy X	0.3

Semiconductor	Emissivity
Silicon	0.69 to 0.71
Germanium	0.60
Gallium arsenic	0.68

Ceramics	Emissivity
Silicon carbide	0.80 to 0.83
Titanium carbide	0.47 to 0.50
Silicon nitride	0.89 to 0.90

Other	Emissivity
Carbon pigment	0.90 to 0.95
Graphite	0.87 to 0.92

11.1.3 Emissivity table (λ= 1.55μm)

Metal	**Emissivity**
Aluminum	0.09 to 0.40
Chrome	0.34 to 0.80
Cobalt	0.28 to 0.65
Copper	0.05 to 0.80
Gold	0.02
Steel plate	0.30 to 0.85
Lead	0.28 to 0.65
Magnesium	0.24 to 0.75
Molybdenum	0.25 to 0.80
Nickel	0.25 to 0.85
Palladium	0.23
Platinum	0.22
Rhodium	0.18
Silver	0.04 to 0.10
Tantalum	0.20 to 0.80
Tin	0.28 to 0.60
Titanium	0.50 to 0.80
Tungsten	0.30
Zinc	0.32 to 0.55
Alloy	**Emissivity**
Brass	0.18 to 0.70
Chromel, Alumel	0.30 to 0.80
Constantan, Manganin	0.22 to 0.60
Inconel	0.30 to 0.85
Monel	0.22 to 0.70
Nickel Chrome	0.28 to 0.85
Ceramics	**Emissivity**
Alumina ceramics	0.30
Red brick	0.80
White brick	0.35
Silicon brick	0.60
Sillimanite brick	0.60
Ceramics	0.50
Other	**Emissivity**
Asbestos	0.90
Asphalt	0.85
Carbon	0.85
Graphite	0.80
Soot	0.95
Cement, Concrete	0.70
Cloth	0.80

