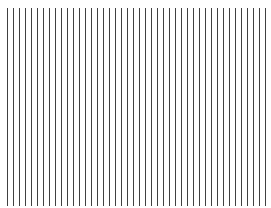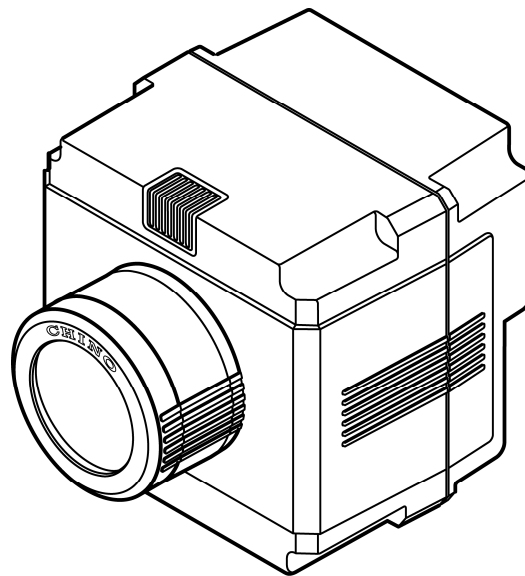**CHINO**

TP-L0225EN

Compact
Thermal Image Sensor

Instruction Manual

INSTRUCTIONS

Please store this instruction manual in a designated place for future reference.

CHINO

■Introduction

Thank you for purchasing a compact thermal image sensor. In order to use this product safely, please read this instruction manual completely before use and confirm the correct handling and instructions. In addition, please retain this instruction manual for future reference.

■Before using

Please confirm the contents of packing. If something is missing, please contact to your nearest distributor.
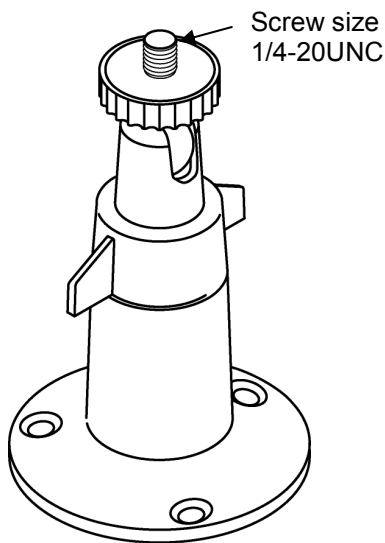
☐ Thermal image sensor

Screw size
1/4-20UNC
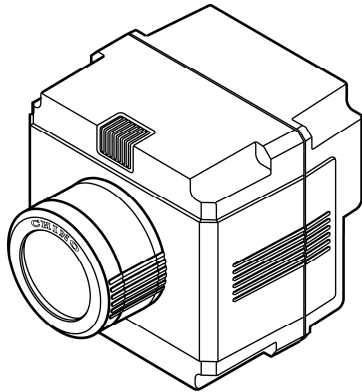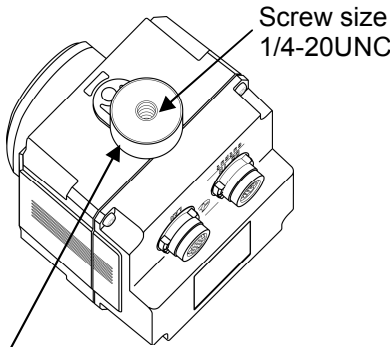
☐ Mounting screw: 1 piece
This is attached to the sensor

☐ Lens cap: 1 piece

Screw size
1/4-20UNC

☐ Universal head: 1 piece

☐ Custom Network Cable
(With a crossing cable and an RJ-45 terminal) 2.5m: 1 piece
* For direct connection to PC
(Refer to Page 6 for details.)

☐ Screws for the universal
head: 3 pieces

☐Connector cap: 1 piece
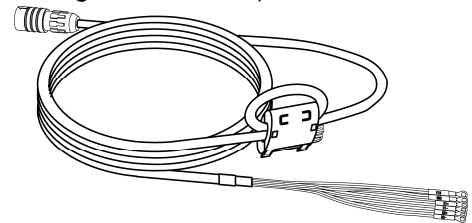
☐ Custom Power/Alarm Output Cable
(With O-tip terminals) 2.5m: 1 piece
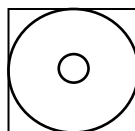
☐ CD-ROM: 1 piece
Application software
Instruction manuals (For the sensor and the application software

☐ Carl plugs for mounting
the universal head
into concrete: 3 pieces
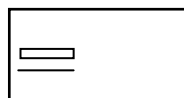
☐ Quick manual: 1 sheet

■ About this instruction manual

・ Under absolutely no circumstances may the contents of this instruction manual, in part or in whole, be transcribed or copied without permission.
・ The contents in this instruction manual are subject to change without notice in future.
・ The figures in this instruction manual may be emphasized, simplified or omitted.
・ Every effort has been made to ensure that the details of this manual are accurate. However, should any errors be found or important information be omitted, please inform your nearest distributor.

・ "Microsoft" and "Windows" are either trademarks or registered trademarks of Microsoft Corporation, USA.
・ The company names and brand names used in this manual are the trademarks or registered trademarks of respective companies.

About exemption from responsibility

・ Unless otherwise specified in the guarantee clauses, we do not offer any guarantee about this product.
・ We shall not be liable to a customer or a third party for any damages or indirect damages by using this product or by unpredictable defects of the product.

This product corresponds to Items 10 (2) and 10 (4) of Export allowable items listed in Appendix No. 1 of the Export Trade Control Ordinance in Japan.
When this product is exported or brought out of Japan, the permission by the Japanese government is required under this control ordinance.

■Safety precautions

- The safety precautions shown in this manual indicate the important contents about safety. Please be sure to understand and follow these precautions.
- In this manual, in order to use this product safely, the precautions are described with the following indications and marks.

⚠ Warning	This indicates a potentially hazardous situation that, if not avoided, will result in death or serious injury.
⚠ Caution	This indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury or cause property damage.

[**Safety precautions**]

⚠ Warning

- Do not operate this product in a place where flammable gas or explosive gas exists. It is extreely dangerous to use this product under such environment.
- In order to prevent an electric shock, make sure that the power source is turned off before connecting any wiring.
- Stop using this product immediately, turn off the power source and contact to your nearest distributor if it is broken or there is smoke/abnormal odor from this product. Otherwise, it may cause fire.
- Do not repair or modify this product. If it is modified, operation of this product will not be guaranteed. It may also cause fire/electric shock.

⚠ Caution

- Avoid the use of this product in the following places.
  A place where ambient temperature varies widely
  A place where humidity is high
  A place where rain/water is splashed
  A place where there are dusts like sand or dirt
  A place where it is subjected to exposed in scorching heat or direct sunlight
  A place where it s subjected to radiation
  A place where strong electric circuit exists beside this product
  A place where there is any inductive interference
  A place where there is mechanical vibration/shock
- If this product is wired with wrong polarity, it may cause trouble or fire.
- Do not aim the sensor to a high temperature object like sun, or the imaging element may be damaged and it may cause trouble on this product.
- In order to use this product safely, refer to "requirements" and handling methods mentioned in this manual or it may cause damage or malfunction to this product or cause damage also to other equipments.
- Optical components have special coating. Be careful that these parts become easily dirty when they are dew-condensed. In addition, the infrared transmission is deteriorated under the dew condensation and a clear image is not provided.

⚠ Precautions for use

- This product is a precision instrument. Do not drop it or make a strong impact on it.
- Do not use it in water.
- Keep this product away from equipments generating strong static electricity and electromagnetic waves including TVs, microwave ovens and wireless applications, or it may cause malfunction or trouble on this product.
- Keep this product away from equipment generating strong high frequency or surge voltage, or it may cause malfunction or trouble on this product.
- Use neutral detergent for cleaning of this product and wipe it off lightly by rubbing with the cloth squeezed firmly. Do not use chemicals or bleaches including benzene, thinner and alcohol.
- Do not use or place this product in a place subjected to temperature of lower than -10°C or higher than 50°C, dew-condensation, or humidity of lower than 10%RH or higher than 80%RH.
- Do not use or place this product in a place subjected to direct sunshine, dusty, high temperature/high humidity or corrosive atmosphere.
- When any service including repairs is required, contact to your nearest distributor.
- Do not apply too much force on the custom power supply and Network cables. It may cause damage of the connection which may lead water immersion into the product, and may cause trouble on this product.

