

INSTRUCTION MANUAL

UCAM-550A

FAST DATA LOGGER

[FOR HARDWARE]

Thank you for purchasing KYOWA's product UCAM-550A Fast Data Logger.

Read this Instruction Manual carefully in order to make full use of the high performance capabilities of the product.

Do not use the product in methods other than described in this Manual.

This Manual only describes hardware operation of the UCAM-550A.

This Manual also describes operation of the strain/voltage/thermocouple unit (USM-51B/52B).

For software, refer to the "DCS-100A DYAMIC DATA RECORDING SOFTWARE INSTRUCTION MANUAL (FOR UCAM-550A OPERATION).

For software operation other than the DCS-100A, refer to the UCAM-550A FAST DATA LOGGER INSTRUCTION MANUAL (FOR CONTROL COMMAND).

Windows are trademarks of Microsoft Corporation, U.S.A. and other countries.

Generally, company names and trade names described in this Instruction Manual are trademarks or registered trademarks of the companies.

This Instruction Manual may not be copied or reproduced, in whole or part, without consent of KYOWA.

Copyright © Kyowa Electronic Instruments Co., Ltd. All rights reserved.

The contents of the Instruction Manual and specifications of the software are subject to change without prior notice.

Kyowa Electronic Instruments Co., Ltd. assumes no liability for any damage resulting from the user's failure to comply with the safety precautions.

—CONTENTS—

STANDARD ACCESSORIES	2
OPTIONAL ACCESSORIES	3
SAFETY PRECAUTIONS	4
LIMITED LIFE PARTS AND PREVENTIVE MAINTENANCE	7
UCAM-550A REPLACEMENT BEFORE THE END OF SERVICE LIFE.....	7
NOTATIONS USED IN THE INSTRUCTION MANUAL.....	8
1 OUTLINE OF PRODUCT.....	9
1-1 OUTLINE	9
1-2 FEATURES	9
1-3 SYSTEM CONFIGURATION	10
2 CONTROLS AND INDICATORS	11
2-1 FRONT	11
2-2 REAR	12
2-3 TOP FACE	13
3 PROCEDURES FOR MEASUREMENTS	15
4 INSTALLING THE SYSTEM.....	16
4-1 INSTALLING METHOD.....	16
4-1-1 Grounding	16
4-1-2 Connecting the Power Supplies	17
4-1-3 Setting Box No.....	18
4-2 CONNECTING UCAM-550A TO THE PC.....	19
4-3 CONNECTING BETWEEN UCAM-550A UNITS	19
4-4 CONNECTING UCAM-550A TO THE PC (WITH HUB).....	20
4-5 POWER ON/OFF	21
4-5-1 UCAM-550A Power ON	21
4-5-2 UCAM-550A Power OFF	21
5 CONNECTING SENSORS.....	22
5-1 CONNECTING STRAIN GAGE, STRAIN GAGE TRASDUCER, POTENTIOMETER SENSOR.....	22
5-2 CONNECTING VOLTAGE OUTPUT TRANSDUCER	24
5-3 CONNECTING THERMOCOUPLE	24
5-4 CONNECTING STRAIN/VOLTAGE/THERMOCOUPLE UNIT	25
5-4-1 Connecting strain gage, strain gage transducer, potentiometer sensor	25
5-4-2 Connecting DC voltage and voltage output type transducer	28
5-4-3 Connecting thermocouple	29
6 LCD INDICATOR AND ITEMS.....	30
6-1 DESCRIPTION OF ITEMS	30
7 SETTING LAN	32
7-1 DEFAULT SETTING	32
7-2 SETTING PC (STATIC IP ADDRESS)	33
7-2-1 For Windows XP	33
7-2-2 For Windows Vista	34
7-2-3 For Windows 7	35
7-3 SETTING PC (DYNAMIC IP ADDRESS).....	36
7-3-1 For Windows XP.....	36
7-3-2 For Windows Vista	37
7-3-3 For Windows 7	38
7-4 METHODS FOR CHECKING WHETHER OR NOT CONNECTIONS ARE CORRECT	39
7-5 SETTING UCAM-550A (STATIC IP ADDRESS SETTING).....	41
7-5-1 Setting IP Address	41
7-5-2 Setting Subnet Mask	42

6-5-3 Setting Default Gateway	42
7-6 SETTING UCAM-550A (AUTOMATIC IP ADDRESS SETTING).....	43
8 DETAILS OF OPTIONAL	44
8-1 DETAILS OF OPTIONAL	44
8-2 INSTALLING MEASURING UNIT	45
9 TROUBLE SHOOTING	46
9-1 BEFORE CONSIDERING FAULTY	46
9-2 METHOD OF REPLACING FUSE	47
10 TECHNICAL INFORMATION REQUIRED FOR MEASUREMEMENT	48
10-1 COMPENSATING NONLINEARITY IN STRAIN GAGES (QUARTER BRIDGE SYSTEM) ..	48
10-2 COMPENSATING TEMPERATURE EFFECTS ON LEAD WIRES (3-WIRE SYSTEM CONNECTION)	49
10-3 COMPENSATING GAGE FACTORS	51
10-4 COMPENSATING LONG LEAD WIRES AND CABLES	51
10-5 STRAIN/VOLTAGE/THERMOCOUPLE UNIT AND THERMOCOUPLE DATA UPDATING RATE	53
11 SPECIFICATIONS	54
12 OUTSIDE DRAWING	58

Revision history

Instruction manual No.	Description	Remarks
IM-A-871	First edition	
IM-A-871b	— — — — —	
IM-A-871c	— — — — —	
IM-A-871D	Added the USM-51B/52B. Added the TC/N in the UST-51A/B.	Make sure the UCAM-550A version is as follows. UCAM Ver03.00 or later FPGA Ver03.00 or later

STANDARD ACCESSORIES

The following accessories are packed with the Fast Data Logger UCAM-550A.
When unpacking, check the contents to ensure that all accessories are enclosed.

Instruction Manual	1 (CD-R)
AC Power Cable: P-18	1
3P-2P Conversion Adapter: CM-39	1
Grounding Wire (5 m)	1
Fuse (Time lag type, 250 V, 3.15 A, $\phi 5 \times 20$ mm)	1
	(Within fuse holder as a spare)
Warranty and Test Data Sheet	1 each
Read in the beginning (Japanese/English)	1
● With the Dynamic Data Recording Software DCS-100A	
DCS-100A and Instruction manual	1 (DVD)
DCS-100A license agreement	1
DCS-100A password sheet	1
● Without the Dynamic Data Recording Software DCS-100A	
DCS-100A trial version and Instruction manual	1 (DVD)

OPTIONAL ACCESSORIES

● Strain unit Accessories: Test Certificate and Warranty	USS-51B 1 each
● Voltage unit Accessories: Test Certificate and Warranty	USV-51B 1 each
● Thermocouple unit Accessories: Terminal cover UT-50A Test Certificate and Warranty	UST-51B 1 1 each
● Strain/voltage/thermocouple unit (Soldering, screw-fixed terminal block + NDIS connector) Accessories: Terminal cover UM-51B Test Certificate and Warranty	USM-51B 1 1 each
● Strain/voltage/thermocouple unit (One-touch type terminal block + NDIS connector) Accessories: Terminal cover UM-51B Test Certificate and Warranty	USM-52B 1 1 each
● Dummy panel	UD-50A
● Terminal cover (for USS-51A/B, USV-51A/B, UST-51A/B)	UT-50A
● Terminal cover (for USM-51B/52B)	UM-51B

Other Optional

● Insulation Transformer	UPT-300B
● Simplified Terminal Block	JT-1A (input terminal mounting type)
● Connection Cable	N-70 (Input terminal ← For connecting NDIS connector)
● Input Cable	U-119 (NDIS connector ← For connecting input terminal)

SAFETY PRECAUTIONS

(Do not forget to read the safety precautions prior to use.)

The UCAM-550A is designed to be used according to "11 SPECIFICATIONS."

Do not use the product in an environment exceeding the specifications. Or, it may cause troubles.

PRIOR TO USE

For safe use of the product, do not forget to read the "Safety Precautions" prior to use.

Kyowa Electronic Instruments Co., Ltd. assumes no liability for any damage resulting from the user's failure to comply with the safety precautions.

For safety operation of the product, the following symbol marks are used in the Instruction Manual.

 GND	Indicates "PROTECTIVE GROUND TERMINAL." Be sure to connect the GND terminal to the ground.
---	---

SAFETY SYMBOLS

For safety operation of the product, the following symbol marks are used in the Instruction Manual.

 WARNING	Improper operation of the system may result in death or severe injury of the operator.
 CAUTION	Improper operation of the system may result in injury of the operator and physical damage of the system.

 WARNING
● WARNING Be sure to observe the warning and precautions described in the UCAM-550A Instruction Manual (FOR HARDWARE). ● Power supply To prevent a fire hazard, ensure that the power supply voltage specified for the product matches the local line voltage and ground the GND terminal, before connecting the power cable. ● Avoid using in environment with inflammable gas, etc. To prevent the risk of fire hazard or explosion, do not use the product in environment with inflammable gas, vapor, or dust. ● If any trouble occurs To prevent a fire hazard, if smoke is emitted from the product, immediately disconnect the AC adapter from the receptacle and stop using the product. ● Protective ground To prevent an electric shock hazards, be sure to connect the product to the ground before connecting the power cable. Be sure to connect the GND terminal to the ground. Or, it may cause an electric shock hazard, lower the performance, and cause trouble. ● For electrical operator safety To prevent an electric shock hazard, operators must be cautioned not to cut the protective grounding conductor or disconnect the GND terminal. ● Confirmation of Protective Ground To prevent an electric shock hazard, be sure to check safe protective ground function before operating the product. If any abnormal matters are found in the protective ground function, fuse holder, etc., do not operate the product.



WARNING

- Power cable and power outlet

To prevent an electric shock or fire hazard, connect an accessory power cable and 3P-2P conversion adapter to a plug with protective ground terminal.

When using 3P power cable, use a 3P power plug with protective ground terminal.

Operators must be cautioned that use of an extension power cable with no ground conductor disables the protective ground function.

Also, when using the power cable, do not forget to connect the protective ground terminal to the ground in advance.

When disconnecting the power cable, disconnect it before removing the grounding conductor.

Make sure the protective ground terminal is grounded during measurements.

- Fuse

To prevent a fire hazard, be sure to use a fuse providing the same rating (current, voltage, type) as specified for the product.

Do not use any fuse other than specified. Do not short-circuit the fuse holder.

Before replacing the fuse with a new one, disconnect the power cable.

- External connection

To prevent electric shock hazards, be sure to connect the PC and other external devices to the ground before connecting them to the product.

To prevent troubles and accidents caused by erroneous handling and installation, fully understand the operating instructions and operating environment and properly use the product with special care to have the product safely fulfill its performance.



CAUTION

- CAUTION

Be sure to observe the warning and precautions described in the UCAM-550A Instruction Manual (FOR HARDWARE).

- Do not use the product outdoors. Or, it may cause an electric shock, fire hazard, lower the performance and cause trouble.
- After turning OFF the power switch, wait more than 10 seconds to turn ON the power once again. If the power is repeatedly turned ON and OFF within 10 seconds, rush current generated by switching the power ON may damage the product.
- Use the product within temperature ranging from 0 to 40°C. Or, it may lower the performance and cause troubles. If use under direct sunlight or in a cold place is inevitable, prepare a sunscreen or take proper measures to keep it warm.
- Use the product in the specified operating humidity range 20 to 85%RH. Use in a humid place exceeding the specified range or where it is exposed to splashing water may lower the performance and cause trouble.
- Do not seal ventilation holes. If there is not enough space to radiate heat, temperature in the product may increase to lower the performance and cause troubles.
- Do not use the product immediately after the change in the environment. Leave the product as it is until it becomes adaptable to the environment. Abrupt change in ambient temperature due to transportation, etc. may cause dew condensation, which may result in lower performance and troubles.
- Do not use the product under dusty environment. Or, it may lower the performance. Be careful that dust may not enter the product not only during operation but also under stored conditions.
- Use the product under environment without excessive vibration or high impact. Use the product under environment without excessive vibration or high impact. Continuous vibration or severe impact may cause deteriorated performance and system failure.
- Do not use the product in strong electromagnetic field. Use the product in a magnetic field environment where the PC may be used. Performance may be lowered and erroneous operation and troubles may result if it is used near a telemetry system, microwave oven, electronic furnace or any other equipment generating a strong magnetic field.
- Do not use the product under poor conditions. Use the power supply voltage within 100 to 240 VAC (50 Hz/50 Hz). The power supply used for the product should not experience an instantaneous power failure and be free from noise.
- Do not pull cords and cables. Lay cords and cables with a certain allowance so that unreasonable force is not applied to the connections. Pulling or applying unreasonable force may cause trouble or interrupt the measurement.
- Avoid installing sensors and products near a welding machine. Failure to do so will pose the risk of erroneous data, malfunction and failure.
- Do not disassemble or remodel the product. Or, it may cause electric shock or trouble. This warranty does not cover any damaged or defective parts that results from disassembling or remodeling.
- When using/storing the product near oceans, block the outside air. Or, it may lower the performance and cause troubles.
- Preheat the product before use. After the power ON, always preheat the product for approximately 1 hour.
- Turn OFF the wireless LAN function of the PC. We do not recommend you control the product by using the wireless LAN function.
- Take care when handling the DVD. Do not expose the DVD to direct sun light, high temperature, or high humidity. Do not apply pressure to the CD-R by laying object or bending. Dust, scratches, and fingerprints on either side of the DVD-R can cause write errors.

LIMITED LIFE PARTS AND PREVENTIVE MAINTENANCE

The product consists of various electronic components and those components, if not all, have a useful life.

Using them exceeding the years specified according to each part type (useful life) may affect the characteristics of the product, resulting in a malfunction or a failure.

You need to replace parts with a regular preventive maintenance schedule.

Limited life parts used with the product are as follows.

- Relay
A relay's insulation will inevitably degrade or a relay itself will be damaged.
- Aluminum electrolytic capacitor
The signal-noise ratio will lower due to capacity low or smoke will be emitted due to liquid leak, resulting in a malfunction of the product.
- EEPROM
EEPROM will results in malfunctions or degraded performance.

To operate the product normally, finding a sign of the product failure early by daily/periodic inspections and taking the corrective action are required. For inspection, contact KYOWA or our representatives.

* Limited life parts used with the product are relay, aluminum electrolytic capacitor, and EEPROM.

* All components do age and will fail.

UCAM-550A REPLACEMENT BEFORE THE END OF SERVICE LIFE

Preventive maintenance and replacement parts are a cost-effective way of keeping the performance and extending the service life of the product. Regardless of the replacement parts, the product itself gradually deteriorates with age. Before the expected service life is reached, consider replacing the product with a new one or the latest series as preventive maintenance.

NOTATIONS USED IN THE INSTRUCTION MANUAL

The following notations are used in the Instruction Manual for convenience.

- Names indicated on the panel face are enclosed with ‘ ’.
Example: 'GND' terminal
- Items indicated on the menu are enclosed with [].
Example: [MAC address]
- Words and phrases indicated on the screen are enclosed with " ".
- Measuring units may be described with Model names.

Strain unit	USS-51B
Voltage unit	USV-51B
Thermocouple unit	UST-51B
Strain/voltage/thermocouple unit	USM-51B
	(Soldering, screw-fixed terminal block + NDIS connector)
Strain/voltage/thermocouple unit	USM-52B
	(One-touch type terminal block + NDIS connector)
- Measuring units may be denoted as the "Unit."
- Input channels of measuring units may be denoted as the "CH."
- Channel numbers of measuring units are denoted as the “CH1, CH2, . . . , CH50.”

Informational Notes

Certain notations are used as necessary to urge attention to information that requires special attention in the handling of the system, and to information provided for reference purposes.

Example:

NOTE

Essential precautions when handling the UCAM-550A.

MEMO

Reference items when handling the UCAM-550A.

1 OUTLINE OF PRODUCT

1-1 OUTLINE

The UCAM-550A is a Fast data logger which can simultaneously sample variables at multiple points at a maximum rate of 50 times per second.

For using one UCAM-550A, connect the PC and UCAM-550A via a LAN cable. For using multiple UCAM-550A units, connect the multiple UCAM-550A units with LAN cables for synchronous measurements.

The UCAM-550A is designed for measurement with measuring speed in a wide range from 1 Hz to 50 Hz (max. 1000 channels). Therefore, one UCAM-550A is capable of measurement in a wide range from statistic to semi-dynamic phenomena.