12. General Specifications

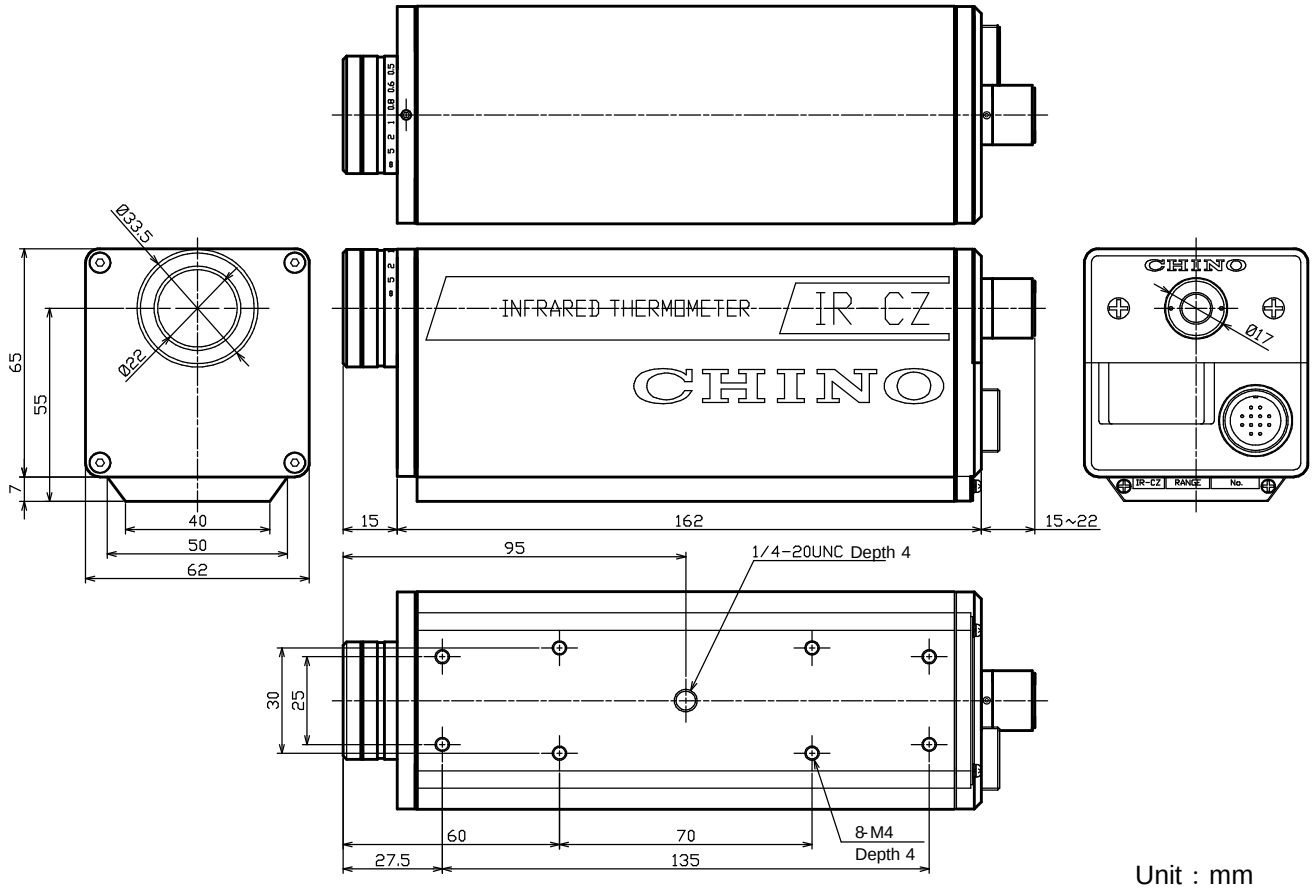
12.1 Thermometer

Model	**IR-CZQH7□**
Measuring system	2-color type
Detecting element	Si /InGaAs
Measuring wavelength	0.9μm /1.55μm
Measuring range	900to3500ºC (Single-color type : 500 to 1400ºC)
Accuracy ratings *1	Less than 1000ºC: ±5ºC 1000 to less than 1500ºC: ±0.5% of readings 1500 to less than 2500ºC: ±0.6% of readings More than 2500ºC: ±1% of reading
Repeatability	Within 1ºC
Stability Temperature drift	0.2ºC /ºC or 0.02%/ºC of measured value, whichever larger
Resolution	1ºC
Response time	2 to 15ms
Distance factor	200
Emissivity (ratio) compensation	Emissivity (ratio) range 1.999 to 0.050
Signal modulation	DELAY: First-order lag tracing (Modulation time constant: 0.000 to 99.9s, 0.1s, 0.01s and 0.001s increment) P E A K: Peak tracing (Decrement degree 0.1 to 10.0ºC /s, 0.1s increment)
Display system	LCD 4-digit (Temperature and parameter) Display resolution 1ºC (more than 1000ºC), 0.1ºC (less than 1000ºC) ºC /ºF (Key switching)
Optical system	Lens light condensing, Mobile focus method
Measuring distance	0.5m to ∞
Measuring diameter	Measuring distance / Distance factor
Focusing system for spot	Finder focusing
Lens aperture	Ø10mm (Locating Ø20mm diaphragm inside, effective aperture at Ø10mm)
Analog output	4 to 20mADC, isolated output, Load resistance: less than 500Ω ·Accuracy: ±0.2% (to the full scale of scaling) ·Analog output resolution: 0.003% (to the full scale of scaling) ·Output scaling (optional programming in measuring temperature range) ·Dummy output (optional programming in 0 to 100% of analog output)
Contact output	Only connector connection type ·1 point ·Upper limit (lower limit) alarm, Error signal (self-diagnostic), dirt detective alarm ·Open collector 30V DC, max. 50mA
Communications interface	RS-485 : Sending of measured data (up to 1-digit below decimal point), and sending/receiving of parameters
Parameter settings by keys	·Operator mode: Emissivity, signal modulation, alarm and others ·Engineering mode: Measurement unit, output scaling, ZERO/SPAN, output correction and others including option-related-parameters
Calculation function	·ZERO/SPAN adjustment ·Automatic emissivity calculation ·Output correction
Self-diagnostic	·Thermometer temperature abnormal ·Parameter error
Ambient temperature	-10 to 60ºC
Allowable vibration	19.6m/S^2 (Less than 2G)
Rated power supply	24V DC (22 to 28V)
Power consumption	About 2.4VA
Connections	Connector type or Terminal type
Installation	Fixing a tripod or a simple type universal head, Rousing on a protective case.
Casing	Aluminum
Weight	About 0.8kg
Standards	CE approval Compatible standards EN61326-1:2013 ClassA Compatibity requirements A special power supply is prepared. The connecting cable is indoors, within 30m *The measured value may very up to ±2% of measuring range under the EMC test ambient.

*1: At ε =1.0 reference operating conditions; 23ºC±5ºC. At relative humidity; 35 to 75%RH.

