



EXTERNAL INPUT/OUTPUT UNIT

UIO-60A

INSTRUCTION MANUAL

Thank you for purchasing KYOWA's UIO-60A External Input/Output Unit designed to be incorporated into the UCAM-60/65 Series 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 a manner other than instructed in this manual.

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STANDARD ACCESSORIES

The following accessories should be enclosed in the package of the UIO-60A External Input/Output Unit (hereinafter referred to as the UIO-60A). Upon unpacking, check to be sure all these items are enclosed.

Screwdriver	1
Inspection Sheet	1
Warranty	1

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SAFETY PRECAUTIONS

PRIOR TO USE

For safe use of the UCAM-60/65Series with the UIO-60A mounted, be sure to read the safety precautions described below.

KYOWA ELECTONIC INSTRUMENTS CO., LTD. assumes no liability for damages resulting from usage made against the safety precautions and voids warranty of products handled improperly.

SAFETY SYMBOLS

- The following symbol is used for safe operation of the system.

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

- In this Instruction Manual, safety precautions are classified into “WARNING” and “CAUTION” as follows:

 WARNING	Failure to read instructions under this heading may result in death or severe injury of the operator.
 CAUTION	Failure to read instructions under this heading may results in injury of the operator and damage of the instrument.

 WARNING
Protective Ground To prevent an electric shock hazard, be sure to ensure protective ground before connecting the AC power cable to a 3-prong wall outlet. If no 3-prong wall outlet is available, be sure to ground the UCAM-60/65Series via the GND terminal before connecting the AC power cable. For Electrical Operator Safety To prevent an electric shock hazard, operators must be cautioned not to cut the protective grounding conductor or disconnect it from the GND terminal. Confirmation of Protective Ground To prevent an electric shock hazard, be sure to confirm safe protective ground before operating the UCAM-60/65Series. If anything seems abnormal in the protective ground, fuse holders, etc., do not operate the UCAM-60/65Series. Power Supply To prevent a fire hazard, before connecting the AC power cable, be sure to confirm the local line voltage is matched with the operating voltage specified for the UCAM-60/65Series. Power Cable and Power Receptacle To prevent electric shock and fire hazards, connect the accessory power cable to a 3-prong wall outlet. If no 3-prong wall outlet is available, ground the UCAM-60/65Series through the GND terminal and then connect the power cable to a 2-prong wall outlet via the accessory 3P-2P conversion adaptor. Do not disconnect the grounding conductor during measurement and before disconnecting the power cable. Operators must also be cautioned that use of an extension power cable with no grounding conductor voids the protective function.



WARNING

Fuse

To prevent a fire hazard, be sure to use a fuse providing the same rating (current, voltage and type) as specified for the UCAM-60/65Series.

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

When replacing the fuse, disconnect the power cable from the wall outlet in advance.

External Connection

To prevent an electric shock hazard, ensure the safe protective ground of all concerned instrument and then connect the UCAM-60/65Series to the measuring objects and external instruments such as a rain gage and PC.

Inflammable Gaseous Environment

To prevent fire and explosion hazards, do not operate the UCAM-60/65Series where it is exposed to inflammable gases, inflammable vapors or inflammable dust.

- To prevent troubles and accidents due to erroneous handling and installation and to let the UCAM-60/65Series safely perform to the specifications, be sure to read the following cautional instructions.



CAUTION

Use the UCAM-60/65Series in the specified operating temperature range of 0 to 50°C.

- Use at temperatures exceeding the specified range 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 UCAM-60/65Series in the specified operating humidity range of 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 troubles.

Immediately stop the UCAM-60/65Series from operating if the environment changes abruptly.

- Leave the UCAM-60/65Series as it is to make it familiar with the environment.
- Abrupt change in ambient temperature due to transportation, etc. may cause dew condensation, which may result in lowered performance and troubles.

Do not use the UCAM-60/65Series under dusty environment.

- Use the UCAM-60/65Series under an environment where a PC may be used.

Do not use the UCAM-60/65Series where it is subjected to vibration and impact.

- Use the UCAM-60/65Series where it does not receive any vibration and impact.
- A continuous vibration or severe impact may lower the performance and cause troubles.

Do not use the UCAM-60/65Series in strong magnetic field.

- Use the UCAM-60/65Series in a magnetic field environment where a 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, electric furnace or any other equipment generating a strong magnetic field.

Do not use the UCAM-60/65Series under poor power condition.

- Operate the UCAM-60/65Series on the specified 85 to 264VAC, 50/60Hz, with no instantaneous power failure and noise.

Do not pull cords and cables.

- Lay cords and cables with a certain allowance so that any unreasonable force may not be applied to the connections.
- Pulling or unreasonable force may cause troubles or interrupt measurement.