When you use accessories connected to this product, follow the instructions relating toregarding the safety in this manual. If you do not follow these instructions, safety of this product and the system will not be guaranteed.

Your extra consideration is required when this product is used in an application that may subject to life threatening to human or property damage. Pay extra attention to safety measures, avoid usage under extreme environment and build a fail-proof system.

Contents

■Outline of product

1. Configuration

The system consists of the thermal image sensor utilizing a thermopile array detector and the application software for displaying thermal images converted from the temperature data from the sensor..

The application software allows to connect up to 4 thermal image sensors and display thermal image from these sensors.

2. Features

・ Built-in thermopile array detector with approximately 2256 pixels. Each pixel can measure temperature.
・Low cost, compact size and lightweight (150g) fixed-mount type thermal image sensor
・Robust and dust/splash-proof construction IP-65
・Data transmission to a PC via Ethernet (LAN), Thermal image display by the application software
・2 built-in circuits of non-voltage contact outputs. The sensor can be used as a fixed-mount type alarm unit.
　(When an alarm is activated, 1 image can be stored in the sensor.)

3. Functions

Alarm can be set from the application software or custom-made commands. The sensor provides non-voltage contact outputs when the alarm condition is met.

◆ Monitor mode (when the supplied application software is used)
　The temperature data of the entire thermopile array can be obtained continuously from the PC.

◆ Capture mode (when the supplied application software is not used)
　The temperature data in a single row of the thermopile array can be obtained at a time by a command from a master unit (e.g. PC or PLC).

⚠ When the capture mode is used, a series of communication command is required.
　　For the communication commands, contact to your nearest distributor.

4. Model/specification

TP-L□□ □□ □ □

Pixels	02: 2256
View angle	60: 60°
Output	E: Alarm + LAN
Specification	N: Standard specifications
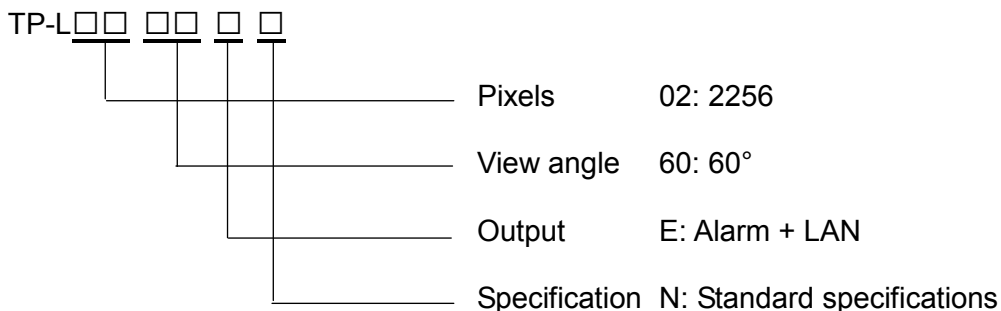
5. Basic configuration

5-1. Connection with 1 Thermal Image Sensor to PC (Monitor mode)

> Monitor mode (when the supplied application software is used)
> The temperature data of entire thermopile array can be obtained   from the PC.

Supplied custom Network cable (Crossing cable)

Thermal image sensor

PC

LAN

Alarm setup or monitor with the PC

DC power supply (DC12V 1.5A)

Custom power/alarm output cable
Power voltage: 12/24VDC
(Min. 9 ~ Max. 30VDC)
(Refer to Page 12 for details.)

Contact output

Alarm contact outputs from the thermal image sensor

5-2. Connection of multiple Thermal Image Sensors (Example: 2 units)

Thermal image sensor

HUB (*)

PC

LAN

LAN

Alarm setup or monitor with the PC

DC power supply (DC12V 1.5A)

Thermal image sensor

Contact output

Alarm contact outputs from the thermal image sensor

Contact output

Alarm contact outputs from the thermal image sensor

DC power supply (DC12V 1.5A)

⚠ * If a HUB without automatic crossing/straight converting function is used, a straight cable is needed. Connect a crossing/straight converting connector between the custom Network cable and a HUB. (Refer to Page 3.)

◆ Connection example of HUB (without automatic crossing/straight converting function)

Custom Network cable (Crossing cable)

Crossing/straight converting connector

PC

HUB

LAN cable (Straight cable)
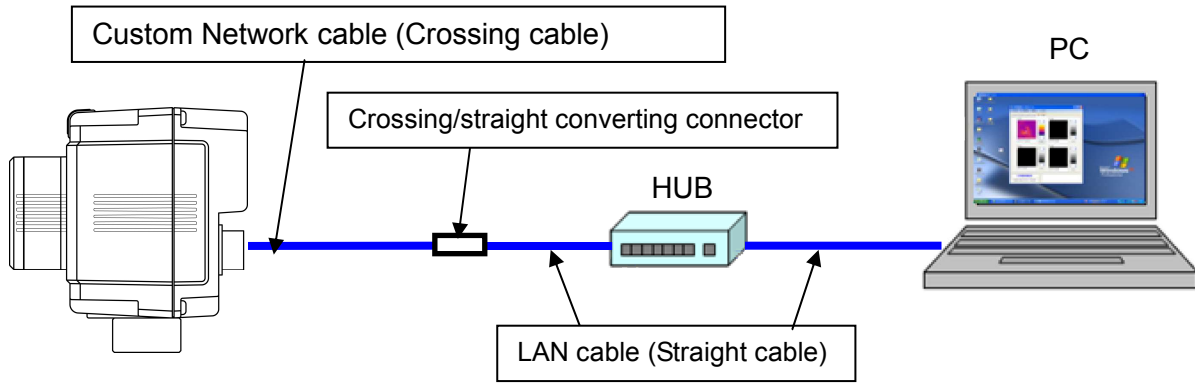
5-3. Stand alone usage of the thermal image sensor

For image confirmation and alarm settings only

LAN

Contact output

Alarm contact output from the thermal image sensor

Contact output

Other alarming devices

DC power supply (DC12V 1.5A)
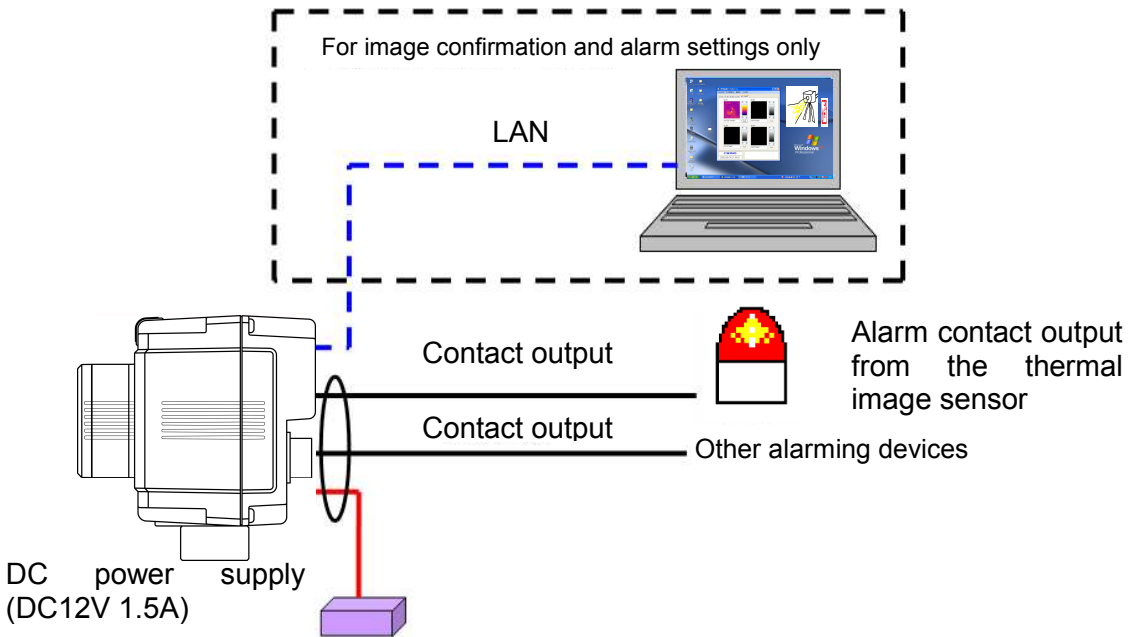
5-4. Connection to PLC (Capture mode)