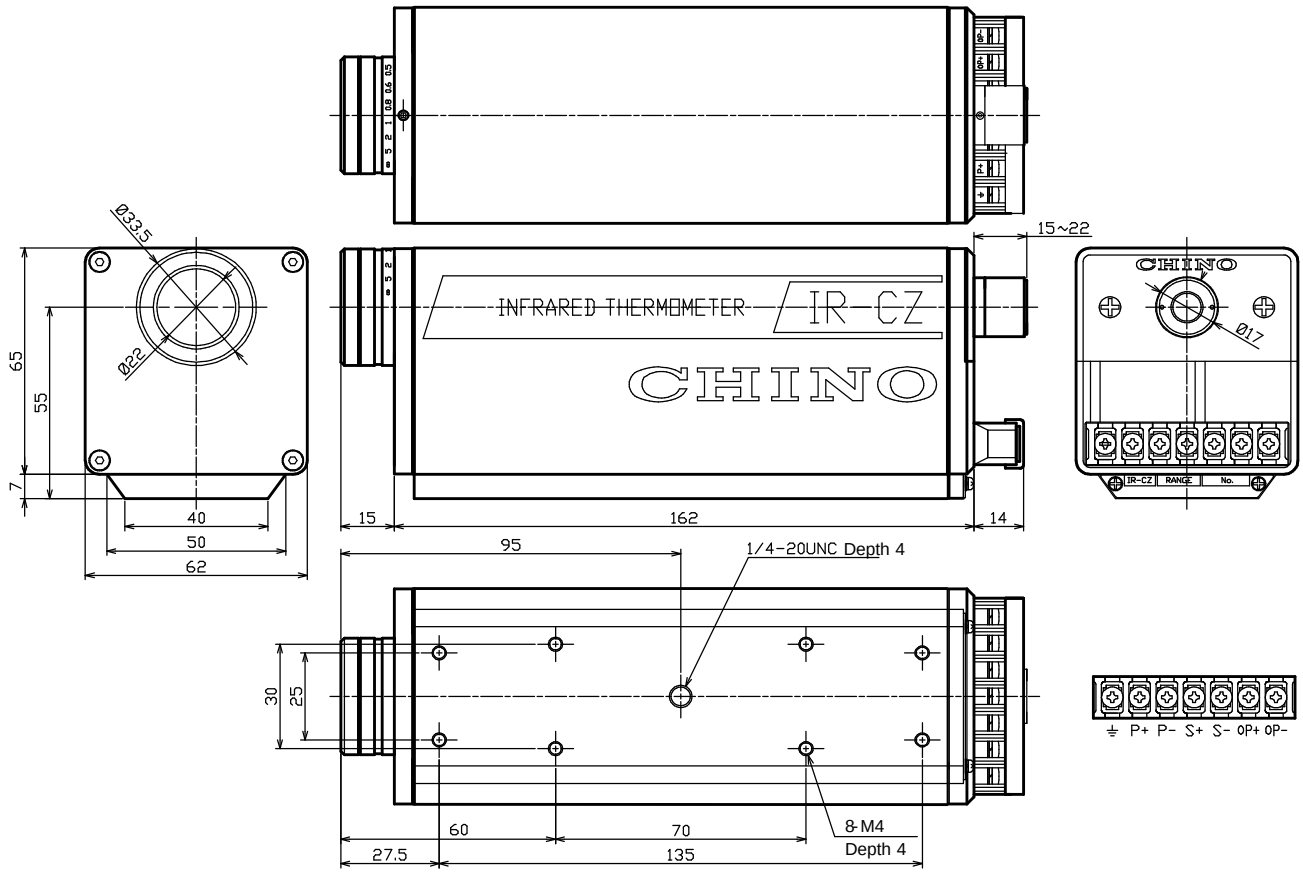
12.2 IR-CZQH series outside dimensions

12.2.1 Connector connection type (Model : IR-CZQH7N)



Unit : mm

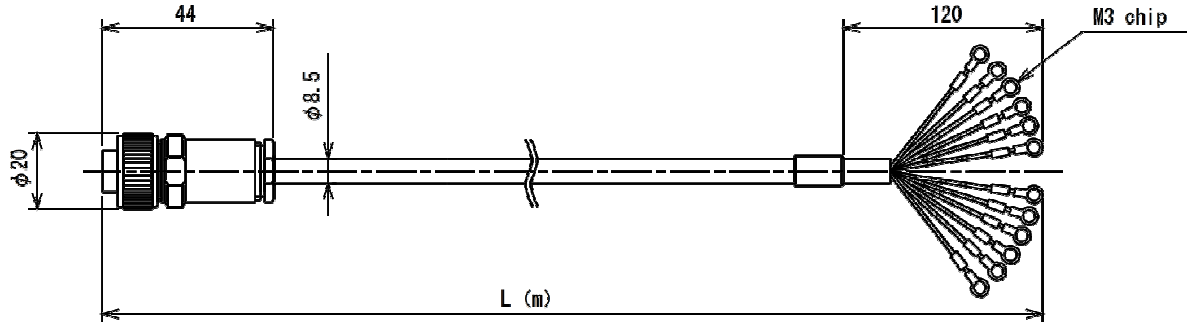
12.2.2 Terminal connection type (Model : IR-CZQH7T)