Preheat the UCAM-60/65Series before use.

- Preheat the UCAM-60/65Series for 30 to 60 minutes after power-ON.

NOTATIONS IN THIS INSTRUCTION MANUAL

For convenience, the following notations are used in this Instruction Manual.

- **Operating panel keys, menu options and set or selected items are expressed as follows:**

Operating panel keys are expressed in a square box.

e.g. SET key

Menu options are expressed in brackets.

e.g. [MEAS Condition]

Set or selected items are expressed in double quotation marks.

e.g. "000"

- **Precautions:**

Precautions for safe operation and reference information for correct handling are expressed as follows:

e.g.

NOTE

- This command is effective only when alarm conditions are set.
- This command is ineffective for channels to which the alarm function is not applied.

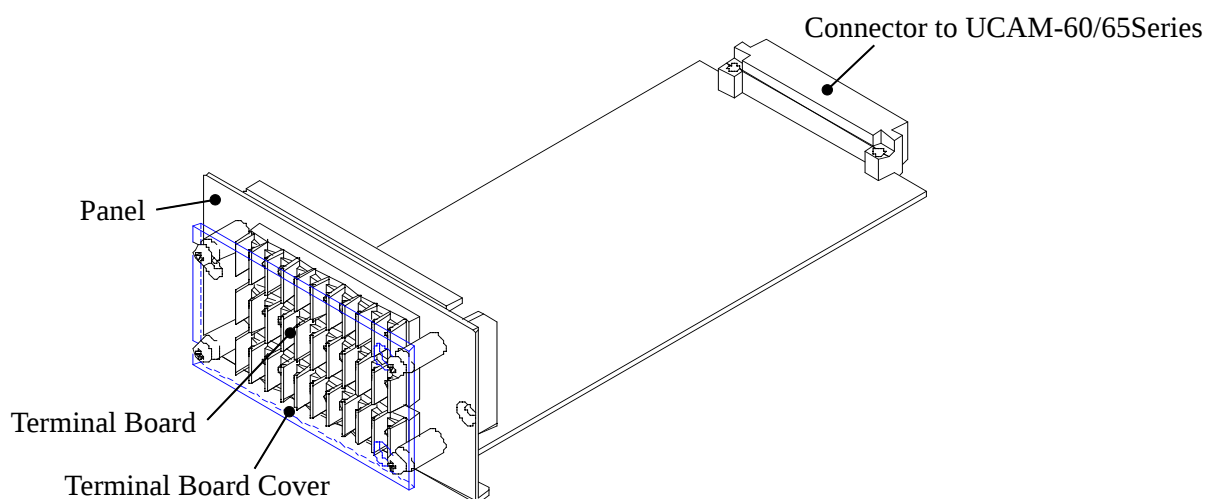
MEMO

- To connect signal lines to the terminal board, use the accessory screwdriver.
- Applicable wires: AWG #24 to 26

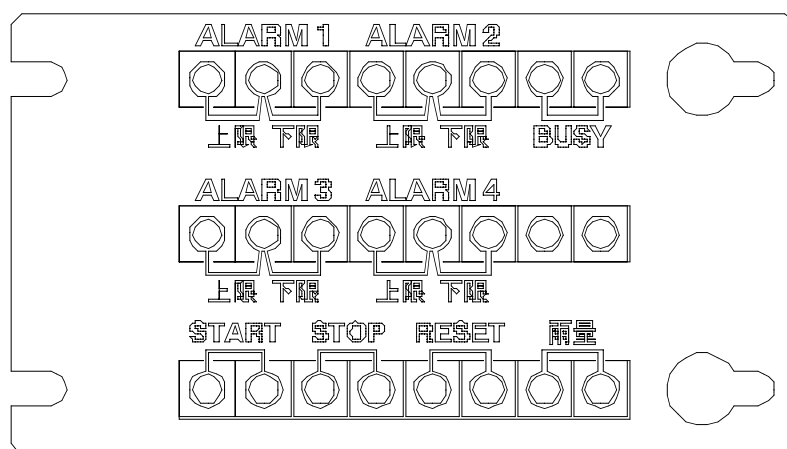
1. PREPARATION

This Chapter describes controls and indicators of the UIO-60A and the method of mounting it into the UCAM-60/65Series Data Logger (hereinafter referred to as the UCAM-60/65Series).

1-1 CONTROLS AND INDICATORS



The terminal board cover has the input/output labels printed as follows.