Capture mode (when the supplied CHINO application software is not used)
The temperature data in a single row of the thermopile array can be obtained at a time by a command from a master unit (e.g. PC or PLC).
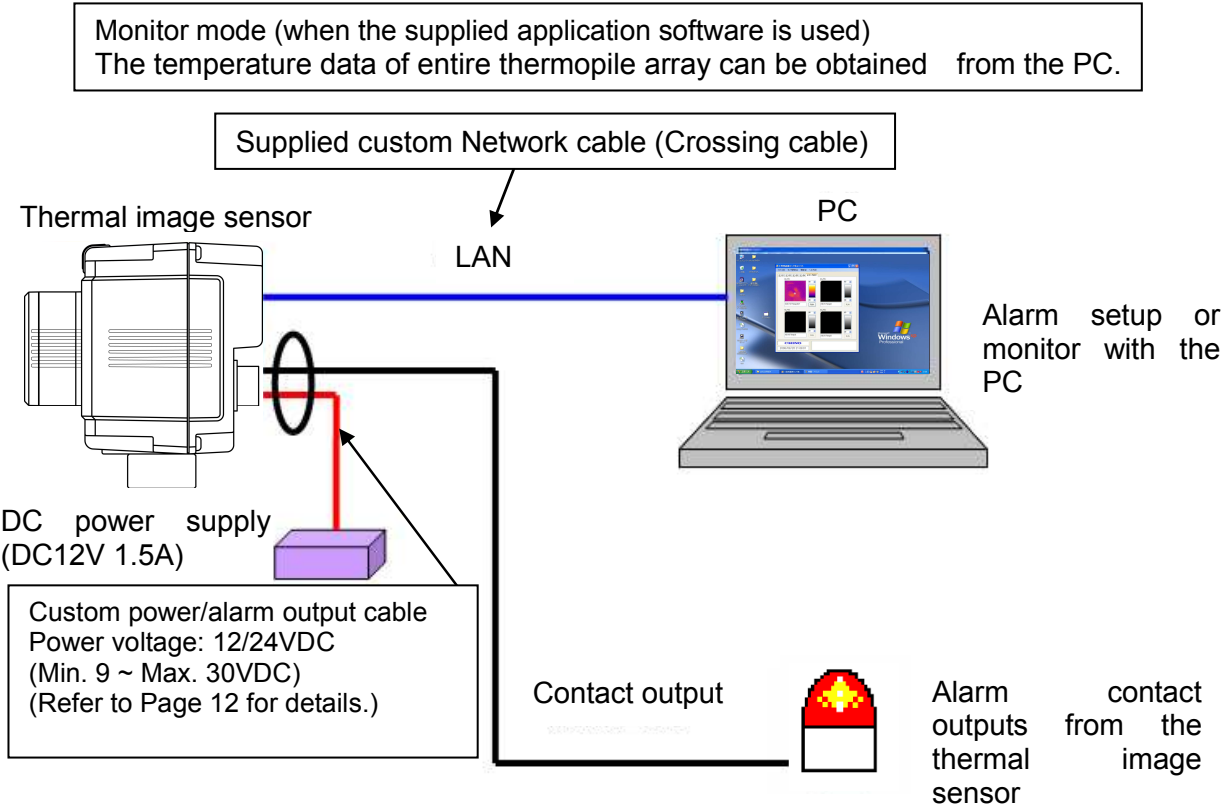
PLC

LAN

DC power supply (DC12V 1.5A)
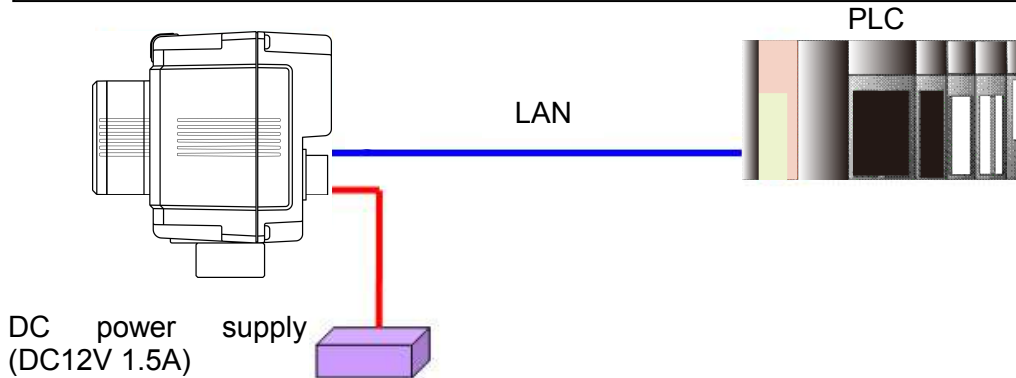
⚠ When the capture mode is used, a series of communication commands are required. For the communication commands, contact to your nearest distributor.

■Names and functions
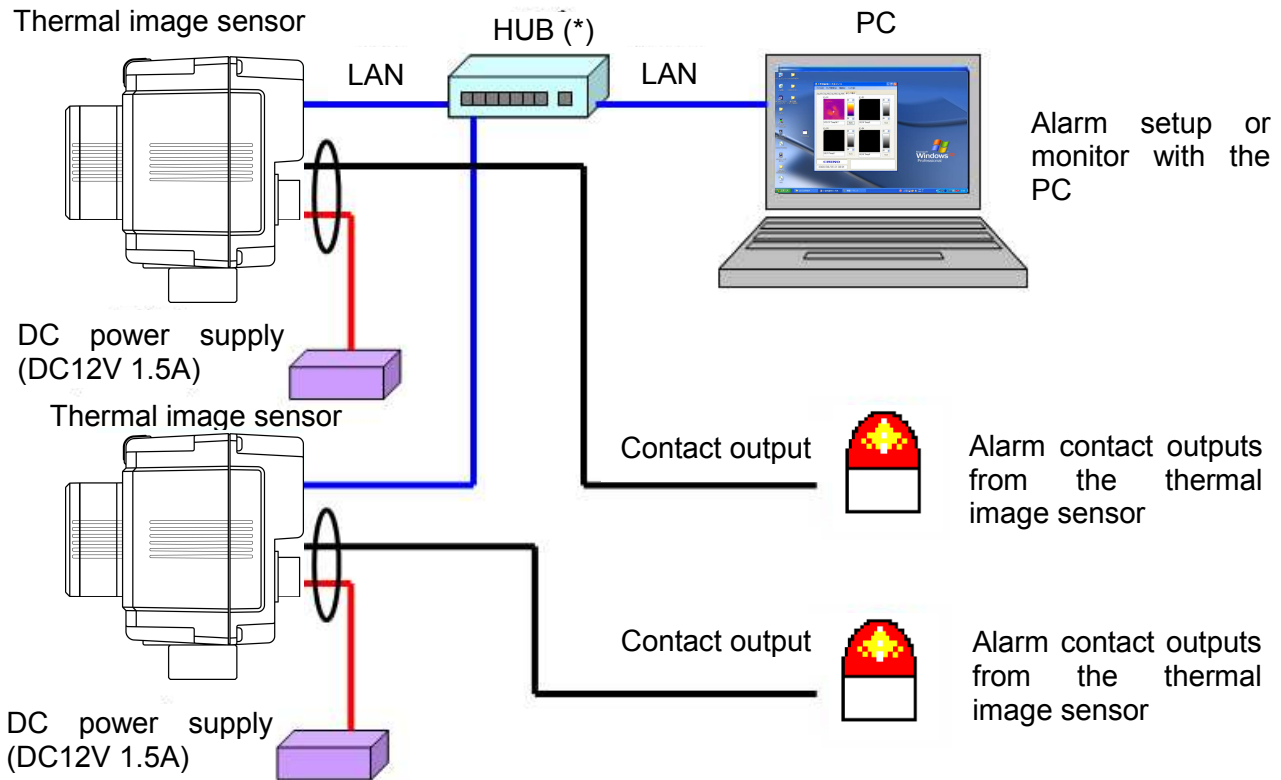
(1) Monitor lamp

(2) Lens

(7)

