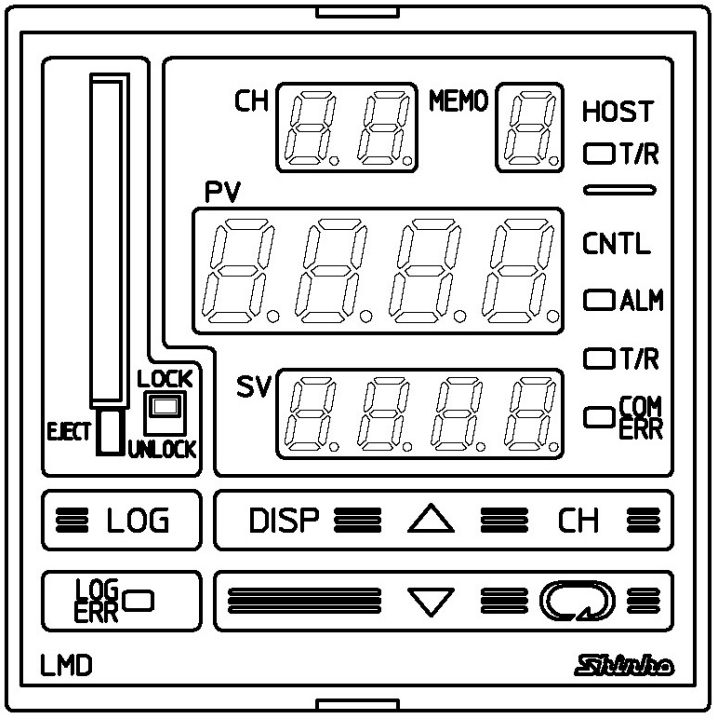
CONSOLE/DATA LOGGER

LMD-100

INSTRUCTION MANUAL



Shinko

Preface

Thank you for purchasing our Console/Data Logger LMD-100.

This manual contains instructions for the mounting, functions, operations and notes when operating the LMD-100.

To prevent accidents arising from the misuse of this instrument, please ensure the operator receives this manual.

Characters used in this manual

Indication	-1	0	1	2	3	4	5	6	7	8	9	℃	℉
Number, ℃/℉	-1	0	1	2	3	4	5	6	7	8	9	℃	℉
Indication	A	b	c	d	E	F	G	H	I	J	K	L	M
Alphabet	A	B	C	D	E	F	G	H	I	J	K	L	M
Indication	n	o	P	q	r	S	T	U	V	W	X	Y	Z
Alphabet	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

⬚ means no indication.

Notes

- This instrument should be used in accordance with the specifications described in the manual. If it is not used according to the specifications, it may malfunction or cause a fire.
- Be sure to follow the warnings, cautions and notices. If they are not observed, serious injury or malfunction may occur.
- Specifications of the LMD-100 and the contents of this instruction manual are subject to change without notice.
- Care has been taken to assure that the contents of this instruction manual are correct, but if there are any doubts, mistakes or questions, please inform our sales department.
- This instrument is designed to be installed within a control panel. If it is not, measures must be taken to ensure that the operator cannot touch power terminals or other high voltage sections.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Shinko Technos CO., LTD. is not liable for any damage or secondary damage(s) incurred as a result of using this product, including any indirect damage.

SAFETY PRECAUTIONS (Be sure to read these precautions before using our products.)
The safety precautions are classified into categories: “Warning” and “Caution”.
Depending on circumstances, procedures indicated by ⚠ Caution may be linked to serious results, so be sure to follow the directions for usage.

⚠ Warning Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.

⚠ Caution Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

⚠ Warning

- To prevent an electric shock or fire, only Shinko or qualified service personnel may handle the inner assembly.
- To prevent an electric shock, fire or damage to instrument, parts replacement may only be undertaken by Shinko or qualified service personnel.

⚠ Safety precautions

- To ensure safe and correct use, thoroughly read and understand this manual before using this instrument.
- This instrument is intended to be used for industrial machinery, machine tools and measuring equipment. Verify correct usage after consulting purpose of use with our agency or main office. (Never use this instrument for medical purposes with which human lives are involved.)
- External protection devices such as protection equipment against excessive temperature rise, etc. must be installed, as malfunction of this product could result in serious damage to the system or injury to personnel. Also proper periodic maintenance is required.
- This instrument must be used under the conditions and environment described in this manual. Shinko Technos Co., Ltd. does not accept liability for any injury, loss of life or damage occurring due to the instrument being used under conditions not otherwise stated in this manual.