Contact output: ALARM 1 (high/low limits) to ALARM 4 (high/low limits), BUSY

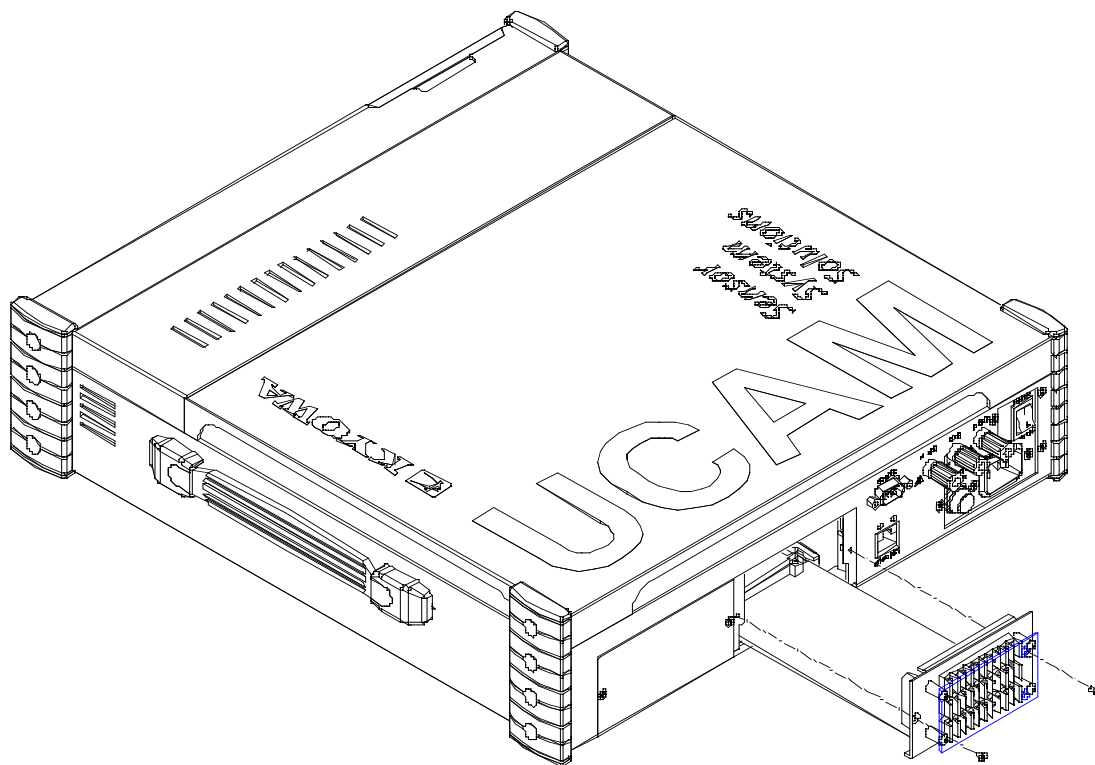
Contact input: START, STOP, RESET, Rainfall (pulse counter input)

The terminal board cover can be removed by loosening four M2.6 bind screws and sliding it rightwards.

MEMO

- To connect signal lines to the terminal board, use the accessory screwdriver.
- Applicable wires: AWG #24 to 26

1-2 MOUNTING TO UCAM-60/65Series



Mount the UIO-60A to the option slot 2 of the UCAM-60/65Series as follows:

Make sure the UCAM-60/65Series is turned OFF. Remove the dummy panel of the option slot 2. Then, along the guide rails inside, slide the UIO-60A into the slot. After setting the UIO-60A into the slot, fix it with two M2.6x5 countersunk screws with the accessory screwdriver.

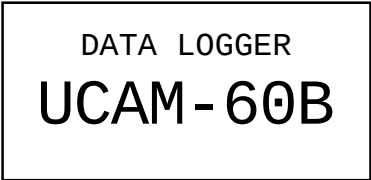
2. POWER ON

2-1 DISPLAY SCREENS

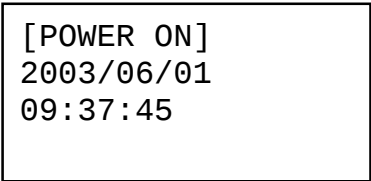
2-2-1 Display Screens at Power-ON

When the UCAM-60A/B is turned ON, the display lights up and changes the indication from the title to the ready state in the following flow.

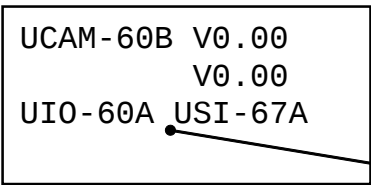
Title



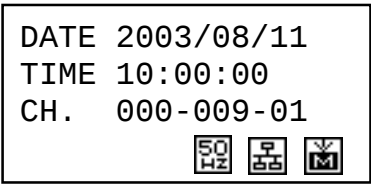
Date/Time at Power-ON



Version



Ready State



At this time, key LEDs sequentially light up and out in the following order: SAVE → LOCK → ORIG. → MEAS.