CHINO
MODEL : TP-L0225EN
LAN
No : TP093C001 (2. 02)
MAC : 000499 800001
MADE IN JAPAN CE

(4)
Power/alarm output
connector

DC IN
IN/OUT

I/F

(5)
LAN connector

(3) Mounting screw

(6) Reset switch
(Behind the screw)
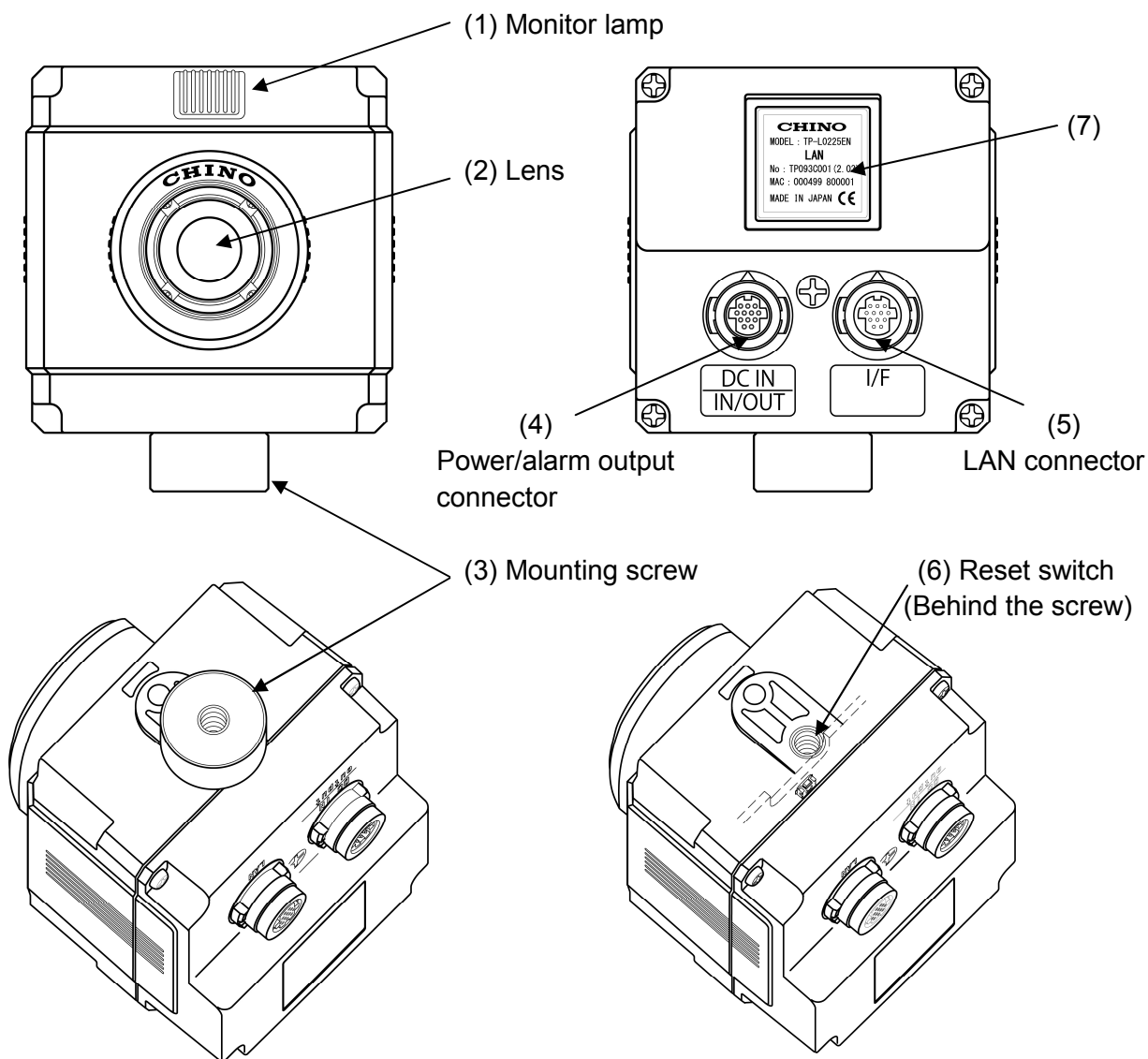
No	Name	Function
(1)	Monitor lamp	The state of alarm and the condition of the sensor is indicated with colors of blue, red and purple. (Refer to Page 8.)
(2)	Lens	For forming image of radiation energy from a measurement object on the detecting element
(3)	Mounting screw	For mounting the sensor on a tripod (1/4-20UNC)
(4)	Power/alarm output connector	For connecting custom power/alarm output cable
(5)	I/F connector	For connection of custom Network cable
(6)	Reset switch	To initialize the sensor to factory default (The switch is located behind the mounting screw.) (Refer to Page 11 for details.)
(7)	Mfg nameplate	Serial No., MAC address, etc. are shown.

4

■Connection

● Connect the custom power/alarm output cable and the custom Network cable to this product.
Connect them to align the marks of [△] back of this product and [Arrow] on the cable connectors.

⚠ To avoid misconnections, the custom Network cable is designed not to connect to the power/alarm output connector of this product. Similarly, the custom power/alarm output cable cannot be connected to the LAN connector of this product.

⚠ The connections are a quick-disconnect locking type. Insert the plug until it clicks.
To unplug, hold the sliding part (that has the [Arrow] marking on) and pull it outward.
If the "A" part is pulled, and the plug may be damaged.

[△] mark

[Arrow] mark

A

Plug ⚠

CHINO
MODEL : TP-L0225EN
LAN
No : TP0930001 (2. 03)
MAC : 000499 800001
MADE IN JAPAN CE

DC IN
IN/OUT

I/F
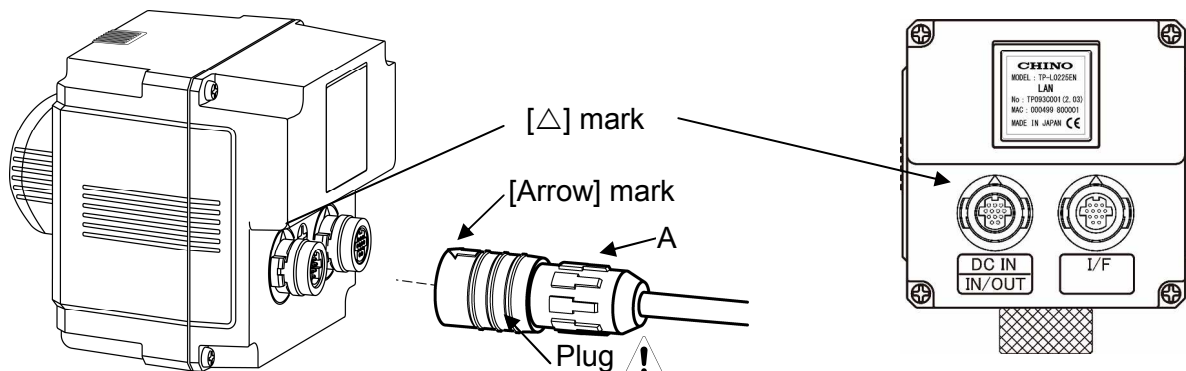
● Plug the connector of the custom Network cable to the Ethernet port of a master unit (PC, etc.) and connect the O-tip terminals of the custom power/alarm output cable to the terminal block of 12VDC Power Supply.

Custom Network cable LAN connector

LAN port

Custom power/alarm output cable ring terminals

Insulate the O-tip alarm output terminals if not used.

