CHINO

IM series

Infrared Multi Analyzer Setting
Display Unit IRGMEG3□

INSTRUCTIONS

CHINO

Contents

1.Introduction

Thank you for purchasing the Infrared Multi Analyzer Setting Display Unit IRGMEG3□ series. The Infrared Multi Analyzer (hereinafter called "constituent meter") Setting display unit IRGMEG3□ is used in combination with IM series constituent meter detector units and can communicate with up to nine (9) detector units.

The Setting display unit digitally displays constituent values including moisture content and thickness, as well as accessing to parameters of a detector unit. It also provides various functions including communication and calibration curve switching by a contact signal.

The user is strongly recommended to read this manual carefully and gain comprehensive knowledge to avoid possible problems before using this product.

This manual describes about the setting display unit only. In addition to this manual, refer to a separate instruction manual of [IM series Infrared Multi Analyzer detector unit IRMA□□□□□□], too.

Request

- To instrumentation and installation engineers and distributors -
  Make sure to provide this manual to the end user.

- To the user of this product -
  Keep this manual at hand until you scrap this product.
  Also, please make sure to record and file your settings.

Product warranty period

This product is warranted for one year from the date of delivery. This product is guaranteed against mechanical failure and will be repaired with no charge within the warranty period, provided that it has been used normally with due attention and adherence to the cautions written in the instruction manual, product labels, etc. (only in Japan) In that case, please contact the dealer or nearest agent of CHINO CORPORATION.

Provided, even in the warranty period, following repairs will be provided at your expense.

1. Mechanical failure or damage caused by improper use, connection, repair, or modification
2. Mechanical failures or damages caused by fire, earthquake, wind or flood, thunderbolt, or other natural disasters, or pollution, salt water, harmful gas, abnormal voltage, or use of unspecified power
3. Replacement of wear and tear parts and accessories

Notices

1. No part of this manual may be copied or reproduced without our permission.
2. Information in this manual is subject to change without prior notice.
3. Every effort has been made to ensure that the details of this manual are accurate, however, if you find any unclear points, errors, or incomplete information, please contact your nearest agent of CHINO CORPORATION.
4. We are not responsible for any consequences caused by your use of this product.

1. Configuration (Configuration example in combination with IRMA1□□□□□□)

Detector unit
IRMA1100□□, 1200□□, 1300□□

Analog output →

IM SERIES CHINO
MADE IN JAPAN
CH   DATA
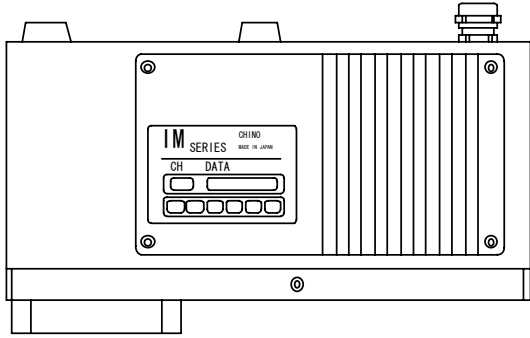
Power Supply unit
IR-WEP
(Supplied as an attachment))
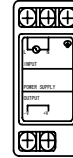
24V DC

Connecting cable
IR-WERP□□□

Air-purge hood
IR-WEA(IRMA1100、1200用)
IR-WEA3(IRMA1300用)

RS-485

Setting display unit
IRGMEG3□

REAL
HOLD   **25.83**
PRES

REM   HEAD   CH
CO **79**   **46**
HEAD   CH   MODE   T   AH   AL

HEAD HOLD PRES R/L S/R SEL
      −   7   8   9
CH   T   4   5   6   CLR
MODE CO   0   1   2   3   ENT

IRGMEG3   CHINO
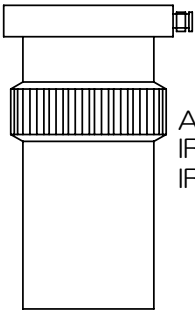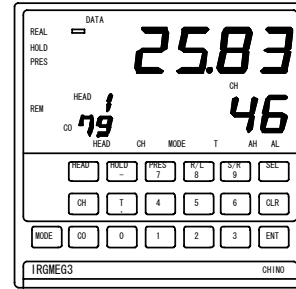
Output Checking plate
IR-WEB(IRMA1100,1200用)
IR-WEB3(IRMA1300用)

No.1
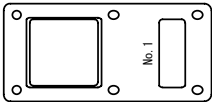
Communication
Analog output

(Note)In case of using IRMA data logging software
for IM-VXA□□□□,the personal computer and
detector unit are a direct communication.

2. Before use

After opening the package, make sure to check the followings before use. If you have any unclear points, please contact the dealer or nearest agent of CHINO CORPORATION.

(1) Check the appearance

Check if there is any damage on the product surface.
The front panel has a protection film on it. Remove it before beginning to use this product.

(2) Check the model code

Check if the product model code that you purchased is correct.

◆A model code plate and its location
    A following plate is attached on the product upper surface.

```
IRGMEG3□            ← Model code
EG□□□□□□□□           ← Serial number
   MADE IN JAPAN
```

(3) Check the accessories

Check the following accessories supplied with this product.

Name	Quantity	Remarks
Terminal cover	1	Transparent cover
Mounting brackets	2 (set)	For panel mounting
Instruction manual	1	This manual
Instruction manual for communications	1	Booklet

If you purchased accessories separately, they may be included in the package.

Request

1. Do not drop the product when unpacking.
2. When transporting this product, put this product in the original box and then a case with cushioning material on the bottom. Considering this, we recommend you store the original box for future transport.
3. If you do not use the product with the final product (panel) removed from it for a long time, put it in the original box and store it at a room temperature away from dust.

2.For safe use of the product

For safe use of this product, please read and acknowledge following cautions.

2-1. Prerequisites for use

This product is a component-type general product used with an interior instrumentation panel. Do not use it in any other condition.
Please use it after ensuring system safety by providing a fail-safe design and periodical inspections on the final product. Also, ask instrumentation specialists to perform connections, adjustments, and operation of this product.
Operators are also required to fully acknowledge the cautions and basic operation of this product through this manual.

2-2. Symbols

Please fully understand the meanings of following symbols shown on the product and in this manual.

Symbol	Description
⚠ **Warning**	Indicates important information to avoid the risk of serious injury or death to the user.
⚠ **Caution**	Indicates important information to avoid the risk of minor injury to the user or damage to this product or peripheral equipments.
⏚	Ground terminal. Make sure to connect it to the protective ground.

⚠ **Caution**	Make sure to read and understand this part to avoid the risk of serious accidents.

1. Check supply voltage and connections.

Before supplying power, check if connections are correct, the supply voltage complies with the rated voltage, and the terminal is grounded.

2. Set an overcurrent protection device.

This product is not equipped with a power supply switch. Set an overcurrent protection device (e.g. circuit breaker) that complies with rated specifications to the power source of this product.

3. Protect terminals.

To avoid shock hazards, provide terminals with a safety measure so that the operator does not touch them directly on the final product.

4. Set a safety instrument.

If a failure of this product or peripheral equipments may cause serious damages to a facility, make sure to provide safety instruments and a fail-safe design on the final product to avoid possible damages. Also, never use this product for crucial facilities that may involve human lives, nuclear power, aviation, and space.

5. Do not reach into the product.

Do not reach into the product with your hands and tools. It may cause a shock hazard and injury.

6. Turn off the power source in suspicious circumstances.

Should any abnormal odor, noise, smoke, or extreme temperature rise be detected, turn off the power source immediately to avoid any dangerous situations and contact the dealer or nearest agent of CHINO CORPORATION.

7. Never repair or modify the product.

If you need repairs or modifications, please contact the dealer or nearest agent of CHINO CORPORATION. Repairs and modifications including part replacement must be carried out by CHINO certified field engineers only.

8. Follow the manual strictly.

Follow this manual to operate this product correctly and safely. We are not responsible for any claims such as for injury, damage, or lost profit resulting from improper uses.

3.Model code list

IRGMEG3☐

Communication interface
R: RS-232C (standard)
A: RS-422A
S: RS-485

4.Installation and connections

4-1. Setting dipswitch

Set internal dispswitches before installing this unit.

4-1-1. How to pull out the internal unit

| ⚠ **Warning** | Make sure to turn off the power source to this unit before pulling out the internal unit. |

Lower cover ───→

Internal unit mounting screw
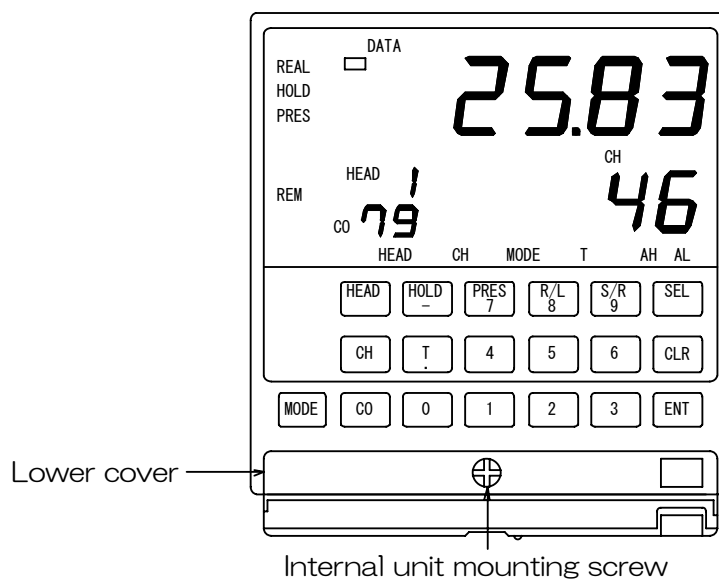
1) Open the lower front cover to find an internal unit mounting screw.
2) If the screw turns freely, you can pull out the internal unit.
3) After setting up the dipswitches, return the internal unit and fasten the screw.

| ⚠ **Caution** | (1) Pay attention not to widen the connector on the substrate when pulling out the internal unit.
(2) Do not insert the internal unit forcedly when it is not easily fit in. |

4-1-2. Setting dipswitches

Set the dipswitches depending on the specification of the detector units to be connected.

Dipswitch No.	Function	SW		Default settings
		OFF	**ON**	
1	Quantity of the detector unit to be connected	Varies depending on the combination with the dipswitch 4.	Varies depending on the combination with the dipswitch 4.	OFF (*1)
2	Not used			OFF
3	Not used			OFF
4	Selection of output method	Varies depending on the combination with the dipswitch 1.	Varies depending on the combination with the dipswitch 1.	OFF (*1)
5	Selection of contact input	A common terminal is provided for HEAD and CH.	Separate terminals are provided for HEAD and CH.	OFF (*2)
6	Not used			OFF
7	Not used			OFF
8	Not used			OFF

(*1) Refer to [About analog output] in [4-5-3. Basics of wiring] for details.

(*2) Refer to [6-10-1. Setting detector unit numbers, constituent numbers and calibration curve numbers] for details.

[Internal unit pulled out]
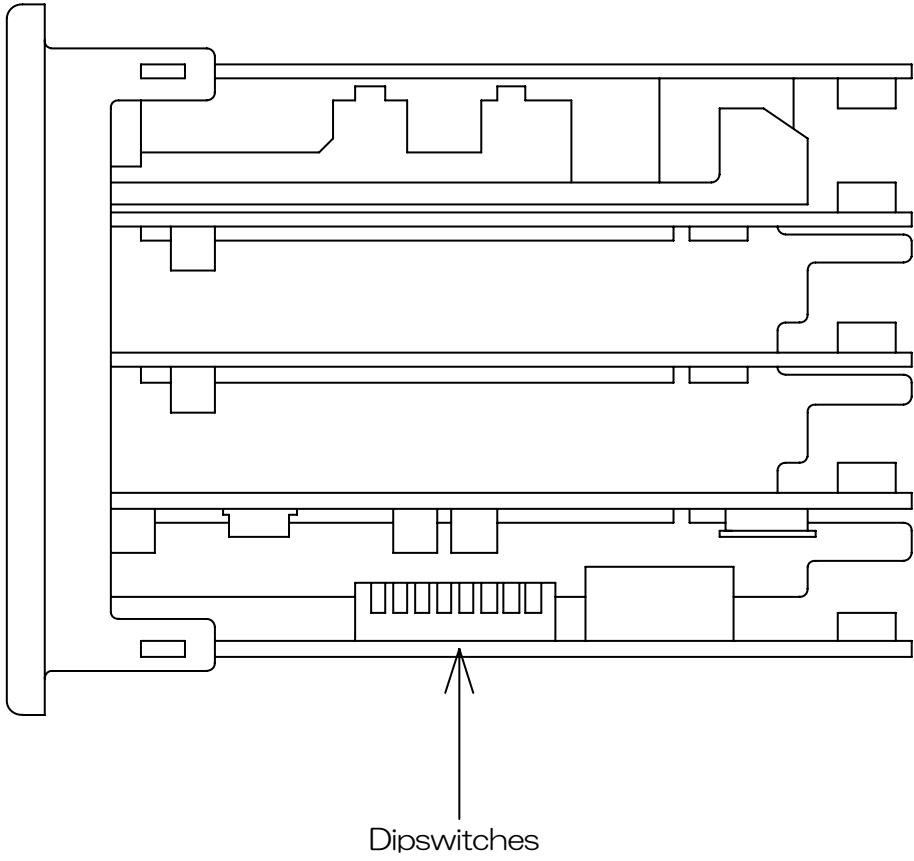
Dipswitches

[Enlarged view of dipswitches]

ON   1   2   3   4   5   6   7   8

ON

4-2. External dimensions

REAL
HOLD
PRES

DATA

25.83

CH

HEAD
REM
CO

46

79

HEAD   CH   MODE   T   AH   AL

HEAD	HOLD −	PRES 7	R/L 8	S/R 9	SEL
CH	T .	4	5	6	CLR
MODE	CO	0	1	2	3	ENT

IRGMEG3   CHINO

96

96

88×88
91×91
115

7   120
147
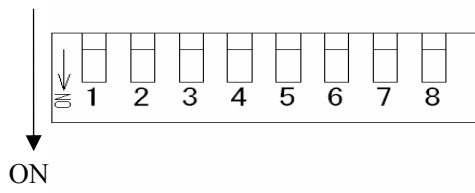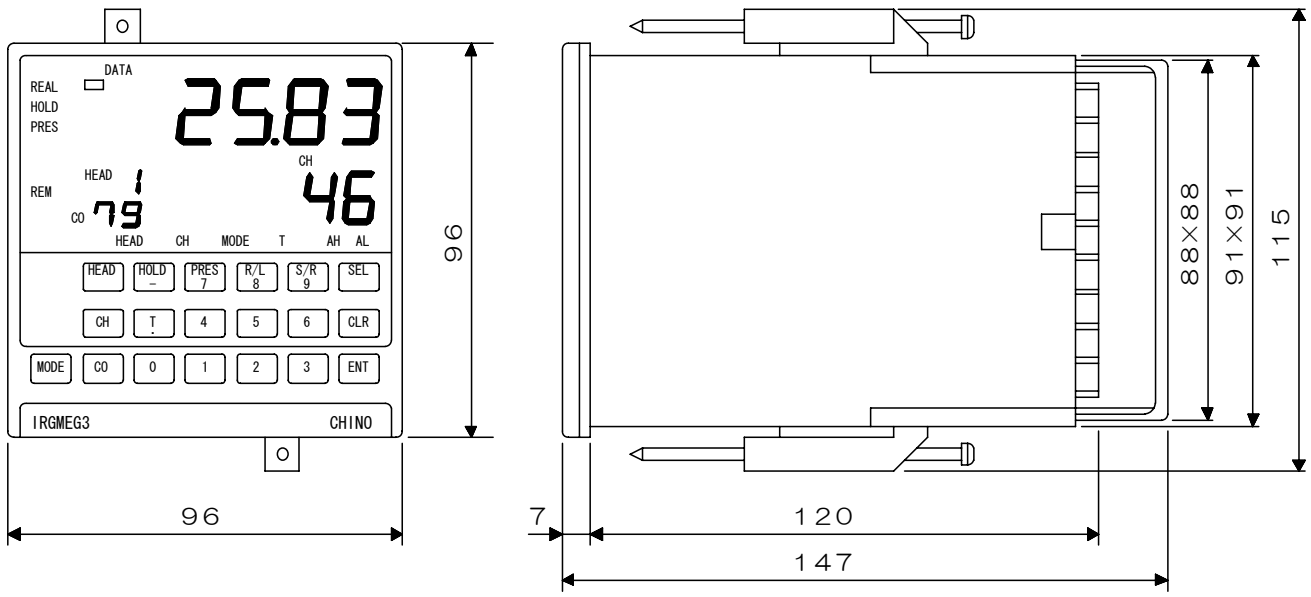
[Unit : mm]

4-3. Mounting

4-3-1. Panel cutout and mounting method

(1) Insert this product to the panel cutout.
(2) Fit the supplied mounting brackets to the upper and lower parts of the panel and screw them tightly using a screw driver.
The maximum tightening torque is 0.8 Nm.