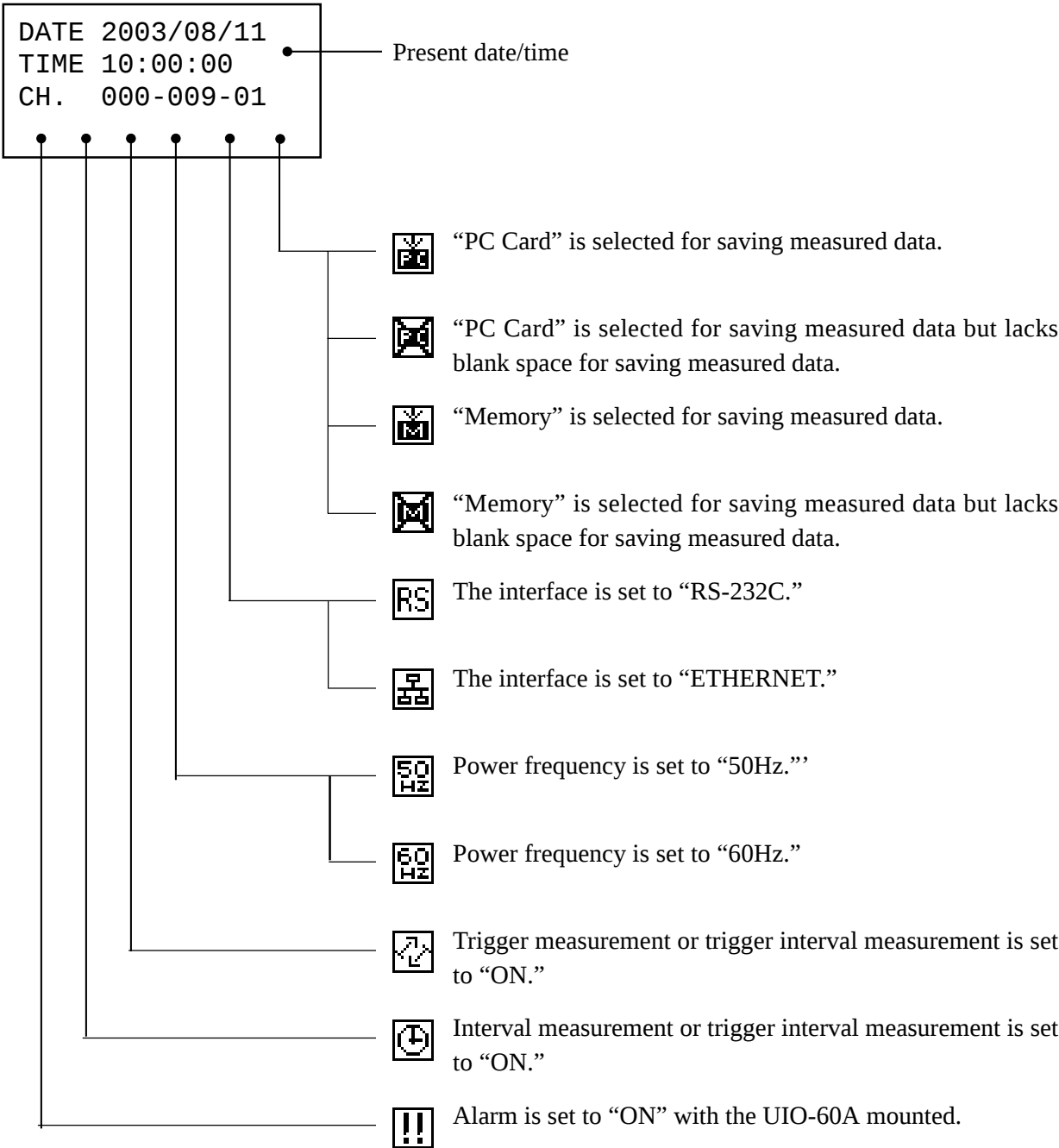
At this time, key LEDs sequentially light up and out in the following order: COEF. → PRINT → EASY MEAS. → MEAS. → LOCK → SAVE → START /STOP

Indicates the UIO-60A and USI-67A scanner interface are correctly mounted to option slots 2 and 1, respectively.

2-1-2 Ready State Indication

The following icons are available on the ready state indication, enabling confirmation of the present setting conditions of the UCAM-60A/B.

Ready State Indication



3. SETTING UCAM-60/65 WITH UIO-60A MOUNTED

3-1 SETTING ALARM

Contact output for alarm is initiated by a value exceeding the high or low limit in ordinary or monitor measurement.

Press the **SET** key on the ready state screen to display the main menu. Select [0: MEAS Condition] on the main menu. Then, select [6: Alarm] on the measuring condition setting menu. The alarm setting screen appears.