Four types of unit are provided for measuring the input data, that is, a strain unit for measuring strain and potentiometer, a voltage unit for measuring voltage, thermocouple unit for measuring temperature, and strain/voltage/thermocouple unit for measuring strain/voltage/thermocouple.

Since the UCAM-550A control command is opened to the public, users can create their own software and construct their specified measuring system.

1-2 FEATURES

Simultaneous sampling of all channels, ensuring simultaneity of data

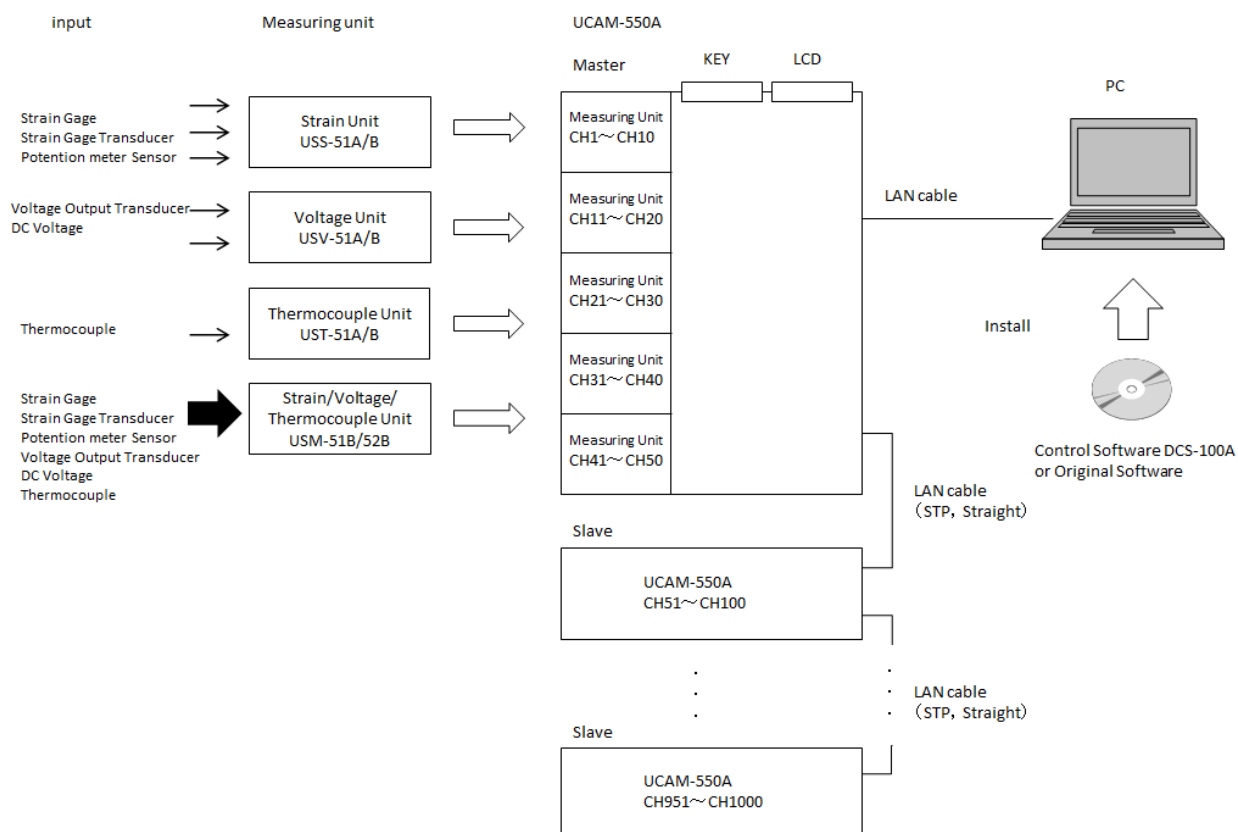
Applicable for measurement of static to quasi-dynamic phenomena changing at several Hz.

Compatible of varieties of sensors

All operations from PC

Loads TEDS sensors by using the strain/voltage/thermocouple unit (USM-51B/52B).

1-3 SYSTEM CONFIGURATION

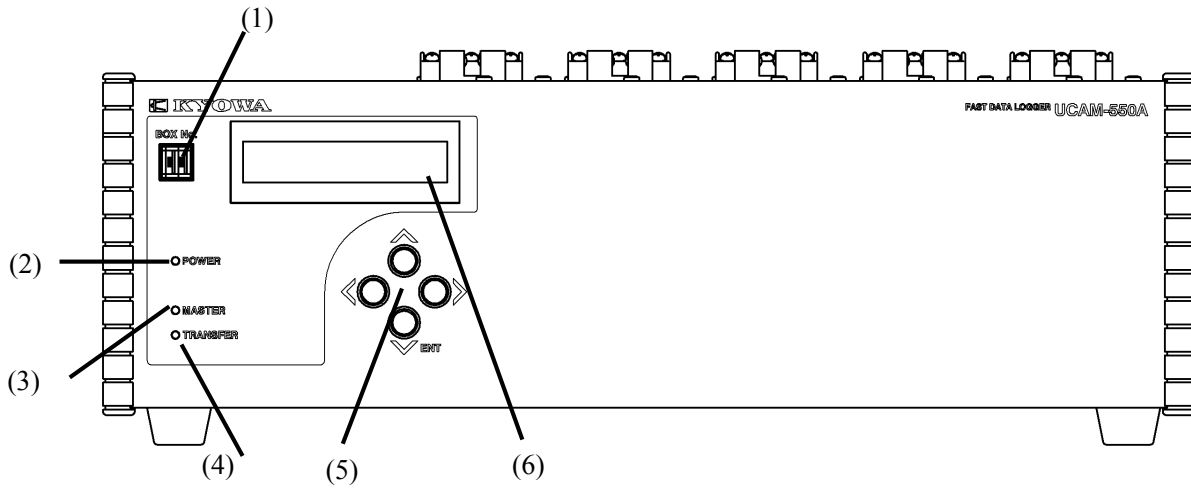


MEMO

- Five measuring units can be mounted. (50 channels)
- Be sure to connect between the master unit and slave unit, between slave units with the LAN cable (STP, straight).
 - * STP is an abbreviation for Shield Twisted Pair. The STP cables are shielded cables used for LAN networks.
- Maximum six measuring units can be mounted for the DCS-100A. (max. 300 channels)
- For creating the original software, see "UCAM-550A Instruction Manual for Software."

2 CONTROLS AND INDICATORS

2-1 FRONT

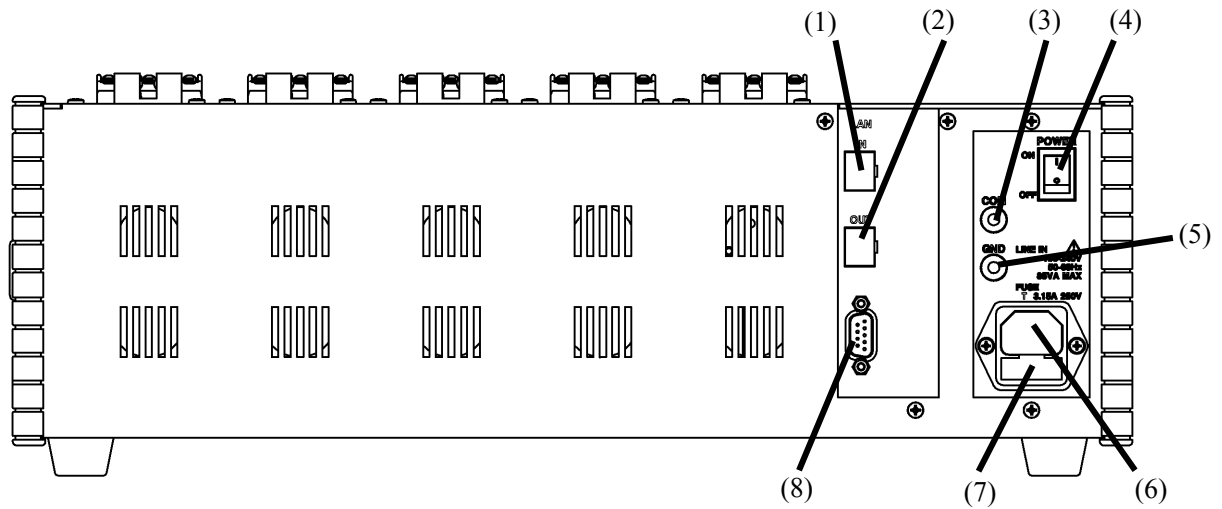


- | | |
|----------------------|--|
| (1) 'BOX No.' switch | <ul style="list-style-type: none"> • • • Digital switch for setting the measuring channel (Box No.). Rotate the 'BOX No.' switch downward to increase the Box No. or upward to decrease the Box No. Do not set the same Box No. in the same networks. Available box numbers are from 01 to 98. |
| (2) 'POWER' LED | <ul style="list-style-type: none"> • • • Lights up in green during turning ON the power. |
| (3) 'MASTER' LED | <ul style="list-style-type: none"> • • • During operating the master unit, the 'MASTER' LED lights up in green and during operating the slave unit, the 'MASTER' LED lights out. |
| (4) 'TRANSFER' LED | <ul style="list-style-type: none"> • • • Lights up in green during communication. |
| (5) Arrow keys | <ul style="list-style-type: none"> • • • For setting and checking the IP Address, Subnet Mask, and Default Gateway of the UCAM-550A. |
| (6) LCD indicator | <ul style="list-style-type: none"> • • • For setting and checking the IP Address, Subnet Mask, and Default Gateway of the UCAM-550A. |

NOTE

- Do not set 00 and 99 as the Box No.
- Or, [BOX No. ERROR (01 to 98)] appears on the LCD indicator.
- Communications and measurements are not available.

2-2 REAR



- | | |
|--------------------------|--|
| (1) 'IN' connector | • • • Communication connector
Connect the PC or the master unit of the UCAM-550A. |
| (2) 'OUT' connector | • • • Communication connector
Connect the slave units of the UCAM-550A. |
| (3) 'GND' Terminal | • • • GND terminal of the UCAM-550A Be sure to ground the GND terminal. |
| (4) 'POWER' switch | • • • POWER switch
Set it to the 'I' side to power ON and, 'O' side to power OFF. |
| (5) 'COM' Terminal | • • • Common terminal of the inner circuit.
Normally, connect nothing. |
| (6) Receptacle 'LINE IN' | • • • Power inlet socket for connecting the power cable. |
| (7) Fuse | • • • Power supply fuse. Spare fuse provided. |
| (8) Adjusting Connector | • • • Connector for adjusting the UCAM-550A. Do not use this connector. |

MEMO

• Applicable fuse

SOC Corporation

Model: ET3.15A

Fusing characteristics: Time lag type

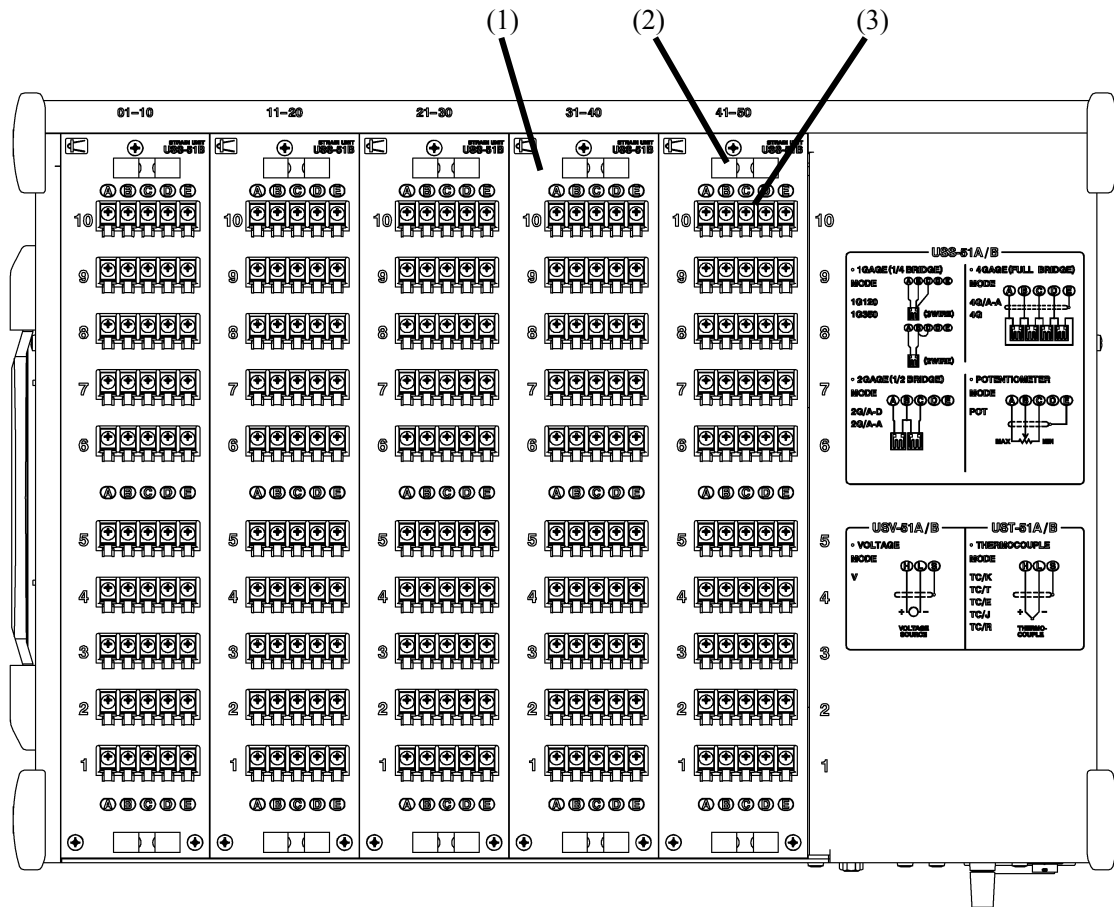
Rated voltage: 250 VAC

Rated current: 3.15 A

Dimensions: $\phi 5 \times 20$ mm

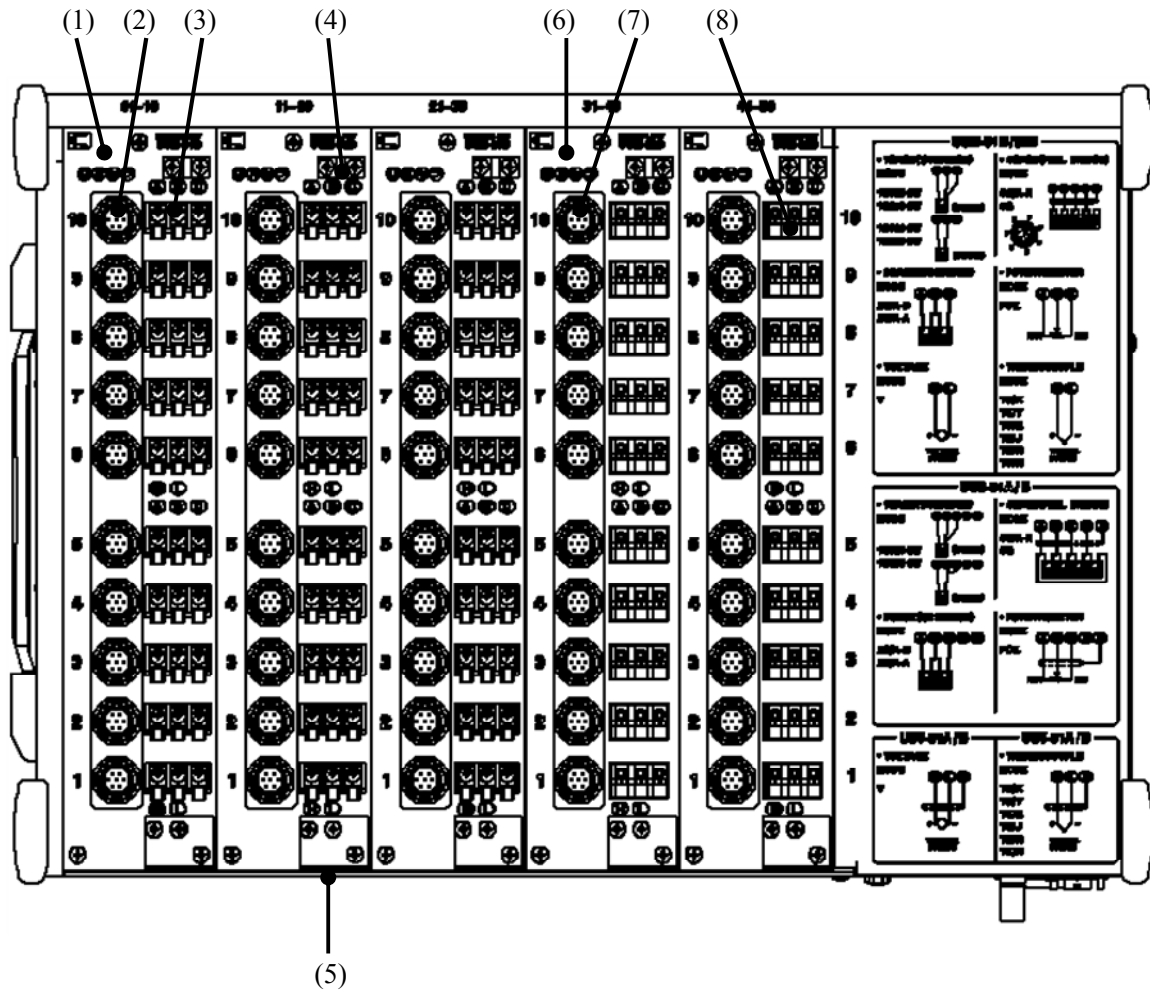
2-3 TOP FACE

The following figure indicates the UCAM-550A with 5 strain units.