Unit : mm

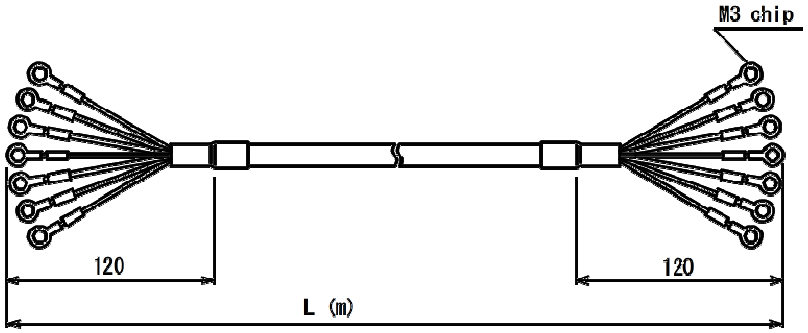
12.3 Accessories outside dimensions

12.3.1 Connector type connecting cable (Model : IR-ZZRC□□□)



Unit : mm

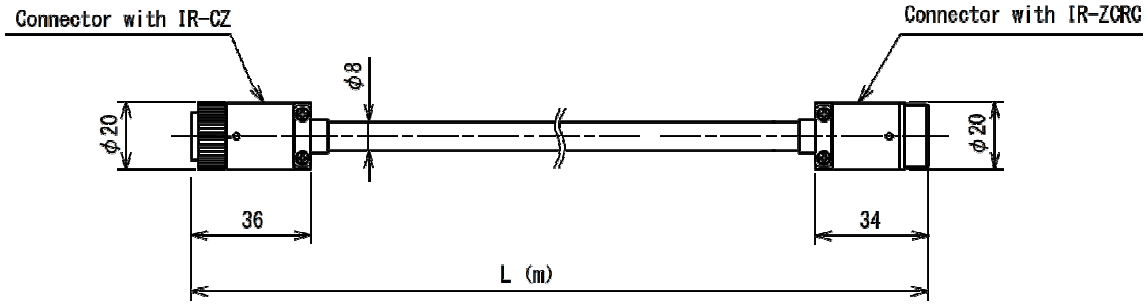
12.3.2 Terminal type connecting cable (Model : IR-ZCRT□□□)



Unit : mm

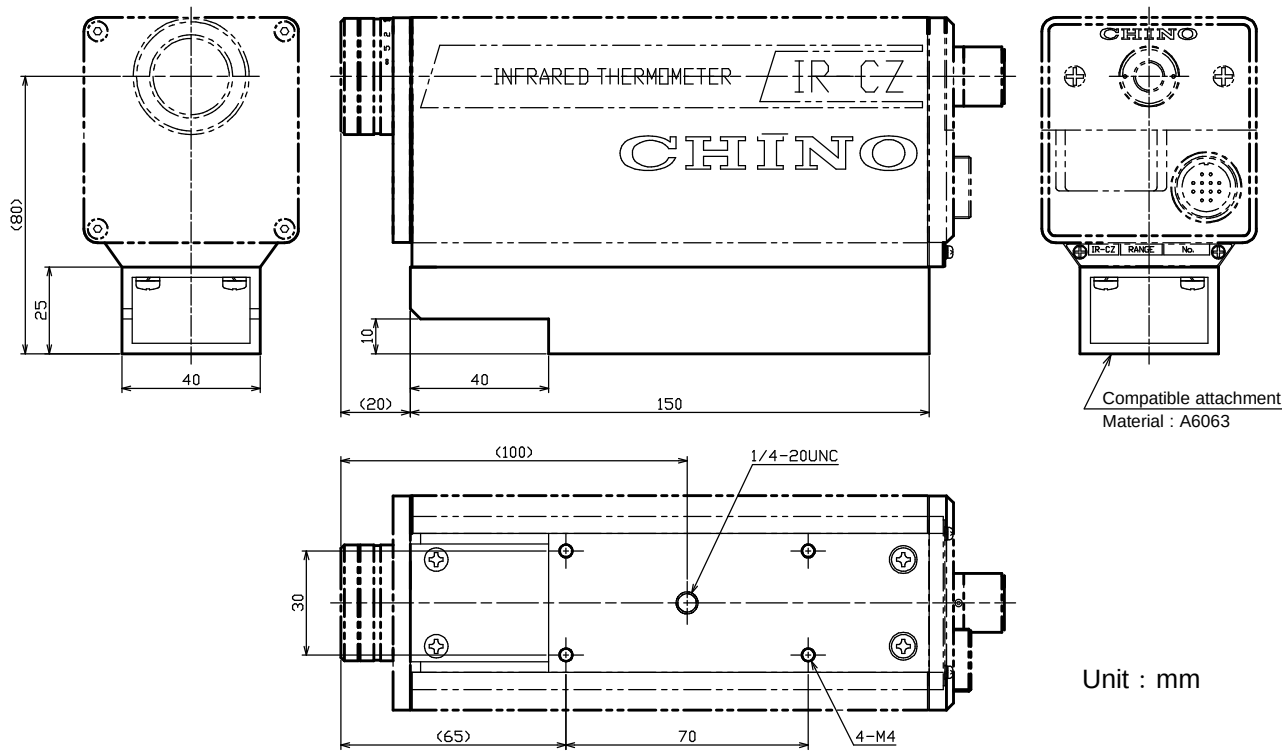
□□□ : Cable length (m)　　002 : 2m, 005 : 5m, 010 : 10m, 020 : 20m 100 : 100m