120

120

$92^{+0.8}_{0}$

$92^{+0.8}_{0}$

$92^{+0.8}_{0}$

$96×N-4 \quad ^{0}_{-2}$
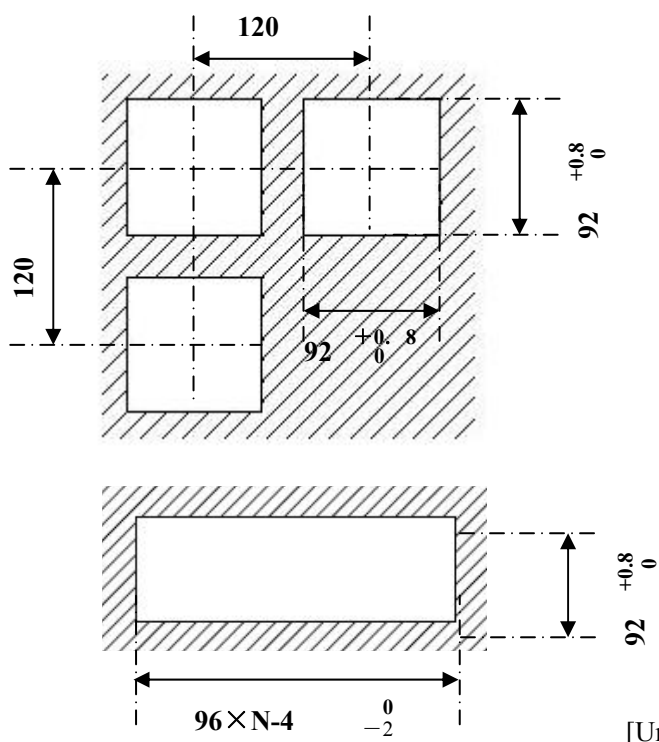
N: Number of mounted units

Mounting bracket

Panel

This product

[Unit: mm]
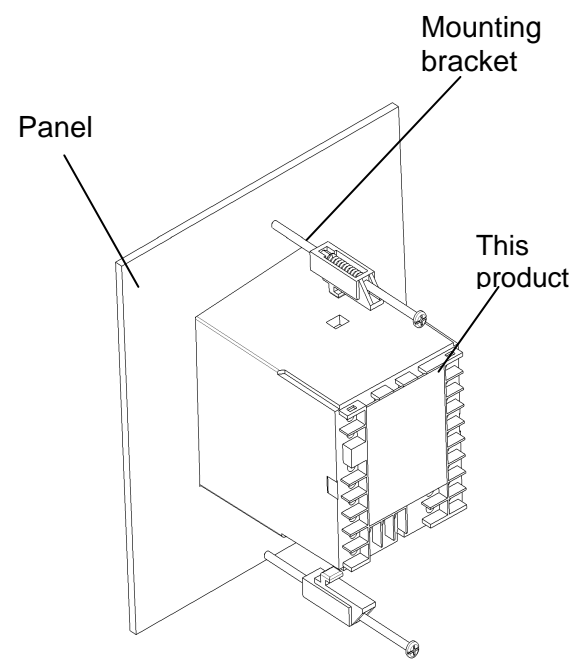
4-3-2. Installation condition

⚠ **Caution**	Make sure to read and understand this part to avoid the risk of accidents.

1. Environment
    (1) Indoors
    (2) Locations not exposed to direct sunlight
    (3) Locations away from high temperature
    (4) Locations away from vibrations and shocks
    (5) Locations not exposed to liquid (e.g. water)
    (6) Locations away from dew condensation

2. Atmosphere
    (1) Locations away from strong noise, static electricity, electric field, or magnetic field
    (2) Locations where the ambient temperature is within 0 $^{\circ}$C and 50 $^{\circ}$C and the ambient humidity
        is within 10 and 90 % RH
    (3) Locations with small temperature variations
    (4) Locations away from corrosive, explosive, flammable, or combustible gas
    (5) Locations not exposed to salted, ferric, or conductive material (e.g. carbon, iron)
    (6) Locations not exposed to steam, oil, or chemical
    (7) Locations without dust or dirt
    (8) Locations away from a high-heat generating source
    (9) Locations away from stagnant heat
    (10) Locations where wide open space can be secured above the product
    (11) Locations without wind

3. Mounting position
    (1) Maximum installation altitude is 2000 m.
    (2) Mounting height is about 1.5 m (approximate eye level).
    (3) Mounting angle is up to ±10° in longitudinal and transverse directions respectively.

4. Miscellaneous
    (1) Do not wipe this product with organic solvent (alcohol, etc.).
    (2) Do not use a mobile phone near this product to prevent its malfunction.
    (3) This product may cause interference to television and radio reception in the vicinity of it.

4-4. Mounting/removing terminal cover

A cover is provided to protect the terminals. It also prevents the operator from touching the terminals.
To avoid shock hazards, use this terminal cover or provide the final product with a safety measure so that the operator does not touch them directly.

4-4-1. How to mount the terminal cover

(1) Engage the upper hooks of the terminal cover to the upper part of the product rear side.
(2) Push the lower terminal cover and engage the lower hooks to the product body.
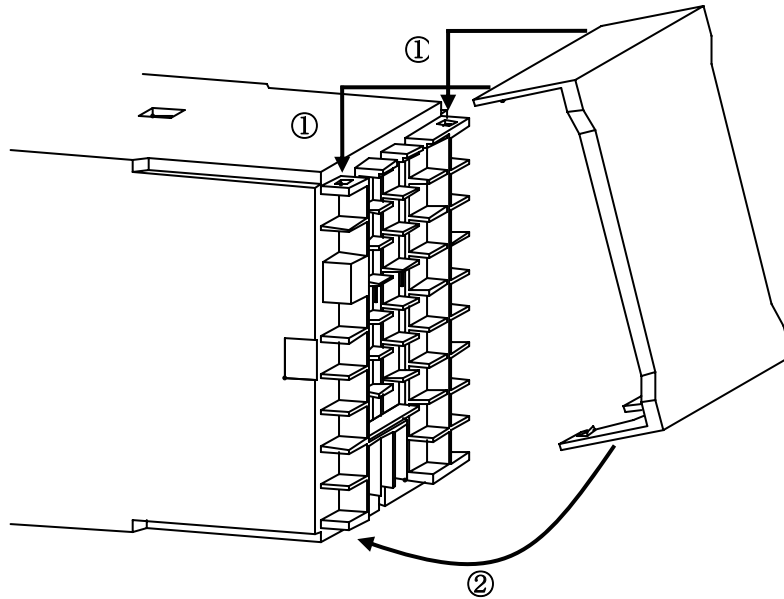
4-4-2. How to remove the terminal cover

(1) Remove the terminal cover by lightly pushing the right and left lower hooks downward respectively.
(2) Remove the upper hooks of the terminal cover.
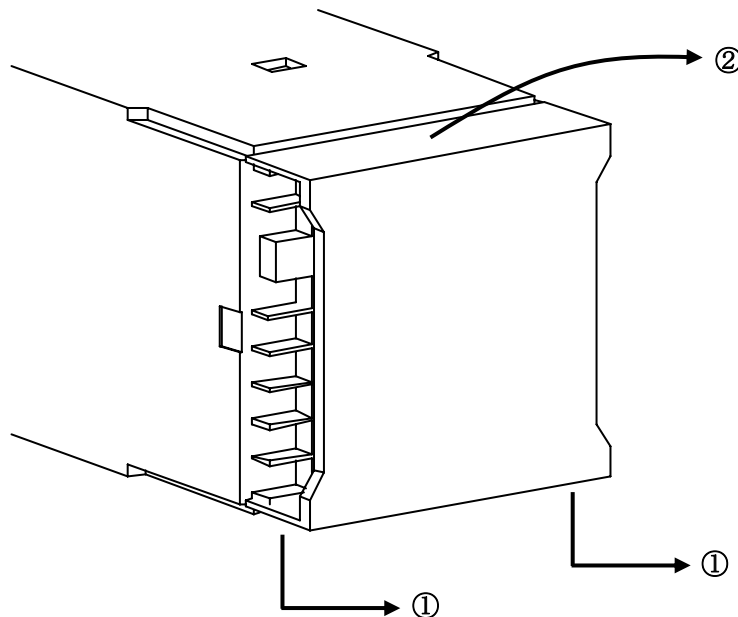
4-5. Connections

There is a terminal board on the rear side of this unit. Turn off the power source and carry out wiring as shown in the figure.

⚠ **Warning** For avoiding the risk of electric shock, make sure to turn off the power source to this unit before wiring to the power terminals.

Connecting cable
IR-WERP

Setting display unit
IRGMEG3□

Detector unit
IRMA□□□□□

IM SERIES CHINO
MADE IN JAPAN
CH DATA

SA(Black)
SB(Red)
SG(Brown)

Ground terminal

Power source
100 to 240V AC
50/60Hz

G(Green)

Power supply unit
IR-WEP

INPUT
POWER SUPPLY
OUTPUT

P-(Blue)
P+(Red)

COMMUNICATION   BCD IN

SD/SDA/SA ❶   ⑫⊕ OUT3   ⑲K2   ㉖1   ㉟⊕ OUT1
/SDB/SB   ❷   ⑬   ⑳K1   ㉗2   ㊱
          14   ㉑PRESET ㉘4   ㊲⊕ OUT2
RD/RDA/   ❸   15   ㉒HOLD ㉙8   ㊳
/RDB/   ❹   16   ㉓HEAD/CH ㉚10   39
SG   ❺   17   ㉔(CH)   ㉛20   ㊵ ERR
FOR HEAD   18   ㉕COM   ㉜40   ㊶ AL1
          SA ❻   POWER   ㉝80   ㊷ AL2
          SB ❼   ❾ ❿ ⓫ ㉞COM   ㊸ COM
          SG ❽   N L

・IRGMEG3□ Supply voltage
  100 to 240V AC 50/60 Hz
・IRGMEG3□ Contact rating
  Resistive load 100 to 240V AC
                  30V DC
                  3A or below
  Inductive load 100 to 240V AC
                  30V DC
                  1.5A or below
  Minimum load 5V DC 10mA

- 12 -

4-5-1. Terminal layout

1. Enlarge view of the terminal board
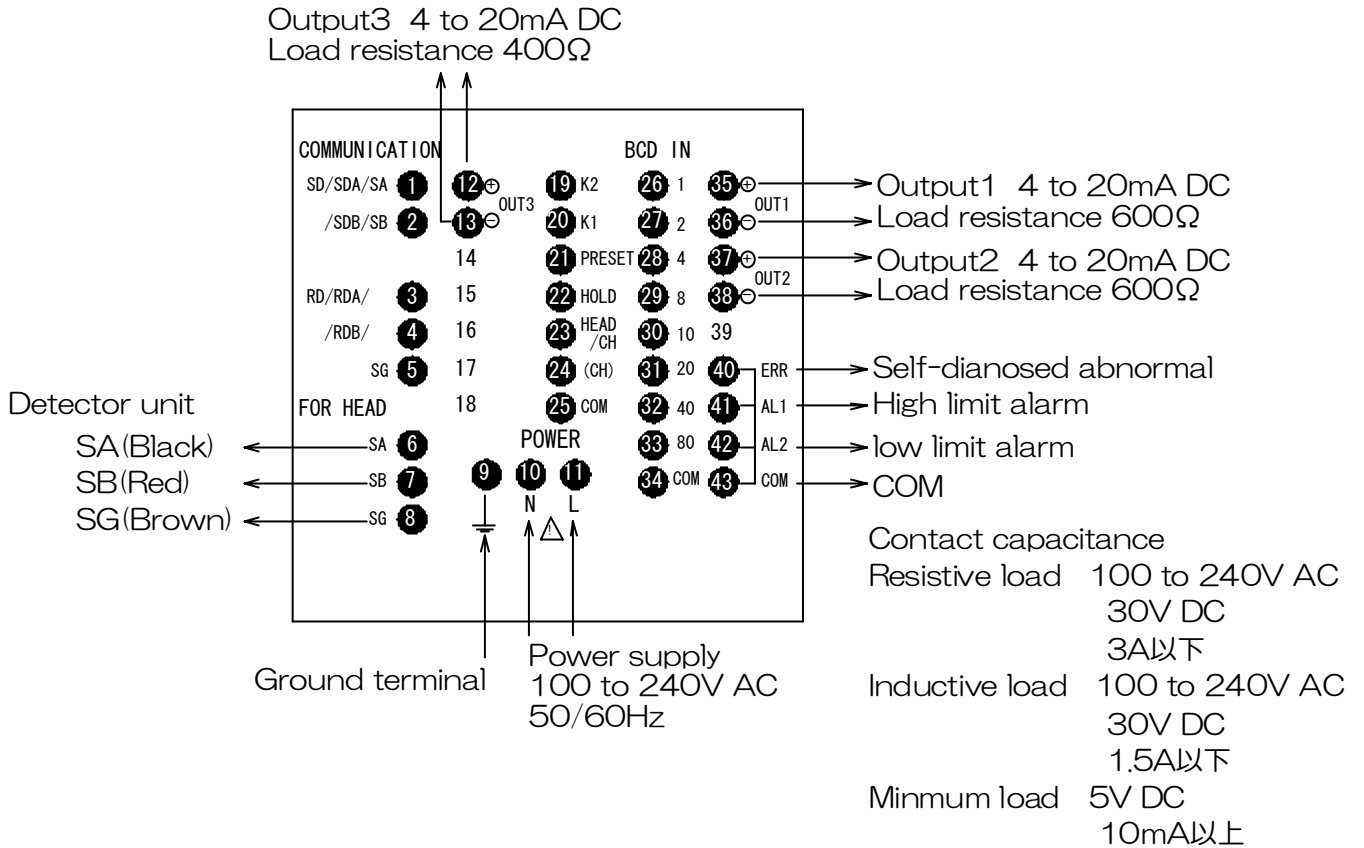
4-5-2. Terminal number and functionality

1. Upper communication output terminals

Terminal No.	IRGMEG3R RS-232C communication	IRGMEG3A RS-422A communication	IRGMEG3S RS-485 communication
1	SD	SDA	SA
2	--	SDB	SB
3	RD	RDA	--
4	--	RDB	--
5	SG	SG	SG

2. Contact input terminals

Terminal No.	Item	Explanation
19	K2	Constituent No. input command
20	K1	No. 1 side calibration with the contact ON
21	PRESET	Preset output with the contact ON
22	HOLD	Hold with the contact ON
23	HEAD/CH	Switching of the detector unit No. and the calibration curve No. (*)
24	(CH)	Switching of calibration curve No. (*)
25	COM	Common terminal for contact input
26	BCD IN 1	Detector unit No./Calibration curve No./Constituent No. 1-input
27	BCD IN 2	Detector unit No./Calibration curve No./Constituent No. 2-input
28	BCD IN 4	Detector unit No./Calibration curve No./Constituent No. 4-input
29	BCD IN 8	Detector unit No./Calibration curve No. 8-input
30	BCD IN 10	Calibration curve No. 10-input (16-input with binary)
31	BCD IN 20	Calibration curve No. 20-input (32-input with binary)
32	BCD IN 40	Calibration curve No. 40-input (64-input with binary)
33	BCD IN 80	Calibration curve No.80-input (not used with binary)
34	COM	Common terminal for contact input

(*) Depends on dipswitch settings.
Refer to [4-1-2. Setting dipswitches] and [3. Setting calibration curve numbers] in [6-10-1. Setting detector unit numbers, constituent numbers and calibration curve numbers] for details.

4-5-3. Basics of wiring

⚠ **Caution**	Make sure to read and understand this part to avoid the risk of accidents.

1. Connecting to terminals

(1) Use crimp-type terminals with insulation sleeve to wire terminals. To secure safety, make sure to use O-type terminals for power supply and ground terminals. It is recommended to use O-type terminals for other terminals as well.

Size

A: 3.7 mm or more

B: 7.0 mm or less
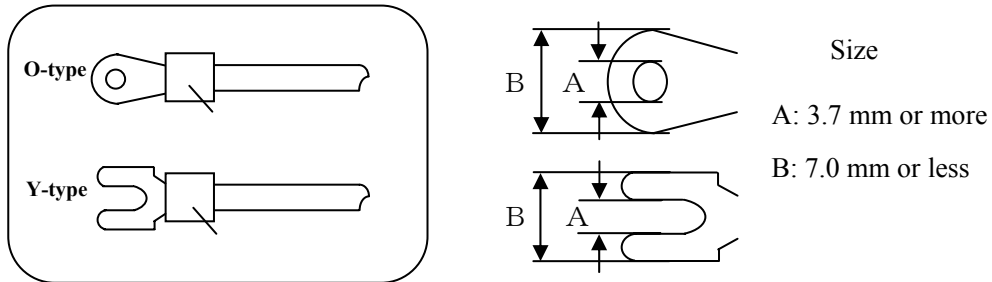
(2) The maximum tightening torque of terminal screws is 0.8 Nm. Be aware that terminal screws will be damaged if an excessive torque is applied.

2. Power supply terminal

(1) For the power source, setup a switch compliant with this unit's rating and an overcurrent protection device in an accessible range, within 3m from this unit.
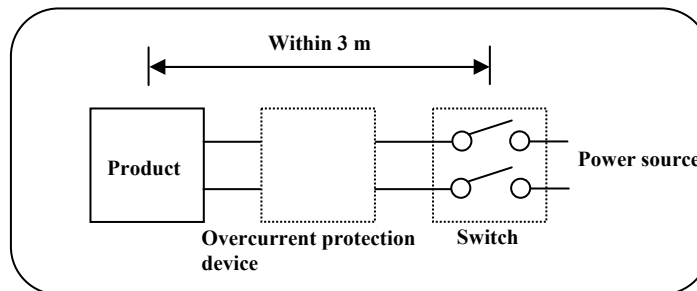
(2) For the power source wiring, use a 600 V vinyl insulation electric cable or above (rating 1 A AC or above).

(3) To prevent malfunctions, use a quality single-phase power source with less noise, waveform distortion, and voltage variation.
If excessive noise is detected, take measures such as inserting a noise filter or an insulation transformer.

(4) Be aware that a minute leakage current is present in the ground terminal at a rated voltage. The leakage current is about 1 mA.

⚠ **Warning**	To avoid the risk of serious accidents, make sure to turn off the power source before wiring.

3. Output terminals

(1) Use the output terminals within the rating range. Application of a load out of the rating range may cause breakdown, significant degradation, or malfunction to the unit.

── About analog output ──

This unit is designed for use with multiple-constituents analyzer detector units' connection and can connect plural constituent meter detector units.

The detector unit to provide output then is determined by dipswitch settings as below.

Refer to [4-1-2. Setting dipswitches] for dipswitch setting.

(1) Dipswitch 1: OFF, 4: OFF (Single-detector-unit connection)

High and low limit outputs in the calibration curve setting are used for the output scale (paired with the calibration curve number).

	Detector unit with a 1 constituent specification	Detector unit with a 2 or more constituents specification
OUT 1	Constituent 1 of the detector unit number 1	Constituent 1 of the detector unit number 1
OUT 2	Constituent 1 of the detector unit number 1	Constituent 2 of the detector unit number 1
OUT 3	Constituent 1 of the detector unit number 1	Constituent 2 of the detector unit number 1

(2) Dipswitch 1: ON, 4: OFF (Multiple-detector-unit connection)

High and low limit outputs in the calibration curve setting are used for the output scale (paired with the calibration curve number).

	2 or more detector units connected
OUT 1	Constituent 1 of the detector unit number 1
OUT 2	Constituent 1 of the detector unit number 2
OUT 3	Constituent 1 of the detector unit number 2

(3) Dipswitch 1: OFF, 4: ON (Single-detector-unit connection)

High and low limit outputs set in MODE 70 are used for the output scale (not rely on the calibration curve number).