- (1) Strain Unit • • • Connects a strain gage, etc. for measuring strain.
- (2) Metal for Optional • • • Used for mounting a terminal cover (optional).
- (3) Input Terminal Block • • • A terminal block for strain measurement.
 Mounted by both soldering and by fastening screws.

The following figure indicates the UCAM-550A with 5 strain/voltage/thermocouple units (USM-51B/52B).



- (1) Strain/voltage/thermocouple unit (Soldering, screw-fixed terminal block + NDIS connector)
- • • Connects a strain gage, strain gage transducer, voltage, and thermocouple.
- (2) NDIS connector
- • • Connects a strain gage transducer. (TEDS supported.)
- (3) Input terminal block (Soldering, screw-fixed)
- • • Connects a strain gage, potentiometer sensor, DC voltage, and thermocouple. You are able to select soldering/screw-fixed.
- (4) Terminal cover metal
- • • Used for mounting the accessory terminal covers.
- (5) Terminal cover metal
- • • Used for mounting the accessory terminal covers.
- (6) Strain/voltage/thermocouple unit (One-touch type terminal block + NDIS connector)
- • • Connects a strain gage, strain gage transducer, voltage, and thermocouple.
- (7) NDIS connector
- • • Connects a strain gage transducer. (TEDS supported.)
- (8) Input terminal block (One-touch type)
- • • Connects a strain gage, potentiometer sensor, DC voltage, and thermocouple.

3 PROCEDURES FOR MEASUREMENTS

This section describes basic procedures for measurements.

1) Installing control software

Install the control software DCS-100A to the PC.

For details, refer to DCS-100A Instruction Manual.

For controlling the UCAM-550A, be sure to install the DCS-100A version 04.06 and after.

Or, you cannot control the UCAM-550A.

2) Installing and connecting the UCAM-550A

Ground the power and 'GND' terminal. For details, refer to "4. INSTALLING THE SYSTEM."

3) Connecting sensors

Connect sensors. For details, refer to "5. CONNECTING SENSORS."

4) Setting LAN

Set the IP address, Subnet Mask, and Default Gateway to the UCAM-550A or PC.

You can set the IP address of the UCAM-550A with 2 methods.

(1) Use the specified IP address (hereinafter referred to as the "Static IP Address Setting").

(2) Automatically obtain the IP address (hereinafter referred to as the "Automatic IP Address Setting").

Based on the system configuration, set the IP address of the UCAM-550A with either method.

A: For PC and UCAM-550A only

Use the static IP address setting.

For connecting the UCAM-550A and PC, refer to "4-2 CONNECTING UCAM-550A TO THE PC."

For setting the IP address of the UCAM-550A, refer to "6-5 SETTING UCAM-550A (STATIC IP ADDRESS SETTING)."

For setting the IP address of the PC, refer to "6-2 SETTING PC (STATIC IP ADDRESS)."

B: For connecting the UCAM-550A with the Static IP Address Setting to the existing networks.

For connecting the UCAM-550A and PC, refer to "4-4 CONNECTING UCAM-550A TO THE PC (WITH HUB)."

For setting the IP address of the UCAM-550A, refer to "6-5 SETTING UCAM-550A (STATIC IP ADDRESS SETTING)."

For setting the IP address of the PC, refer to "6-2 SETTING PC (STATIC IP ADDRESS)."

C: For connecting the UCAM-550A with the Static IP Address Setting to the existing networks.

For connecting the UCAM-550A and PC, refer to "4-4 CONNECTING UCAM-550A TO THE PC (WITH HUB)."

For setting the IP address of the UCAM-550A, refer to "6-6 SETTING UCAM-550A (AUTOMATIC IP ADDRESS SETTING)."

For setting the IP address of the PC, refer to "6-3 SETTING PC (DYNAMIC IP ADDRESS)."

NOTE

- When using the UCAM-550A in the existing network environment, for setting values of IP Address, etc. contact network administrators managing the environment.

5) Settings for measurements

Set the UCAM-550A for measurements. For details, refer to DCS-100A Instruction Manual or UCAM-550A Instruction Manual (For Control Command).

4 INSTALLING THE SYSTEM

4-1 INSTALLING METHOD

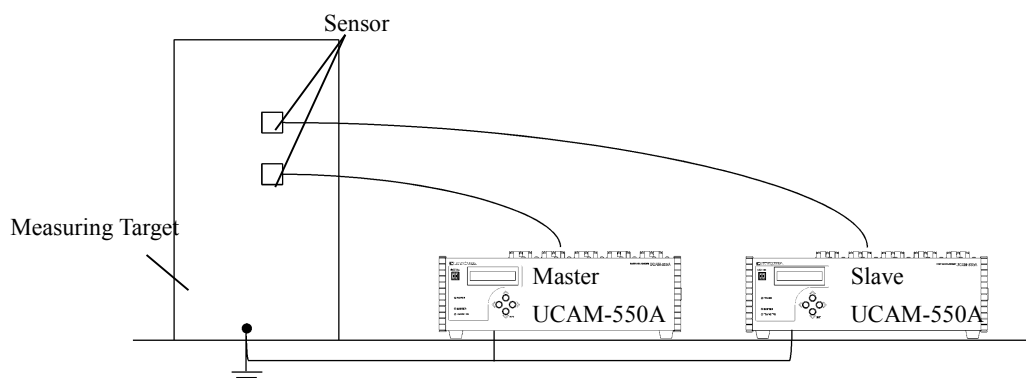
4-1-1 Grounding

Ground the 'GND' terminal (Protective Ground Terminal) provided on the UCAM-550B rear.

1) Grounding example 1: When measuring target is grounded

After checking the measuring target (Specimen) is securely grounded, connect the 'GND' terminal by referring to the following figure.

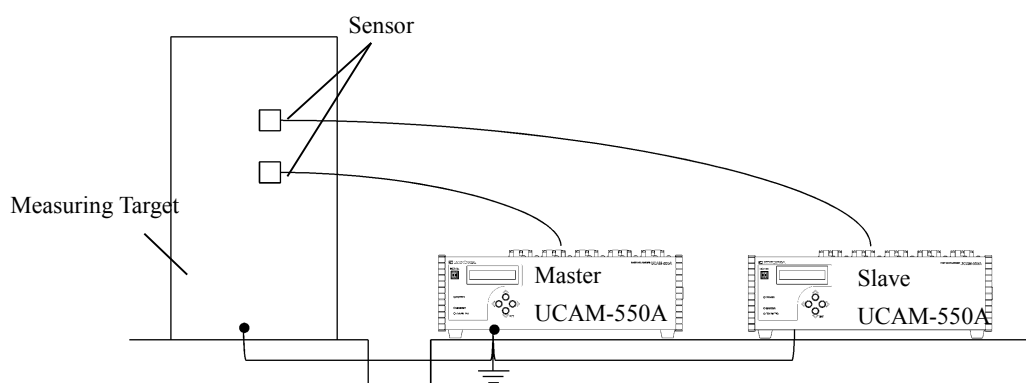
- (1) Connect the measuring target (Specimen) to the master UCAM-550A 'GND' terminal with the ground wire.
- (2) Connect the measuring target (Specimen) to the slave UCAM-550A 'GND' terminal with the ground wire.



2) Grounding example 2: When measuring target is insulated from the earth

After checking the measuring target (Specimen) is securely insulated from the earth, connect the 'GND' terminal by referring to the following figure.

- (1) Connect the slave UCAM-550A 'GND' terminal to the master UCAM-550A 'GND' terminal with a ground wire.
- (2) Connect the measuring target (Specimen) to the master UCAM-550A 'GND' terminal with a green colored heatproof vinyl wire.
- (3) Connect the master UCAM-550A 'GND' terminal to the UCAM-550A 'GND' terminal with a ground wire.



NOTE

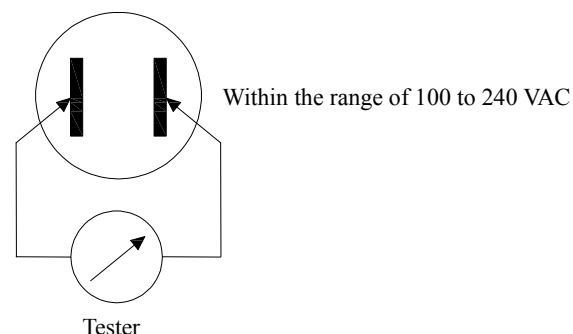
- It is essential to ground the 'GND' terminal in order to prevent foreign noise and electric shock due to leak current from the power supply noise filter. Do not forget to ground the terminal.
- Always use the attached ground wire for grounding.
- If the length or the numbers of the attached ground wires are not enough, use the green colored heatproof vinyl wire having nominal cross section 0.75 mm² or more.
- Basically 1 point grounding is required. If 2 or more groundings are made, take special care of the ground wires or, they may be looped and are easily affected by noise.
- Grounding resistance should be 100 ohm or less and independently made.

4-1-2 Connecting the Power Supplies

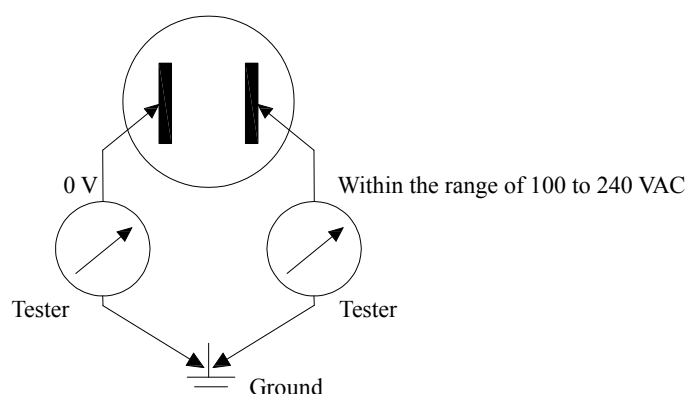
Supply AC power to the UCAM-550A with the attached AC power cable.

The power supply voltage should be checked according to the procedure described below.

- 1) Use the tester to measure the voltage between the AC power outlet terminals and ensure that the voltage is within the range of 100 to 240 VAC.



- 2) Use the testers to measure the voltage levels between the ground and each of the AC power outlet terminals to ensure that one voltage level is 0 V and the other is within the range of 100 V to 240 VAC.



- 3) If the UCAM-550A is used at job site where induction motors, electric welder and other devices that generate noise are used, power supply condition may be insufficient due to noise. It is recommended to use KYOWA's insulation transformer (optional: UPT-300B) or noise cut transformer.
- 4) If the power supply voltage excessively varies, use stabilized power supply.

MEMO

- | | | |
|--------------------------------------|---------|-----------------------------------|
| • Recommended Insulation Transformer | Name: | Insulation Transformer KYOWA made |
| | Model: | UPT-300A |
| | Input: | 100/120/220/240 VAC selectable |
| | Output: | 100 VAC Capacity 300 VA |

NOTE

- Be sure to check the power supply voltage before connecting the AC power cable to the AC power outlet.
- Operating voltage range of the UCAM-550A is 100 to 240 VAC (50/60 Hz). Be sure to keep the voltage range.
- If the power supply voltage exceeds the above range or if a voltage between each terminal and the grounding has a potential exceeding power supply voltage, do not connect the AC power cable to the AC power outlet. Or, it may cause system failures and accidents.

4-1-3 Setting Box No.

Set Box No. on the UCAM-550A front.

Relation between Box Nos. and channels are described in the following table.

Channel indication 01 to 50 on the UCAM-550A top face corresponds to the actual channels in the following table.

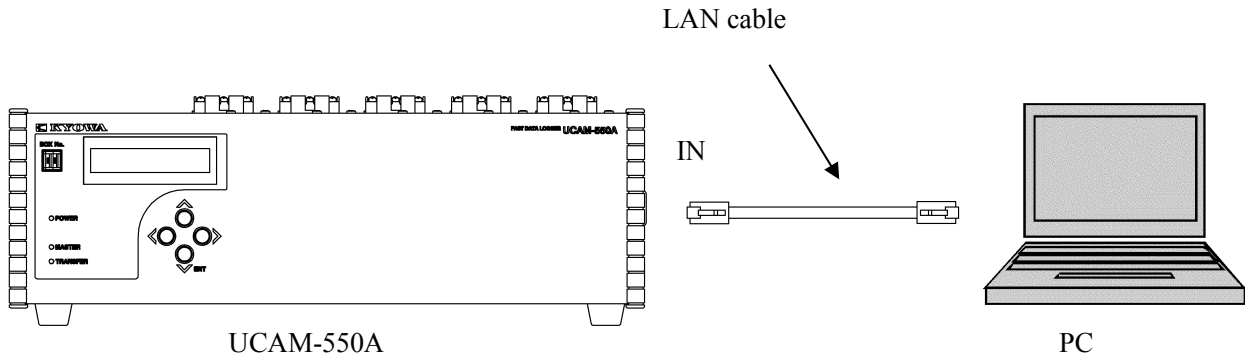
BOX No.	CH	Mode
01	01 to 50	Master UCAM-550A
02	51 to 100	Slave UCAM-550A
03	101 to 150	Slave UCAM-550A
04	151 to 200	Slave UCAM-550A
05	201 to 250	Slave UCAM-550A
06	251 to 300	Slave UCAM-550A

NOTE

- Set '01' as the Box No. of the master unit.
- The Box No. is read into the UCAM-550A when the power is turned ON.
Therefore, set the Box No. with the power OFF and then, turn the power ON.
- If you are controlling the UCAM-550A with the original software, refer to the UCAM-550A Instruction Manual (For Control Command).

4-2 CONNECTING UCAM-550A TO THE PC

Connect the 'IN' connector on the UCAM-550A to the LAN connector of the PC with the LAN cable (straight or cross).

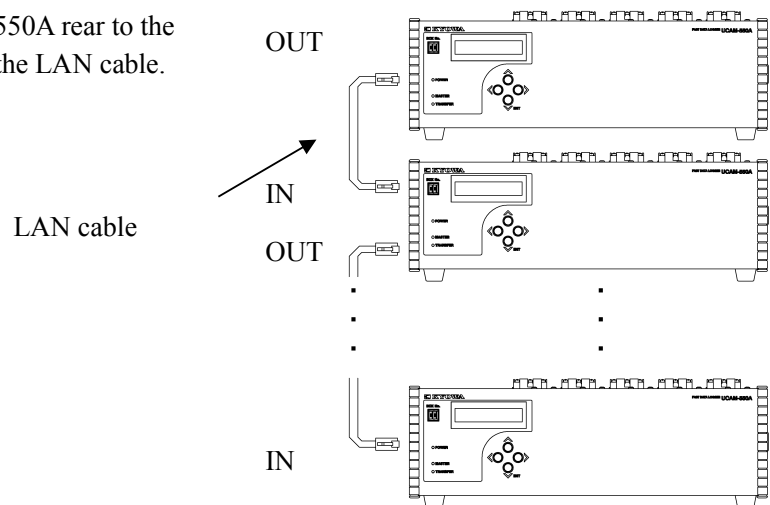


NOTE

- Do not forget to turn OFF the power of all the devices before connecting the LAN cable.

4-3 CONNECTING BETWEEN UCAM-550A UNITS

Connect the 'OUT' connector on the UCAM-550A rear to the 'IN' connector of the UCAM-550A rear with the LAN cable.