ALARM SETTING	
A1	000
HIGH	12345678
LOW	-12345678

- Preset high/low limits are displayed. Move the cursor to the desired alarm channel.

■ Alarm High/Low Limit Setting Procedure

(1) Select the measuring channel to which high/low limit checking is applied.

○○○
└──────── 3 digits (000 to 999, ---: No alarm applied)

(2) Input high/low limits.

○○○○○○○○○○ (−99999999 to +99999999)
└──────── 8 digits each for high/low limits (including a decimal point)
└──────── Sign (−, 0)

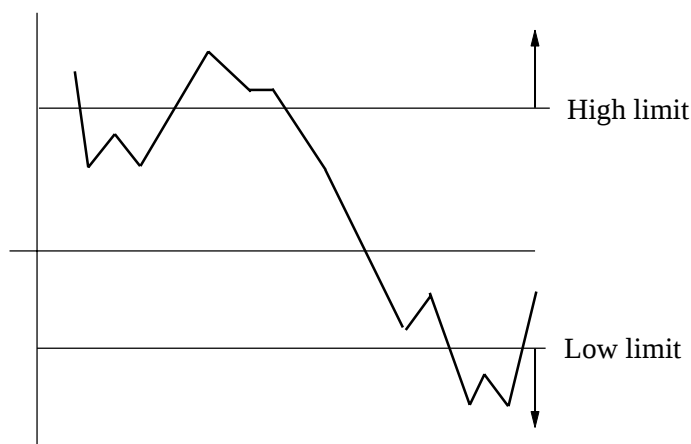
(3) After inputting high/low limits, press the **ENTER** key to determine the setting. The cursor moves to the next channel.

(4) To change the high/low limits, move the cursor to the required position using the **<** or **>** key, input a desired numeric and press the **ENTER** key.

(5) To move between channel to channel, scroll the display up and down using the **^** and **v** keys, respectively.

^ ↓	A1	000
	HIGH	12345678
	LOW	-12345678
	A2	100
	HIGH	100
	LOW	- 100
	A3	256
	HIGH	- 1500
	LOW	- 3000
	A4	---
	HIGH	-----
	LOW	-----
	↓ v	

(6) To conclude high/low limit setting, press the **ESC** key. One-step previous display ([MEAS Condition] menu) returns. If the **ESC** key is pressed without pressing the **ENTER** key, the high/low limits under editing are not concluded.



When the signal of the alarm channel exceeds the high limit, the high-limit contact output is ON.
When the signal of the alarm channel falls below the low limit, the low-limit contact output is ON.

MEMO

- A list of high/low limits of alarm channels is printed out from the alarm setting display by pressing the **LIST** key.

■ Alarm ON/OFF Setting Procedure

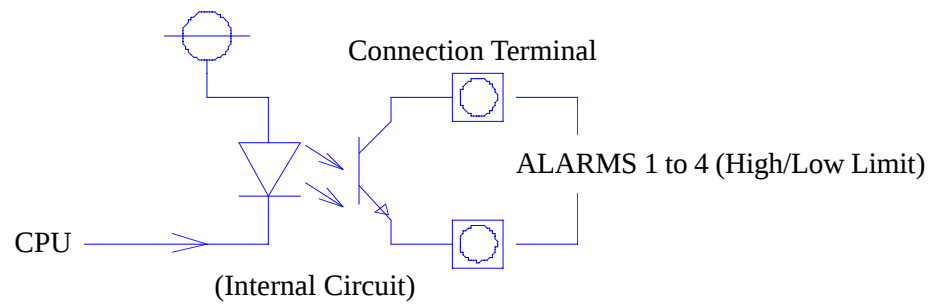
Press the **SET** key on the ready state screen to display the main menu. Select [1: Auto-MEAS] on the main menu. Move the cursor to “Alarm” using the **▽** key and set it to “ON.” The **<** or **>** key selects “ON” or “OFF” alternately.

INTERVAL	OFF
TRIGGER	OFF
TRIG INTERVAL	OFF
ALARM	ON

NOTE

- Once the alarm is set to ON, high/low limit settings cannot be changed. If a need arises to change, set the alarm to OFF on the [Auto-MEAS] display and input desired high/low limits.

■ Precautions in Using the Alarm



The alarm output is photocoupler-isolated open collector output.

The rated output is 30Vdc (max.), 20mA (max.), and thus the operator should be cautioned not to exceed the rating in the connection of the contacts..

If required, add a protection circuit such as a spark killer to the external circuit. If the contact output is used to open/close the AC line, add a relay to the external circuit.

3-2 HIGH/LOW LIMIT SETTING IN HYSTERESIS

Hysteresis can be set to high/low limits of the alarm.