	Detector unit with a 1 constituent specification	Detector unit with a 2 or more constituents specification	Detector unit with a 3 or more constituents specification
OUT 1	Constituent 1 of the detector unit number 1	Constituent 1 of the detector unit number 1	Constituent 1 of the detector unit number 1
OUT 2	Constituent 1 of the detector unit number 1	Constituent 2 of the detector unit number 1	Constituent 2 of the detector unit number 1
OUT 3	Constituent 1 of the detector unit number 1	Constituent 2 of the detector unit number 1	Constituent 3 of the detector unit number 1

(4) Dipswitch 1: ON, 4: ON (Multiple-detector-unit connection)

High and low limit outputs set in MODE 70 are used for the output scale (not rely on the calibration curve number).

	3 or more detector units connected
OUT 1	Constituent 1 of the detector unit number 1
OUT 2	Constituent 1 of the detector unit number 2
OUT 3	Constituent 1 of the detector unit number 3

4. Alarm terminals

(1) Use the alarm terminal within the rating range. Application of a load out of the rating range may cause breakdown, significant degradation, or malfunction to the unit.

(2) Make sure to apply a load to the alarm terminal via a buffer relay. Also, a contact protection element must be provided on the coil side of the buffer relay to protect the contact of the unit's internal relay and to reduce noise.
Capacitor: 0.01 μF (rating about 1 kV)
Resistance: 100 to 150 Ω (rating about 1 w)

About alarm output

Each alarm output is fixed as below regardless of the number of units connected.

AL1	High limit alarm of the constituent 1 of the detector unit number 1
AL2	Low limit alarm of the constituent 1 of the detector unit number 1
ERROR	Output by OR of the self-diagnosed failure of each detector unit connected

⚠ **Caution**	(1) Connecting a power source out of the rating range may cause breakdown, significant degradation, or malfunction to the unit.
	(2) Analog and contact outputs may have a defective result due to malfunction, breakdown, and sensor failure. Make safety provisions on the final product side, if necessary.

4-5-4. Connection examples

1. Multiple-detector-units connection

In the multiple-detector-units connection, the following two connection systems are available. For either connection system, before turning on the power to this unit, set detector unit numbers not to overlap them each other.
Refer to a separate instruction manual of [Infrared Multi Analyzer IRMA □□□□□] for setup of detector unit numbers.

(1) Relaying boxes used

Detector unit
IRMA□□□□□

Connecting cable
IR-WERP□□□(∗)

Relay box IR-WEE□
(Power supply unit is built in)

2-conductor twisted cable
(with shield)

Connecting cable
IR-WERP□□□(∗)

2-conductor twisted cable
(with shield)

Connecting cable
IR-WERP□□□(∗)

2-conductor twisted cable
(with shield)

Setting display unit
IRGMEG3□

100 to 240V AC
50/60Hz
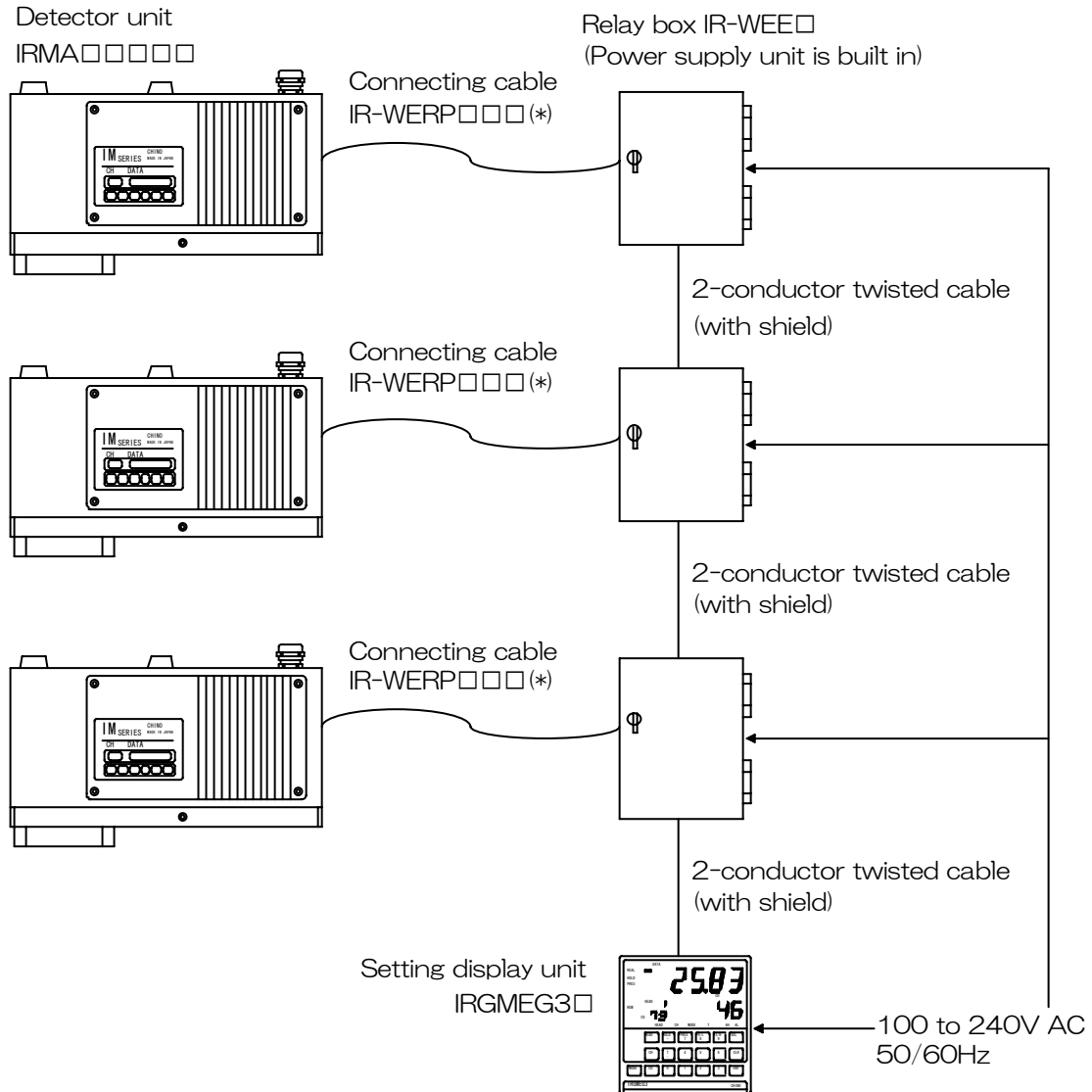
Remarks ∗Connection cable length should be within 30 m indoors.

⚠ **Caution**   For wiring to the relaying box, refer to the separate manual for the relaying box.

(2) Relaying boxes not used

Detector unit
IRMA□□□□□

Connecting cable
IR-WERP□□□(*)

Power supply unit IR-WEP

IM SERIES CHINO
CH DATA

INPUT
POWER SUPPLY
OUTPUT

Connecting cable
IR-WERP□□□(*)

IM SERIES CHINO
CH DATA

INPUT
POWER SUPPLY
OUTPUT

Connecting cable
IR-WERP□□□(*)

IM SERIES CHINO
CH DATA

INPUT
POWER SUPPLY
OUTPUT

Setting display unit
IRGMEG3□

25.83
46

100 to 240V AC
50/60Hz
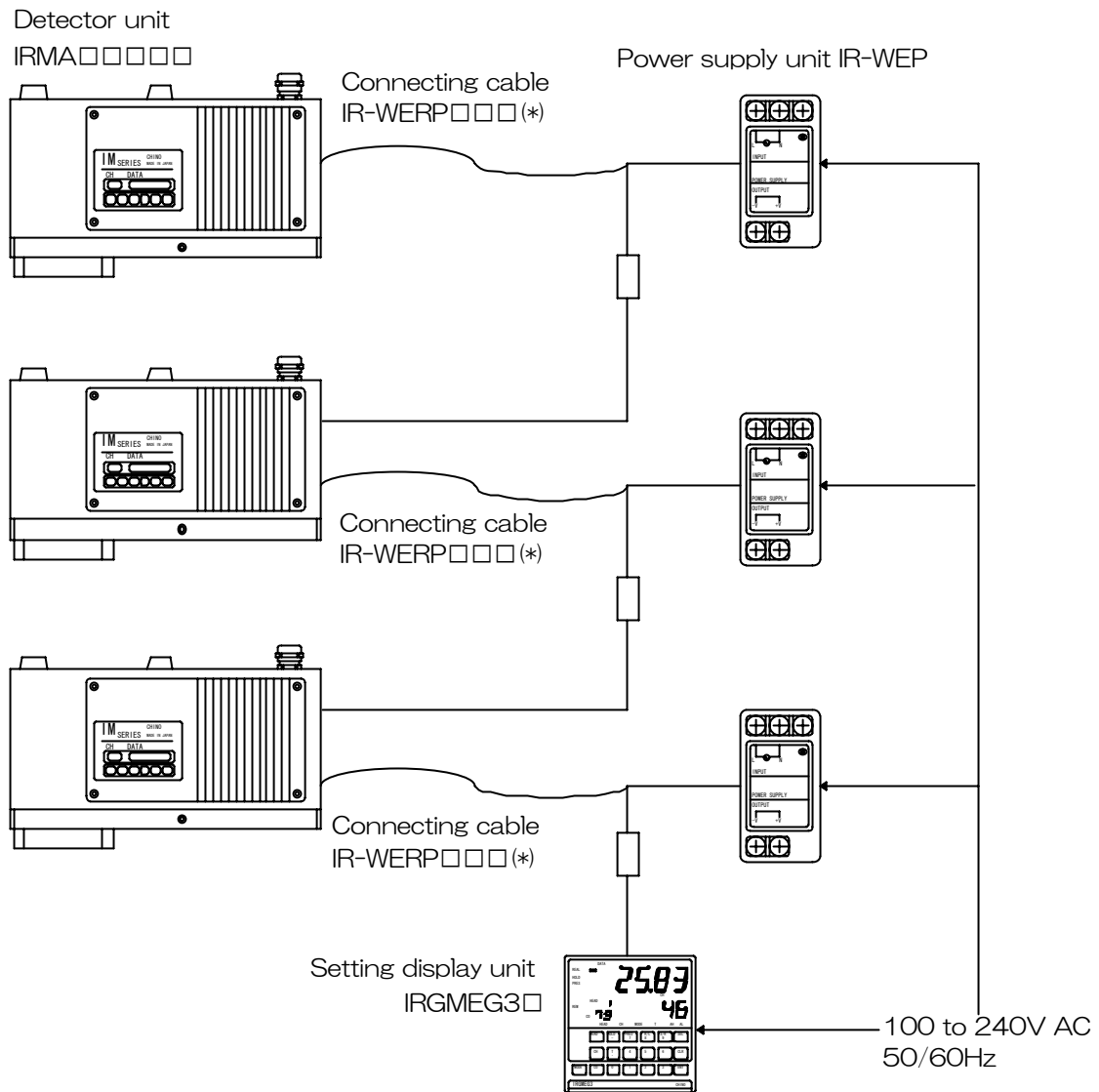
Remarks ⟩ *Connection cable length should be within 30 m indoors.

4-5-5. Cautions on connections

⚠️ **Warning**	Make sure to read and understand this part to avoid the risk of serious accidents.

1. Ask specialists for wiring.

Wiring must be carried out by a specialist with basic knowledge of instrumentation and experiences in it.

2. Set a terminal cover.

To secure safety, after wiring, provide a measure so that the unit terminals are not touched directly.

3. Separate the unit from strong power circuits or noise sources.

To avoid any negative effect by noise, do not install the unit in the vicinity of noise generating instruments (e.g. magnetic relay, motor, thyristor regulator, and inverter). Also, do not set the cables of this unit and those from the noise generating instruments in a same duct. Make sure to separate them.
Take noise reduction measures, if necessary.

4. Use care with ground terminal wiring.

For overall reliability of the final product, proper grounding (earth) is very important. It is generally recommended that each instrument is ground by single-point grounding. In multiple-point grounding, they become prone to be negatively impacted by noise. Use special care with the grounding path.

5. Separate the unit from heat sources.

To avoid any negative effect by high temperature, do not install the unit in the vicinity of heat sources. With a heat source close to it, the unit may cause measurement errors and eventually its life may shorten significantly. Pay attention to ambient temperature of the unit.
Also, avoid windy locations or sudden temperature changes which trigger measurement errors of the unit.

6. Unassigned terminals

Do not connect anything to unassigned terminals. It may cause a failure of the unit.

7. Measures against erroneous output at the time of power on

After turning on the power source, output-related signals may be generated momentarily before the unit starts operating normally. Take measures in external circuits, if necessary.

5.Names and Functions

Minus status lamp

(6)Measurement status lamp

(2)Detector unit number display (HEAD display window)

(4)Constituent number display (CO display window)

(8)Function key

(1)Data display (DATA display window)

(5)Setting status lamps

(3)Calibration curve number display (CH display window)

(7)Key-lock indicator

(6)Measurement status lamps (Alarm)

IRGMEG3   CHINO

Name	Function
①Data display (DATA display window)	Measurement mode: Displays a constituent value (moisture content and thickness). Setting mode: Displays a setting data. Displays an error number when an abnormal condition occurred.
②Detector unit number display (HEAD display window)	Displays a detector unit number of the constituent meter currently indicating a constituent value in the data display. When the detector unit numberis changed, a constituent value being measured by the detector unit with the changed number will be displayed.
③Calibration curve number display (CH display window)	Measurement mode: Displays a calibration curve number. Setting mode: Displays a setting item. Displays a mode number during mode setting and a time constant during time constant setting. The first-digit decimal point indicates the key-lock activated.
④Constituent number display (CO display window)	Measurement mode: Displays a constituent number. Setting mode: Displays a calibration curve number in process during settings of a calibration curve number and calibration curve output limit value.
⑤Setting status lamps	HEAD: Lights during the detector unit number setting. CH: Lights during the calibration curve number setting. MODE: Lights during the mode number setting. For IRMA5000 or 6000 series detector units being connected, this lamp lights during the setting of the constituent number whose calibration curve or time constant is set. T: Lights during the time constant setting.
⑥Measurement status lamps	REAL: Lights during the real (without smoothing) measurement mode. HOLD: Lights in the hold mode. PRES: Lights during the preset output. REM: Lights during the remote setting of a calibration curve number.
(Alarm)	AH: Lights up when the constituent 1 of the displayed detector unit reached a high limit alarm status. AL: Lights up when the constituent 1 of the displayed detector unit reached a low limit alarm status.
⑦Key-lock indicator	The first-digit decimal point indicates the key-lock activated.

Name	Function		
⑧Function keys	HEAD		Is used to set a detector unit number.
	CH		Is used to set a calibration curve number.
	MODE		Is used to set a mode number.
	CO		Is used to set a constituent number.
	HOLD／−		Switches the HOLD to ON or OFF in the measurement mode. Is used to enter a minus sign (-) in the setting mode.
	PRES／7		Switches the PRESET to ON or OFF in the measurement mode. Is used to enter the numeric of 7 in the setting mode.
	R/L／8		Switches the calibration curve setting to REMOTE or LOCAL in the measurement mode. Is used to enter the numeric of 8 in the setting mode.
	S/R／9		Switches the measurement mode to REAL or SMOOTHING in the measurement mode. Is used to enter the numeric of 9 in the setting mode.
	T／・		Is used to set the time constant in the measurement mode. Is used to enter the decimal point in the setting mode.
	0 ∼ 6		Is used to enter the numeric from 0 to 6.
	SEL		Is used to enter into the setting mode or switch screens. Press this key for 2 seconds or more in the setting mode to return to the measurement mode.
	CLR		Is used to clear a data being set. A data is cleared from the least significant digit, each time this key is pressed once.
	ENT		Is used to store a parameter data.

6. Operation

6-1. Confirmation before operation

Check the following three points before turning on the power.
1) Have the dipswitches been set? (Refer to [4-1. Setting dipswitches].)
2) Are all of connections correct? (Refer to [4-5. Connections])
3) In the multiple-detector-units connection, have detector unit numbers been set?
  (Refer to the separate instruction manual for [Infrared Multi-constituents Analyzer detector unit IRMA□□□□□□].)

⚠ **Caution**	Turn on the power to this unit concurrently with or after turning on the power to detector units. If the power to this unit is turned on before turning on detector units, this unit can not recognize the detector units and will display the error code Er18 (detector unit number error). If Er18 is displayed, press HEAD and CLR keys at the same time for 2 seconds or more to reattempt to recognize the detector units (status with all lights on indicates the reattempt is in process). If HEAD lamp is on, press SEL key for 2 seconds or more to turn it off.

6-2. Setting detector unit numbers

When the power to this unit is turned on, data measured by the constituent meter with the detector unit number being indicated in "HEAD" will be displayed. The following procedure is for changing a detector unit number.

(1) Press HEAD key to enter into the detector unit number setting mode with the setting lamp "HEAD" lit.
(2) Press the numeric keys 1 to 9 to enter a detector unit number.
(3) By pressing ENT key, the data measured by the constituent meter with the changed detector unit number will be displayed. The calibration curve number and the constituent value displayed this time are under the conditions set in the changed constituent meter. (Time constant, decimal places of constituent values displayed, etc.)
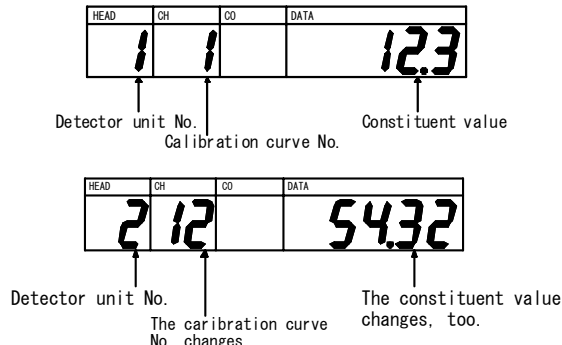
6-3. Setting constituent numbers

For IRMA5000 or 6000 series detector units being connected

To change the currently displayed constituent number, set it by the following steps.