Terminal block
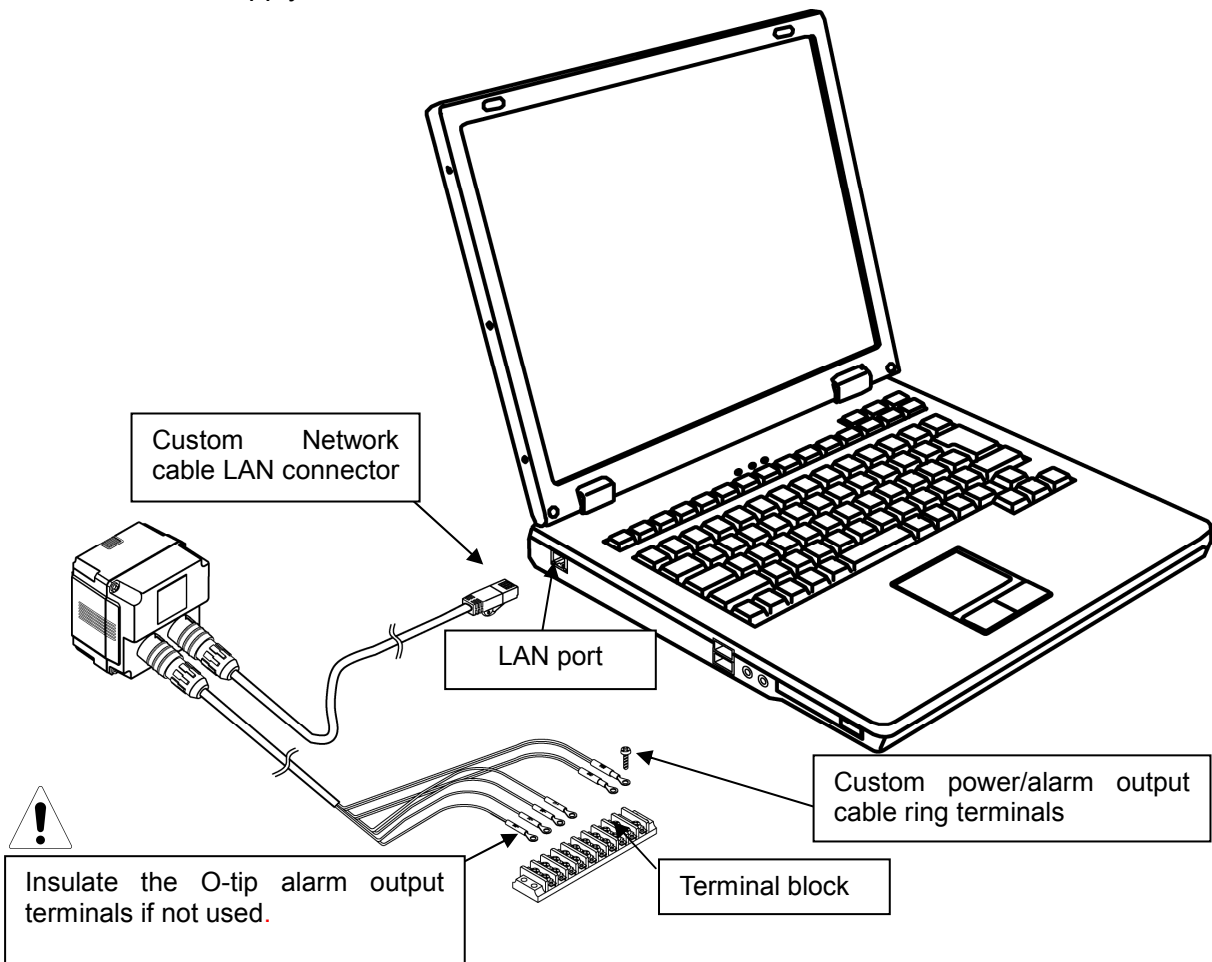
[Details of custom power/alarm output cable] O-tip terminal 0.5-3.5

Power +	P +	Red
Power -	P -	Black
Alarm 1 +	Orange	AL1 +
Alarm 1 -	Pink	AL1 -
Alarm 2 +	Bright green	AL2 +
Alarm 2 -	Blue	AL2 -
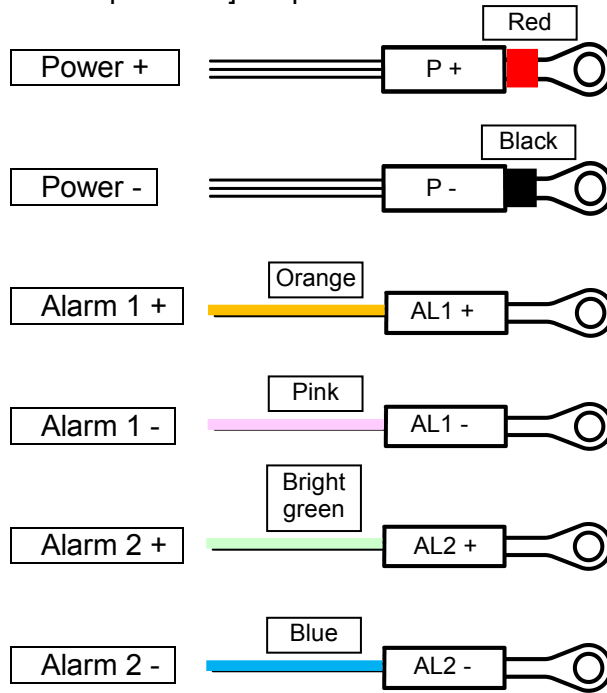
[Example of contact output circuit]

⚠ Use the contact output with a protection device (e.g. fuse) for preventing malfunction.

[Alarm 1, w/ AC current]

AL1 +
(Relay)
Power (AC)
AL1 -
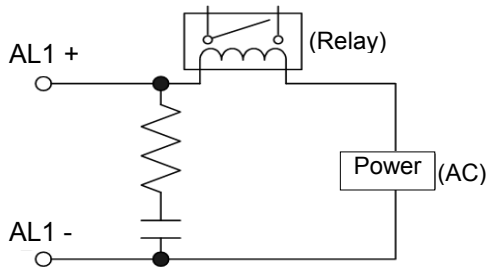
[Alarm 1, w/ DC current]

AL1 +
(Relay)
Power (DC)
AL1 -
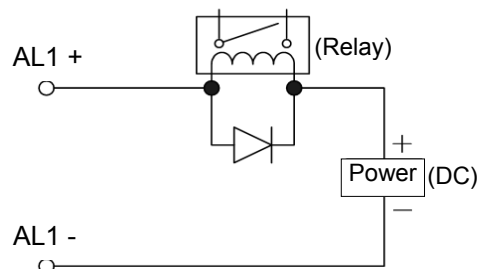
Output capacity (Per 1 contact)	Max. output load voltage	400V (Peak AC)
	Max. continuous load current	0.1A (Peak AC)
	Peak load current	240mA (100ms/1 shot)
	Max. output loss	300mW

● If the custom Network cable is not used (When using the thermal image sensor stand alone)
  Cover the supplied connector cap to the connector marked with [LAN] back of this product.
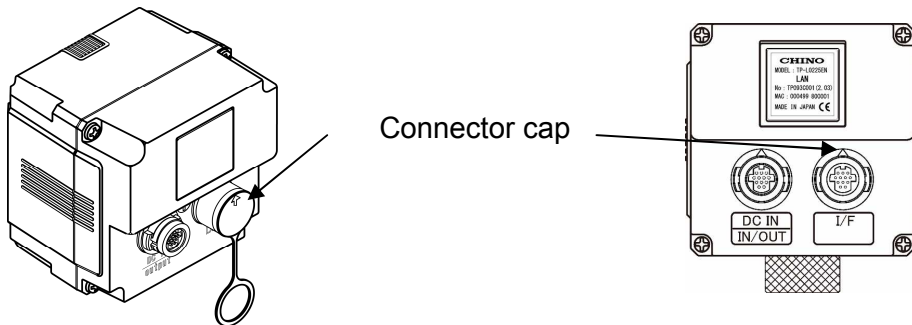
Connector cap

⚠ If you don't cover the connector with the cap, the waterproofing performance cannot be satisfied. (It may cause water immersion.)

6

■Installation

By referring the figure below, install the thermal image sensor at the measuring distance that a measuring object can be imaged at the center of screen as large as possible.

⚠ Do not install the sensor where subjected to vibration/shock or inductive ambient.