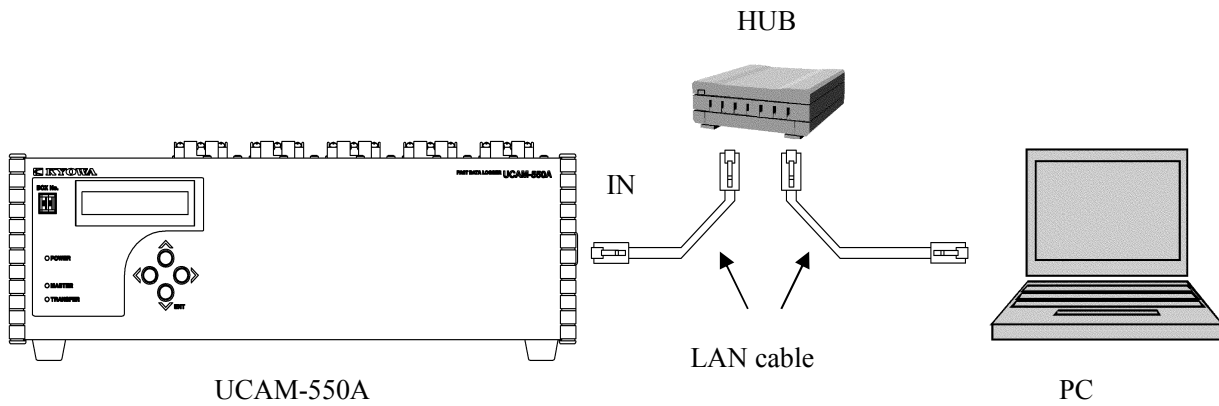


NOTE

- Be sure to use the STP straight cables.
(STP is an abbreviation for Shield Twisted Pair.)

4-4 CONNECTING UCAM-550A TO THE PC (WITH HUB)

Connect the 'IN' connector on the UCAM-550A to the LAN connector of the PC with the LAN cable (straight) by using the LAN hub.

**NOTE**

- Do not forget to turn OFF the power of all the devices before connecting the LAN cable.

4-5 POWER ON/OFF

4-5-1 UCAM-550A Power ON

Press the 'POWER' switch on the UCAM-550A rear to the 'I' side to turn ON and, to the 'O' side to turn OFF the UCAM-550A. The 'POWER' LED lights up green when the power switch is turned ON.

NOTE

- Always set the Box No. with the power turned OFF.
- Turn ON the power in due order from the master UCAM-550A and then, slave UCAM-550A units.
If the power is turned ON in the reverse order, the master UCAM-550A may not be recognized and the desired measurement is not available.
- It is required to have 30 to 60 minutes preheating time to stable the operation of the above internal components.

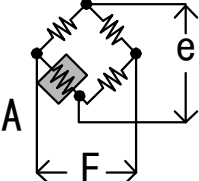
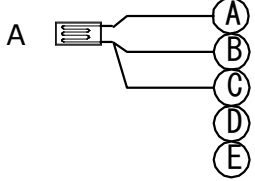
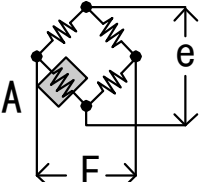
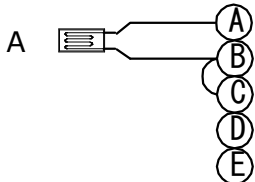
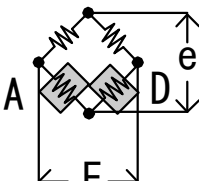
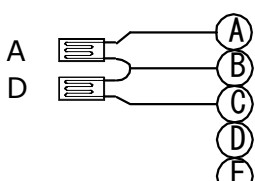
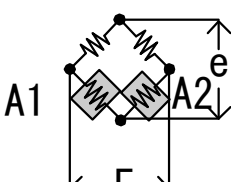
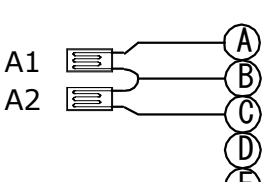
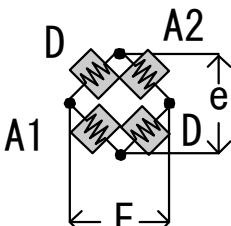
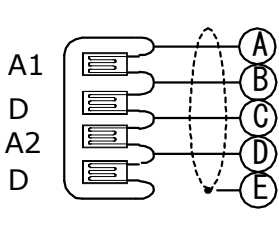
4-5-2 UCAM-550A Power OFF

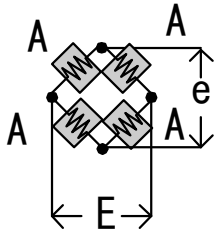
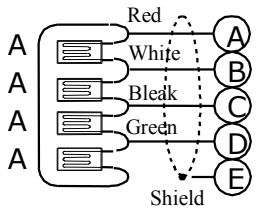
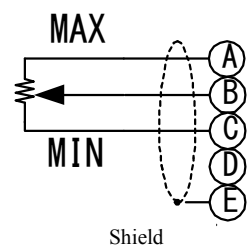
Do not forget to check no operations including measurement, setting, etc. are conducted. And then, press the 'POWER' switches on the UCAM-550A rear face to the 'O' to turn OFF the power.

5 CONNECTING SENSORS

5-1 CONNECTING STRAIN GAGE, STRAIN GAGE TRASDUCER, POTENTIOMETER SENSOR

Prepare a strain unit for measurement using a strain gage, strain gage transducer and potentiometer sensor.
Method for connecting the above sensors to the strain unit is described in the following table.

Measuring Method	Bridge Circuit  : Strain gage  : Built-in fixed resist A: Active gage D: Dummy gage E: Bridge excitation e: Bridge output	Connection Method	Meas CH Mode
Quarter Bridge System (3-wire system connection) Gage Resistance: 120 ohm 350 ohm			1G120 1G350
Quarter Bridge System (2-wire system connection) Gage Resistance: 120 ohm 350 ohm			1G120 1G350
Half Bridge System (Active-dummy System) Gage Resistance: 120 ohm to 1k ohm			2G/A-D
Half Bridge System (Active-active System) Gage Resistance: 120 ohm to 1k ohm			2G/A-A
Full Bridge System (Opposite Side Active System) Gage Resistance: 120 ohm to 1k ohm			4G/A-A

Measuring Method	Bridge Circuit  : Strain gage  : Built-in fixed resist A: Active gage D: Dummy gage E: Bridge excitation e: Bridge output	Connection Method A: Active gage D: Dummy gage	Meas CH Mode
Full Bridge System (Full Bridge System Strain Gage Transducer) Gage Resistance or Bridge Resistance: 120 ohm to 1k ohm			4G
Potentiometer Sensor Potentiometer Resistance: 1 kohm to 10 kohm			POT.

MEMO

- For quarter bridge system, it is recommended to adopt a "3-wire system connection" that is less affected by temperature on the gage lead wire and that causes little difference including dislocation in initial value, etc.
- For wiring, use Kyowa's low-noise lead wire with shield (L-13, 14, 15, and 16) or 4-conductor shielded cables. Locate the product far apart from power lines and wirings interfered with noise.
- When measured values are unstable, connect the GND terminal of the UCAM-550A to the ground to make them stable.
- When the Meas CH Mode is 1G120, 1G350, 2G/A-D, and 4G/A-A, the UCAM-550A compensates nonlinearity.

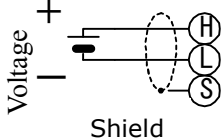
NOTE

After the power ON, the strain unit constantly supplies bridge excitation.
If a gage or conduct wire of the transducer touches the other channel terminals, measured data may become faulty.
Take special care for wiring.

5-2 CONNECTING VOLTAGE OUTPUT TRANSDUCER

A voltage unit is used for measurement using voltage output type transducer.

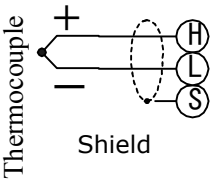
Method for connecting the above voltage output transducer to the voltage unit is described in the following table.

Measuring Method	Connection Method	Meas CH Mode
Voltage Measurement		V

5-3 CONNECTING THERMOCOUPLE

A thermocouple unit is used for temperature measuring using thermocouple.

Method for connecting the above thermocouple to the thermocouple unit is described in the following table.

Measuring Method	Connection Method	Meas CH Mode
Thermocouple Temperature Measurement		TC/K TC/T TC/E TC/J TC/R TC/N

NOTE

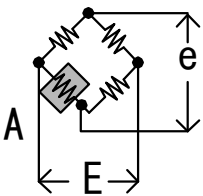
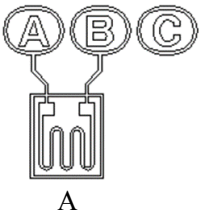
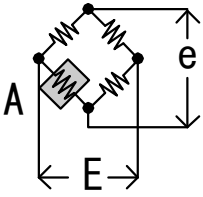
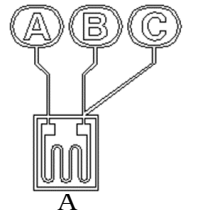
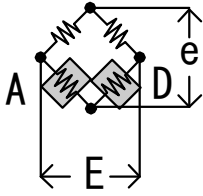
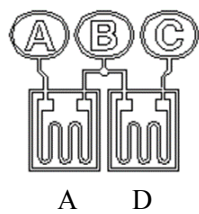
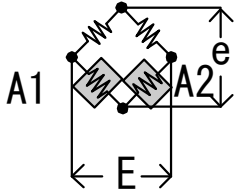
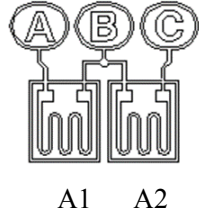
- Before starting the measurement, do not forget to cover the terminal portion to make it accustomed to the room temperature as well as to make the terminal temperature in a stable state,
Do not expose the product to air-conditioner wind or direct sunlight.
Or, it may cause temperature errors.
- Place the product on a stable place.
Or, it may cause temperature errors.
- Use shielded twisted-pair cables for connecting thermocouples.
Or, it may cause temperature errors.
- Do not directly connect the thermocouple to the measuring target having potential from the ground.
Or, it may cause trouble or temperature errors.

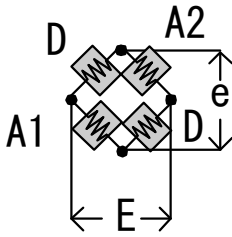
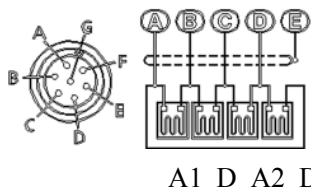
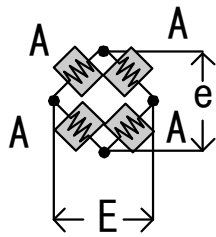
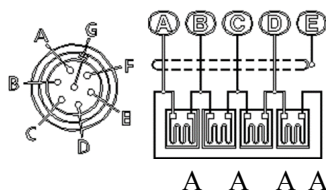
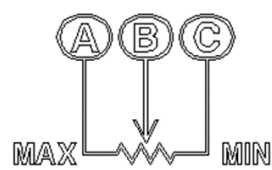
5-4 CONNECTING STRAIN/VOLTAGE/THERMOCOUPLE UNIT

5-4-1 Connecting strain gage, strain gage transducer, potentiometer sensor

Before connecting sensors, be sure to disconnect the power supply.

Connect strain gages, strain gage transducers, and potentiometer sensors as follows.

Measuring Method	Bridge Circuit  Strain gage  Built-in fixed resistor A: Active gage D: Dummy gage E: Bridge excitation e: Bridge output	Connection Method A: Active gage D: Dummy gage	Meas CH Mode
Quarter Bridge System (2-wire system connection) Gage resistance: 120 ohm 350 ohm			1G120 2W 1G350 2W
Quarter Bridge System (3-wire system connection) Gage resistance: 120 ohm 350 ohm			1G120 3W 1G350 3W
Half Bridge System (Active-dummy System) Gage resistance: 120 ohm to 1 kohm			2G/A-D
Half Bridge System (Active-active System) Gage resistance: 120 ohm to 1 kohm			2G/A-A

Measuring Method	Bridge Circuit  Strain gage  Built-in fixed resistor A: Active gage D: Dummy gage E: Bridge excitation e: Bridge output	Connection Method	Meas CH Mode
Full Bridge System (Opposite Side Active System) Gage resistance: 120 ohm to 1 kohm			4G/A-A
Full Bridge System (Full Bridge System Strain Gage Transducer) Gage Resistance or Bridge Resistance: 120 ohm to 1 kohm * TEDS supported.			4G
Potentiometer Sensor Potentiometer Resistance: 1 kohm to 10 kohm			POT.

NOTE

- After the power ON, the strain unit constantly supplies bridge excitation. If gage or conduct wire of the transducer touches the other channel terminals, measured data may become faulty. Take special care for wiring. Before wiring, turn OFF the UCAM-550A power.
 - Do not connect gage leads (lead wires directly connected from the strain gage) directly to the terminal block.
- Or,
- it may break cables. Use a gage terminal and convert the gage leads to the applicable lead wires or use a strain gage with pre-attached lead cables.

When using the USM-52B (One-touch type terminal block + NDIS connector)

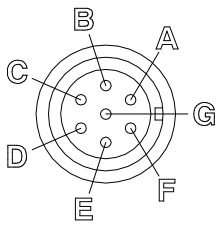
- Insert the lead wire, with its coating peeled off approx. 10 mm all the way to its end, into the lead wire hole.
 - Connect a lead wire with the button pressed on the terminal block and release the switch to lock.
 - The available wires are as follows.
 Solid wire: AWG26-16
 Stranded wire: AWG24-16
- Be sure to use the above lead wires. Or, a breaking or connection error will happen.
- The replacement frequency of the terminal block is about 1 year, assuming twice a day (connection and disconnection) of use, 20 days a month. Through repeated connections/disconnections, the terminal block will wear out and will give a poor connection. In that case, push up the button with your nail with the lead wires connected.
 - The one-touch type terminal block is made of plastic. Through repeated connections/disconnections, the button will gradually wear out and may give a poor connection unless you push up the button. The one-touch type terminal block is considered to be a consumable item. It is not covered under the terms of the warranty.

MEMO

- For quarter bridge system, it is recommended to adopt a "3-wire system connection" that is less affected by temperature on the gage lead wire and that causes little difference including dislocation in initial value, etc.
- For wiring, use Kyowa's low-noise lead wire with shield (L-13, 14, 15, and 16) or 4-conductor shielded cables. Locate the product far apart from power lines and wirings interfered with noise.
- When measured values are unstable, connect the GND terminal of the UCAM-550A to the ground to make them stable.
- When the Meas CH Mode is 1G120 2W/3W, 1G350 2W/3W, 2G/A-D, and 4G/A-A, the UCAM-550A compensates nonlinearity.

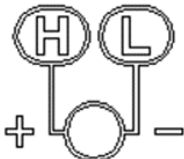
For the strain gage transducer with a connector plug (NDIS connector) applied to the cable tip, directly connect the transducer to the UCAM-550A connector. For the strain gage or transducer without the connector plug, use the accessory input cable (U-119) for connection.

Input connector

Measuring target	Connection Method	Remarks
Strain gage Strain Gage Transducer Quarter Bridge System 120 ohm/350 ohm Half bridge, full bridge 120 to 1000 ohm		A: +BV B: -SIG C: -BV D: +SIG E: Shield F: TEDS + G: TEDS - TEDS supported.

5-4-2 Connecting DC voltage and voltage output type transducer

Connect DC voltage and voltage output type transducer as follows.

Measuring Method	Connection Method	Meas CH Mode
Voltage measurement:		V

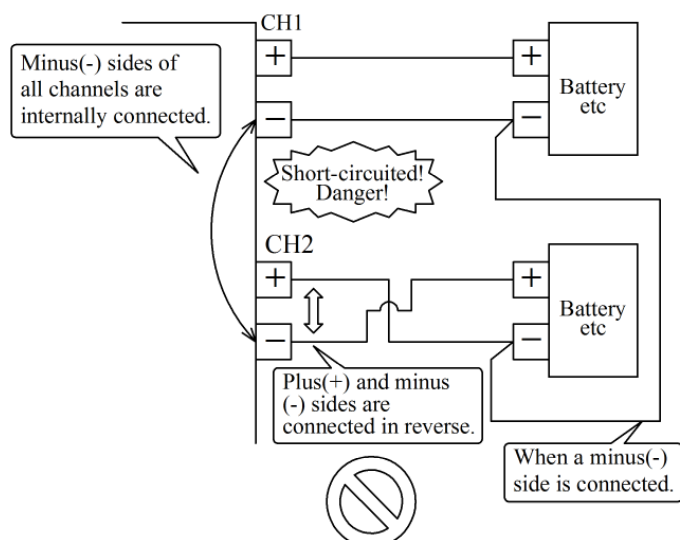
NOTE

- Do not measure DC voltages by using the input conversion adapter FV-1A.
Be sure to use input terminals.
Or, it may cause troubles and accidents.