1) Press CO key. The setting lamp (MODE) turns on and a number 30 is displayed in the CH display window.
2) Press numeric keys 0 to 4 to enter a detector unit number.
3) Press ENT key to display the moisture meter data of a new detector unit number.
  Then, all of calibration curve numbers and constituent values are displayed in accordance with setting conditions of the changed constituent meter (number of decimals of time constant and moisture content, etc).
  Setting range: 0 to 4
  (0: CYCLE (Circulating display), 1: C1, 2: C2, 3: C3, 4: C4)
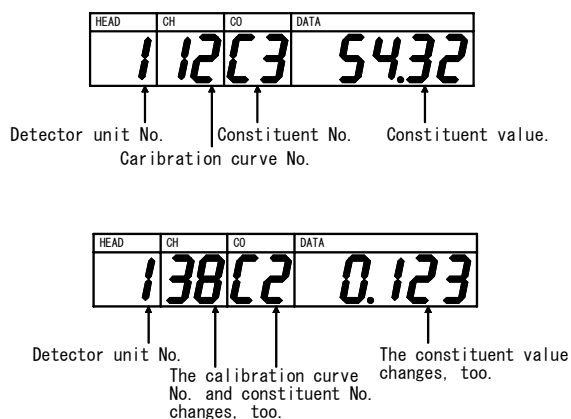
6-4. Setting calibration curves

Output characteristics of detector units depend upon measuring objects. It may also change according to process conditions or constituent measuring conditions of samples.

Accordingly, for accurate measurements, it is required to perform beforehand sample tests of each object and obtain, for moisture measurements, a relationship (This is called as a calibration curve.) between moisture contents (%H_2O) obtained by a drying method or other measuring methods and　absorbance "x" measured by a detector unit] or, for thickness measurements, a relationship (This is called as a calibration curve.) between thickness (μm) obtained by a micrometer or other measuring methods and absorbance "x" measured by a detector unit].

Reference〉 This paragraph describes the setting method of calibration curve data, assuming that calibration curves have been already created.
When the calibration curves have not been created yet, refer to the paragraph [Sample preparation] in the separate instruction manual of the detector unit IRMA□□□□□□　being connected.

6-4-1. Setting calibration curves: [Flow chart of the parameter menus]

*Displayed in the computing mode 4.
Displayable and settable coefficients vary depending on specifications of detector units being connected (number of wavelengths).

Display and setting are available with IRMA5000 or 6000 series detector units.

Displayed when the surface water ratio computation is ON.
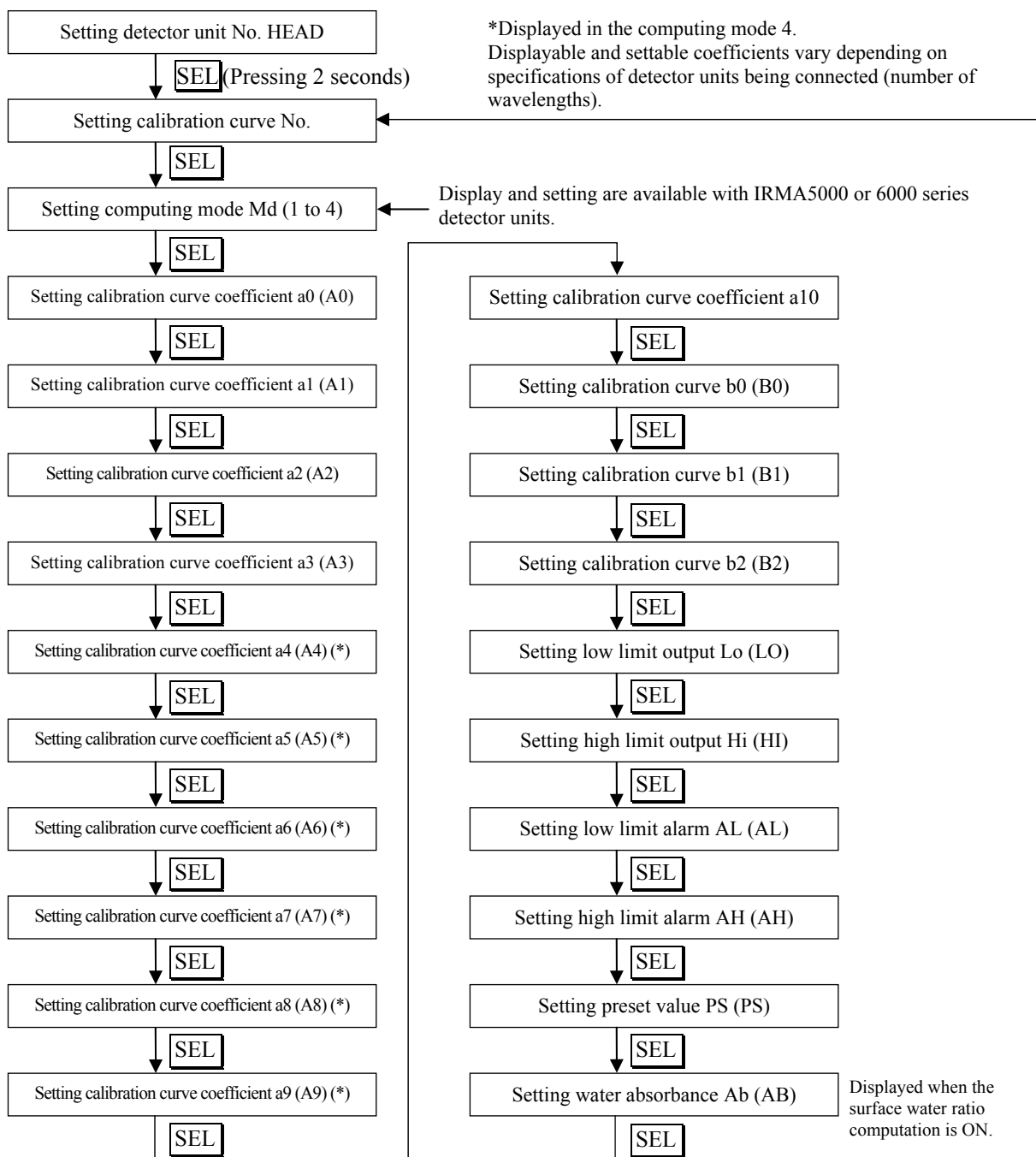
6-4-2. Data for calibration curves setting

1. List of data for calibration curves setting

The followings are data for setting calibration curves.
Setting items available differ depending on specifications (number of wavelengths and number of constituents) of a detector unit being connected.

		Data name	Display	Range of data	Default value	Remarks
(1)		Calibration curve No.	CH	1 to 99	1	
(2)		Computing mode	Md	1 to 4	1	(*1)
(3)		Calibration curve coefficient a_0	A0	-99999 to 99999	0.0000	
		Calibration curve coefficient a_1	A1	-99999 to 99999	1.0000	Effective numeric: 5 digits
		Calibration curve coefficient a_2	A2	-99999 to 99999	0.0000	
		Calibration curve coefficient a_3	A3	-99999 to 99999	0.0000	
		The followings are used in the mode 4 only. The numbers 4 to 10 indicate the number of wavelengths. (*1)				
		Calibration curve coefficient a_4	A4	-99999 to 99999	0.0000	
		Calibration curve coefficient a_5	A5	-99999 to 99999	0.0000	
		Calibration curve coefficient a_6	A6	-99999 to 99999	0.0000	
		Calibration curve coefficient a_7	A7	-99999 to 99999	0.0000	Effective numeric: 5 digits
		Calibration curve coefficient a_8	A8	-99999 to 99999	0.0000	
		Calibration curve coefficient a_9	A9	-99999 to 99999	0.0000	
		Calibration curve coefficient a_{10}	AA	-99999 to 99999	0.0000	
(4)		Correction expression coefficient b_0	b0	-99999 to 99999	0.0000	
		Correction expression coefficient b_1	b1	-99999 to 99999	1.0000	Effective numeric: 5 digits
		Correction expression coefficient b_2	b2	-99999 to 99999	0.0000	
(5)		Low limit output	Lo	0 to 9999.9	0.00	For IRMA1000, 2000, 7000, and 8000, decimal points vary depending on settings.
		High limit output	Hi	0 to 9999.9	100.00	
(6)		Low limit alarm	AL	0 to 9999.9	0.00	
		High limit alarm	AH	0 to 9999.9	100.00	For IRMA5000,6000 -Effective numeric : 5 digits
(7)		Preset value	PS	0 to 9999.9	0.00	
(8)		Water absorbance	Ab	-99999 to 99999	0.00	Effective numeric: 5 digits (*2)
(9)		Sample temperature	tS	-999.9 to 999.9	999.9	(*3)

*1: Displays and settings of these items are only available for IRMA5000 or 6000 series detector units being connected.

*2: For measuring the moisture content of sands, etc., the water absorbance is required to be set. Water absorbance can be displayed and set only when the surface water ratio computation in [6-9-11. Computing surface water ratio] is ON.

*3: Displayed when the sample temperature correction is enabled. Refer to the description from [6-5-3. Enabling/disabling the sample temperature correction function] to [6-5-5. Setting sample temperature] for details.

2. Descriptions of the setting data for calibration curves

	Setting data name	Function
(1)	Calibration curve number	Specify a calibration curve number from 99 calibration curves. Usually, it is specified from 1 sequentially.
(2)	Computing mode (*)	The computing modes selectable differ depending on specifications (number of wavelengths and number of constituents) of a detector unit being connected. The computing modes 1 to 3 are 3-wavelength ratio processing (R1, S and R2) in each group in the table shown below. • Computing mode 1: 3-wavelength ratio processing ($\lambda 1, 2, 3$) in Group 1 • Computing mode 2: 3-wavelength ratio processing ($\lambda 4, 5, 6$) in Group 2 • Computing mode 3: 3-wavelength ratio processing ($\lambda 7, 8, 9$) in Group 3 • Computing mode 4 is multiple regression computation using each wavelength. The number of the wavelengths differs depending on specifications of the detector unit and up to 10 wavelengths are available. Each computing expression of the calibration curve is shown in the next column.

Wavelength	$\lambda 1$	$\lambda 2$	$\lambda 3$	$\lambda 4$	$\lambda 5$	$\lambda 6$	$\lambda 7$	$\lambda 8$	$\lambda 9$	$\lambda 10$
	GROUP 1			GROUP 2			GROUP 3			
Computing mode 1	R1	S1	R2							
Computing mode 2				R1	S1	R2				
Computing mode 3							R1	S1	R2	
Computing mode 4	$\lambda 1$	$\lambda 2$	$\lambda 3$	$\lambda 4$	$\lambda 5$	$\lambda 6$	$\lambda 7$	$\lambda 8$	$\lambda 9$	$\lambda 10$

	Setting data name	Function

(3)	Calibration curve coefficient a_0 to a_{10} (*)	These coefficients are provided for the following computing expressions to compute a calibration curve.
		1) Computing mode 1, 2, 3
		   A calibration curve is computed by the cubic or lower-degree polynomial.
		     $y = a_3 x^3 + a_2 x^2 + a_1 x + a_0$,
		     where, "y" is a measured value and "x" is an absorbance.
		2) Computing mode 4
		   A calibration curve is computed by the multiple regression computation at each wavelength.
		     $y = a_0 + a_1 LOG(\lambda 1) + a_2 LOG(\lambda 2) + \ldots\ldots\ldots + a_{10} LOG(\lambda 10)$
		     Note that settable coefficients differ depending on number of wavelengths being used.

(4)	Correction expression coefficient b_0 to b_2	These coefficients are provided for the quadratic expression correction against a measured value "y". Assuming that a measured value after the correction be "Y", we obtain "$Y = b_2 y^2 + b_1 y + b_0$".
(5)	Low limit output High limit output	These specify measured values at a low limit output and a high limit output on the analog output scaling. The output is scaled to 4mA at the low limit measured value and 20mA at the high limit measured value. It is enabled when the dipswitch 4 is OFF.
(6)	Low limit alarm High limit alarm	A low limit alarm is activated when a measured value is lower than a low limit alarm setpoint. A high limit alarm is activated when a measured value is higher than a high limit alarm setpoint.
(7)	Preset value	By setting the preset output to ON by key operations or through communications, the value being set as a preset value is displayed and outputted, regardless of measured values.
(8)	Water absorbance	Decide a water absorbance to compute a surface water ratio for measuring moisture contents of sands, etc. The relation between a measured moisture content (%: mass basis moisture content), a surface water ratio (%) and a water absorbance (%) is; ・Surface water ratio = (Moisture content − Water absorbance) / (1 + (Water absorbance / 100))
(9)	Sample temperature	A temperature is specified for a calibration curve computation. Refer to [6-5-6. Setting calibration curve data] for details.

(*) Computing mode setting is enabled with IRMA5□□□ and IRMA6□□□.

6-4-3. Setting procedure of calibration curves

The setting procedures for (1) calibration curve numbers, (2) computing modes and (3) calibration curve coefficients a_0 to a_{10} shown in [6-4-2.-1. List of the setting data for calibration curves differ depending on specifications (number of wavelengths and number of constituents) of a detector unit being connected.
The followings are these setting procedures.

1. Setting detector unit numbers and (1) calibration curve numbers to (3) calibration curve coefficients for IRMA1000, 2000, 7000 or 8000 series detector units

1) Use numeric keys $\boxed{1}$ to $\boxed{9}$ to select a desired detector unit number.
$\boxed{\text{HEAD}}$ $\boxed{}$ $\boxed{\text{ENT}}$

2) Press $\boxed{\text{SEL}}$ key for 2 seconds or more to display CH in the CH display window. Then, the mode enters into the calibration curve number setting mode.

3) Use numeric keys $\boxed{0}$ to $\boxed{9}$ to select a desired calibration curve number.
$\boxed{}$ $\boxed{}$ $\boxed{\text{ENT}}$

Detector unit No. to set
Caribration curve No. setting mode
Caribration curve No.

4) Press $\boxed{\text{SEL}}$ key to display A0 in the CH display window. Then, the mode enters into the calibration curve coefficient a_0 setting mode.

5) Use the numeric keys $\boxed{0}$ to $\boxed{9}$ to set a calibration curve coefficient a_0.
$\boxed{}$ $\boxed{}$ $\boxed{}$ $\boxed{}$ $\boxed{}$ $\boxed{\text{ENT}}$

Setting data name
Calibration curve No. in process
Setting value

$\boxed{\text{Reference}}$ Press $\boxed{\text{T}/\cdot}$ key to enter a decimal point.

6) Press $\boxed{\text{SEL}}$ key to display A1 in the CH display window. Then, the mode enters into the calibration curve coefficient a_1 setting mode.

7) Set a calibration curve coefficient a_1 with the same key operation.(Refer to. 5))

8) Repeat the steps 5) and 6) above to set calibration curve coefficients a_2 and a_3 (CH display window shows A2 and A3).
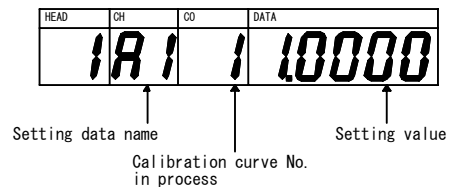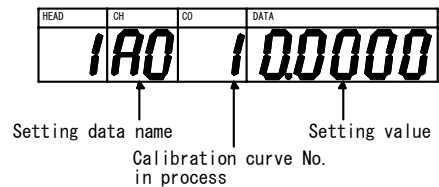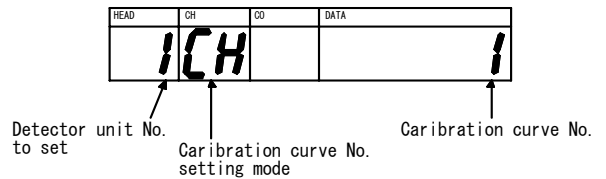
Setting data name
Calibration curve No. in process
Setting value

2. Setting detector unit numbers and (1) calibration curve numbers to (3) calibration curve coefficients for IRMA5000 or 6000 series detector units being connected

1) Use numeric keys $\boxed{1}$ to $\boxed{9}$ to select a desired detector unit number.
$\boxed{\text{HEAD}}$ $\boxed{}$ $\boxed{\text{ENT}}$

2) Press $\boxed{\text{SEL}}$ key for 2 seconds or more to display CH in the CH display window. Then, the mode enters into the calibration curve number setting mode.

3) Use numeric keys $\boxed{0}$ to $\boxed{9}$ to select a desired calibration curve number.
$\boxed{}$ $\boxed{}$ $\boxed{\text{ENT}}$

Detector unit No. to set
Calibration curve No. setting mode
Calibration curve No.

4) Press $\boxed{\text{SEL}}$ key to display Md in the CH display window. Then, the mode enters into the computing mode selection.

5) Use the numeric keys $\boxed{1}$ to $\boxed{4}$ to set a computing mode.
$\boxed{}$ $\boxed{\text{ENT}}$

Setting data name
Calibration curve No. in process
Setting value

6) Press SEL key to display A0 in the CH display window. Then, the mode enters into the calibration curve coefficient a_0 setting mode.

7) Use the numeric keys 0 to 9 to set a calibration curve coefficient a_0.

□ □ □ □ □ ENT

HEAD | CH | CO | DATA
1 A0 | 1 | 0.0000

Setting data name — Calibration curve No. in process — Setting value

<table>
<tr><td>Reference⟩</td><td>Press T/· key to enter a decimal point.</td></tr>
</table>

8) Press SEL key to display A1 in the CH display window. Then, the mode enters into the calibration curve coefficient a_1 setting mode.

9) Set a calibration curve coefficient a_1 with the same key operation. (Refer to. 7))

10) Repeat the steps 7) and 8) above to set calibration curve coefficients a_2 to a_{10} (CH display window shows A2 to AA).

HEAD | CH | CO | DATA
1 A1 | 1 | 1.0000

Setting data name — Calibration curve No. in process — Setting value

3. Setting (4) correction expression coefficient b_0 to b_2 to (8) water absorbance

1) Press SEL key in the setting screen of the calibration curve coefficient $a_\square$ to enter into the correction expression coefficient b_0 setting mode.

2) Use numeric keys 0 to 9 to set a calibration curve coefficient b_0.

□ □ □ □ □ ENT

3) Repeat the steps 1) and 2) above to set correction expression coefficients b_1 and b_2 (CH display window shows b1 and b2).

4) Press SEL key in the setting screen of the correction expression coefficient b_2 to enter into the low limit output Lo setting mode.

5) Use numeric keys 0 to 9 to set a low limit output Lo.

□ □ □ □ □ ENT

6) Repeat the steps 4) and 5) above to set a high limit output Hi (CH display window shows Hi).