\<Relation between a measuring surface and a measuring distance\>
D (View width) = 0.5 × L (Measuring distance)

■: View per pixel
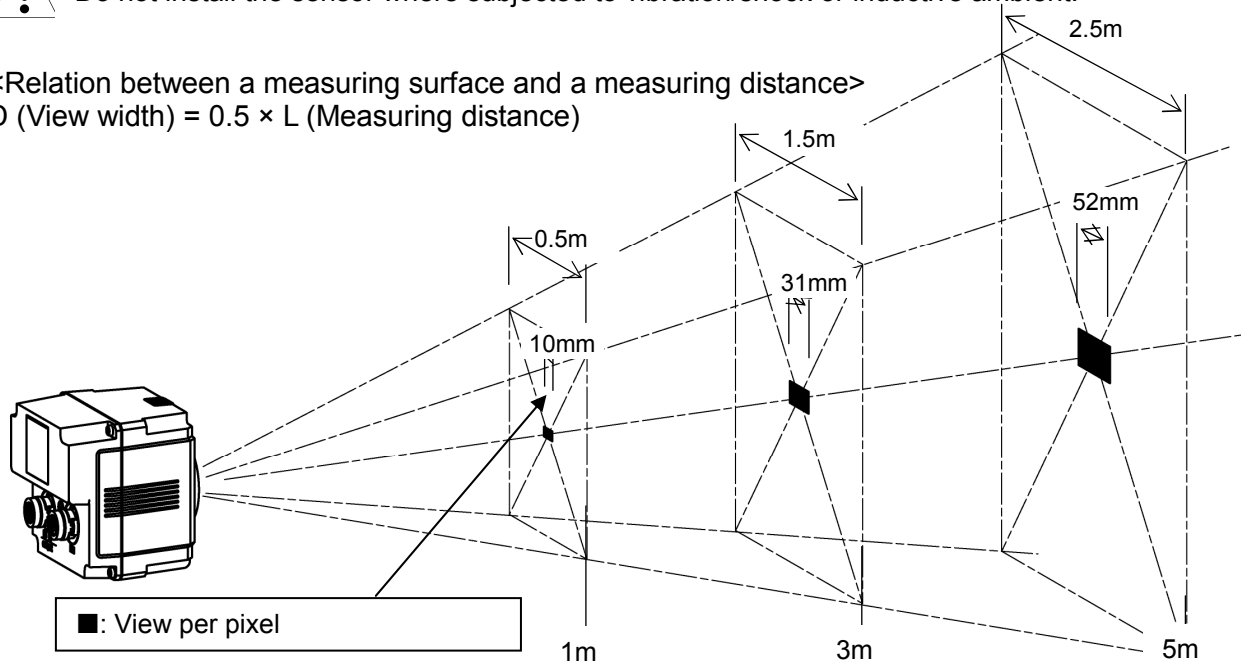
⚠ For accurate measurements, 5 x 5 pixels or more for a target is recomended.

■Operation

● Install the supplied application software to your personal computer.
   (For the details, refer to the instruction manual for the application software.)

● For more accurate measurements, wait 30 minutes after power-on until this product is stabilized.

● Use this product with noiseless and stable power source.

■ Monitor lamp

The state of product is indicated by 3 colors on the LED indicator; blue, purple and red.

Item		Color	Specification
Mode is not set (Factory Default)		Blue	Lit once for 3 seconds
Alarm values are not set		Blue	Lit once for 3 seconds
Alarm being monitored		Blue	Lit continuously
Set to Captured Mode		Purple	Lit continuously
Reboot is required after all settings have completed		Purple	Lit for 3 seconds twice
Alarm is activated		Red	Lit continuously
Abnormal State	Abnormal internal memory	Red	Lit once for 3 seconds * Refer to Page 14 Troubleshooting.
	Abnormal internal temperature	Red	Lit once for 3 seconds * Refer to Page 14 Troubleshooting.

■Operation mode

1. Monitor mode: When CHINO application software is used
   The temperature data is sent continuously to a master unit (e.g. PC) by a command from the software.(The frame rate of the thermal image on the software is 3fps without any Alarm activated.)
   The alarm set on the sensor can provide a non-voltage contact output while sending the temperature data.(The frame rate goes down to 1fps or less with the alarm set on the sensor.)

2. Capture mode: Without CHINO application software
   The temperature data in a single row of the thermopile array can be obtained at a time by a command from a master unit.

   ⚠ When Capture mode is used, a series of communication commands are required.
      For the communication commands, contact to your nearest distributor.

■Alarm output

1. Specifications

Item	Specification
Alarm area	1 area
Alarm set value	2 values in a specified area
Setting resolution	1 degree (°C/ºF)
Alarm activation condition	When consecutive 4 frames have satisfied the alarm condition
Alarm reset condition	When the measured temperature returns from the alarm set value in 4 images continuously
Output Control	Auto Alarm Reset/Manual Alarm Reset
Resetting condition of alarm output manual reset	・Rebooting of the thermal image sensor ・Command from a PC
Alarm Output	Non-voltage contact output
Number of outputs	2 points [Alarm name: AL1 (alarm 1), AL2 (alarm 2)]
Output logic	Output logic selectable (N.O/N.C)
Alarm condition	Selectable (high-limit, low-limit)
Alarm condition when power is off	Opened

2. Image storage
The image data can be stored when alarm is activated.

Item	Content
Number of storage	1 image An image can be stored by AL1 or AL2 (to be specified).
Storage medium	Built-in EEPROM
Storage data	Temperature data (without time stamp)
Storage timing	Every time when the alarm is activated/when the first alarm is activated only Selectable by a PC (Refer to Page 10.)
Reading of stored data	Can be retrieved from a PC
Erasing of stored data	Automatic erasing or erasing by a command with the alarm setting from a PC

● Alarm output and storing image

Alarm state	

ON   OFF   ON

Auto Reset	Contact output
	Image saving

Image is overwritten.

The image is saved only at the time of when alarming state turns from Off to On.

Manual Reset	Contact output
	Image saving

Contact output state will be held until the sensor restarts or you reset the alarm by clicking [Alarm Reset] button in Alarm Setup Window.
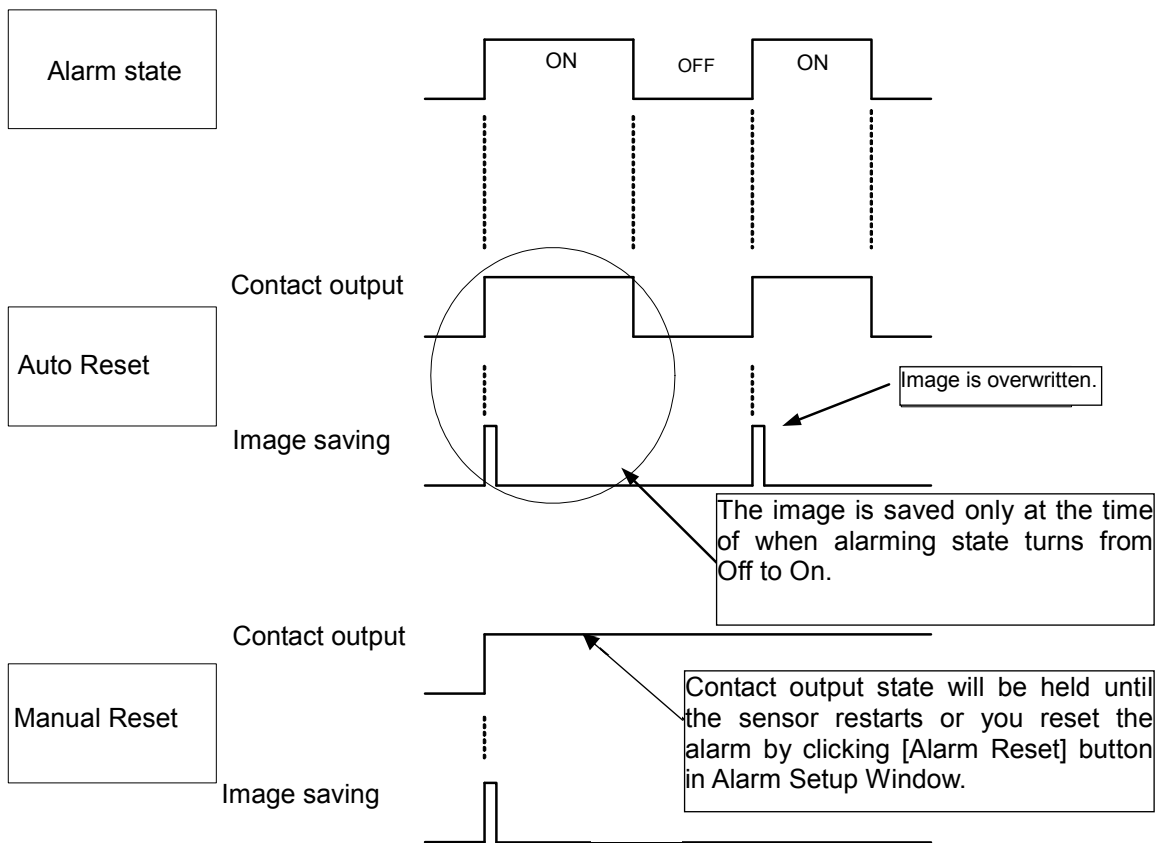
■ About reset switch

In case of an error, etc. at the LAN environment settings, the set values can be reset to the default values as shipped from factory by removing the mounting screw and then pushing the reset switch.