12.3.3 Compatible cable with IR-CA (Model : IR-ZZCC)



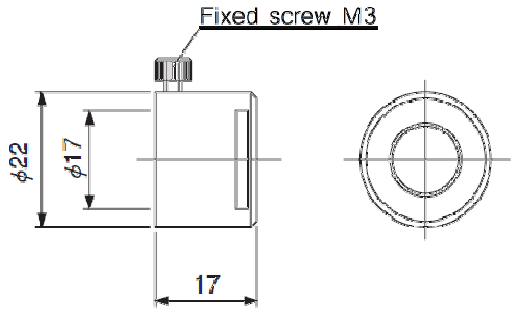
Unit : mm

12.3.4 Compatible attachment (Model : IR-ZCZS)



Unit : mm

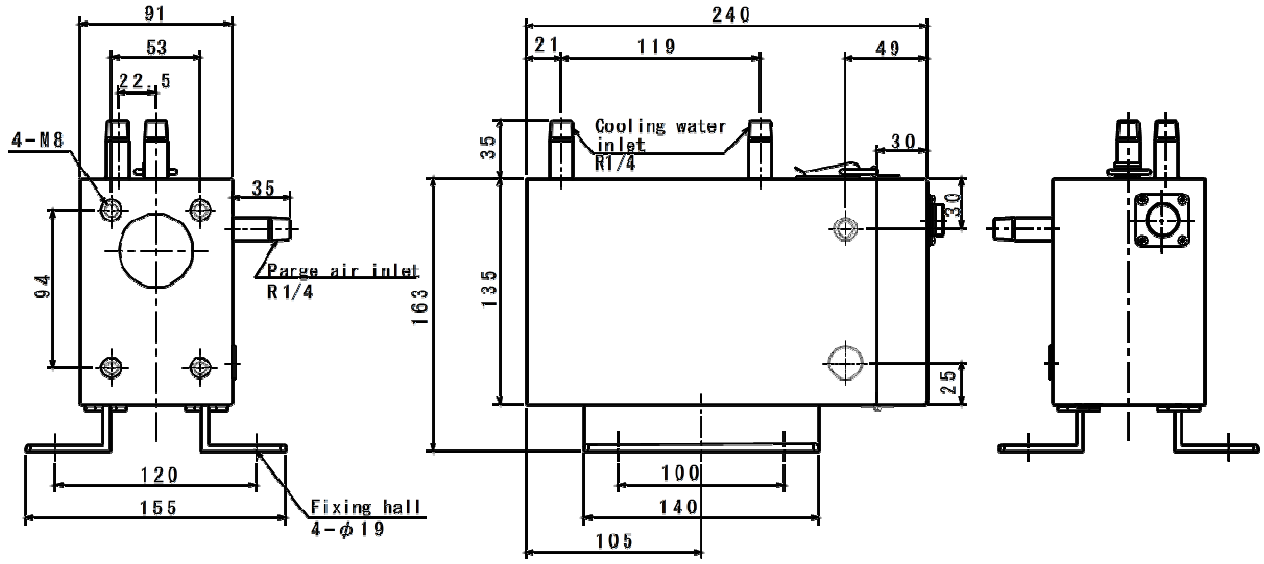
12.3.5 Eyepiece filter (Model : IR-ZCLF)



Unit : mm

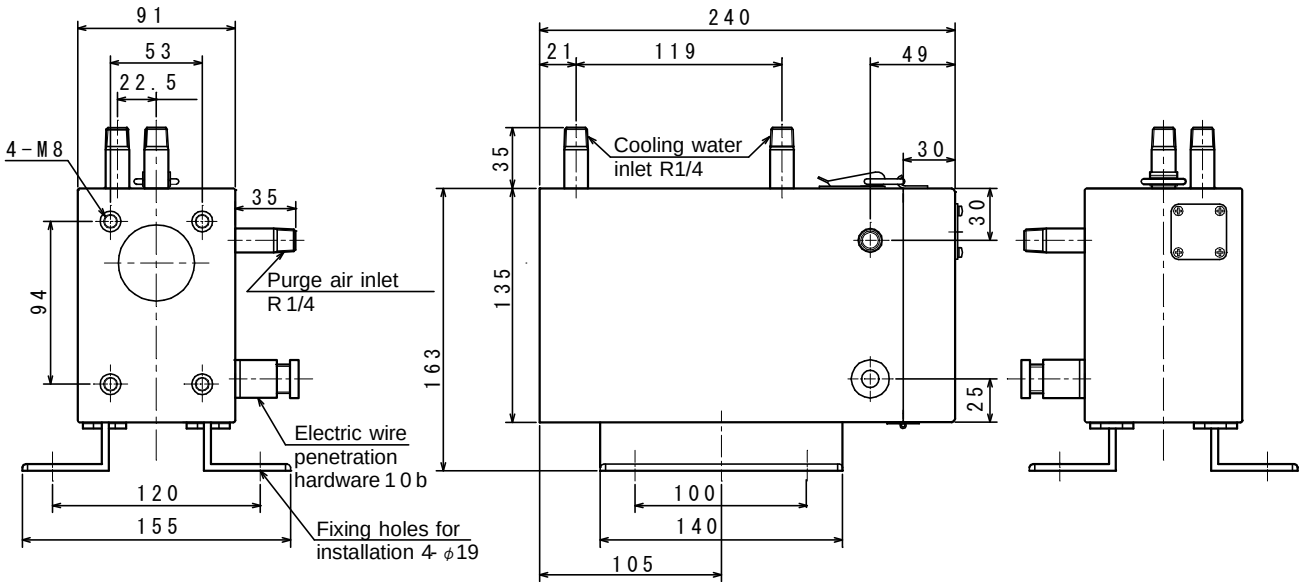
12.3.6 Protective case (Hard type)　Model : IR-ZCCH□□