7) Press SEL key in the setting screen of the high limit output Hi to enter into the low limit alarm AL setting mode.

8) Use numeric keys 0 to 9 to set a low limit alarm AL.

9) Repeat the steps 7) and 8) above to set a high limit alarm AH (CH display window shows AH).

10) Press SEL key in the setting screen of the high limit alarm AH to enter into the preset value PS setting mode.

11) Use numeric keys 0 to 9 to set a preset value PS.

□ □ □ □ □ ENT

HEAD | CH | CO | DATA
1 b0 | 1 | 0.0000

Setting data name — Calibration curve No. in process — Setting value

HEAD | CH | CO | DATA
1 Lo | 1 | 0.0

Setting data name — Calibration curve No. in process — Setting value

HEAD | CH | CO | DATA
1 AL | 1 | 0.0

Setting data name — Calibration curve No. in process — Setting value

HEAD | CH | CO | DATA
1 PS | 1 | 0.0

Setting data name — Calibration curve No. in prosess — Setting value

12) Press $\boxed{\text{SEL}}$ key to enter into the water absorbance Ab setting mode.

13) Use numeric keys $\boxed{0}$ to $\boxed{9}$ to set a water absorbance Ab.
   ☐ ☐ ☐ ☐ ☐ $\boxed{\text{ENT}}$

14) If calibration curve data is set with other calibration curve numbers, press $\boxed{\text{SEL}}$ key to display CH in the CH display window. Then, repeat from setting of the calibration curve number.
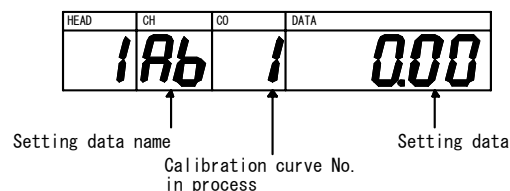
HEAD	CH	CO	DATA
1Ab	1		0.00

Setting data name

Calibration curve No. in process

Setting data

Remarks⟩ Press $\boxed{\text{SEL}}$ key for 2 seconds or more to return to the measurement mode.
Or, if there is no key operation for one minute or more, the mode returns to the measurement mode automatically.

6-4-4. Correcting calibration curves

If an actual constituent value (moisture content or thickness) does not correspond with a constituent value (moisture content or thickness) on a calibration curve being preset due to the difference of one-line and off-line measurements, or other causes, correct it with correction coefficients b_0, b_1 and b_2 in [6-4. Setting calibration curves]. These coefficients are provided for the quadratic expression correction against a measured value "y". Assuming that a measured value after correction be "Y", we obtain,

$$Y = b_2y^2 + b_1y + b_0$$

Usually, a shift correction is done with b_0 only. ($b_1 = 1$, $b_2 = 0$)

Remarks⟩ [Example 1] hen a measured moisture content before correction is 15 (%H_2O) and an actual moisture content is 13 (%H_2O), "-2%H_2O should be set. ($b_2 = 0$, $b_1 = 1$, $b_0 = -2$)

[Example 2] hen a measured thickness before correction is 25 (μm) and an actual thickness is 23.5 (μm), "-1.5μm should be set. ($b_2 = 0$, $b_1 = 1$, $b_0 = -1.5$)

6-5. Sample temperature correction function

6-5-1. General

When a calibration curve changes depending on the sample temperature Ts, this function enables to switch the calibration curve to other one corresponding to the sample temperature measured.

For the input of the sample temperature, a radiation thermometer or a temperature/voltage converter with the output of 4 to 20mADC can be used.

By utilizing this function, 10 calibration curves in one group (9 calibration curves only in the group 10) can be switched corresponding to the sample temperature Ts.

99 calibration curves are available and up to 10 groups can be set accordingly.

Calibration curve of sample temperature T3

Caribration curve of sample temperature T2

Calibration curve of sample temperature T1

Moisture content Y

absorbance X
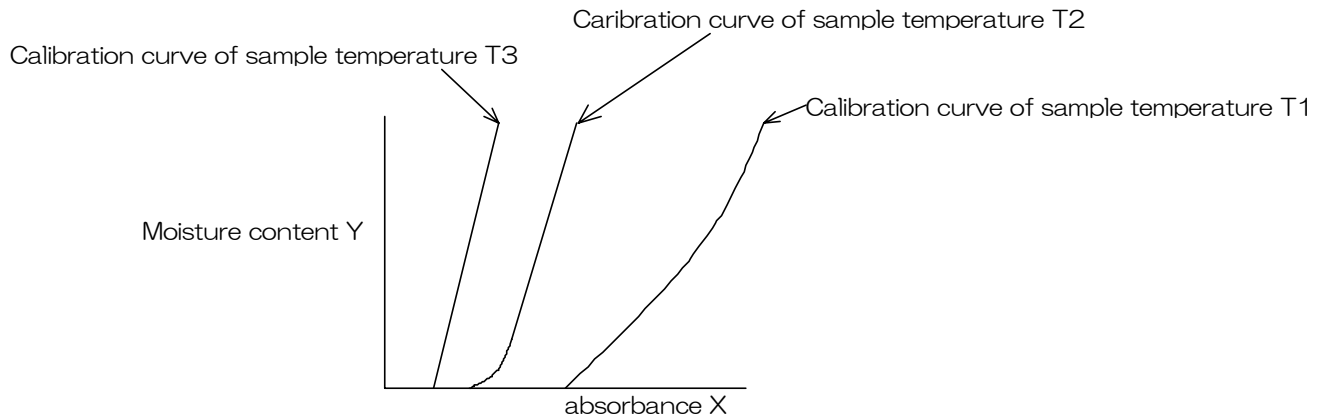
6-5-2. Wiring this detector unit

Correction input
4 to 20mA

| P+ | P− | OUT+ | OUT− | SA | SB | SG | DI | COM | DO | COM | IN+ | IN− |

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭

24VDC 4−20mADC RS−485 DIGITAL IN DIGITAL OUT 4−20mADC
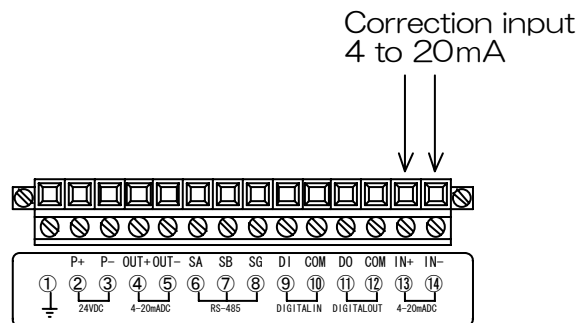
6-5-3. Enabling/disabling the sample temperature correction function

Execute this setting with either this detector unit or the setting display unit. When the correction is disabled, the operation is normal which means the calibration curve is not switched corresponding to the sample temperature measured. When it is enabled, the calibration curve is switched with the sample temperature.

---

1. Setting with the detector unit

(1) Press SEL key and ENT key simultaneously for 2 seconds to enter into the operating condition setting mode.
(2) Press SEL key several times to enter into the sample temperature correction enabled/ disabled setting mode (St).

CH	DATA
St	oFF
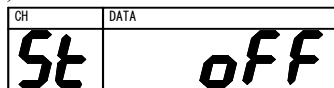
(3) Select the sample temperature correction enabled or disabled.
　　> ∨ ENT (OFF)　　Correction OFF (disabled)
　　> ∧ ENT (ON)　　Correction ON (enabled)
* When you go on setting the sample temperature scaling, skip the next (4) and proceed to (2) of [6-5-4. Setting a sample temperature scaling 1.Setting with this detector unit].
(4) Press SEL key for 2 seconds. The mode returns the measurement mode.

---

2. Setting with the setting display unit

1) Set the calibration curve number to 0.
　　CH 0 ENT
(2) Enter into the sample temperature correction enabled/ disabled setting mode (St).
　　MODE 1 9 ENT
(3) Select the sample temperature correction enabled or disabled.
　　0 ENT (OFF)　Correction OFF (disabled)
　　1 ENT (ON)　　Correction ON (enabled)
* When you go on setting the sample temperature scaling, skip the next (4) and proceed to (2) of [6-5-4. Setting a sample temperature scaling 2.Setting with the setting display unit].
(4) Return the calibration curve number to the original one.

6-5-4. Setting a sample temperature scaling

When a radiation thermometer or a thermoelectric converter is used, matching the temperature range for its 4 to 20mADC output to the temperature range for 4 to 20mADC input of this detector unit is required.
Carry out the scaling with either this detector unit or the setting display unit, following the procedure shown below.

---

1. Setting with the detector unit

(1) Press SEL key and ENT key simultaneously for 2 seconds to enter into the operating condition setting mode.
(2) Press SEL key several times to enter into the sample temperature scaling low limit (tL) setting mode.
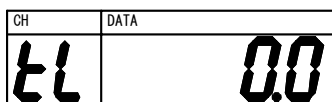
CH	DATA
tL	0.0

(3) Set the sample temperature scaling low limit (tL). (Setting range: -999.9 to 999.9)
(4) Press SEL key once to enter into the sample temperature scaling high limit (tH) setting mode.
(5) Set the sample temperature scaling high limit (tH). (Setting range: -999.9 to 999.9)

---

2. Setting with the setting display unit

(1) Set the calibration curve number to 0.
　　CH 0 ENT
(2) Enter into the sample temperature scaling setting mode
　　MODE 2 1 ENT
(3) Set the sample temperature scaling low limit (tL). (Setting range: -999.9 to 999.9)
(4) Press SEL key once to enter into the sample temperature scaling high limit (tH) setting mode.
(5) Set the sample temperature scaling high limit (tH). (Setting range: -999.9 to 999.9)

6-5-5. Setting sample temperature

The following key operation is common to this detector unit or the setting display unit.

(1) Press $\boxed{\text{SEL}}$ key for 2 seconds to enter into the calibration curve setting mode.

(2) Press $\boxed{\text{SEL}}$ key several times to enter into the sample temperature setting mode (tS).

(3) Set the sample temperature.（Setting range: -999.9 to 999.9）

6-5-6. Setting calibration curve data

(1) Specify a group for calibration curve number to be used.
The groups are from 1 to 10 and each one corresponds to the following calibration curve numbers respectively.

Group	Calibration curve number	Group	Calibration curve number
Group 1	1 to 10	Group 6	51 to 60
Group 2	11 to 20	Group 7	61 to 70
Group 3	21 to 30	Group 8	71 to 80
Group 4	31 to 40	Group 9	81 to 90
Group 5	41 to 50	Group 10	91 to 99

(2) Example: Assuming that the group 1 has been selected,Set the following calibration curve at the sample low limit temperature T1 to the calibration curve No. 1.

$$y=a3x_3+a2x_2+a1x+a0$$

Only the calibration curve by polynomial expression can be used.
Further, set the sample temperature T1. For its setting, refer to [6-5-5. Setting sample temperature].

(3) Set the calibration curves at the sample temperature Ti (i = 2 to 10) to the calibration curve numbers 2 to 10.
T1 (Sample low limit temperature) $\leqq$ T2 $\leqq$ ………. $\leqq$ T9 $\leqq$ T10 (Sample high limit temperature)

(4) Enter 999.9 into the Ti not used. Be careful that, if this value is not entered, a calibration curve not used is computed as a data.
* The default of the sample temperature Ti is 999.9.

(5) For the correction expression coefficients b_1 and b_0 and the constants (low limit range, high limit range, low limit alarm, high limit alarm and preset value), the values for the first calibration curve number in a group are used.

Group	Calibration curve number	Group	Calibration curve number
Group 1	1	Group 6	51
Group 2	11	Group 7	61
Group 3	21	Group 8	71
Group 4	31	Group 9	81
Group 5	41	Group 10	91

Press $\boxed{\text{SEL}}$ key for 2 seconds to enter into the calibration curve setting mode.

Press $\boxed{\text{SEL}}$ key several times to enter into the target constants.

Change the numeric by $\boxed{0}$ to $\boxed{9}$ key, and store it by pressing $\boxed{\text{ENT}}$ key.

After the above setting procedure is completed, return to the measurement mode by pressing $\boxed{\text{SEL}}$ key for 2 seconds

(6) Execute the following operation to make the setting data effective.
$\boxed{\text{CH}}$ $\boxed{}$ $\boxed{}$ $\boxed{\text{ENT}}$
＊

* Calibration curve number in the same group other than displayed number.

6-5-7. Measurement

(1) When ON (enabled) is selected in the sample temperature correction and one calibration curve number in a group is set, the calibration curve number is automatically switched corresponding to the sample temperature. For example, when the sample temperature Ts fulfills the following expression, the calibration curve number becomes "i".

$$T_1 \leqq \ ..... \ \leqq T_i \leqq Ts < T_i + 1 \ \leqq \ ..... \ \leqq T_{10}$$

(2) However, the measured value Y is not the measured value Y_1 on the calibration curve No. "i" but becomes the following value interpolated from the measured value Y_i and the measured value Y_{i+1} on the calibration curve No. "i+1".

$$Y = (Y_{i+1} - Y_i) \times \frac{Ts - T_i}{T_{i+1} - T_i} + Y_i$$

(3) When the sample temperature Ts is lower than the sample temperature of the first calibration curve number in the group or when it is higher than the sample temperature of the last calibration curve number, the following error display appears.

However, the calibration curve, of which sample temperature is set as 999.9, is ignored.

* For the sample temperature lower than the sample temperature of the first calibration curve number in the group ..... Er15 (Sample temperature too low)
* For the sample temperature higher than the sample temperature of the last calibration curve number in the group ..... Er14 (Sample temperature too high)

6-5-8. Displaying sample temperature Ts

1. Displaying with this detector unit

(1) Set the calibration curve number to 0.
$\boxed{\text{CH}}$ $\boxed{0}$ $\boxed{\text{ENT}}$
(2) Press $\boxed{\wedge}$ key for 2 seconds to display the sample temperature.
(3) For canceling of the sample temperature display, press $\boxed{\text{SEL}}$ key for 2 seconds or press $\boxed{\text{CH}}$ key for 2 seconds

2. Displaying with the setting display unit

(1) Set the calibration curve number to 0.
$\boxed{\text{CH}}$ $\boxed{0}$ $\boxed{\text{ENT}}$
(2) Display the sample temperature.
$\boxed{\text{MODE}}$ $\boxed{2}$ $\boxed{0}$ $\boxed{\text{ENT}}$
(3) For canceling of the sample temperature display, press $\boxed{\text{SEL}}$ key for 2 seconds or press $\boxed{\text{CH}}$ key for 2 seconds

6-6. Setting output limit values of calibration curves

A measured value can be fixed by low limit and high limit absorbance values.

When an absorbance becomes less than a low limit absorbance value, a measured value is fixed to YL as shown right.
Also, when an absorbance becomes more than a high limit absorbance value, a measured value is fixed to YH.
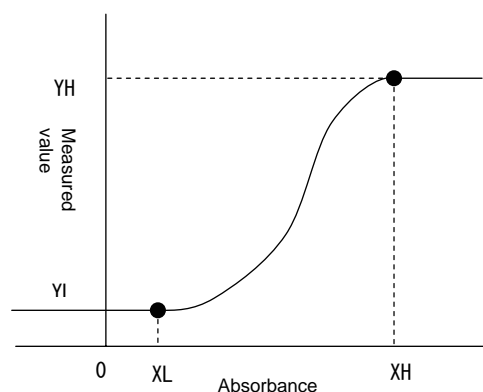
6-6-1. Setting output limit values of calibration curves
  : [Flow chart of the parameter menus]

```
┌─────────────────────────────────────────┐
│   Setting detector unit No. HEAD         │
└─────────────────────────────────────────┘
              │  SEL + CH (Pressing 2 seconds)
              ▼
┌─────────────────────────────────────────┐ ◄──┐
│      Setting calibration curve No.       │    │
└─────────────────────────────────────────┘    │
              │  SEL                            │
              ▼                                 │
┌─────────────────────────────────────────┐    │
│ Enabling/disabling output limit processing LM │
└─────────────────────────────────────────┘    │
              │  SEL                            │
              ▼                                 │
┌─────────────────────────────────────────┐    │
│   Setting low limit absorbance value XL  │    │
└─────────────────────────────────────────┘    │
              │  SEL                            │
              ▼                                 │
┌─────────────────────────────────────────┐    │
│   Setting low limit measured value YL    │    │
└─────────────────────────────────────────┘    │
              │  SEL                            │
              ▼                                 │
┌─────────────────────────────────────────┐    │
│  Setting high limit absorbance value XH  │    │
└─────────────────────────────────────────┘    │
              │  SEL                            │
              ▼                                 │
┌─────────────────────────────────────────┐    │
│   Setting high limit measured value YH   │    │
└─────────────────────────────────────────┘    │
              │  SEL                            │
              └─────────────────────────────────┘
```
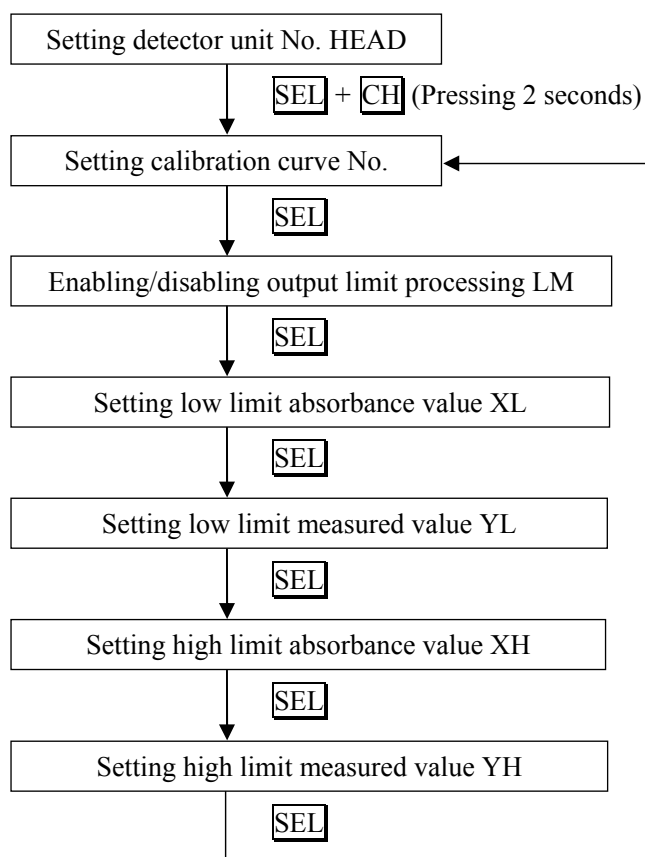
6-6-2. List of data for setting calibration curve output limit values

The followings are data for setting calibration curve output limit values.