Press the **[SET]** key on the ready state screen to display the main menu. Select [8: System Control] on the main menu. Select [8: Hysteresis] on the system control menu to display the hysteresis setting screen.

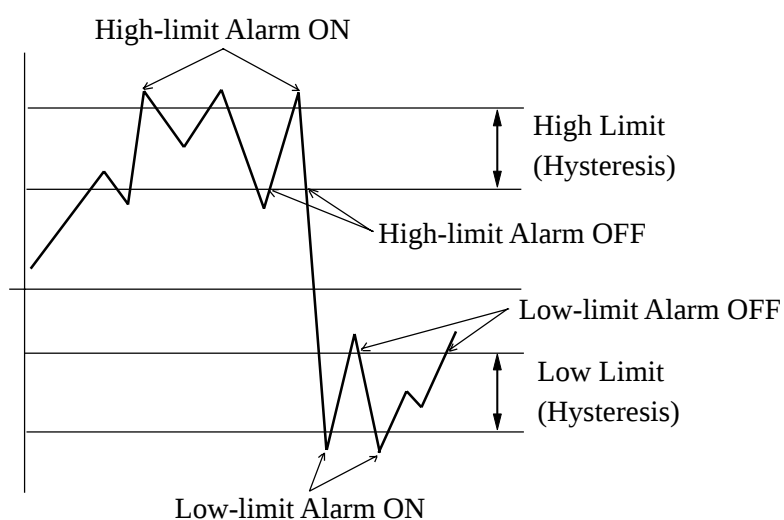
HYSTEREIS

000.00

(000.00~999.99)

Hysteresis can be set in a width of 000.00 to 999.99 of each of the high/low limits of the alarm.

Concept of Hysteresis Alarm



NOTE

- Note that high/low limit setting of hysteresis is applied to all alarm channels (A1 to A4) in bulk.

3-3 SETTING FOR RAINFALL INPUT

The UIO-60A is provided with an external input to receive pulse signals from a rain gage. The rainfall input is output as a counting of a difference between the n th measurement and the $(n-1)$ th measurement.

Press the **[SET]** key on the ready state screen to display the main menu. Select [6: System Control] on the main menu. Then, select [9: Rainfall] on the system control menu to display the rainfall input setting screen.

RAINFALL
 1mm
 (1: 1mm, 2: 0.5mm)
 (0: Disuse)

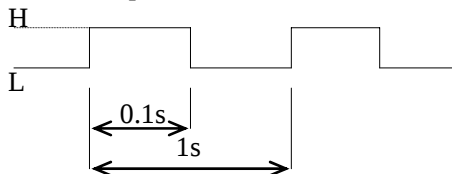
When using the rainfall input, select “1: 1mm” or “2: 0.5mm” according to the applied rain gage.

In the “original” measurement, a counting of pulses is output with no unit.

In the “coefficient” measurement, an input value is obtained by multiplying the calibration coefficient and is output as a rainfall in mm.

MEMO

- The rainfall pulses pulse should have a width of 0.1s or more and an interval 1s or more. Thus, the rainfall input cannot be used for counting higher speed pulses.

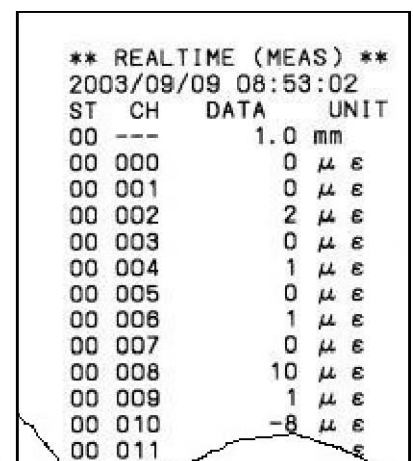
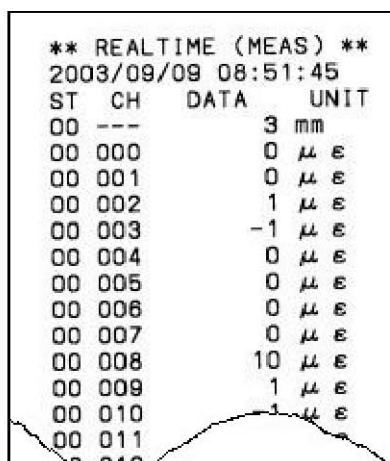
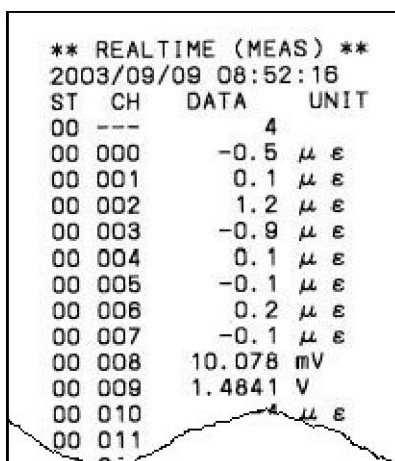