12.3.6-1 Connector type (IR-ZCCHCZ)



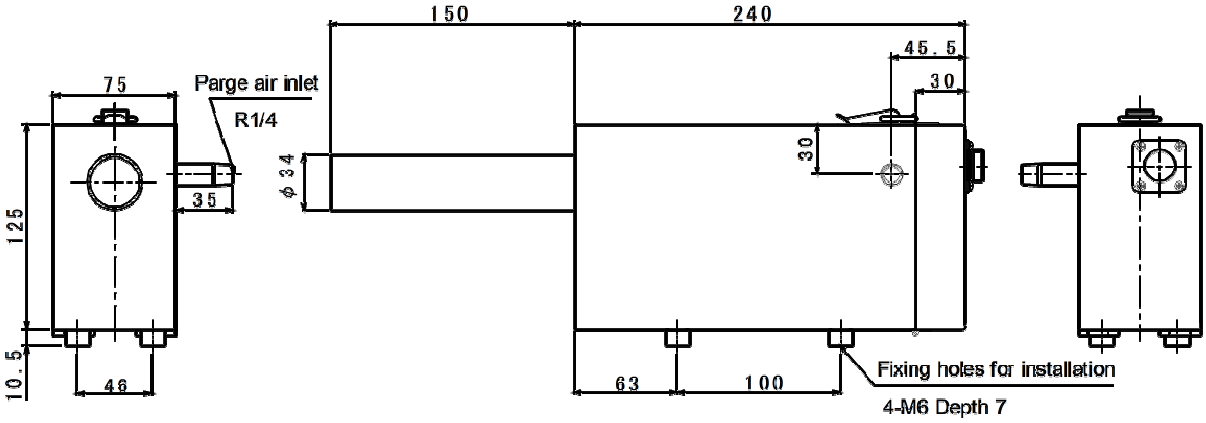
Unit : mm

12.3.6-2 Terminal type (IR-ZCCHT)



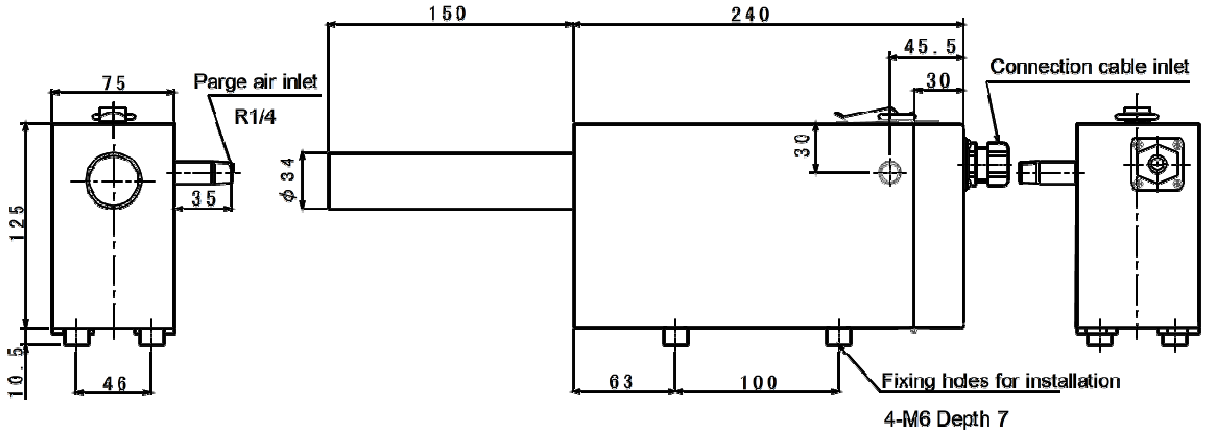
12.3.7 Protective case (Soft type)　Model : IR-ZCCS□□

12.3.7-1 Connecter type (IR-ZCCSCZ)