	Setting data name	Display	Setting range of data	Default value	Remarks
(1)	Calibration curve number	CH	1 to 99	1	
(2)	Output limit processing enabled/disabled	LM	OFF, ON	OFF	0: OFF, 1: ON
(3)	Low limit absorbance value	XL	-9999.9 to 9999.9	0.0000	Effective numeric: 5 digits
	Low limit measured value	YL	-9999.9 to 9999.9	0.0000	Effective numeric: 5 digits
(4)	High limit absorbance value	XH	-9999.9 to 9999.9	9.9999	Effective numeric: 5 digits
	High limit measured value	YH	-9999.9 to 9999.9	9999.9	Effective numeric: 5 digits

	Setting data name	Description
(1)	Calibration curve number	Specify a calibration curve number from 99 calibration curves. Usually, it is specified from 1 sequentially.
(2)	Output limit processing enabled/ disabled	Set the output limit processing enabled or disabled. When ON (enabled) is set, a measured value is outputted corresponding to limit values being set. When OFF (disabled) is set, a measured value is outputted corresponding to data of a calibration curve.
(3)	Low limit absorbance value XL Low limit measured value YL	Enter data to fix a measured value at a low limit side.
(4)	High limit absorbance value XH High limit measured value YH	Enter data to fix a measured value at a high limit side.

6-6-3. Setting procedure of calibration curve output limit data

1. Setting calibration curve numbers

1) Use numeric keys $\boxed{1}$ to $\boxed{9}$ to select a desired detector unit number.
$\boxed{\text{HEAD}}$ $\boxed{}$ $\boxed{\text{ENT}}$

2) Press $\boxed{\text{SEL}}$ and $\boxed{\text{CH}}$ keys for 2 seconds or more to display CH in the CH display window. Then, the mode enters into the calibration curve number setting mode.

3) Use numeric keys $\boxed{0}$ to $\boxed{9}$ to select a desired calibration curve number.
$\boxed{}$ $\boxed{}$ $\boxed{\text{ENT}}$

2. Enabling/disabling the output limit processing

1) Press $\boxed{\text{SEL}}$ key to display LM in the CH display window. Then, the mode enters into the output limit processing enabling/disabling mode.
Use numeric keys $\boxed{0}$ to $\boxed{1}$ to enable/disable the computation.
Enter 0 for OFF (disabled) and 1 for ON (enabled).
$\boxed{}$ $\boxed{\text{ENT}}$
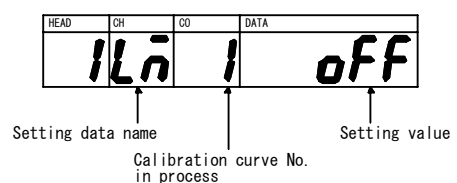
3. Setting a low limit absorbance value (XL) and a low limit measured value (YL)

1) Press SEL key to display XL in the CH display window. Then, the mode enters into the low limit absorbance value XL setting mode.
Use the numeric keys 0 to 9 to set a low limit absorbance value XL.

☐ ☐ ☐ ☐ ☐ ENT

HEAD	CH	CO	DATA

Setting data name
Calibration curve No. in process
Setting value

> Reference 〉 Press T／· key to enter a decimal point
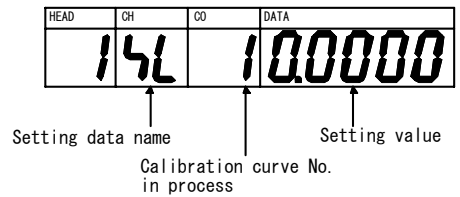
2) After the setting above, press SEL key to display YL in the CH display window. Then, the mode enters into the low limit measured value YL setting mode.
Use the numeric keys 0 to 9 to set a low limit measured value YL.

☐ ☐ ☐ ☐ ☐ ENT

HEAD	CH	CO	DATA

Setting data name
Calibration curve No. in process
Setting value

> Reference 〉 Press T／· key to enter a decimal point.
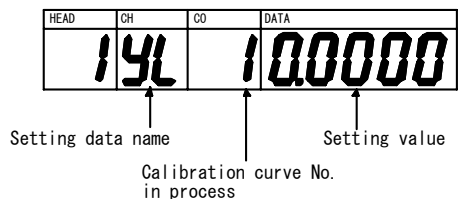
4. Setting a high limit absorbance value (XH) and a high limit measured value (YH)

1) Press SEL key to display XH in the CH display window. Then, the mode enters into the high limit absorbance value XH setting mode.
Use the numeric keys 0 to 9 to set a high limit absorbance value XH.

☐ ☐ ☐ ☐ ☐ ENT

HEAD	CH	CO	DATA

Setting data name
Calibration curve No. in process
Setting value

> Reference 〉 Press T／· key to enter a decimal point.
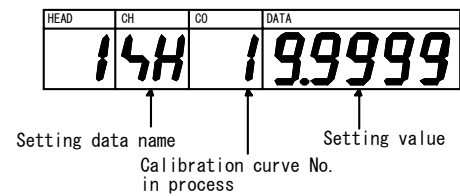
2) After the setting above, press SEL key to display YH in the CH display window. Then, the mode enters into the high limit measured value YH setting mode.
Use the numeric keys 0 to 9 to set a high limit measured value YH.

☐ ☐ ☐ ☐ ☐ ENT

HEAD	CH	CO	DATA

Setting data name
Calibration curve No. in process
Setting value

> Reference 〉 Press T／· key to enter a decimal point.
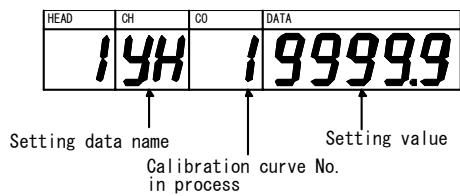
5. Setting output limit values to other calibration curve numbers

1) After the step 4 above, press SEL key to display CH in the CH display window. Then, the mode returns to the calibration curve number setting mode.
2) Set other calibration curve numbers.
3) Repeat the steps 1) to 4) above to set output limit values to other calibration curve numbers.

HEAD	CH	CO	DATA
1CH			*1*

Calibration curve No.
Setting mode

Detector unit No. setting

Calibration curve No.
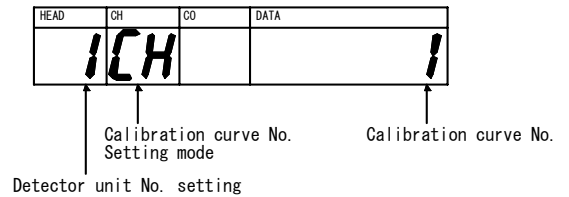
Remarks > Return to the measurement mode by pressing SEL key for more than two seconds, or the automatic return is made if no key is pressed for one minute.

6-7. Selecting calibration curve number

This is for selecting a calibration curve number whose data for computing moisture contents, thickness or constituent values have been set in [6-4. Setting calibration curves] and [6-6. Setting output limit values of caliration curves].

6-7-1. For IRMA1000, 2000, 7000 or 8000 series detector units being connected

Selecting calibration curve No.

CH key
CH lamp ON

Inputting calibration curve No.

0 to 9, CLR key
ENT key
CH lamp OFF

[1 to 99]   [0]

Measurement mode   Display of absorbance
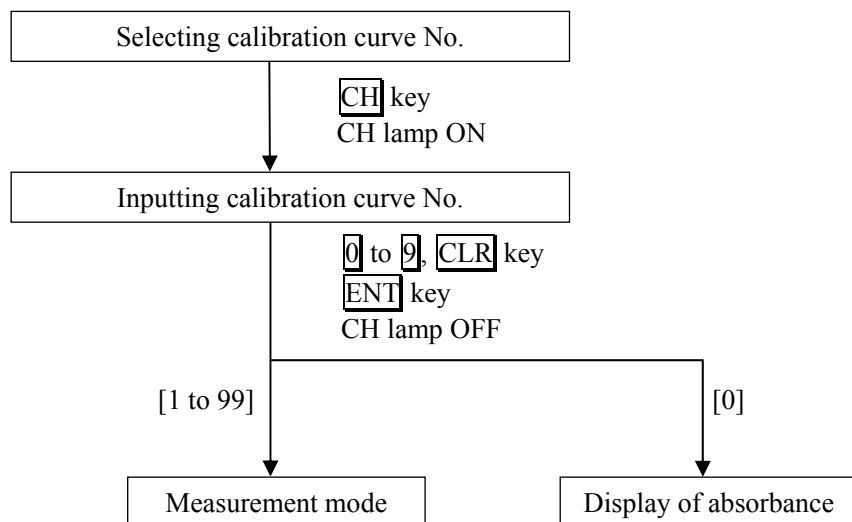
1) Press CH key to light the setting status lamp CH.
2) Enter a calibration curve number by using the numeric keys 0 to 9.

☐ ☐ ENT

By entering 0, the unit proceeds to the absorbance display mode.
After entering it, the setting status lamp CH will go off and the mode will go to the measurement mode.

HEAD	CH	CO	DATA
1	*3*		*5.25*

Caribration curve No.

Measured value

HEAD	CH	CO	DATA
1	*0*		*0.0123*

Calibration curve No.

Absorbance value
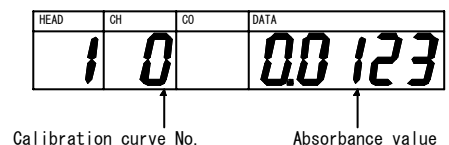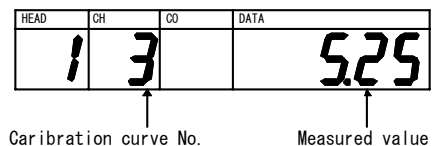
6-7-2. For IRMA5000 or 6000 series detector units being connected

Selecting calibration curve numbers: [Status transition diagram]

```
        ┌─────────────────────────────────┐
        │   Selecting calibration curve No. │
        └─────────────────────────────────┘
                    │ CH key
                    │ CH and MODE lamps ON
                    ▼
        ┌─────────────────────────────────┐
        │  Inputting constituent No. (1 to 4) │
        └─────────────────────────────────┘
                    │ 0 to 4, CLR key
                    │ 0: Display of absorbance
                    │ 1 to 4: Selection of constituent No.
        [1 to 4                                   [0]
        MODE lamp OFF
                    ▼
        ┌─────────────────────────────────┐
        │   Inputting calibration curve No. │
        └─────────────────────────────────┘
                    │ 0 to 9, CLR key, ENT key
                    │ CH lamp OFF
                    ▼                              ▼
        ┌──────────────────┐          ┌──────────────────────┐
        │ Measurement mode │          │ Display of absorbance │
        └──────────────────┘          └──────────────────────┘
```
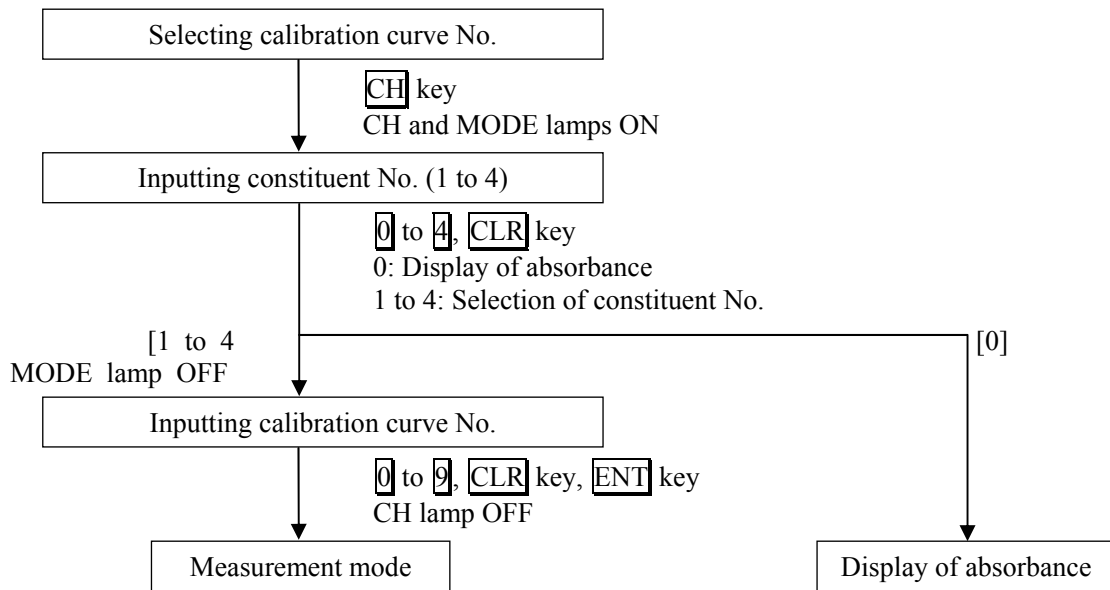
After selecting a constituent number you want to set, set a calibration curve number.
Settable constituent numbers differ depending on constituent specifications of a detector unit being connected.

Data name	Display	Setting range	Default value	Remarks
Constituent number	CO	0 to 4	1	0: Absorbance display mode
Calibration curve number	CH	1 to 99	1	

[Changing constituent numbers]
1) Press CH key to light the setting status lamps CH and MODE.
2) By entering a constituent number using the numeric keys 1 to 4, the CO display window shows C1 to C4 corresponding to the constituent number.
3) Press ENT key. The calibration curve number being currently set will be displayed in the CH display and the setting status lamp MODE will go off.
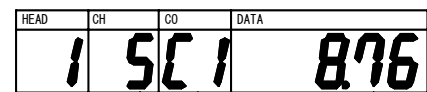
[Changing calibration curve numbers]
After changing of the constituent number, change a calibration curve number.
1) Use numeric keys 0 to 9 to enter a calibration curve number. Press ENT key to turn off the setting status lamp CH and the mode changes to the measurement mode.
2) For setting a calibration curve number for each constituent number, repeat from [Changing constituent numbers] above.

[Going to the absorbance display mode]
When 0 is entered in the 2) of [Changing constituent numbers] above, the CH display window shows M1. Press ENT key to turn off the setting status lamps MODE and CH, and then the unit enters into the absorbance value display mode of the computation mode 1.
Press SEL key to change the CH display from M1, M2, M3, M4, to M1 in order and the absorbance value of each computation mode is displayed. Note that M4 is not an absorbance value but a measurement data of the wavelength 1.

HEAD | CH | CO | DATA
1 5C1 876
Calibration curve No. — Constituent No. — Measured value

HEAD | CH | CO | DATA
1 8C2 147
Calibration curve No. — Constituent No. — Measured value

HEAD | CH | CO | DATA
1 15C2 35.79
Calibration curve No. — Constituent No. — Measured value
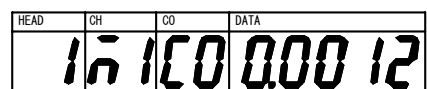
HEAD | CH | CO | DATA
1m 1C0 0.0012
Computing mode — Constituent No. — Absorbance value

6-8. Setting operation conditions I (display/output)

This is for setting display/output conditions of a detector unit by this unit.

6-8-1. List of setting data

	Setting data name	Lamp	Range of data	Default value
(1)	Time constant	T lights.	0.1 to 9.9 sec (less than 10 sec) 1 to 99 sec (10 sec or more)	0.2sec
(2)	Smoothing/real	REAL lights.	Smoothing/real switching	Smoothing
(3)	Hold	HOLD lights.	HOLD activated/released	Invalid
(4)	Preset output ON OFF	PRES lights.	ON OFF	OFF

6-8-2. Setting operation conditions

1. Setting a time constant

When a measured value fluctuates quickly, the signal can be dulled by delaying a response time of a constituent meter detector unit.
A smoothing time (equivalent to a time constant of analog instruments) can be set with 0.1-second increment for shorter than 10 seconds and 1-second increment for 10 seconds or longer.

<For IRMA1000, 2000, 7000 or 8000 series detector units being connected>
1) Press $\boxed{T/\cdot}$ key to light up the setting status lamp T and display a time constant in the CH display window.
2) Enter a time constant by using the numeric keys $\boxed{0}$ to $\boxed{9}$ and press $\boxed{ENT}$ key. The setting status lamp T will go off and the mode will return to the measurement mode.
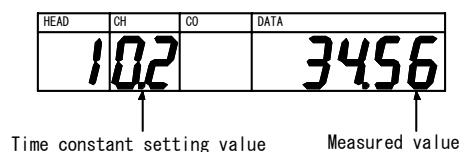
<For IRMA5000 or 6000 series detector units being connected>
1) Press $\boxed{T/\cdot}$ key to display the setting status lamp T and MODE
2) Use numeric keys $\boxed{1}$ to $\boxed{4}$ to select a desired constituent number, and then press $\boxed{ENT}$ key. The setting status lamp MODE goes off and the CH display window shows a time constant.
3) Enter a time constant by using the numeric keys $\boxed{0}$ to $\boxed{9}$ and press $\boxed{ENT}$ key. The setting status lamp T will go off and the mode will return to the measurement mode.
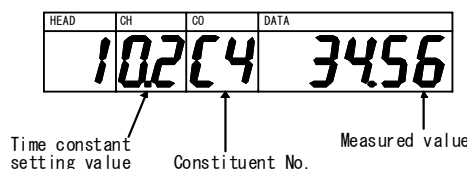
2. Switching smoothing/real

Switch processes, smoothing (time constant setting is available) or real (time constant = 0.0 sec.), to deal with measured values.
1) Press $\boxed{S/R/9}$ key to light up the REAL lamp. Then, the mode enters into the real processing mode.
   This setting is reflected in analog outputs and displays.
2) Press $\boxed{S/R/9}$ key again to turn off the REAL lamp. Then, the mode enters into the smoothing processing mode.

3. Switching hold

Apply when a measured value needs to be held (fixing the current measured value).

1) Press $\boxed{\text{HOLD／一}}$ to light up the HOLD lamp. Then, the analog output and display are held.
2) Press $\boxed{\text{HOLD／一}}$ key again to turn off the HOLD lamp. Then, the hold mode is released.

4. Switching preset output

Apply when the display of constituent meter values (moisture content and thickness) need to be fixed at preset values. An analog output also corresponds to the preset value.