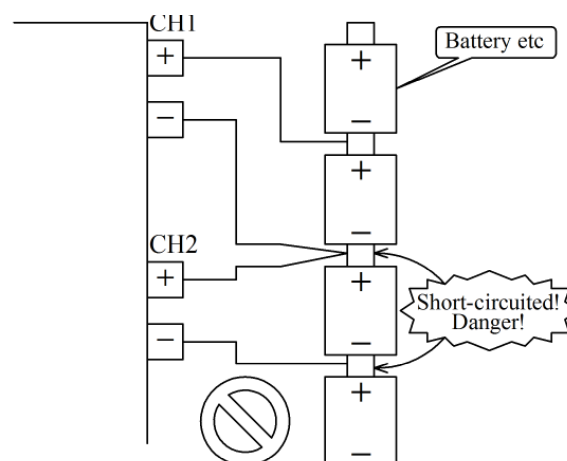
WARNING

- Do not apply any voltage beyond the specified input voltage range.
The input voltage range of the USM-51B/52B is $\pm 50\text{V}$.
Failure to do so will pose the risk of electric shock, deteriorated performance and system failure.
- Precautions when measuring the DC voltage of a battery, power supply, etc.
See the following precautions when measuring the DC voltage of a battery, power supply, etc.
 - 1) Use a tester or the like to measure the voltage between negative sides of the DC voltage and confirm that the voltage is approximately 0 V.
 - 2) Confirm that the voltage between the negative side of the DC voltage and the GND terminal of the UCAM-550A is approximately 0 V.
 - 3) When connecting an input, correctly connect the positive and negative sides.
Or, internal circuits have short-circuited and cause troubles.
 - 4) You cannot measure the middle voltage of the battery connected with the sensors.
Or, internal circuits have short-circuited and cause troubles.
Failure to comply with the above precautions will result in a short circuit of the signal source (e.g. DC power supply) of the measuring target, thus causing system failure and a fire hazard.

USM-51B/52B

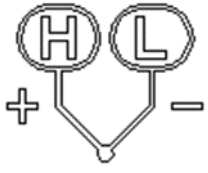


USM-51B/52B



5-4-3 Connecting thermocouple

Connect thermocouples for measuring temperatures as follows.

Measuring Method	Connection Method	Meas CH Mode
Thermocouple Temperature Measurement		TC/K TC/T TC/E TC/J TC/R TC/N

NOTE

- Be sure to put a terminal cover on the terminal block. Leave the product as it is until the input terminal temperature is stable.
Do not expose the product to air-conditioner wind or direct sunlight.
Or, it may cause temperature errors.
- Place the product on a stable place.
Or, it may cause temperature errors.
- Use shielded twisted-pair cables for connecting thermocouples.
Or, it may cause temperature errors.
- Do not directly connect thermocouples to the measuring target having potential larger than the ground.
Or, it may cause trouble or temperature errors.
- Do not measure thermocouples by using the input conversion adapter FV-1A.
Be sure to use input terminals.
Or, it may cause troubles and accidents.

6 LCD INDICATOR AND ITEMS

6-1 DESCRIPTION OF ITEMS

This section describes the LCD indicator and items after turning ON

The current BOX No., firmware version, and FPGA version appear.

Power ON



BOX No.	UCAM Ver XX.	XX
01	FPGA Ver XX.	XX

The current BOX No., firmware version, and FPGA version appear.

* XX.XX: The current version appears.



Static IP:
192. 168. 5. 50

The current IP address appears.

Press the “^/√” key.

IP address	>
192. 168. 5. 50	

Goes to the IP address setting window.

Press the “^/√” key.

Subnet mask	>
255. 255. 255. 0	

Goes to the subnet mask setting window.

Press the “^/√” key.

Default gateway	>
0. 0. 0. 0.	

Goes to the default gateway setting window.

Press the “^/√” key.

Auto IP	>
OFF	

Goes to the automatic IP address setting window.

Press the “^/√” key.

MAC address
XX-XX-XX-XX-XX-XX

The current MAC address appears.

Press the “^/√” key.

BOX No.	UCAM Ver XX.	XX
01	FPGA Ver XX.	XX

Press the “^/√” key.

41 :	31 :	21 :	11 :	01 :
USS	USV	UST	USM	USM

The current measuring unit name appears.

Press the “^/√” key.

Unit USM Ver XX.	XX
01-10 FPGA Ver XX.	XX

The current firmware version and FPGA version of the USM-51B/52B appear.

BOX No.	UCAM	Ver	XX.	XX
01	FPGA	Ver	XX.	XX

The current BOX No. appears.

You are able to check the BOX No.

41:	31:	21:	11:	01:
USS	USV	UST	USM	USM

Unit position

Unit name

USS: Strain unit
 USV: Voltage unit
 UST: Thermocouple unit
 USM: Strain/voltage/thermocouple unit
 ---: No unit

Unit	USM	Ver	XX.	XX
01-10	FPGA	Ver	XX.	XX

Indicates the strain/voltage/thermocouple unit position.

7 SETTING LAN

7-1 DEFAULT SETTING

Factory default (initial state) of LAN is as follows.

IP Address	192. 168. 5. 50
Subnet Mask	255. 255. 255. 0
Default-Gateway	0. 0. 0. 0

MEMO

- For initializing the settings, while pressing '<' key, '^' key and '>' key at the same time, turn ON the UCAM-550A. Keep pressing the arrow keys until [RESET Over] appears.

NOTE

- When using the UCAM-550A in the existing network environment, for setting values of IP Address, etc., contact network administrators managing the environment.

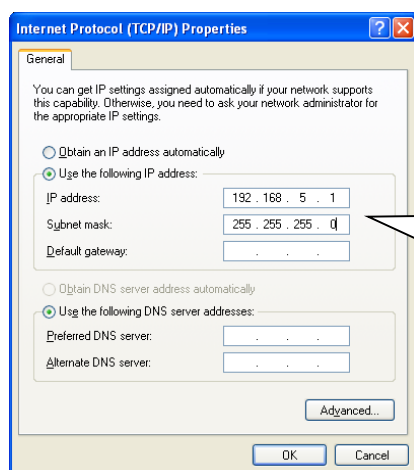
7-2 SETTINGPC (STATIC IP ADDRESS)

This section describes how to use the specified IP address based on the factory default of the UCAM-550A. The PC's network is described as follows.

IP Address	192. 168. 5. 1
Subnet Mask	255. 255. 255. 0
Default-Gateway	0. 0. 0. 0

7-2-1 For Windows XP

- 1) Click the [Start] and then click [My Computer].
- 2) Right-click on the [My Network Places] icon on the left and then choose [Properties].
- 3) Right-click on the [Local Area Connection] icon, then select [Properties] from the dialog box.
- 4) Click on the [Internet Protocol (TCP/IP)], then click [Properties].
- 5) Select "Use the following IP address;" and enter the desired IP of the Internet Protocol (TCP/IP) in the spaces provided.



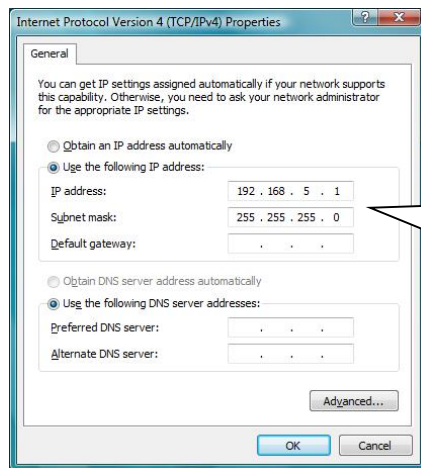
IP Address: 192.168.5.1
Subnet Mask: 255.255.255.0

Delete the Default Gateway address with the [Delete] key.
(Do not input 0.)

- 6) Click the [OK] button on the Internet Protocol (TCP/IP) Properties window.
- 7) Click the [OK] button on the Local Area Network Properties window.
- 8) Restart the PC.

7-2-2 For Windows Vista

- 1) Click the [Start] and then click [Computer].
- 2) Right-click on the [Network] icon on the left and then choose [Properties].
- 3) On the "Network and Sharing Center" window, click the [Manage Network Connections].
- 4) Right-click on the [Local Area Connection] icon, then select [Properties] from the dialog box.
- 5) Click the [Internet Protocol Version 4 (TCP/IPv4)] on the "Local Area Connection Properties" window, then click [Properties].
- 6) Enter the desired IP of the Internet Protocol Version 4 (TCP/IPv4) in the spaces provided.



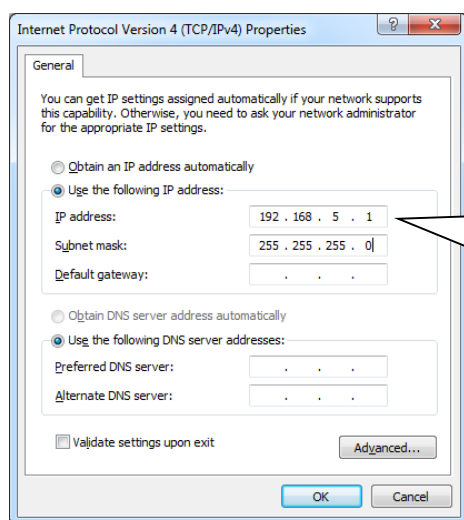
IP Address: 192.168.5.1
Subnet Mask: 255.255.255.0

Delete the Default Gateway address with the [Delete] key.
(Do not input 0.)

- 7) Click the [OK] button on the Internet Protocol Version 4 (TCP/IPv4) Properties window.
- 8) Click the [OK] button on the "Local Area Network Properties" window.
- 9) Restart the PC.

7-2-3 For Windows 7

- 1) Click the [Start] and then click [Computer].
- 2) Right-click on the [Network] icon on the left and then choose [Properties].
- 3) On the "Network and Sharing Center" window, click the [Change adapter settings].
- 4) Right-click on the [Local Area Connection] icon, then select [Properties] from the dialog box.
- 5) Click the [Internet Protocol Version 4 (TCP/IPv4)] on the "Local Area Connection Properties" window, then click [Properties].
- 6) Enter the desired IP of the Internet Protocol Version 4 (TCP/IPv4) in the spaces provided.



IP Address: 192.168.5.1
Subnet Mask: 255.255.255.0

Delete the Default Gateway address with the [Delete] key.
(Do not input 0.)

- 7) Click the [OK] button on the Internet Protocol Version 4 (TCP/IPv4) Properties window.
- 8) Click the [OK] button on the Local Area Network Properties window.
- 9) Restart the PC.

NOTE

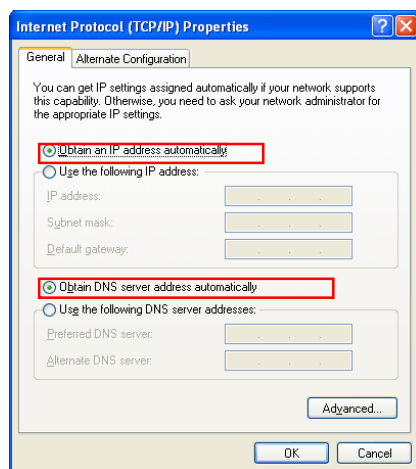
- Take note and be sure to save your old network setting before change.
- IP address of the PC
The IP address of the UCAM-550A is 192.168.5.50.
The upper rank 3 groups 192. 168. 5 of the PC are the same as that of the UCAM-550A.
Be sure to input different numbers (1 to 254) for 4th group for the PC.
In the example, "1" is used.
- If other PCs and devices are connected in the LAN connecting environment, check each IP address and input different numbers for not to overlap with each other.

7-3 SETTING PC (DYNAMIC IP ADDRESS)

This section describes how to obtain the IP address automatically.

7-3-1 For Windows XP

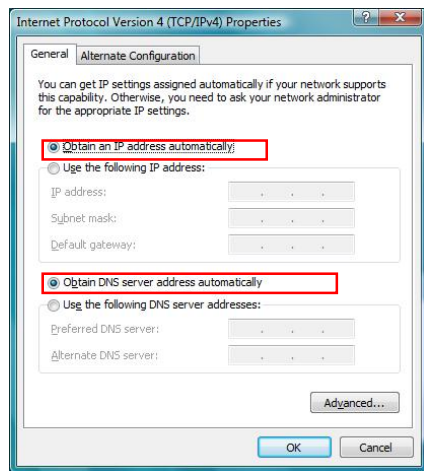
- 1) Click the [Start] and then click [My Computer].
- 2) Right-click on the [My Network Places] icon on the left and then choose [Properties].
- 3) Right-click on the [Local Area Connection] icon, then select [Properties] from the dialog box.
- 4) Click on the [Internet Protocol (TCP/IP)], then click [Properties].
- 5) Select "Use the following IP address;" and enter the desired IP of the Internet Protocol (TCP/IP) in the spaces provided.



- 6) Click the [OK] button to close the window.
- 7) Click the [OK] button on the "Local Area Network Properties" window.
- 8) Restart the PC.

7-3-2 For Windows Vista

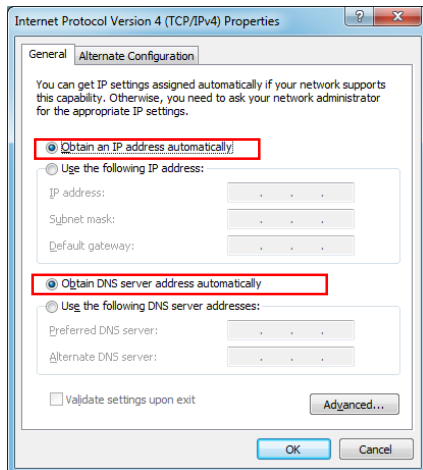
- 1) Click the [Start] and then click [Computer].
- 2) Right-click on the [Network] icon on the left and then choose [Properties].
- 3) On the "Network and Sharing Center" window, click the [Manage Network Connections].
- 4) Right-click on the [Local Area Connection] icon, then select [Properties] from the dialog box.
- 5) Click the [Internet Protocol Version 4 (TCP/IPv4)] on the "Local Area Connection Properties" window, then click [Properties].
- 6) Enter the desired IP of the Internet Protocol Version 4 (TCP/IPv4) in the spaces provided.



- 7) Click the [OK] button to close the window.
- 8) Click the [OK] button on the "Local Area Network Properties" window.
- 9) Restart the PC.

7-3-3 For Windows 7

- 1) Click the [Start] and then click [Computer].
- 2) Right-click on the [Network] icon on the left and then choose [Properties].
- 3) On the "Network and Sharing Center" window, click the [Change adapter settings].
- 4) Right-click on the [Local Area Connection] icon, then select [Properties] from the dialog box.
- 5) Click the [Internet Protocol Version 4 (TCP/IPv4)] on the "Local Area Connection Properties" window, then click [Properties].
- 6) Enter the desired IP of the Internet Protocol Version 4 (TCP/IPv4) in the spaces provided.



- 7) Click the [OK] button to close the window.
- 8) Click the [OK] button on the "Local Area Network Properties" window.
- 9) Restart the PC.

NOTE

- Take note and be sure to save your old network setting before change.
- If other PCs and devices are connected in the LAN connecting environment, check each IP address and input different numbers for not to overlap with each other.

7-4 METHODS FOR CHECKING WHETHER OR NOT CONNECTIONS ARE CORRECT

A: Checking connection by Hardware (Checking method with 'IN' connector LED of the UCAM-550A turned ON)

The 'IN' connector of the UCAM-550B has LEDs. Whether or not connection is judged with lightening condition.

A-1) Connect the LAN cable to the UCAM-550A and power ON.

A-2) If it is correctly connected, upper LED lights up green during communication available state and lower LED flickers orange during communication.

When lightening or flickering is abnormal, check the LAN cable or hub. In addition, the 'TRANSFER' LED flickers in green during communications.

B: Checking connection by Software

Checking method with ping command

B-1) Send ping command to devices from the command prompt of the PC. If the devices respond to the command, connection is correctly made.

1) Activating the Command Prompt

Point to [Start] and select [All Programs (P)]- [Accessory] - [Command Prompt].