Rainfall Printout Examples

(1) “Original” measurement
(pulse counting with no unit)

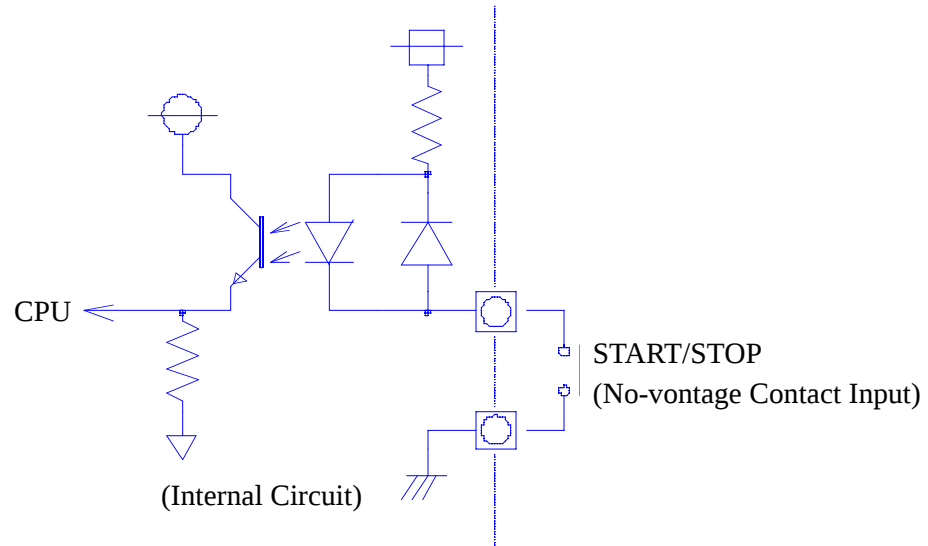
(2) “Coefficient” measurement
(with “1: 1mm” selected)

(3) “Coefficient” measurement
(with “2: 0.5mm” selected)



4. EXTERNAL START/STOP

With the UCAM-60/65Series in ready state, turn the START signal to ON (short-circuiting START contacts) to start the measurement. Turn the STOP signal to ON (short-circuiting STOP contacts) during the measurement to stop the UCAM-60/65Series from measuring. The BUSY signal output enables the operator to confirm that the UCAM-60/65Series is measuring.



MEMO

- The input START/STOP pulse should have a width of 100ms or more.
- Make the input START/STOP pulse free from chattering.

5. CONTROL COMMANDS

■List of Control Commands

Command Message		Command	Ref. Page
Type	Description		
Alarm-related	Set alarm function to ON/OFF	AON/AOF	12
	Set alarm conditions	ARM	12
	Read alarm conditions	PRR05	12
	Set alarm contact output to ON	ANC	13
	Set alarm contact output to OFF	ANO	13
	Set all alarm contact outputs to OFF	ACL	13
Rainfall-related	Set rainfall input to ON/OFF in setting system conditions	DSW	14
	Reset rainfall data	CRD	14

■Rainfall Data Format

[With Calibration Coefficient ON]

2003, 09, 08, 15, 47, 42 ← Header
 00, ---, 0, 0, 17, 0, 0 ← Rainfall data
 00, 000, 0, 00, 0, 0 ← Ordinary measured data

[With Calibration Coefficient OFF]

2003, 09, 08, 15, 47, 42 ← Header
 00, ---, 0, 0, 58, 0, 0 ← Rainfall data
 00, 000, 0, 00, 0, 0 ← Ordinary measured data

00, ---, 0, 0, 17, 0, 0

End code
 Incidental data discrimination code
 Unit number
 Rainfall data
 Channel
 Status

■ Control Commands

AON: Setting alarm function to ON

- This command makes the alarm function effective during measurement.

AON +TC

AOF: Setting alarm function to OFF

- This command makes the alarm function ineffective during measurement.

AOF +TC

ARM: Setting alarm conditions

- This command sets the alarm channel and high/low limits of the alarm.

ARM 000 +12345678 -12345678 +TC → Setting alarm channel 1

Low limit of alarm (8 digits, including a demical point)
 Sign of the low limit (+, -, 0)
 High limit of alarm (8 digits, including a decimal point)
 Sign of the high limit (+, -, 0)
 Measuring channel designated as alarm channel
 (---: When the alarm is not used)

ARM 001 +00000100 -00000200 +TC → Setting alarm channel 2

ARM 100 +00005000 +00005000 +TC → Setting alarm channel 3

ARM --- +00000100 +00000100 +TC → Setting alarm channel 4

PRR05: Reading alarm conditions

- This command lets the UCAM-60/65Series output alarm channels and high/low limits of the alarm.