1) Press $\boxed{\text{PRES／7}}$ key to turn on the PRES lamp. Then, the preset output and display are activated.
2) Press $\boxed{\text{PRES／7}}$ key again to turn off the PRES lamp. Then, the preset mode is released.

6-9. Setting operation conditions II (MODE setting)

Use the MODE setting for setting operation conditions of this setting display unit and a detector unit. The MODE setting is available in the absorbance value display mode (refer to [6-7. Selecting calibration curve numbers] for display of absorbance values).

Remarks
> For exiting the MODE setting, press $\boxed{\text{SEL}}$ key for more than 2 seconds or the automatic return to the measurement mode is made if no key is pressed for one minute.

⚠ **Caution** | If an invalid MODE number is entered, Er is displayed in the CH display window for one second.

6-9-1. List of data for setting operation conditions

Followings are the data available for setting operation conditions II. Setting items available differ depending on number of constituents.

MODE No.	Setting data name		CH Disp.	Setting range	Default value	Remarks	Para
6	Weight α, Calibration constant						6-9-2
	Computation mode 1	Weight α1	1A[*1]	0 to 1.000	0.5000	0.5:3-wavelength processing 0 or 1: 2-wavelength processing	
		Calibration constant K1	1K[*1]	-9.9999 to 9.9999	1.0000		
	Computation mode 2	Weight α2	2A[*2]	0 to 1.000	0.5000	0.5: 3-wavelength processing 0 or 1: 2-wavelength processing	
		Calibration constant K2	2K[*2]	-9.9999 to 9.9999	1.0000		
	Computation mode 3	Weight α3	3A[*3]	0 to 1.000	0.5000	0.5: 3-wavelength processing 0 or 1: 2-wavelength processing	
		Calibration constant K3	3K[*3]	-9.9999 to 9.9999	1.0000		
14	Decimal place displaying measured values		d1[*4] to d4[*4]	0 to 4	1	0: No digit displayed after the decimal point. 1: Displays 1 decimal place 2: Displays 2 decimal places 3: Displays 3 decimal places 4: Displays 4 decimal places	6-9-3
17	Calibration curve remote inputs with Binary or BCD		17	0、1	bCd	0: Binary 1: BCD	6-9-4
19	Sample temperature correction enabled or disabled (With a 1 constituent specification)		St	0、1	oFF	0: Disabled 1: Enabled	6-9-5
20	Sample temperature displaying					When 1(enable) is selected in MODE 19, this mode is effective	6-9-6
21	Sample temperature input scaling		tL tH	-999.9 to 999.9	0.0 100.0	tL: Low limit scaling tH: High limit scaling	6-9-7

*1: (1) Weight α1: The 3-wavelength processing and the 2-wavelength processing can be changed by setting the weight α1.
        By setting α1=0.5, the 3-wavelength ratio processing becomes available.
        By setting α1=0 or 1, the 2-wavelength ratio processing becomes available.
        (By setting α1=1, the ratio processing is done with a λ1 and λ2, whereas α1=0, with a λ2 and λ3.)
  (2) Calibration constant k1: This constant is automatically obtained in [6-12. Calibration].
*2: (1) Weight α2: The 3-wavelength processing and the 2-wavelength processing can be changed by setting the weight α2.
        By setting α2=0.5, the 3-wavelength ratio processing becomes available.
        By setting α2=0 or 1, the 2-wavelength ratio processing becomes available.
        (By setting α2=1, the ratio processing is done with a λ4 and λ5, whereas α2=0, with a λ5 and λ6.)
  (2) Calibration constant k2: This constant is automatically obtained in [6-12. Calibration].
*3: (1) Weight α3: The 3-wavelength processing and the 2-wavelength processing can be changed by setting the weight α1.
        By setting α3=0.5, the 3-wavelength ratio processing becomes available.
        By setting α3=0 or 1, the 2-wavelength ratio processing becomes available.
        (By setting α3=1, the ratio processing is done with a λ7 and λ8, whereas α3=0, with a λ8 and λ9.)
  (2) Calibration constant k3: This constant is automatically obtained in [6-12. Calibration].
*4: (d1): Decimal place displaying measured values of constituent 1 setting.
  (d2): Decimal place displaying measured values of constituent 2 setting.
  (d3): Decimal place displaying measured values of constituent 3 setting.
  (d4): Decimal place displaying measured values of constituent 4 setting.
Displayed range varies depending on the constituent number of the detector unit.

MODE No.	Setting data name	CH Disp.	Setting range	Default value	Remarks	Para.
31	Selecting a constituent number for an analog output and a contact output from a detector unit (For detector units for 2 or more constituents in IRMA5000 or 6000)	31	1 to 4	C1	1: C1 2: C2 3: C3 4: C4	6-9-8
32	Enabling/disabling a detector unit's contact output and selecting an output type	32	0 to 2	nonE	0: nonE 1: ALARM 2: Error	6-9-9
33	Enabling/disabling a detector unit's contact input and selecting an input type	33	0 to 3	nonE	0: nonE 1: HoLd 2: PrESt 3: SMt.rL	6-9-10
40	Computing surface water ratio	40	0, 1	oFF	0: OFF 1: ON	6-9-11
70	Setting analog output scaling	1L 1H 2L 2H 3L 3H	0.0 to 9999.9	0.0 100.0 0.0 100.0 0.0 100.0	Effective when the internal dipswitch 4 is ON.	6-9-12
80	Setting communication conditions					
	(1) Protocol	Pr	1, 2	rtU	1: rtU 2: PriV	
	(2) Communication speed	SP	1, 2	9600	1: 9600 2: 19200	
	(3) Parity	P	1 to 3	EVEn	1: nonE 2: odd 3: EVEn	6-9-13
	(4) Data bit length	d	7, 8	8	7: 7 bits 8: 8 bits	
	(5) Stop bit length	Sb	1, 2	1	1: 1 bit 2: 2 bits	
	(6) BCC use/no use	bC	0, 1	no	0: no 1: YES	

6-9-2. Weight α, calibration constant

The weights "α" are values to decide a ratio of 2 wavelengths in 3-wavelength processing.
The calibration constants are values obtained in [6-12. Calibration] which have been automatically stored.

Enter $\boxed{\text{MODE}}$ $\boxed{6}$ $\boxed{\text{ENT}}$ to display 1A in the CH display window and its setting value in the DATA display window.

By pressing $\boxed{\text{SEL}}$ key, following items are displayed in cycle.

1A: Computing mode 1 weight α1
1K: Computing mode 1 calibration constant K1
2A: Computing mode 2 weight α2
2K: Computing mode 2 calibration constant K2
3A: Computing mode 3 weight α3
3K: Computing mode 3 calibration constant K3
Setting range: 1A, 2A, 3A   0 to 1.000
                1K, 2K, 3K   -9.9999 to 9.9999

HEAD	CH	CO	DATA
	1 1A		0.5000

Setting data name   Setting value

HEAD	CH	CO	DATA
	1 1K		1.0000

Setting data name   Setting value

$\boxed{\text{Reference}}$ For the details of the weight α1 to α3, refer to *1 to *3 on the margin of [6-9-1. List of data for setting operation conditions].

6-9-3. Decimal place displaying measured values

The decimal place of a measured value can be set for better viewing of the data displayed.

Enter $\boxed{\text{MODE}}$ $\boxed{1}$ $\boxed{4}$ $\boxed{\text{ENT}}$ to display d1 in the CH display window and its setting value in the DATA display window.

d1: Decimal place of a measured value of the constituent 1

HEAD	CH	CO	DATA
	1 d1		2

Setteing data name   Setting value

For IRMA5000 or 6000 series detector units with a specification of 2 or more constituents, following items are displayed in cycle based on the constituent number by pressing $\boxed{\text{SEL}}$ key.

d2: Decimal place of a measured value of the constituent 2
    (This will be displayed for the number of constituents is 2 or more and settable.)
d3: Decimal place of a measured value of the constituent 3
    (This will be displayed for the number of constituents is 3 or more and settable.)
d4: Decimal place of a measured value of the constituent 4
    (This will be displayed for the number of constituents is 4 and settable.)
Setting range: 0 to 4
   0: No digit displayed after the decimal point.
            1: Displays 1 decimal place
            2: Displays 2 decimal places
            3: Displays 3 decimal places
            4: Displays 4 decimal places

6-9-4. Calibration curve remote contact inputs with Binary or BCD

This is for setting the processing of calibration curve remote contact inputs to this unit.
Processing with the binary code or the BCD code of remote contact input data can be selected.

Enter [MODE] [1] [7] [ENT] to display 17 in the CH display window and its setting value in the DATA display
window.
Setting range: 0 to 1

          0: bin（Binary）
          1: bCd（ＢＣＤ）

HEAD	CH	CO	DATA
	1 17		*bCd*

Setting data name   Setting value
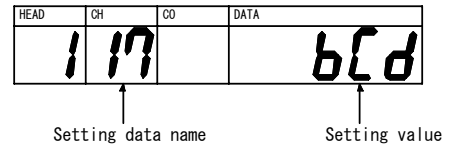
Reference > With binary, a calibration curve number is
determined by an addition of 1, 2, 4, 8, 16, 32, 64.
With BCD, a calibration curve number is
determined by an addition of 1, 2, 4, 8, 10, 20, 40,
80.

6-9-5. Sample temperature correction enabled or disabled

This is effective for IRMA1000, 2000, 7000, or 8000 series detector units and for IRMA5000 or 6000 series detector
units with a 1 constituent specification.
Select the sample temperature correction by a detector unit is enabled or disabled.

Enter [MODE] [1] [9] [ENT] to display St in the CH display window and its setting value in the DATA display
window.
Setting range: 0 to 1

          0: oFF (disabled)
          1: on (enabled)

HEAD	CH	CO	DATA
	1 St		*oFF*

Setting data name   Setting value
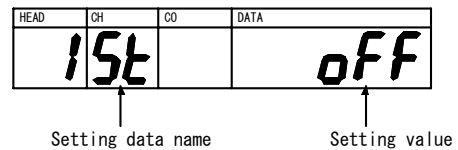
6-9-6. Sample temperature displaying

This is effective when the sample temperature correction is enabled in [6-9-5. Sample temperature correction enabled
or disabled].
A sample temperature is displayed in the DATA display window of this unit.

[MODE] [2] [0] [ENT]

6-9-7. Sample temperature input scaling

Set a scaling of an analog input to a detector unit for the sample temperature correction.

Enter [MODE] [2] [1] [ENT] to display tL in the CH display window and its setting value in the DATA display
window.
By pressing [SEL] key, following items are displayed in cycle.
    tL: Low limit of sample temperature input scaling
    tH: High limit of sample temperature input scaling
Use numeric keys [0] to [9] to set low and high limits of the
sample temperature input.
    Setting range: -999.9 to 999.9

HEAD	CH	CO	DATA
	1 tL		*0.0000*

Setting data name   Setting value
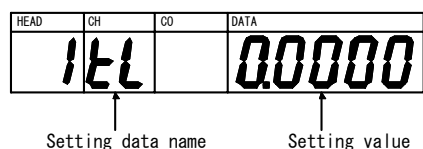
Reference > Press [HOLD／−] key to enter a minus (-).

HEAD	CH	CO	DATA
	1 tH		*100.00*

Setting data name   Setting value
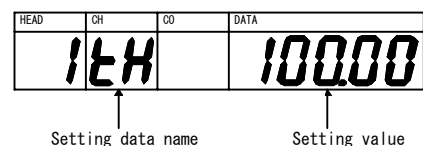
6-9-8. Selecting a constituent number for an analog output and a contact output from a detector unit

This is available for IRMA5000 or 6000 series detector units with a specification of 2 or more constituents.
Select a constituent number for an analog output and a contact output from a detector unit.

Enter MODE 3 1 ENT to display 31 in the CH display window and its setting value in the DATA display window.
Setting range: 1 to 4
        1: C1 (Constituent number 1)
   2: C2 (Constituent number 2)
        3: C3 (Constituent number 3)
        4: C4 (Constituent number 4)

HEAD	CH	CO	DATA
1	31		C3

Setting data name   Setting value

Remarks > Constituent number setting is not available for IRMA1000, 2000, 7000, or 8000 detector units and for IRMA5000 or 6000 detector units with a specification of 1 constituent.

6-9-9. Selecting a contact output from a detector unit enabled or disabled and an output item

Select a kind of a contact output from a detector unit.

Enter MODE 3 2 ENT to display 32 in the CH display window and its setting value in the DATA display window.
Setting range: 0 to 2
        0: nonE (Unassigned)
        1: ALArM (Alarm)
        2: ErrOr (self-diagnosed abnormal condition)

HEAD	CH	CO	DATA
1	32		nonE

Setting data name   Setteing value

6-9-10. Selecting a contact input to a detector unit enabled/disabled and an input item

Select a kind of a contact input to a detector unit.

Enter MODE 3 3 ENT to display 33 in the CH display window and its setting value in the DATA display window.
Setting range: 0 to 3
        0: nonE (Unassigned)
        1: HoLd (Hold)
        2: PrSEt (Preset)
        3: SMt.rL (Smoothing/real)

HEAD	CH	CO	DATA
1	33		nonE

Setting data name   Setting value

6-9-11. Computing surface water ratio

Select the surface water ratio computation for computing moisture contents of sands, etc. enabled or disabled.
Select ON when you want to use the computation.

Enter MODE 4 0 ENT to display 40 in the CH display window and its setting value in the DATA display window.
Setting range: 0 to 1
        0: oFF
        1: on

HEAD	CH	CO	DATA
1	40		oFF

Setting data name   Setting value

6-9-12. Setting analog output scaling

This is effective when the dipswitch 4 is ON. When the dipswitch 4 is ON, data of the displayed detector unit number is analog output using the scaling set here.

Enter MODE 7 0 ENT to display 1L in the CH display window and its setting value in the DATA display window.
Setting range: 0.0 to 9999.9

By pressing SEL key, following items are displayed in cycle.
  1L: OUT1 Low limit output
  1H: OUT1 High limit output
  2L: OUT2 Low limit output
  2H: OUT2 High limit output
  3L: OUT3 Low limit output
  3H: OUT3 High limit output

HEAD	CH	CO	DATA
1	1L		0.0

Setting data name   Setting value

HEAD	CH	CO	DATA
1	1H		100.0

Setting data name   Setting value
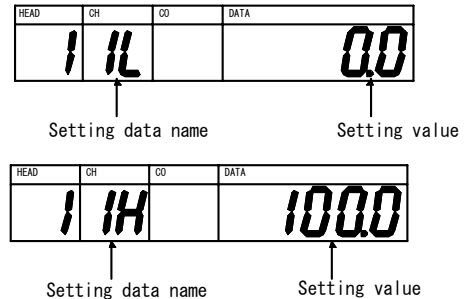
Reference〉 Reverse scaling (L>H) and equal scaling (L=H) are also available, however, dummy data will be output in equal scaling.

6-9-13. Setting communication conditions

The followings are data for setting communication conditions between this unit and a personal computer, a PLC or other equipment.

Enter MODE 8 0 ENT to display Pr in the CH display window and its setting value in the DATA display window.
By pressing SEL key, following items are displayed in cycle.
After selecting, press ENT key to store the setting value.

☐ ENT

	Data name	Display	Setting rage	Default value
(1)	Protocol	Pr	1: rtU, 2:PriV	1: rtU
(2)	Communication speed	SP	1: 9600, 2:19200	1: 9600
(3)	Parity	P	1: nonE, 2: odd, 3: EVEn	3: EVEn
(4)	Data length	d	7, 8	8
(5)	Stop bit length	Sb	1, 2	1
(6)	BCC enabled/disabled	bC	0: no, 1: YES	0: no

(1) Protocol
    Select MODBUS mode (rtU) or CHINO's private protocol (PriV).
    Setting range: 1 to 2
              1: rtU
              2: PriV

HEAD	CH	CO	DATA
1	Pr		rtU

Setting data name   Setting value
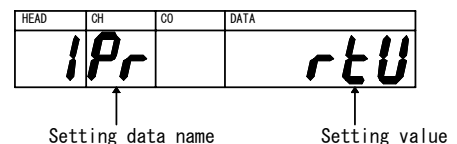
(2) Communication speed
    Select 9600 or 19200bps.
    Setting range: 1 to 2
              1: 9600 bps
              2: 19200 bps

HEAD	CH	CO	DATA
1	SP		9600

Setting data name   Setting value

(3) Parity

Select no-parity (nonE), odd parity (odd) or even parity (EVEn).

Setting range: 1 to 3

1: nonE
2: odd
3: EVEn

HEAD	CH	CO	DATA
1	P		EVEn

Setting data name   Setting value

(4) Data length

Select 7 or 8 bits.

HEAD	CH	CO	DATA
1	d		8

Setting data name   Setting value

Remarks

When MODBUS RTU mode protocol is selected, the data length is fixed to 8 bits and this item will be skipped.

(5) Stop bit length

Select 1 or 2 bits.

HEAD	CH	CO	DATA
1Sb			1

Setting data name   Setting value

Remarks

When MODBUS RTU mode protocol is selected, the stop bit length is fixed as shown below and this item will be skipped.

• Even parity (EVEn) or odd parity (odd): 1 bit
• No parity (nonE): 2 bits

(6) BCC enabled/disabled

When CHINO's private protocol (PriV) is selected, set BCC enabled or disabled.

Setting range: 0 to 1

0: no
1: YES

HEAD	CH	CO	DATA
1bC			no

Setting data name   Setting value

Remarks

When MODBUS RTU mode protocol is selected, this item will be skipped.

6-10. Remote contact inputs

Calibration curve numbers and other items can be set through an external contact.

6-10-1. Setting detector unit numbers, constituent numbers and calibration curve numbers

For activating this function, press R/L／8 to go to the remote mode (The measurement status lamp REMOTE will light.). When setting a calibration curve number, the operation varies depending on the dipswitch status.

1. Setting detector unit numbers

By setting a numeric with the BCD code or the binary code at BCD IN terminals, detector unit numbers can be set. By short-circuiting the terminal, HEAD (No. 23)/COM (No. 25), the numeric at BCD IN terminals is set as a detector unit number.