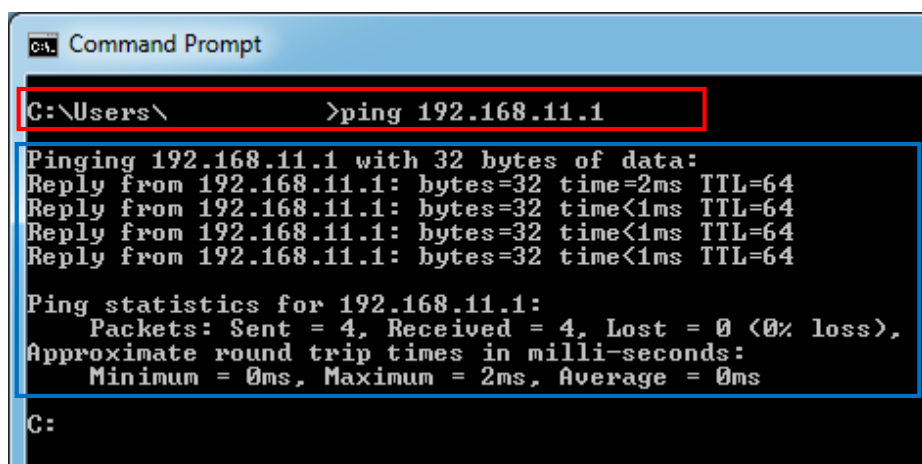
2) Input the ping command

Input "ping" IP address of the UCAM-550A and, click the [ENTER] key.

Example: ping 192.168.5.50

3) Connection checking is conducted 4 times and the result is displayed on the window.

Display when correctly connected



```

C:\> Command Prompt
C:\Users\>ping 192.168.11.1

Pinging 192.168.11.1 with 32 bytes of data:
Reply from 192.168.11.1: bytes=32 time=2ms TTL=64
Reply from 192.168.11.1: bytes=32 time<1ms TTL=64
Reply from 192.168.11.1: bytes=32 time<1ms TTL=64
Reply from 192.168.11.1: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.11.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

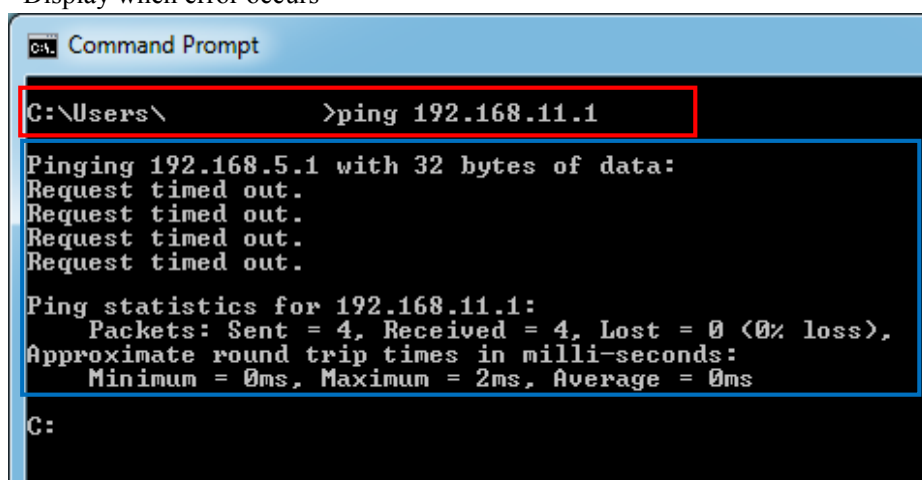
C:

```

IP address of the UCAM-550A

Result (normal time)

Display when error occurs



```

C:\> Command Prompt
C:\Users\>ping 192.168.11.1

Pinging 192.168.5.1 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.11.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:

```

IP address of the UCAM-550A

Result (error time)

- 4) If items A and B in the previous section are conducted normally but the UCAM-550A is not controlled by the actual application, check the following items.
- Check the setting of the application in use.
 - Remove firewall of security software, etc. and check the operation.
 - If communication port (34568) is set to be always kept closed, communication to the UCAM-550A is not available.

7-5 SETTING UCAM-550A (STATIC IP ADDRESS SETTING)

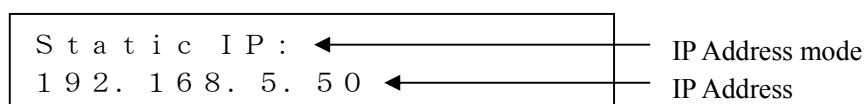
7-5-1 Setting IP Address

1) Turn ON the UCAM-550A.

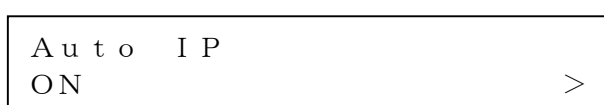
A: When the [Static IP] is displayed on the LCD, press the 'V' key once to display the [IP address]. Jump to 7).

B: When the [Auto IP] is displayed on the LCD, operate as follows.

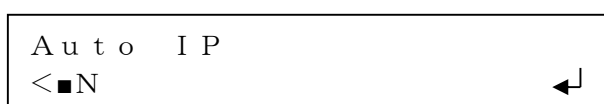
C: When the [BOX No. ERROR (01-98)] is displayed on the LCD, set the Box No. (1 to 98) and turn OFF and ON the UCAM-550A again.



2) Press the 'V' key 4 times and [Auto IP] appears.



3) Press the '>' key to display the setting window.

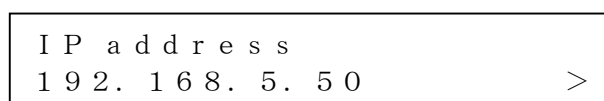


4) Press the '^' or 'V' key to display [OFF].

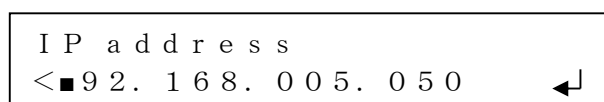


5) Place the cursor on the [<], click the 'V' key for determination.

6) Press the '^' key 3 times and [IP address] appears.



7) Press the '>' key to display the setting window.



8) Set the IP Address.

9) Place the cursor on the [<], click the 'V' key for determination.

7-5-2 Setting Subnet Mask

1) Press the 'V' key and [S u b n e t m a s k] appears.

S u b n e t m a s k 2 5 5 . 2 5 5 . 2 5 5 . 0	←→	Subnet Mask
--	----	-------------

2) Press the '>' key to display the setting window.

S u b n e t m a s k < ■ 5 5 . 2 5 5 . 2 5 5 . 0 0 0	←↵
--	----

3) Set the Subnet Mask.

4) Place the cursor on the [↵], click the 'V' key for determination.

6-5-3 Setting Default Gateway

1) Press the 'V' key and [D e f a u l t g a t e w a y] appears.

D e f a u l t g a t e w a y 0 . 0 . 0 . 0	←→	Default-Gateway
--	----	-----------------

2) Press the '>' key to display the setting window.

D e f a u l t g a t e w a y < ■ 0 0 . 0 0 0 . 0 0 0 . 0 0 0	←↵
--	----

3) Setting Default Gateway

4) Place the cursor on the [↵], click the 'V' key for determination.

MEMO

- Operation keys are as follows.
 - '^' key: To increase or change the number
 - 'V' key: To decrease or change the number/ENTER
 - '>' key: To right
 - '<' key: To left
- If you do not operate keys approximately 30 seconds on the setting window, the UCAM-550A will display the first window again.
At this time, the UCAM-550A displays the kept value before the setting.
- ■: Indicates flickering status.
- When no UCAM-550A and PC exist on the same subnet, you need to set the Default Gateway. For setting values of the Default Gateway, contact network administrators managing the environment.

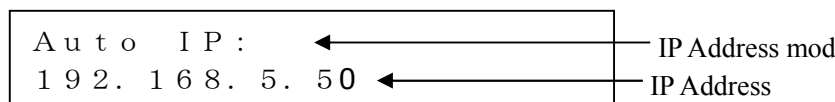
7-6 SETTING UCAM-550A (AUTOMATIC IP ADDRESS SETTING)

1) Turn ON the UCAM-550A.

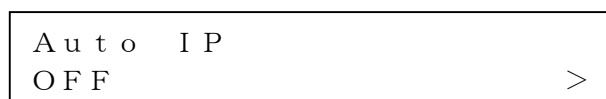
A: When the [Auto IP] and IP address are displayed on the LCD, no operation required.

B: When the [Static IP] and IP address are displayed on the LCD, operate as follows.

C: When the [BOX No. ERROR (01-98)] is displayed on the LCD, set the Box No. (1 to 98) and turn OFF and ON the UCAM-550A again.



2) Press the 'V' key 4 times and [Auto IP] appears.



3) Press the '>' key to display the setting window.



4) Press the '^' or 'V' key to display [ON].



5) Place the cursor on the [↵], click the 'V' key for determination.

6) The UCAM-550A automatically obtains the IP address subnet mask, and default gateway.

NOTE

- When performing the Automatic IP Address Setting and when the UCAM-550A obtains '0.0.0.0' as the IP Address, Subnet Mask and Default Gateway, check the followings.
 - (1) For obtaining the IP address automatically, the UCAM-550A requires the DHCP-supported network. Check whether the network is supported by the DHCP.
 - (2) Cables are not correctly connected. Refer to "4-2 CONNECTING UCAM-550A TO THE PC" and "4-4 CONNECTING UCAM-550A TO THE PC (WITH HUB)" and check that cables are correctly connected.

MEMO

- ■: Indicates flickering status.

8 DETAILS OF OPTIONAL

8-1 DETAILS OF OPTIONAL

This chapter described details of optional that are used by assembling with the UCAM-550A.

Name	Model	Function
Strain Unit	USS-51B	• A unit for strain gage and potentiometer sensor measurement. • A strain measuring unit installed on the UCAM-550A. • Capable of measuring 10 channels per unit.
Voltage Unit	USV-51B	• A unit for voltage output transducer measurement. • A voltage measuring unit installed on the UCAM-550A. • Capable of measuring 10 channels per unit.
Thermocouple Unit	UST-51B	• A thermocouple measuring unit installed on the UCAM-550A. • A unit for thermocouple measurement. • Capable of measuring 10 channels per unit. • Attached with a terminal cover (UT-50A).
Strain/Voltage/Thermocouple Unit (Soldering, screw-fixed terminal block + NDIS connector)	USM-51B	• A unit for strain gage, potentiometer sensor, DC voltage, voltage output type transducer, and thermocouple. • Capable of measuring 10 channels per unit. • Attached with a terminal cover (UM-51B). • TEDS supported.
Strain/Voltage/Thermocouple Unit (One-touch type terminal block + NDIS connector)	USM-52B	• A unit for strain gage, potentiometer sensor, DC voltage, voltage output type transducer, and thermocouple. • Capable of measuring 10 channels per unit. • Attached with a terminal cover (UM-51B). • TEDS supported.
Dummy Panel	UD-50A	• A panel used for a portion with no measuring unit installed.
Terminal Cover	UT-50A	• A dustproof cover for protecting inlet of the measuring unit.
Terminal Cover	UM-51B	• A dustproof cover for protecting inlet of the strain/voltage/thermocouple unit (USM-51B/52B).

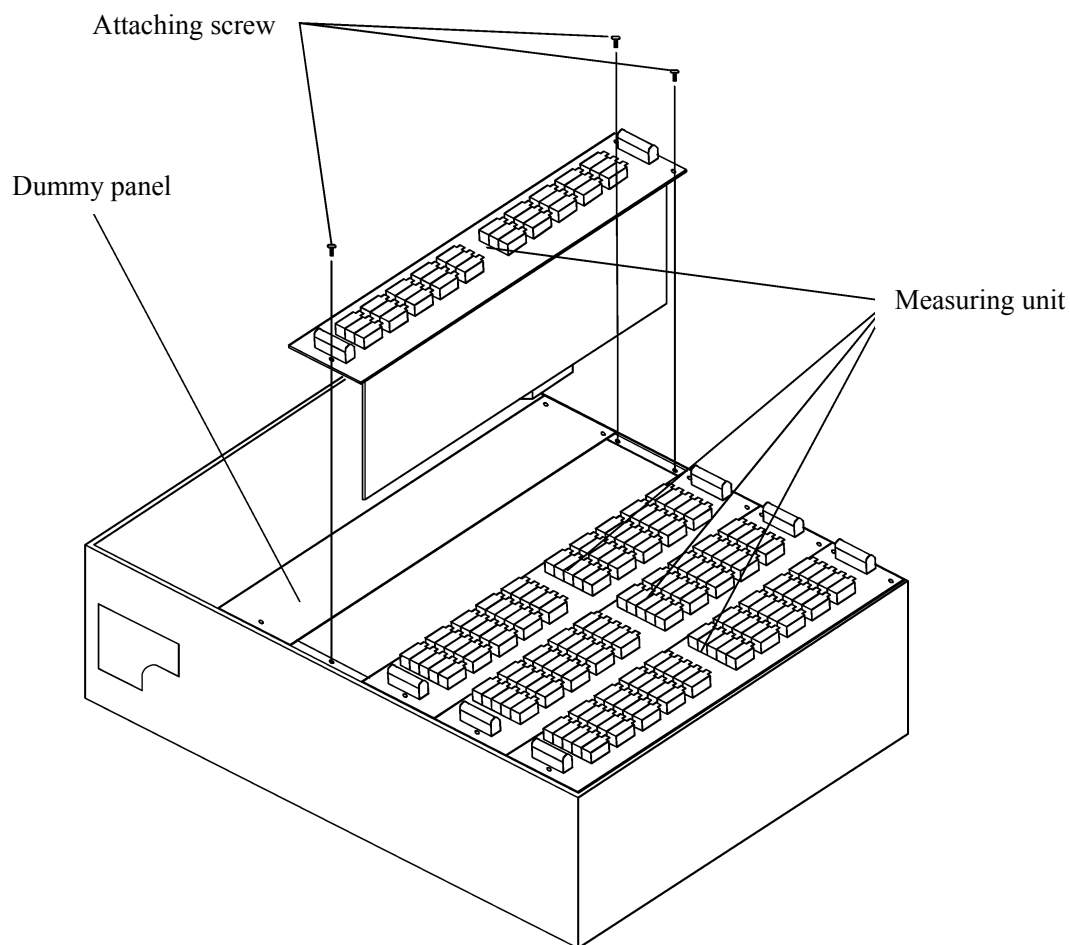
MEMO

- Although the different numbers are printed on the USS-51A, USV-51A, and UST-51A, you can use them.

8-2 INSTALLING MEASURING UNIT

A method of installing measuring units to the UCAM-550A is described in the following.

- 1) Turn OFF the UCAM-550A and disconnect the power cable.
- 2) Remove a dummy panel on the UCAM-550A top face or remove the replacing measuring units. (3 mounting screws)
- 3) Arrange the measuring units in due order from right to left (CH1 to CH10). Insert the measuring units into the UCAM-550A along with the substrate guide.



NOTE

- Take care that the same type of measuring units should be installed together.
- Do not mix and install the measuring units with different type.

9 TROUBLE SHOOTING

9-1 BEFORE CONSIDERING FAULTY

In case the following trouble occurs, take appropriate countermeasures according to the check items in the following table.

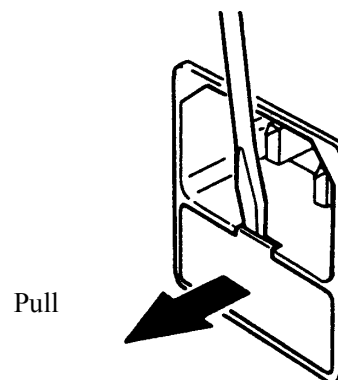
If the same phenomenon still generates after taking the following countermeasures, contact KYOWA or our representatives.