⚠ Turn the power on while pushing the reset switch for 1 second continuously. Resetting to the default values becomes effective (The violet monitor lamp flashes 2 times.) By re-power-on, the set values are reset to the default values at the shipment from factory. Usually do not push the reset switch.

Remove the mounting

Reset switch (behind the screw)

Reset switch
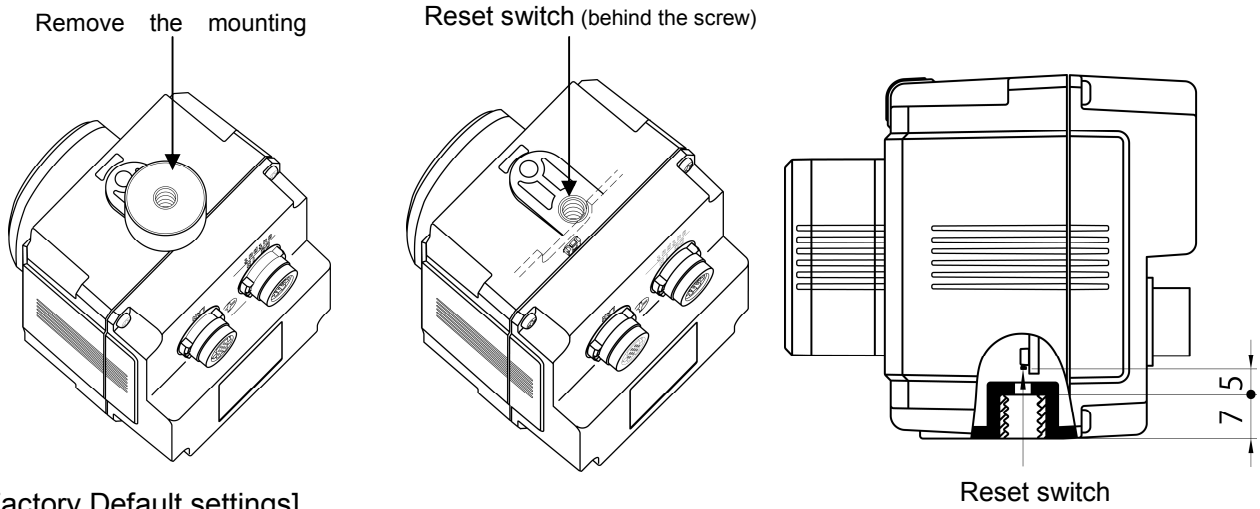
[Factory Default settings]

Items	Specifications
IP address	192.168.1.254
Subnet mask	255.255.255.0
Gateway address	0.0.0.0 (Invalidation)
Sensor number	1
UDP port address	50828 (fixed) *1
Emissivity	1.00 (all pixels)
Alarm setting	Alarm invalid

⚠ *1 If you use UDP port on your PC and the UDP port address that you are using is overlapping with this address, change the UDP address that you are using.

[MEMO]

■ Specifications

	Items	Specifications
Thermal image specifications	Detecting element	Thermopile array with 48 x 47 pixels
	Measurement wavelength	Center wavelength 10μm
	Measurement view angle	25° x 25°
	Temperature measurement range	-20°C to 300°C
	Temperature resolution	0.5°C (at 100°C black body)
	Accuracy ratings	±2% of measured value or ±3°C, whichever is greater (Ambient temperature 25 ± 2°C)
	Focus	Fixed focus
	Flame rate	3fps (1fps or slower if alarm function is enabled)
	Emissivity correction	0.10 ~ 1.00 (0.01 increment)
	Radius resolution	9.1mrad
General specifications	Working temperature range	-10°C to 50°C
	Working humidity range	10 to 80%RH (no dew condensation)
	Storage temperature range	-20°C to 60°C
	Housing	IP65 (with custom cable connection or connector cap, and mounting screw mounted)
	External dimensions	W62 x H62 x D69.7 (mounting screw not included)
	Weight	About 160g (sensor unit)
	Material	Polycarbonate Resin Color: Black
	Conforming standard	Influence within 5% of measurement range under the environment of CE (EN61326-1/Class B)
	mounting screw size	1/4-20UNC
Power specifications	Power supply	12 to 24VDC (Min. 9 to Max. 30VDC)
	Current consumption *1	Max. 2.5VA at 12VDC
	Inrush current *1	Max. 1A at 12VDC (When power supply S8VM-01512 made in Omron is used)
	Connection	Custom-connector connection
	Connector name	[DC IN/IN/OUT]

⚠ *1 The inrush current should be considered for the selection of power source.

Items		Specifications
Contact output specifications	Number of contact output	2 Outputs
	Kind of contact	No-voltage contact output
	Cable terminal names	AL1, AL2
	Contact Rating (per contact)	Max. output load voltage 400V (Peak AC)
		Max. continuous load current 0.1A (Peak AC)
		Peak load current 240mA (100ms/1 shot)
		Max. output loss 300mW
	Connection	Custom-connector connection
	Connector name	[DC IN/IN/OUT]
Ethernet specifications	Interface standard	10BASE-T/100BASE-TX
	Data/Protocol	Data communication by UDP Measured temperature data → To a master unit (PC, etc.) Setting data ← From a master unit (PC, etc.)
	Setting data	IP address/alarm setting information, etc.
	DHCP	Not supported
	Thermal image sensor IP address	192.168.1.254 (default at shipment)
	Thermal image sensor subnet mask	255.255.255.0
	Default gateway	0 or FFFF (Not set)
	Connection	Custom-connector connection
	Connector name	[I/F]

■ Accessory (sold separately)
  Protective case: Model: TP-ZCC1 (Refer to Extrernal Dimension.)

■ Minimum requirements for the CHINO application software
  Compatible PC: DOS/V computers with PC/AT compatible
        * The LAN port is required.
        * Display resolution: 800 x 600 pixels or more recommended
        * .NET Framework 2.0 or later has been installed and runs correctly.
  Compatible OS: Windows 2000 (SP4 or later)/XP/Vista
        * Windows XP or later recommended
        * .NET Framework 2.0 or later required

⚠ Precautions (For maintaining measurement accuracy)

Pay attention to the followings for maintaining the measurement accuracy.

● Vibration and shock

  Vibration and shock causes not only a damage to the thermal image sensor in a long term but in stability of the measurement. When vibration is present, anti-vibration/shock absorber may be required between the thermal image sensor and a mounting plate or between the mounting bracket and a mounting plate.

● Inductive condition

  The thermal image sensor is designed to be inductivity-resistant. However, it is recommended to keep the sensor from induction heaters or power lines as much as possible.

● IR energy path between measuring targets and the sensor

  Avoid places where water drops, dusts, smoke, steam, etc. can be present between the thermal image sensor and a measurement surface. If it is impossible to avoid such places, consider utilizing an air purge system or equivalent system. The optional protective case is recommended.

● Disturbances causing higher temperature indication

  Avoid places where high temperature heat source such as sunlight, light/flame of incandescent electric lamps is not reflecting on a measurement surface and the thermal image sensor. If such condition is present, cover the area with an opaque object.