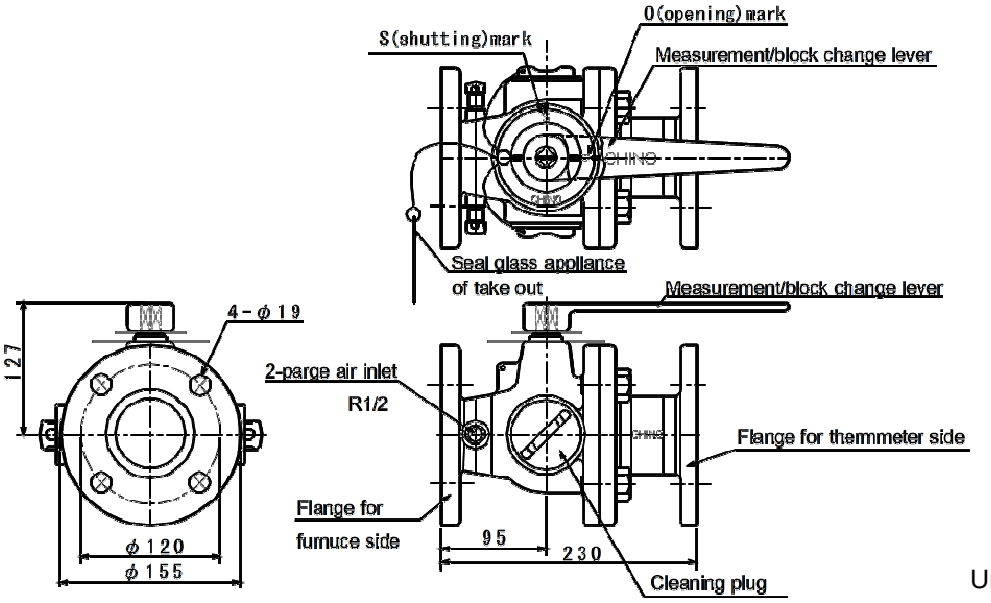
Unit : mm

12.3.7 -2 Terminal type (IR-ZCCST)