PRR05 +TC

AL -1 000 +12345678 -12345678 +TC → Alarm conditions of alarm channel 1

Low limit of alarm
 Sign of the low limit
 High limit of alarm
 Sign of the high limit
 Measuring channel designated as alarm channel
 Alarm channel

AL -2 001 +00000100 -00000200 +TC → Alarm conditions of alarm channel 2

AL -3 100 +00001000 +00000500 +TC → Alarm conditions of alarm channel 3

AL -4 101 +00005000 +00005000 +TC → Alarm conditions of alarm channel 4

ANC: Setting alarm contact output to ON

- This command sets alarm contact output to ON by each alarm channel (1 to 4).

ANC 1 0 +TC

- Number to select the high or low limit which is set to ON (0: Low limit, 1: High limit)
- Alarm channel number of which the contact output is set to ON (1 to 4).

NOTE

- This command is effective only when alarm conditions are set.
- This command is ineffective for channels to which the alarm function is not applied.

ANO: Setting alarm contact output to OFF

- This command sets alarm contact output to OFF by each alarm channel (1 to 4).

ANO 1 1 +TC

- Number to select the high or low limit which is set to OFF (0: Low limit, 1: High limit)
- Alarm channel number of which the contact output is set to OFF (1 to 4).

NOTE

- This command is effective only when alarm conditions are set.
- This command is ineffective for channels to which the alarm function is not applied.

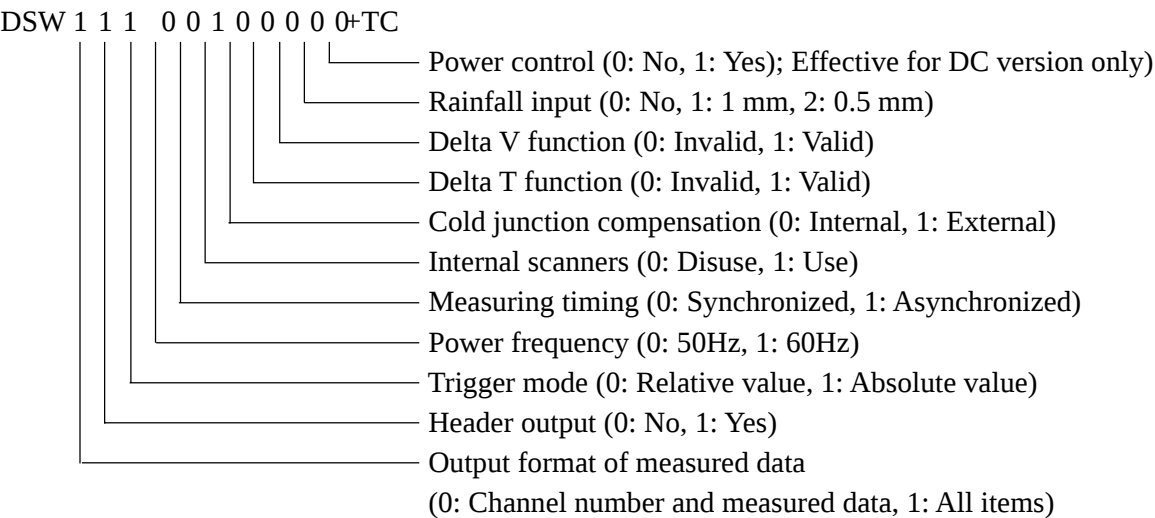
ACL: Setting all alarm contact outputs to OFF

- This command sets all alarm contact outputs to OFF.

ACL +TC

DSW: Setting system conditions

- This command sets UCAM-60/65Series system conditions.



CRD: Reset rainfall data

- This command resets rainfall data.

CRD +TC

6. SECIFICATIONS

1. Contact Output

Alarm output	4 channels
BUSY output	1 channel
Output mode	Photocoupler-isolated open collector output
Rated output	30 V _{DC} max., 20 mA max. (resistance load)

2. Contact Input

START signal	1 channel
STOP signal	1 channel
Input mode	No-voltage contact input

3. Pulse Input

Rainfall	1 channel (contact input, pulse width:0.1s or more,pulse interval:1s or more)
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4. Signal Connection

M2.6 terminal board; Applicable wires: AWG#24 to 26

5. Operating Temperature/Humidity Range

Temperature	0 to 50°C
Humidity	20 to 85%RH (non condensing)

6. Dimensions

90(W) x 50(H) x 180(D) mm (excluding protrusions)

7. Mass

Approx. 140g