■ Troubleshooting

If you are experiencing difficulties with the sensor or noticing an abnormality on its operation, refer to the followings. If the difficulties or abnormality is still present, contact to your nearest distributor.

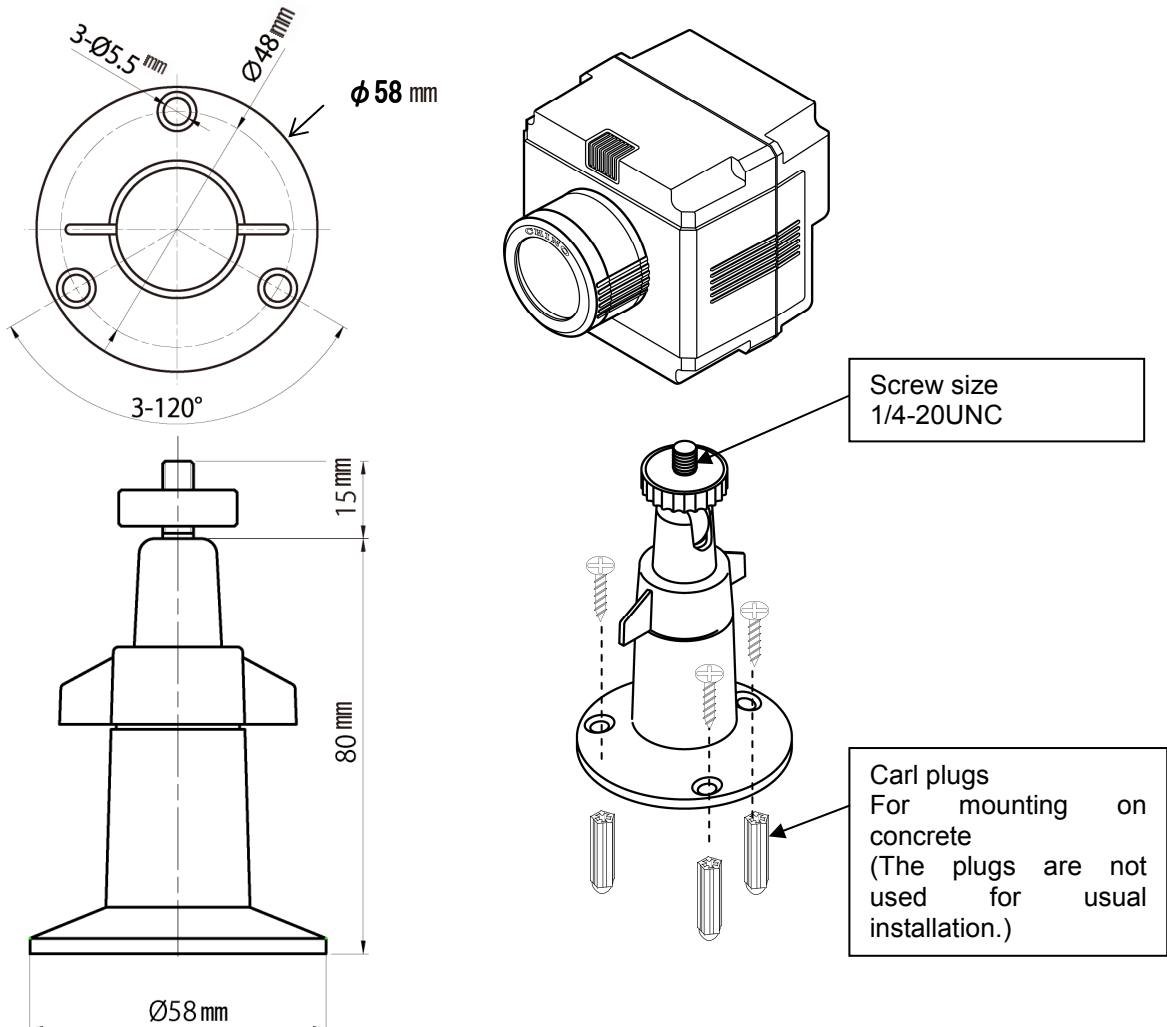| Symptoms	Causes	Measures
Indicator lamp is not lit	The custom power cable is not connected properly.	Connect the custom power cable properly.
	The power for equipment is not turned on.	Turn the power for the equipment.
No Communications	The custom Network cable is not connected correctly.	Connect the custom Network cable properly.
	The application software is not installed.	Install the software. Refer to the instruction manual for the application software.
	The IP address has not been set.	Refer to the instruction manual for the application software.
Image/temperature value abnormally fluctuates.	Strong statistic electricity, electromagnetic wave or high frequency may be present around the sensor.	Keep this product away from an equipment generating strong static electricity or electromagnetic wave.
Indicator lamp is red	Alarm is activated (Not abnormal)	Automatic reset: Resets automatically. Manual reset: Resets by re-boot or a command from a master unit (PC, etc.).
Indicator lamp flashes red once	Internal memory abnormality	Contact to your nearest distributor.
Indicator lamp flashings red twice	Internal temperature abnormality	Use this product within its operating temperature range. Contact to your nearest dirtributor.

■External dimensions

1. Thermal image sensor
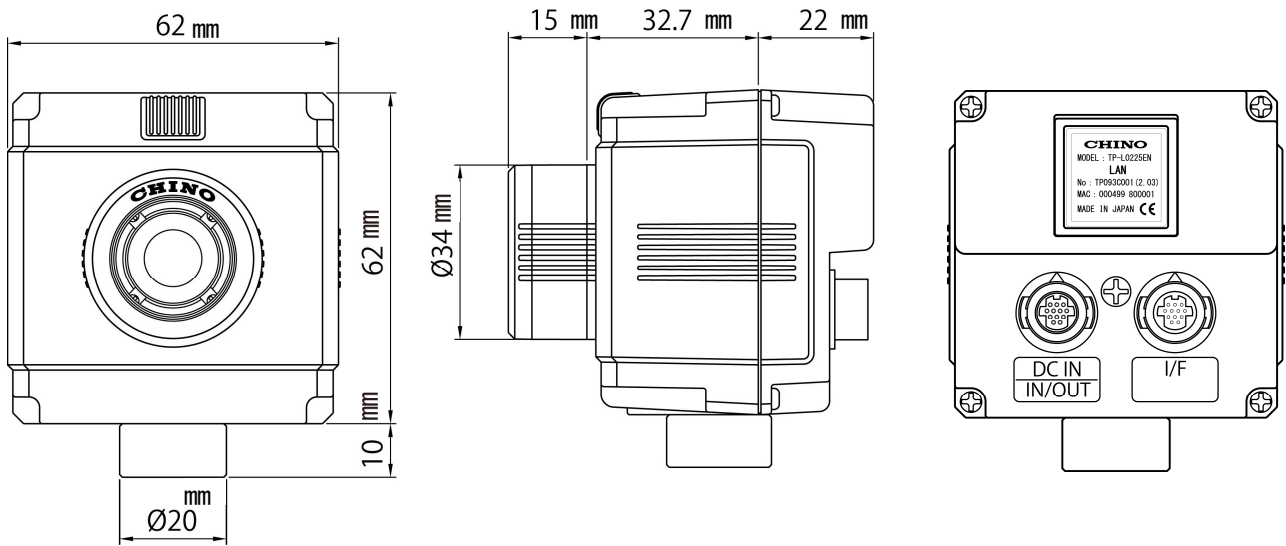
2. Universal head

When the thermal image sensor is installed with the universal head, mount the mounting bracket with 3 pieces of screws through the 3 holes on the bracket. If the universal head needs to be mounted on concrete surface, drill holes with 6.5mmø and 25mm depth on the concrete and push the Carl plugs into the holes, and then mount the universal head.

Screw size
1/4-20UNC

Carl plugs
For mounting on concrete
(The plugs are not used for usual installation.)

3. Accessory

Protective case: Model TP-ZCC1

30 mm   80 mm   4-Φ7 mm   100 mm

80 mm   82 mm   90 mm   5 mm   Ø60 mm

15 mm   140 mm   25 mm   (36) mm

Hole for air purge (PT1/8)