- BCD IN terminals

Detector unit No.	Terminal No.							
	26	27	28	29	30	31	32	33
1	○	×	×	×	×	×	×	×
2	×	○	×	×	×	×	×	×
3	○	○	×	×	×	×	×	×
4	×	×	○	×	×	×	×	×
5	○	×	○	×	×	×	×	×
6	×	○	○	×	×	×	×	×
7	○	○	○	×	×	×	×	×
8	×	×	×	○	×	×	×	×
9	○	×	×	○	×	×	×	×

○: Short-circuit with COM (No. 34) terminal, ×: Release

2. Setting constituent numbers

By setting a numeric with the BCD code or the binary code at BCD IN terminals, constituent numbers can be set. By short-circuiting the terminal, K2 (No. 19)/COM (No. 25), the numeric at BCD IN terminals is set as a constituent number.

- BCD IN terminals

Constituent No.	Terminal No.							
	26	27	28	29	30	31	32	33
1	○	×	×	×	×	×	×	×
2	×	○	×	×	×	×	×	×
3	○	○	×	×	×	×	×	×
4	×	×	○	×	×	×	×	×

○: Short-circuit with COM (No. 34) terminal, ×: Release

Remarks ＞ The setting of a constituent number is not required for IRMA1000, 2000, 7000 or 8000 detector units, or detector units for 1 constituent in IRMA5000 or 6000 detector units.

3. Setting calibration curve numbers

By setting a numeric with the BCD code or the binary code at BCD IN terminals, calibration curve numbers can be set. The operation varies depending on ON/OFF of the dipswitch 5.

Dipswitch 5	Function
OFF	By releasing the terminal, HEAD (No. 23)/COM (No. 25), the numeric at BCD IN terminals is set as a calibration curve number.
ON	By short-circuiting the terminal, CH (No. 24)/COM (No. 25), the numeric at BCD IN terminals is set as a calibration curve number.

The function of BCD IN terminals varies depending on the MODE 17 setting (refer to [6-9-4. Calibration curve remote contact inputs with Binary or BCD]).

Example

Terminal No.	Calibration curve No.			
	Calibration curve No. 39		Calibration curve No. 99	
	BCD code	Binary code	BCD code	Binary code
1	◯	◯	◯	◯
2	×	◯	×	◯
4	×	◯	×	×
8	◯	×	◯	×
10 (16)	◯	×	◯	×
20 (32)	◯	◯	×	◯
40 (64)	×	×	×	◯
80	×	×	◯	×

◯: Short-circuit with COM (No. 34) terminal, ×: Release

Remarks ⟩ For BCD code, use 1 to 8 for ones digit and 10 to 80 for tens digit.

6-10-2. Calibration

By short-circuiting the terminal, K1 (No. 20)/COM (No. 25), a calibration with No. 1 side of the output checker plate is executed. Refer to [6-12. Calibration] to confirm the calibration result.

6-10-3. Preset

While short-circuiting the terminal, PRESET (No. 21)/COM (No. 25), the preset output is activated and the PRES lamp turns on.
While releasing the terminal, PRESET (No. 21)/COM (No. 25), the unit enters into the measurement mode and the PRES lamp goes off.

6-10-4. Hold

The unit is held with the value measured when the HOLD (No. 22)/COM (No. 25) terminal was short-circuited and the HOLD lamp turns on.
By releasing the terminal, HOLD (No. 22)/COM (No. 25), the hold mode is released and the HOLD lamp goes off.

6-11. Key lock

1) By pressing MODE and SEL simultaneously for 2 seconds except the absorbance display mode, the key lock will be activated and the first-digit decimal point will light. With this key lock, settings cannot be changed by key operations, but various data can be confirmed.
2) For releasing the key lock, press MODE and SEL simultaneously for 2 seconds.

6-12. Calibration

For using this detector unit accurately, the periodical calibration (once in three months) is recommended. Supply the power to the detector unit for more than 1 hour before calibration.

6-12-1. For IRMA1000, 2000, 7000 or 8000 series detector units being connected

1) Mount an output checker plate to the detector unit in accordance with the paragraph [Calibration] in the separate instruction manual for the detector unit being connected.

2) Enter CH 0 ENT to enter into the absorbance value display mode.

3) Enter MODE 1 ENT to execute calibration. If the absorbance "x" (value in the DATA display window) is in the range of the following table, the calibration is complete.

HEAD	CH	CO	DATA
1	*0*		*0.0000*

Detector unit	Absorbance "x"
IRMA1100□□, 1200□□, 2100□□, 2200□□, 7100□□	Within 0.0000±0.0010
IRMA1300□□, 7200□□, 8100□□	Within 0.0000±0.0050

4) Press CH key, enter a calibration curve number, and then press ENT key. The mode returns to the measurement mode.

*If the absorbance "x" is not in the range of the table, the detector unit may be faulty. Please contact the dealer or nearest agent of CHINO CORPORATION.

6-12-2. For IRMA5000 or 6000 series detector units being connected

1) Mount an output checker plate to the detector unit in accordance with the paragraph [Calibration] in the separate instruction manual for the detector unit being connected.

2) Enter $\boxed{\text{CH}}$ $\boxed{0}$ $\boxed{\text{ENT}}$ to enter into the absorbance value display mode.

3) Enter $\boxed{\text{MODE}}$ $\boxed{1}$ $\boxed{\text{ENT}}$ to execute calibration. If the absorbance "x" in the display M1 (value in the DATA display window) is in the range of the following table, the calibration is complete.

HEAD	CH	CO	DATA
1m1		C0	0.0 123

HEAD	CH	CO	DATA
1m1		C0	0.0000

Detector unit	Absorbance "x"
IRMA51□□□□, 61□□□□	Within 0.0000±0.0050
IRMA52□□□□	Within 0.0000±0.0100

4) For confirmation, press $\boxed{\text{SEL}}$ key to check the absorbance "x" (value in the DATA display window) in each computing mode.

HEAD	CH	CO	DATA
1m4		C0	1.0000

Computing mode	Detector unit	Absorbance "x"
M2, M3	IRMA51□□□□, 61□□□□	Within 0.0000±0.0050
	IRMA52□□□□	Within 0.0000±0.0100
M4	All models	Within 1.000±0.010

5) Press $\boxed{\text{CH}}$ key, enter a constituent number, and then press $\boxed{\text{ENT}}$ key. The mode returns to the measurement mode.

6) If no change is made to the calibration curve number, press $\boxed{\text{ENT}}$ key. To change the calibration curve number, enter a number and press $\boxed{\text{ENT}}$ key.

*If the absorbance "x" is not in the range of the table, the detector unit may be faulty. Please contact the dealer or nearest agent of CHINO CORPORATION.

7. *Creating calibration curves*

Output characteristics of detector units depend upon measuring objects. It may also change according to process conditions or constituent measuring conditions of samples.

Accordingly, for accurate measurements of constituants such as water, it is required to perform beforehand sample tests of each object and obtain, for moisture measurements, a relationship (This is called as a calibration curve.) between moisture contents (%H_2O) obtained by a drying method or other measuring methods and absorbance "x" measured by a detector unit] or, for thickness measurements, a relationship (This is called as a calibration curve.) between thickness (μm) obtained by a micrometer or other measuring methods and absorbance "x" measured by a detector unit].

7-1. Sample preparation

Refer to the paragraph [Sample preparation] in the separate instruction manual of [Infrared Multi Analyzer IRMA□□□□□□].

7-2. Sample measurement

Refer to the paragraph [Sample measurement] in the separate instruction manual of [Infrared Multi Analyzer IRMA□□□□□□].

7-3. Creating calibration curves

Refer to the paragraph [Procedure for creating calibration curves] in the separate instruction manual of [Infrared Multi Analyzer IRMA □□□□□].

8. Troubleshooting

If a trouble occurred, take remedial measures referring to the corresponding section in this manual after checking following points. For troubles of a detector unit, refer to the separate instruction manual of [Infrared Multi Analyzer IRMA□□□□□].

8-1. Self-diagnosis function

The detector unit has a self-diagnosis function and shows an error in the DATA display window when a trouble occurred. Error display is common in detector units and setting display units.

8-1-1. Display types

1) Er01 to Er08 are always displayed.
2) Er12 to Er20 are displayed alternately with a measured value.
3) A flashing display of a measured value indicates a trouble outside the displayed detector unit.

8-1-2. List of error measures

Error No.	Item	Contents	Measures	Diagnosed abnormal condition
- - - - - (Displayed in upper side)	High limit over range	Measured value is higher than the displaying range.	Check the calibration curve data. Check the output by the output checker plate.	×
- - - - - (Displayed in lower side)	Low limit over range	Measured value is lower than the displaying range.	Check the calibration curve data. Check the output by the output checker plate.	×
Er01	Abnormal nonvolatile memory of the detector unit	Writing to or reading from the nonvolatile memory is disabled.	Return this detector unit to CHINO.	○
Er03	Motor rotation abnormal	The motor stops or rotates abnormally.	Replace the motor of the detector.	○
Er06	Computation error	Overflow happed in computation.	Check the output by the output checker plate.	○
Er07	Element temperature Abnormal	The element temperature is abnormal.	Return this detector unit to CHINO.	○
Er08	Communication abnormal	Abnormal communication between a detector unit and this operator nterface /display unit.	Separate from a noise source causing abnormal communication	○
Er12	Ambient temperature too High	The ambient temperature of the detector unit is high.	Lower the ambient temperature.	×
Er13	Ambient temperature too Low	The ambient temperature of the detector unit is low.	Raise the ambient temperature.	×
Er14	Sample temperature too High	The sample temperature is higher than the correction range.	Widen the correction range.	×
Er15	Sample temperature too Low	The sample temperature is lower than the correction range.	Widen the correction range.	×
Er16	Sample low reflection	The reflection rate of the sample is low or the lamp is burned out.	Close the distance to the sample. If the lamp is burned out, replace it.	×
Er17	Sample high reflection	The reflection rate of the sample is high.	Incline or extend the distance to the sample.	×
Er18	Detector unit number error	A detector unit number not connected is set.	Set a detector unit number again.	×
Er20	Number of calibration curves insufficient for sample temperature correction	The number of calibration curves is insufficient for the sample temperature correction.	Set two calibration curves settingsample temperature or more.	×
Er99	Abnormal nonvolatile memory of the setting display unit	Setting display unit's backup data has been destroyed.	Return the setting display unit to CHINO.	○

(Note) For the items with ○ in the self-diagnosed abnormal condition, a self-diagnosed abnormal condition alarm is output from a detector unit and setting display unit.

8-2. Measures against troubles not included with self-diagnosis

Symptom	Checking item
1. Measured value remains unchanged.	- Is the measurement mode lamp HOLD on? - Is the measurement mode lamp PRES on? ・Are the calibration curve data correct? ・Turn off the power once and then turn on it. ・By using the output checker plate, check if the data displayed in the absorbance display mode change? - When the data remains unchanged, initialize it. If this phenomenon is not still recovered, return this unit to CHINO.
2. Measured value fluctuates.	・Is the measuring surface flat? ・Is the measuring position correct? Make sure that a detector unit does not measure such bottom face as a conveyor belt, etc. ・Make sure that any disturbance light is not irradiated onto a measuring surface. ・Is the smoothing time proper? Certain smoothing time is necessary in stable measurements. ・Make sure that any noise source does not exist around a detector unit or connection cables. ・By using the output checker plate change, check if the data displayed in the absorbance display mode fluctuate? - When it fluctuates, initialize it. If this phenomenon is not still recovered, return this unit to CHINO.
3. Measured value is higher or lower than an actual value	・Is the calibration curve number correct? ・Are the calibration curve data correct? - Is the measurement mode lamp HOLD on? - Is the measurement mode lamp PRES on? ・Is the measuring position by a detector unit correct? ・Is a cover glass surface face of a detector unit clean?

If the troubleshooting above do not solve your problem, please contact the dealer (instrumentation and installation companies and distributor) or nearest agent of CHINO CORPORATION.

⚠ **Caution**	If you need repairs or modifications, please contact the dealer or nearest agent of CHINO CORPORATION. Repairs and modifications including part replacement must be carried out by CHINO certified field engineers only. If an unexpected trouble occurred during repairing (power failure, earthquake, or other unexpected troubles), the data already set may be lost. Make sure to copy and save the set data before sending the unit for repair. If your data is lost, no compensation will be made under any circumstances.

9. Initialization

9-1. Parameter initialization

(1) Turn on the power by pressing MODE key and CLR key simultaneously.
(2) Settings have been initialized. Set data again.
(3) Following settings are initialized.
　　- Remote/Local modes
　　- Remote input type (MODE 17)
　　- Key-lock mode
　　- Analog output scaling (MODE 70)
　　- Communication conditions (MODE 80)

⚠ **Caution**	Make sure to turn off the power source before parameter initialization. Data stored in the detector unit are not initialized.

(4) To initialize other settings, initialize the detector unit. For initialization, refer to the paragraph [Ram clearing] in the separate instruction manual for the detector unit being connected.

10. Inspection and maintenance

10-1. Periodical inspection

10-1-1. Checking by trial operation

Perform a trial operation before every operation and confirm that this unit and the final product operate properly.

10-1-2. Accuracy checking

Some items in this unit require a periodical accuracy check depending on your need. These items may lose accuracy slightly from the time of purchase because of aging or other factors. For this reason, calibrate the unit every 3 months or so (refer to [6-12. Calibration]).
Accuracy checking is available at CHINO as well. Please contact the dealer or nearest agent of CHINO CORPORATION.

10-1-3. Overhaul

We recommend an overhaul every 2 to 3 years to keep long-term reliability. For overhaul, please contact the dealer or nearest agent of CHINO CORPORATION.

10-2. Wear and tear parts

Followings are known wear and tear parts of this unit.
Generally, most of the parts change and deteriorate because of aging.

Part name	Estimated lifetime (replacement guide line)
Relay	Approx. 100 thousand times
Electrolytic capacitor (for smoothing the power circuit)	Approx. 5 years (continuous operation at ambient temperature 30 °C)

10-3. Disposal

Caution	(1) Components of this unit contain trace amounts of toxic substances less than the amount defined under the RoHS directive. (2) When disposing this unit, make sure to ask a specialist. Or, follow the instructions of your local authority. (3) For recycling, separate the packing materials such as boxes, plastic bags, cushioning materials, and seals in accordance with the garbage collection instructions of your local authority.

11. Specifications

Item			
Detector unit input	RS-485, Up to 9 sets connectable		
Input renewable cycle	Approx. 28 msec per unit		
Analog output	Output 1	Output 2	Output 3
Output signal	4 to 20mA DC	4 to 20mA DC	4 to 20mA DC
Output accuracy	±0.5%/FS	±0.5%/FS	±0.5%/FS
Output resolution	Approx. 1/11000	Approx. 1/11000	Approx. 1/11000
Load resistance	600 Ω or less	600 Ω or less	400 Ω or less
Output renewable cycle	Approx. 28 msec x number of detector units connected		
Isolation	Isolated between outputs (500V DC, 20 MΩ or more)		
Display	Data : LED 5 digits Calibration curve number : LED 2 digits Detector unit number : LED 1 digit Constituent number : LED 2 digits		
Alarm type	High limit alarm	Low limit alarm	Self-diagnosed abnormal condition alarm
Output type	Relay output	Relay output	Relay output
Resistive load	3A or less for 100 to 240V AC and 30V DC	3A or less for 100 to 240V AC and 30V DC	3A or less for 100 to 240V AC and 30V DC
Inductive load	1.5A or less for 100 to 240V AC and 30V DC	1.5A or less for 100 to 240V AC and 30V DC	1.5A or less for 100 to 240V AC and 30V DC
Minimum load	5V DC 10mA	5V DC 10mA	5V DC 10mA
Remote setting	Settings of detector unit numbers, constituent numbers, calibration curve numbers, calibration, a PRESET output, a HOLD by remote contact signal		
Input signal	Non-voltage contact, open-collector signal		
Contact capacity	5V DC 2mA		
Isolation	Isolated from the internal circuit (500V DC, 20 MΩ or more)		
Upper communication	RS-232C (RS-422A and RS-485 also available)		
Isolation	Isolated from the internal circuit (500V DC, 20 MΩ or more)		
Power	100 to 240V AC 50/60Hz		
Maximum power consumption	100V AC: Approx.15VA, 200V AC: Approx. 20VA		
Measure against power failure	EEPROM (Rewrite count: approx. one million times)		
Terminal screw	M3.5		
Insulation resistance	Between primary terminal and secondary terminal: 500V DC, 20 MΩ or more Between primary terminal and ground terminal: 500V DC, 20 MΩ or more Between secondary terminal and ground terminal: 500V DC, 20 MΩ or more *) Primary terminal: Terminals for power supply and alarm output Secondary terminal: All terminals except for primary terminals		
Withstand voltage	Between primary terminal and secondary terminal: 1500V AC (for 1 minute) Between primary terminal and ground terminal: 1500V AC (for 1 minute) Between secondary terminal and ground terminal: 500V AC (for 1 minute) *) Primary terminal: Terminals for power supply and alarm output Secondary terminal: All terminals except for primary terminals		
Casing	Fire-retardant polycarbonate		
Color	Gray		
External dimensions	96 (H) × 96 (W) × 127 (D) (147 (D) with a terminal cover)		

Item	
Weight	About 600g
Reference operating conditions	
Ambient temperature	23 °C±2 °C
Ambient humidity	55 % RH±5 % (no dew condensation)
Supply voltage	100V AC±1 %
Supply frequency	50/60 Hz±1 %
Mounting angle	Longitudinal ±3°, transverse ±3°
Installation altitude	2000 m or below
Vibration	0 m/s^2
Shock	0 m/s^2
Mounting condition	Single-unit panel mounting (space required in the right, left, top and bottom of the unit)
External noise	None
Warm-up time	30 minutes or more
Normal operating conditions	
Ambient temperature	0 to 50 °C
Ambient humidity	10 to 90 % RH
Supply voltage	90 to 264V AC
Supply frequency	50/60 Hz±2 %
Mounting angle	Longitudinal ±10°, transverse ±10°
Installation altitude	2000 m or below
Vibration	2 m/s^2
Shock	0 m/s^2
Mounting condition	Single-unit panel mounting (space required in the right, left, top and bottom of the unit)
External noise	None
Ambient temperature change	10 °C/hour or less
Transport conditions	
Ambient temperature	-20 to 60 °C
Ambient humidity	5 to 90 % RH (no dew condensation)
Vibration	4.9 m/s^2
Shock	392 m/s^2 (package status at factory shipment)
Storage conditions	
Ambient temperature	-20 to 60 °C
Ambient humidity	5 to 90 % RH (no dew condensation)
Vibration	0 m/s^2
Shock	0 m/s^2

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