Phenomenon	Check Items
No power is ON.	● Is AC receptacle applied with the specified voltage? → Check the voltage with a tester. ● Are both ends of the AC power cable correctly connected? ● Correctly connect the both ends of the AC power cable. ● Is the 'POWER' switch turned ON? → Securely turn ON the 'POWER' switch. ● The fuse may be blown out. → Replace the fuse. Do not forget to disconnect the AC power cable before replacing the fuse. (See "8-2 METHOD OF REPLACING FUSE.")
Operation stops and accepts no instruction at all.	● Is operation of the UCAM-550A hung up due to foreign noise, etc.? → Turn OFF the power and turn ON again. If the same phenomenon still generates due to foreign noise, take appropriate countermeasures for removing the noise from operating environment, power supply, etc.
Measured value varies.	● Are terminals of the measuring target (Specimen) and the UCAM-550A 'GND' correctly grounded? → Check and correctly ground the terminals. ● Is operation of the UCAM-550A abnormal due to foreign noise, etc.? → Turn OFF the power and turn ON again. If the same phenomenon still generates due to foreign noise, take appropriate countermeasures for removing the noise from operating environment, power supply, etc. ● Is input lead wire or cable correctly connected to input terminals? → Measured value may vary if connection (soldering, fastening with screws, simple touch connection) to the input terminals are not stable. Check and correctly connect the terminals.
The master UCAM-550A would not work.	● Is the LAN cable between the UCAM-550A and PC correctly connected? → Check and correctly connect the LAN cable, Check whether LAN cable is broken or not.
The slave UCAM-550A units would not work.	● Is the LAN cable between the UCAM-550A units correctly connected? → Check and correctly connect the LAN cable, Check whether LAN cable is broken or not. ● Are you using the STP straight cable between the UCAM-550A units? → Check and correctly connect the STP straight cable.

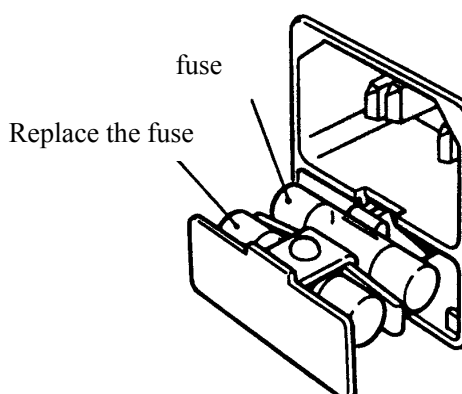
9-2 METHOD OF REPLACING FUSE

This section describes method of replacing the fuse of the UCAM-550A.

- 1) Turn OFF the UCAM-550A and disconnect the power cable.
- 2) Insert a screwdriver tip on the power receptacle slot and drag out the fuse box by referring to the right drawing.



- 3) Check whether or not the fuse is blown out.
Replace the fuse with a spare, if required.



- 4) Push the fuse box into the power receptacle.

MEMO

- | | | |
|---|------------------------|---|
| <ul style="list-style-type: none"> • Applicable fuse | <p>SOC Corporation</p> | <p>Model: ET3.15A
 Fusing characteristics: Time lag type
 Rated voltage: 250 VAC
 Rated current: 3.15 A
 Dimensions: $\phi 5 \times 20$ mm</p> |
|---|------------------------|---|

10 TECHNICAL INFORMATION REQUIRED FOR MEASUREMENT

10-1 COMPENSATING NONLINEARITY IN STRAIN GAGES (QUARTER BRIDGE SYSTEM)

An ideal bridge output in strain measurements can be obtained by the following formula.

$$\text{Output voltage } e = \frac{1}{4} K_s \cdot \varepsilon \cdot E$$

K_s : Gage factor

ε : Strain

E : Bridge excitation

Assume that only one side of the Wheatstone bridge is regarded as the strain gage and when only the said side changes, nonlinearity generates between the strain and output voltage.

The output voltage at that time is obtained by the following formula resulting to cause error as shown in the following table.

$$e = \frac{\varepsilon}{1 + \varepsilon}$$

True strain	Error
1,000 $\mu\text{m/m}$	-0.1%
10,000 $\mu\text{m/m}$	-1.0%
100,000 $\mu\text{m/m}$	-9.1%

MEMO

The UCAM-550A automatically compensates the output voltage to obtain the true strain.

$$\varepsilon = \frac{e}{1 - e}$$

Compensation formulas and Meas CH modes during strain measurements are as follows.

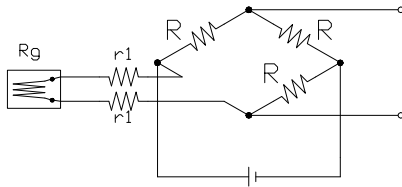
Measuring Method	Meas CH Mode	Compensation formula	Compensation
Quarter Bridge System (2-wire system connection) (3-wire system connection)	1G120 1G350	$\varepsilon = \frac{e}{1 - e}$	ON
Half Bridge System (Active-dummy System)	2GA-D		
Half Bridge System (Active-active System)	2G	$\varepsilon = e$	OFF
Full Bridge System (Opposite Side Active System)	4GA-A	$\varepsilon = \frac{2e}{2 - e}$	ON
Full Bridge System (Full Bridge System)	4G	$\varepsilon = e$	OFF

10-2 COMPENSATING TEMPERATURE EFFECTS ON LEAD WIRES (3-WIRE SYSTEM CONNECTION)

When you extend lead wires between the gage and bridge circuit by using a SELCOM gage as follows, resistance changes of the lead wire due to temperature changes appear as an apparent strain.

Under such circumstances, SELCOM gages do not deliver its performances.

The apparent strain due to temperature changes on lead wires is obtained as follows.



$$\varepsilon = \frac{\Delta R}{R} \cdot \frac{1}{K_s} = \frac{r1 \cdot 2l \cdot \alpha \cdot \Delta t}{Rg + r1 \cdot 2l} \cdot \frac{1}{K_s}$$

Rg: Gage resistance (ohm)

α : Temperature coefficient of resistance on lead wires ($^{\circ}\text{C}$)

Δt : Amount of temperature change ($^{\circ}\text{C}$)

l: Lead wire length (m)

r1: Resistance per lead wire (ohm/m)

Ks: Gage factor = 2.00

[Example 1]

Suppose the parallel vinyl wire (cross section: 0.3mm^2) is 10 m (one way).

Resistance: 0.062 ohm/m

Temperature coefficient of resistance: $3.93 \times 10^{-3}/^{\circ}\text{C}$

The apparent strain per temperature change is as follows.

$$\varepsilon = \frac{0.062 \times 2 \times 10 \times 3.93 \times 10^{-3} \times 1}{120 + 0.062 \times 2 \times 10} \times \frac{1}{2} \doteq 20 \mu\text{m} / \text{m} / ^{\circ}\text{C}$$

Calculate each apparent strain of 20 m and 50 m in the same manner.

20 m	40 $\mu\text{m}/\text{m}/^{\circ}\text{C}$
50 m	100 $\mu\text{m}/\text{m}/^{\circ}\text{C}$

In this case, the apparent strains are large.

[Example 2]

Suppose the parallel vinyl wire (cross section: 0.08mm^2) is 10 m (one way).

Resistance: 0.239 ohm/m

Temperature coefficient of resistance: $3.93 \times 10^{-3}/^\circ\text{C}$

The apparent strain per temperature change is as follows.

10 m	$145\text{ }\mu\text{m/m}/^\circ\text{C}$
20 m	$290\text{ }\mu\text{m/m}/^\circ\text{C}$
50m	$725\text{ }\mu\text{m/m}/^\circ\text{C}$

The apparent strains of the parallel vinyl wire (cross section: 0.08mm^2) are larger than that of the parallel vinyl wire (cross section: 0.3mm^2).

The smaller the cross-section of the lead wire and longer the length of the lead wire, the larger the apparent strain.

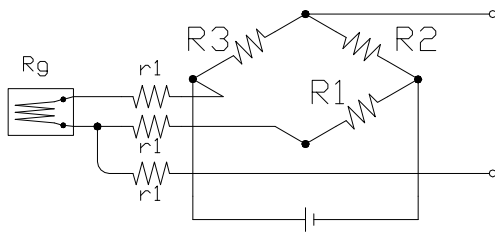
To eliminate the temperature effects on lead wires, the 3-wire system connection is widely adopted in static strain meters.

Principles are described as follows.

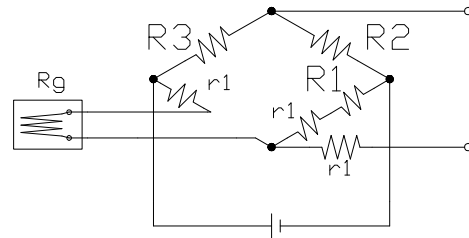
In the following figures, a strain gage has 3 lead wires and single lead wire resistance locates at the adjacent side. With the 3-wire system connection, you are able to cancel temperature effects on lead wires.

In order to have the same temperature effects on every lead wire, the 3 lead wires should be of same type, length, cross section, and coating color.

To satisfy the above requirements, use parallel vinyl 3-wire cables.



(a)



(b)

R_g :	Strain gage
R_1, R_2 , and R_3 :	Internal fixed resistance
r_l :	Lead wire resistance
Figure (a):	Basic circuit
Figure (b):	Simplified figure of the figure (a)

10-3 COMPENSATING GAGE FACTORS

The NTB-100A measures data by using the gage factor 2.00.

When the gage factor of the target gage is not 2.00, you are required to compensate the strain.

Compensate the strain as follows.

$$\text{True strain} = \text{Measured strain} \times \frac{2.00}{\text{Actual gage factor}}$$

You are also able to compensate the strain by using the coefficient calculation function.

10-4 COMPENSATING LONG LEAD WIRES AND CABLES

When you extend lead wires in quarter bridge system and half bridge system, the bridge circuit includes unnecessary lead wire resistances in series and gage factor of the apparent strain lowers.

$$\text{True strain} = \text{Measured strain} \times \frac{\text{Gage resistance} + \text{Lead wire resistance}}{\text{Gage resistance}}$$

The above lead wire resistance is resistance of the whole lead wire (Round-trip resistance).

However, for the 3-wire system connection system, substitute one-way resistance.

When you extend cables in full bridge system, the bridge circuit includes unnecessary cable resistances in series and the sensitivity lowers due to the bridge excitation drop.

$$\text{True strain} = \text{Measured strain} \times \frac{\text{Bridge circuit resistance} + \text{Cable resistance}}{\text{Bridge circuit resistance}}$$

The above cable resistance is resistance of the whole cable (Round-trip resistance).

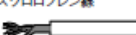
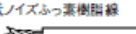
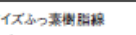
You are also able to compensate the strain by using the coefficient calculation function.

The following table indicates round-trip resistances per meter of each lead wire and cable.

The actual resistances vary with lead wires.

If you are able to check the actual resistances of lead wires, use the correct values.

●Lリード線

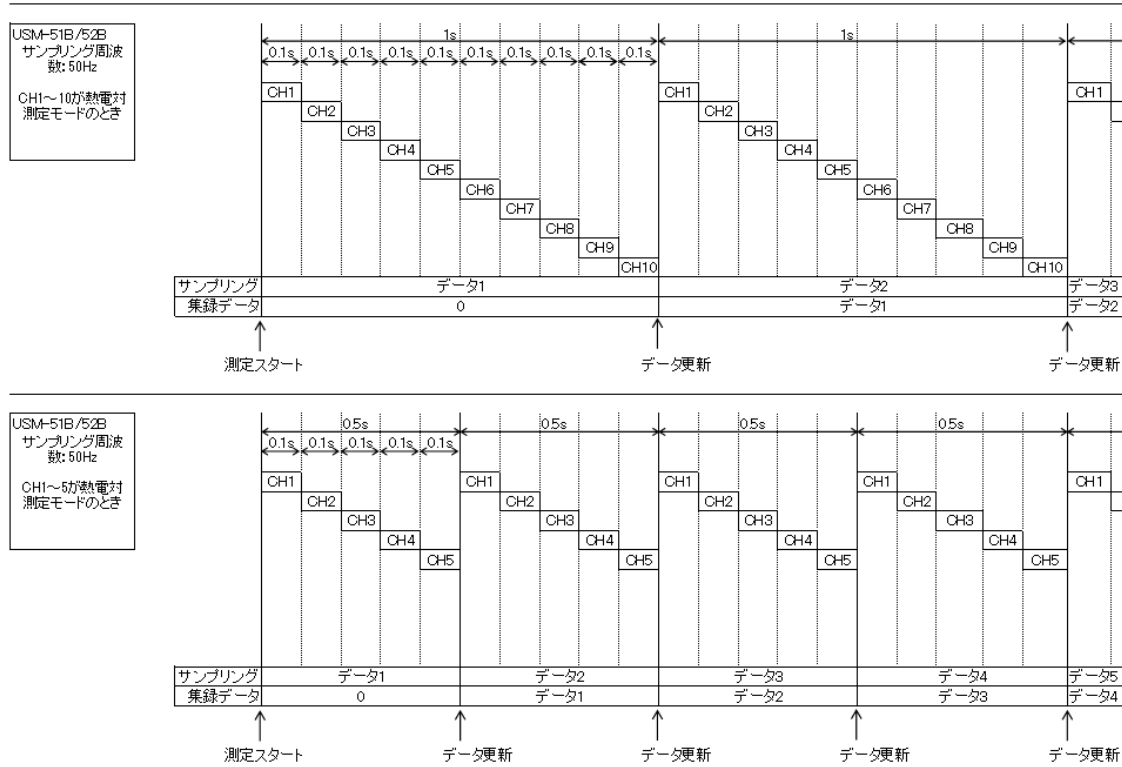
使用温度範囲	型式名	リード線種類	導体材質	導体公称 断面積 (mm ²)	心数/線径	1m当りの 往復抵抗 (Ω)	1本当りの 被覆外径 (mm)	単位 (m巻)
室温～350	L-1	高温用リード線 	銅ニッケル合金線	0.07	1/φ0.30	14.20	φ0.50	50
－10～80	L-2	3線式平行ビニル線 	銅線	0.30	12/φ0.18	0.12	φ2.30	100
－269～250	L-3	3線式高低温度用ふっ素樹脂線 	銀めっき銅線	0.14	7/φ0.16	0.28	φ0.98	50
室温～350	L-4	高温用リード線 	ニッケルクラッド銅線	0.20	1/φ0.50	0.18	φ0.70	30
－10～80	L-5	2線式平行ビニル線 	銅線	0.50	20/φ0.18	0.07	φ2.50	100
－10～80	L-6 (注1)	2線式平行ビニル線 	銅線	0.08	7/φ0.12	0.44	φ1.00	
－10～80	L-7 (注2)	3線式平行ビニル線 	銅線	0.08	7/φ0.12	0.44	φ1.00	
－10～80	L-9 (注1)	2線式平行ビニル線 	銅線	0.11	10/φ0.12	0.32	φ1.00	
－10～80	L-10 (注2)	3線式平行ビニル線 	銅線	0.11	10/φ0.12	0.32	φ1.00	
－100～150	L-11	2線式中温用リード線 	銀めっき銅線	0.08	7/φ0.12	0.44	φ0.86	
－100～150	L-12	3線式中温用リード線 	銀めっき銅線	0.08	7/φ0.12	0.44	φ0.86	
－10～80	L-13	3線式常温度低ノイズビニル線 	銀めっき銅線	0.09	7/φ0.13	0.46	φ3.50	10
－50～90	L-14	4心常温度低ノイズクロブレッド線 	銀めっき銅線	0.08	7/φ0.12	0.48	φ4.00	
－269～250	L-15	3線式高低温度用低ノイズふっ素樹脂線 	銀めっき銅線	0.08	7/φ0.12	0.48	φ2.50	
－269～250	L-16	4心高低温度用低ノイズふっ素樹脂線 	銀めっき銅線	0.08	7/φ0.12	0.48	φ3.30	
－269～350	L-17	3線式高低温度用リード線 	ニッケルめっき銅線	0.07	1/φ0.30	0.50	φ0.38	30

注1) 型式名の後にR(赤)、W(白)、G(緑)、Y(黄)、B(黒)を付し、それぞれの線色を示します。例:L-6Bは黒ビニル線

注2) 型式名の後にWR(赤)、WL(青)、WY(黄)を付し白ビニル被覆に、それぞれのストライプ色を示します。例:L-7WRは、白ビニル被覆に赤のストライプ

10-5 STRAIN/VOLTAGE/THERMOCOUPLE UNIT AND THERMOCOUPLE DATA UPDATING RATE

This section describes the thermocouple data updating rate.