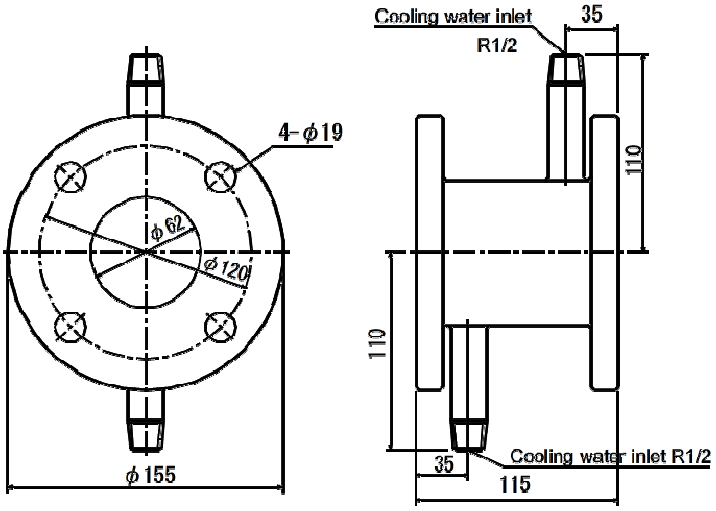
Unit : mm

12.3.8 Sealing window (IR-ZW□)



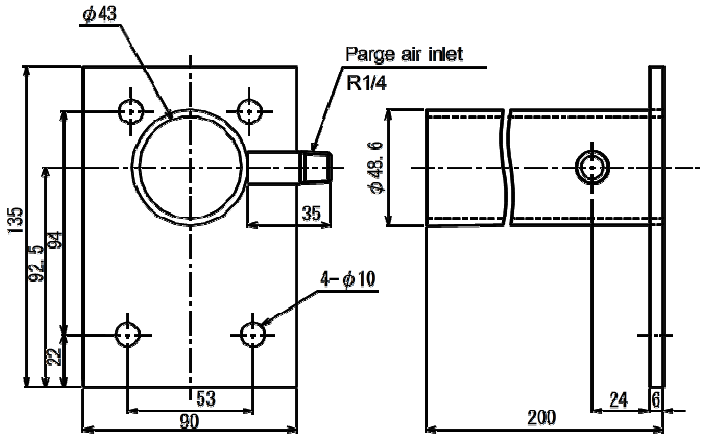
Unit : mm

12.3.9 Water-cooling flange (Model : IR-VSW)



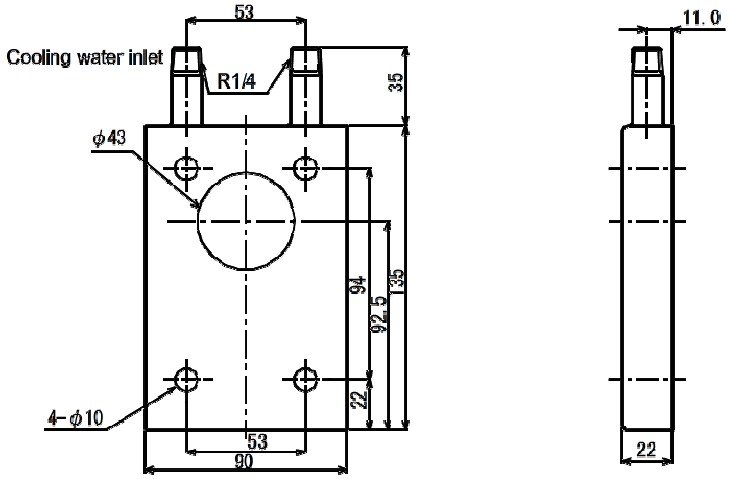
Unit : mm

12.3.10 Air-purge hood (Model : IR-ZCAP)



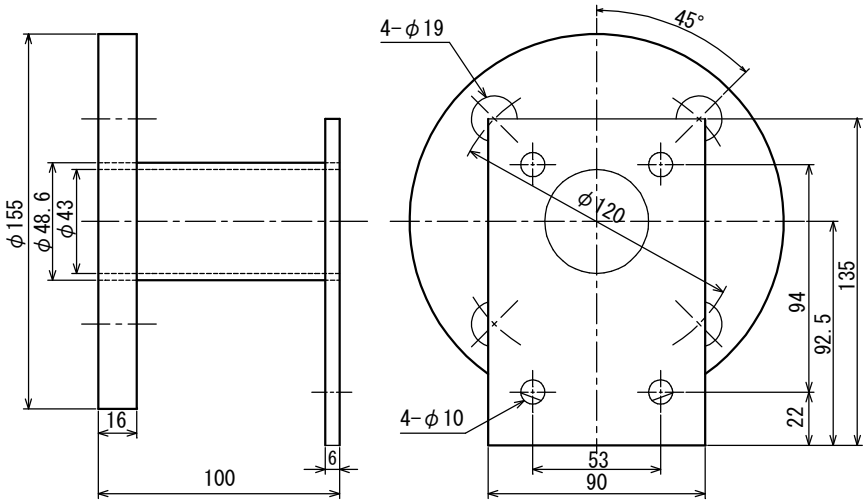
Unit : mm

12.3.11 Cooling water plate (Model : IR-ZCWC)



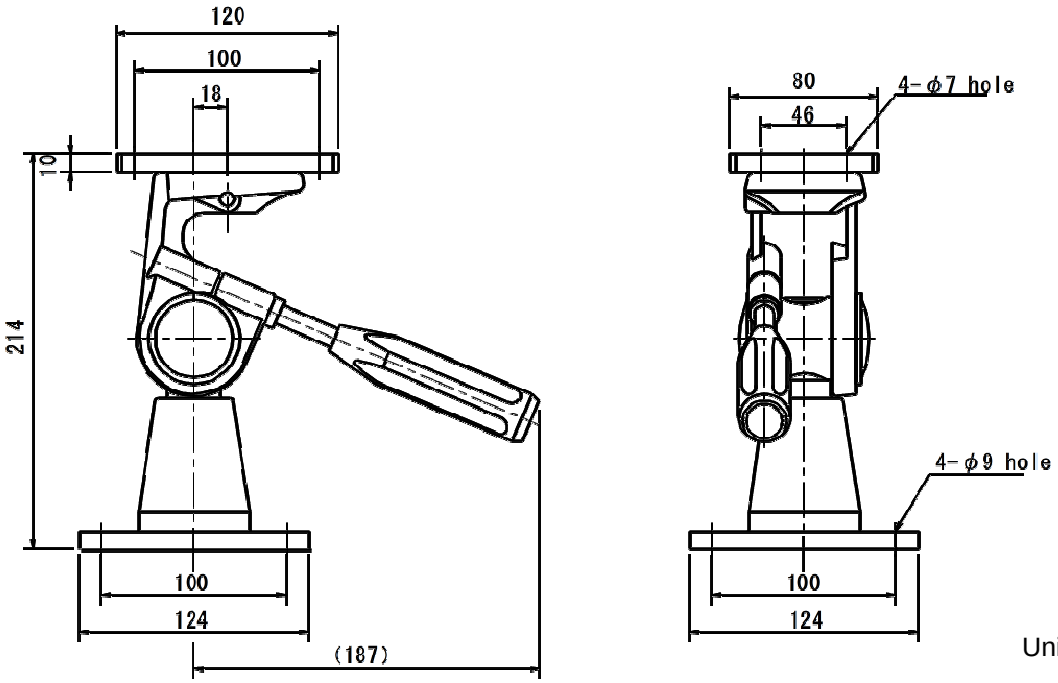
Unit : mm

12.3.12 Flange installation plate (Model : IR-ZCAF)



Unit : mm

12.3.13 Simple type universal head (Model : IR-ZMS)



Unit : mm

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