11 SPECIFICATIONS

1) Measuring Target and Measuring Unit

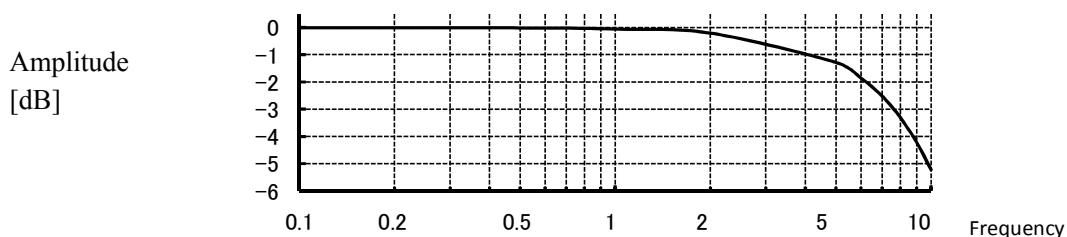
Unit			Strain unit	Voltage unit	Thermocouple	Strain/voltage/the
Measuring target			USS-51A/ B	USV-51A/B	unit UST-51A/B	rmocouple unit USM-51B/52B
Strain gage	Quarter bridge system	120 ohm	●			●
		350 ohm	●			●
Strain gage transducer	Half bridge system 120 to 1000 ohm	(Active-dummy system)	●			●
		Active-active system	●			●
	Full bridge system 120 to 1000 ohm	Opposite side active system	●			●
		Full bridge system	●			●
Potentiometer sensor		1 to 10 kohm	●			●
Voltage		±20.0 V		●		●
Temperature	Thermocouple	K(CA)			●	●
		T(CC)			●	●
		E(CRC)			●	●
		J(IC)			●	●
		R			●	●
		N			●	●

- 2) Number of Measuring Channels: Max. 50 channels/unit (Up to 5 measuring units are available.)
 (One measuring unit can measure 10 channels.)
 Max. 1000-channel measurement available with multiple UCAM-550A
 units in synchronous operation
 *Up to 20 units (max. 1000 channels) available with the opened command
 *The DCS-100A can control 6 measuring units (max. 300 channels).

3) Sampling Frequency

Sampling Frequency (Hz)	The number of measuring channels (CH)	The number of units
1	1 to 1000	1 to 20
2		
10		
20		
50		

*The response frequency varies with the number of units.
 USS-51A/B, USV-51A/B, UST-51A/B : DC to 7.8 Hz
 (Deviation: 0.5 dB to -3.5 dB)
 Example of frequency response is described in the following.



- 4) Measuring Function Original value measurement
 Measure value measurement

5) USS-51A/B Strain Unit

Bridge excitation, potentiometer supply: Constant voltage 2 VDC (Constantly applied)

Gage factor: 2.00 (Can be changed by DCS-100A)

Measuring range, resolution, accuracy (When static [DC] power is input)

Range (Fixed)		Measuring Range	Resolution	Accuracy
Strain	L	0 to $\pm 19,000 \mu\text{m/m}$	$1 \mu\text{m/m}$	$\pm 0.05\% \text{ FS}$
	H	0 to $\pm 20,000 \mu\text{m/m}$	$10 \mu\text{m/m}$	
Potentiometer sensor		$0 \sim \pm 50\%$	0.01%	$\pm 0.1\% \text{ FS}$

NOTE) Measuring range in the above table is related to that of the initial and original measurements.

For measure measurement, the required value is obtained by subtracting the previous initial measurement value from the original measurement value.

6) USV-51A/B Voltage Unit

Measuring range, resolution, accuracy (When static [DC] power is input)

Measuring Range	Resolution	Accuracy	Signal Source Resistance
0 to $\pm 20.000 \text{ V}$	1 mV	$\pm 0.05\% \text{ FS}$	50Ω or less

7) UST-51A/B Thermocouple Unit

Measuring range, resolution, accuracy (When static [DC] power is input)

Range (Fixed)		Measuring Range	Resolution	Accuracy	Internal Reference Junction Compensation Accuracy
K	L	-200.0 to 437.0°C	0.1 °C	$\pm 0.8^\circ\text{C}$	$\pm 0.5^\circ\text{C}$ When the input terminal temperature is stable. Ambient Temperature range: $25^\circ\text{C} \pm 10^\circ\text{C}$
	H	-200.0 to 1200.0°C	0.1 °C	$\pm 2.8^\circ\text{C}$	
T		-200.0 to 350.0°C	0.1 °C	$\pm 0.7^\circ\text{C}$	
E	L	-200.0 to 260°C	0.1 °C	$\pm 0.5^\circ\text{C}$	
	H	-200.0 to 800.0°C	0.1 °C	$\pm 1.7^\circ\text{C}$	
J	L	0 to 330.0°C	0.1 °C	$\pm 0.6^\circ\text{C}$	
	H	0 to 750.0°C	0.1 °C	$\pm 2.0^\circ\text{C}$	
R		0 to 1600.0°C	0.2 °C	$\pm 2.2^\circ\text{C}$	

NOTE) *The accuracy of the internal reference compensation junction and accuracy of thermocouples are not included.

The reference junction compensation is selectable between external mode and internal mode.

Thermocouple resistance: 300Ω or less (K Type).

8) USM-51B/52B Strain/voltage/thermocouple Unit

• Strain measurement

Bridge excitation, potentiometer supply: Constant voltage 2VDC (Constantly applied)

Gage factor: 2.00 (Can be changed by DCS-100A)

Measuring range, resolution, accuracy (When static [DC] power is input)

Range (fixed)		Measuring range	Resolution	Accuracy
Strain	L	0 to $\pm 19,000 \mu\text{m/m}$	1 $\mu\text{m/m}$	$\pm 0.08\% \text{FS}$
	H	0 to $\pm 300,000 \mu\text{m/m}$	10 $\mu\text{m/m}$	
Potentiometer Sensor		0 to $\pm 50\%$	0.01%	$\pm 0.1\% \text{FS}$

NOTE) Measuring range in the above table is related to that of the initial and original measurements.

For measure measurement, the required value is obtained by subtracting the previous initial measurement value from the original measurement value.

• Voltage measurement

Measuring range, resolution, accuracy (When static [DC] power is input)

Measuring range	Resolution	Accuracy	Signal source resistance
0 to $\pm 20.000 \text{V}$	1mV	$\pm 0.08\% \text{FS}$	50 ohm or less

• Thermocouple measurement

Measuring range, resolution, accuracy (When static [DC] power is input)

Type	Measuring range	Resolution	Measuring accuracy		Accuracy of the internal reference junction compensation
K	-200.0 to + 1200.0℃	0.1℃	-200.0 to lower than -100.0℃	±(0.3% of the reading value +0.8℃)	±1.0℃ (when the input terminal temperature is stable.) [Ambient temperature range: 25±10℃]
			-100.0 to +1200.0℃	±(0.2% of the reading value +0.6℃)	
T	-200.0 to + 350.0℃		-200.0 to lower than -100.0℃	±(0.3% of the reading value +0.8℃)	
			-100.0 to +350.0℃	±(0.2% of the reading value +0.6℃)	
E	-200.0 to + 800.0℃		-200.0 to lower than -100.0℃	±(0.3% of the reading value +0.8℃)	
			-100.0 to +800.0℃	±(0.2% of the reading value +0.6℃)	
J	-200.0 to + 750.0℃		-200.0 to lower than -100.0℃	±(0.3% of the reading value +0.8℃)	±2.0℃ (when the input terminal temperature is stable.)
			-100.0 to +750.0℃	±(0.2% of the reading value +0.6℃)	
R	0.0 to + 1600.0℃		0.0 to lower than +100.0℃	±(0.6% of the reading value +1.2℃)	[Within the ambient temperature range and operating temperature range (excluding 25±10℃)]
			+100.0 to +1600.0℃	±(0.5% of the reading value +1.0℃)	
N	-200.0 to + 1250.0℃		-200.0 to lower than -100.0℃	±(0.3% of the reading value +0.8℃)	
			-100.0 to +1250.0℃	±(0.2% of the reading value +0.6℃)	

* The accuracy of the internal reference compensation junction and accuracy of thermocouples are not included.

Measurement error of compensating internal reference junction is obtained as a sum of "error due to measuring accuracy", "error due to internal reference junction compensator", and "error due to the thermocouple".

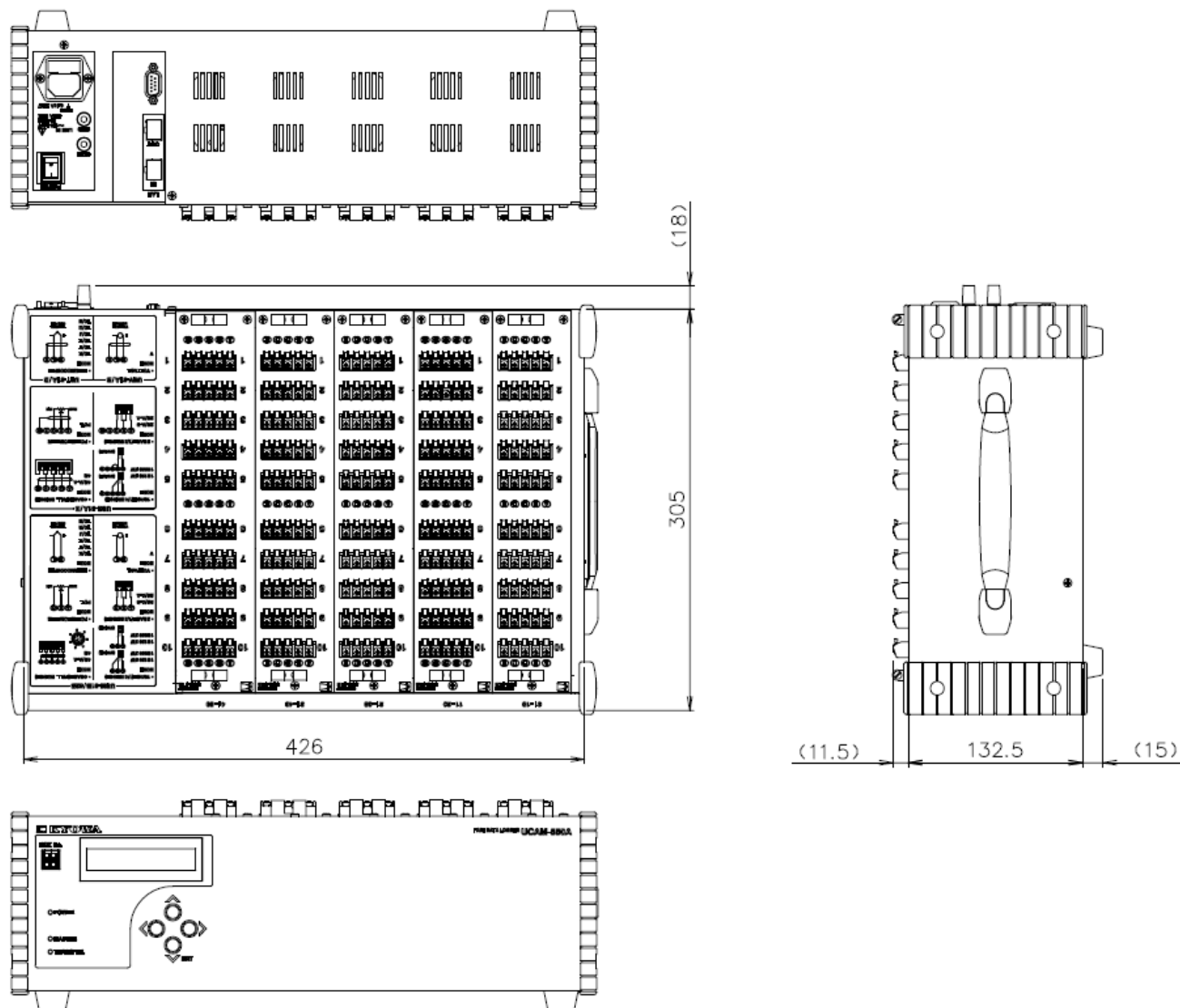
The reference junction compensation is selectable between external mode and internal mode.

Thermocouple resistance: 1kohm or less

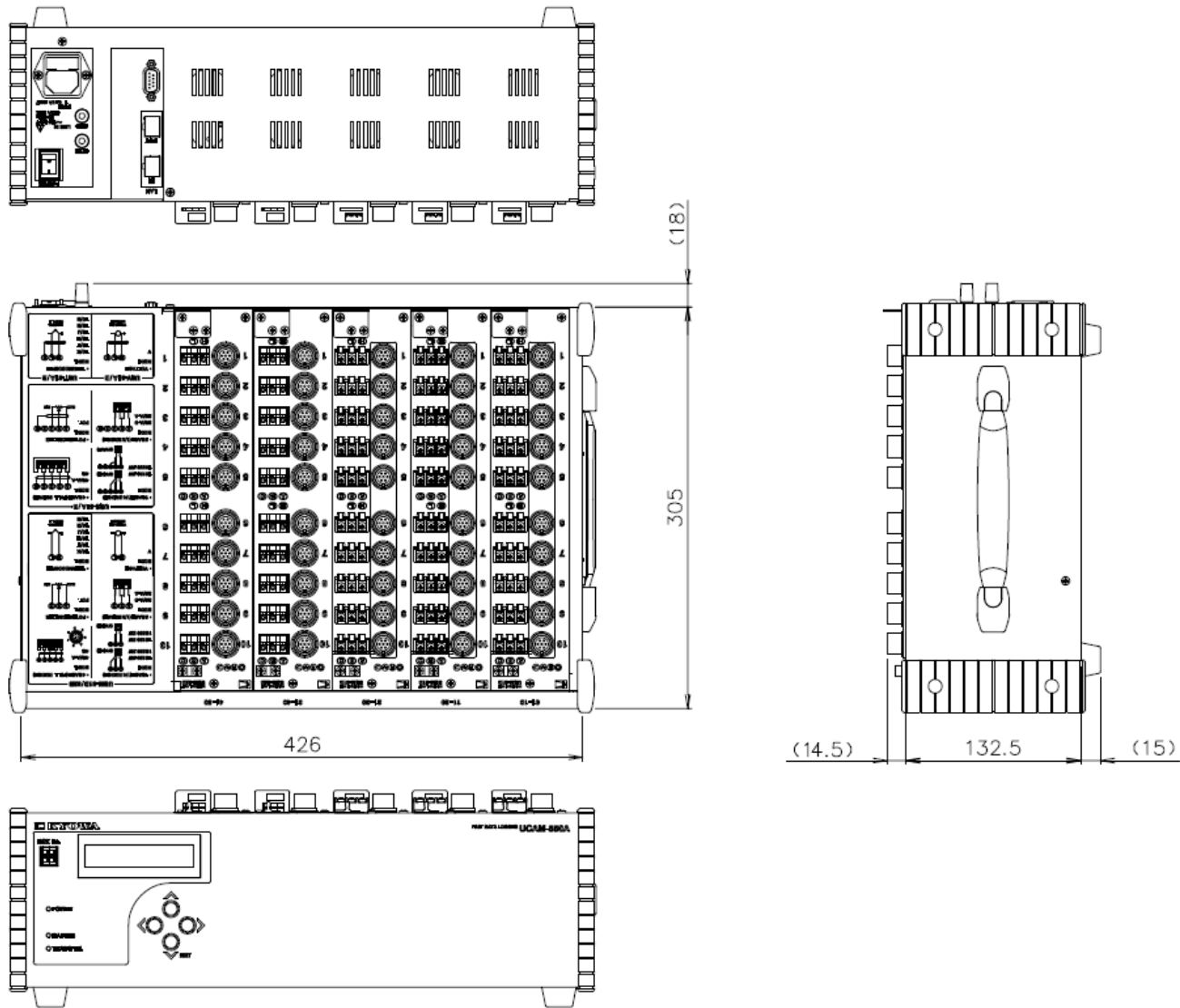
9) Interface	10BASE-T, 100BASE-TX Max. 100 m *For using one UCAM-550A: Connect the LAN cable directly. For using multiple UCAM-550A units synchronously, connect the UCAM-550A units with the STP cables (refer to NOTE) for cascade connection. *HUB is not required.
NOTE: STP is an abbreviation for Shield Twisted Pair. The STP cables are shielded cables used for LAN networks.	
10) Display	LCD (20 char × 2 lines)
11) Operation keys	Arrow keys
12) Storage data	Measured data can be stored into the PC (the UCAM-550A cannot store the measured data).
13) Operating Temperature and Humidity Range	Temperature: 0 to 40°C Humidity: 20 to 85%RH (Noncondensing)
14) Power Supply	100 to 240 VAC, 50/60 Hz Approx. 50 VA (5 Strain Unit USS-51A/B units with a 120-ohm sensor mounted to every channel)
15) Dimensions	426 (W) × 132.5 (H) × 305 (D) (Protruded portion not included)
16) Weight	Approx. 8.5 kg (With five USM-51B units)

12 OUTSIDE DRAWING

- With five USS-51A/B units



- With five USM-51B/52B units





Kyowa Electronic Instruments Co., Ltd.
3-5-1, Chofugaoka, Chofu, Tokyo 182-8520 Japan
<http://www.kyowa-ei.com/>