Caution with respect to Export Trade Control Ordinance
To avoid this instrument from being used as a component in, or as being utilized in the manufacture of weapons of mass destruction (i.e. military applications, military equipment, etc.), please investigate the end users and the final use of this instrument.
In the case of resale, ensure that this instrument is not illegally exported.

1. Installation precautions

⚠ Caution

This instrument is intended to be used under the following environmental conditions (IEC61010-1): Overvoltage category Ⅱ, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

- **A minimum of dust, and an absence of corrosive gases**
- **No flammable, explosive gases**
- **Few mechanical vibrations or shocks**
- **No exposure to direct sunlight, an ambient temperature of 0 to 50℃ (32 to 122℉) that does not change rapidly**
- **An ambient non-condensing humidity of 35 to 85%RH**
- **No large capacity electromagnetic switches or cables through which large current is flowing**
- **No water, oil or chemicals or where the vapors of these substances can come into direct contact with the unit**
- **When installing this unit within a control panel, take note that ambient temperature of this unit as well as the control panel must not exceed 50℃. Otherwise the life of electronic components (especially electrolytic capacitor) may be shortened.**

Note: Although the case of this instrument is made of flame-resistant resin, do not install this instrument near flammable material.
Avoid setting this instrument directly on flammable material.

2. Wiring precautions

⚠ Caution

- **Do not leave bits of wire in the instrument, because they could cause fire or malfunction.**
- **Use the solderless terminal with an insulation sleeve in which the M3 screw fits when wiring the LMD-100.**
- **The terminal block of this instrument is designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened with the terminal screw.**
- **Tighten the terminal screw to within the specified torque. If excessive force is applied to the screw when tightening, the terminal screw or case may be damaged.**
- **When wiring, keep power lines away from communication lines.**
- **This instrument has no built-in power switch or fuse. It is necessary to install them near the instrument.**
  (Recommended fuse: Time-lag fuse, Rated voltage 250V AC, Rated current 2A)

3. Running and maintenance precautions

⚠ Caution

- **Do not touch live terminals. This may cause electric shock or problems in operation.**
- **Turn the power supply to the LMD-100 OFF before retightening the terminal. Working or touching the terminal with the power switched ON may result in severe injury or death due to Electric Shock.**
- **Be sure to turn the power to the LMD-100 OFF before cleaning.**
- **Use a soft, dry cloth when cleaning the instrument. (Alcohol based substances may tarnish or deface the unit.)**
- **As the display section is vulnerable, do not strike or scratch it with a hard object or press hard on it.**

--- CONTENTS ---

1. Overview

1.1 Overview

The LMD-100 indicates PV, SV and alarm status, sets various set values, and logs data by connecting up to 16 units of digital indicating controllers to which C5 (Serial communication) option is added.

The LMD-100 has the following major functions.

(1) Data logging

The LMD-100 saves data such as PV, SV, OUT1 MV, OUT2 MV and controller status (output, alarm, etc.) on the CF card with CSV format.
Data on the CF card can be edited on spreadsheet applications like EXCEL.

(2) Monitoring

The LMD-100 indicates PV, SV and Alarm status of the connected controllers.

(3) Console

The LMD-100 sets values for the connected controllers.

(4) Set value memory

6 groups of SV for the connected controllers can be saved.

(5) Broadcast setting

The same set value can be set to all connected controllers simultaneously.

(6) 2-point external operation input (Edge action)

Logging Start/Stop and Front key Lock/Unlock can be switched.

(7) 1 point error output (Relay contact 1a)

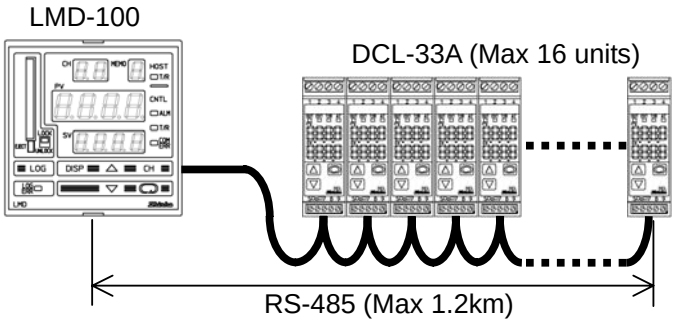
ERR output is turned ON for the following cases.

- If errors occur during data logging
- If the CF card is defective
- If the CF card is not inserted
- If battery (for clock) runs down
- If the LOG key is pressed without setting time

1.2 System configuration

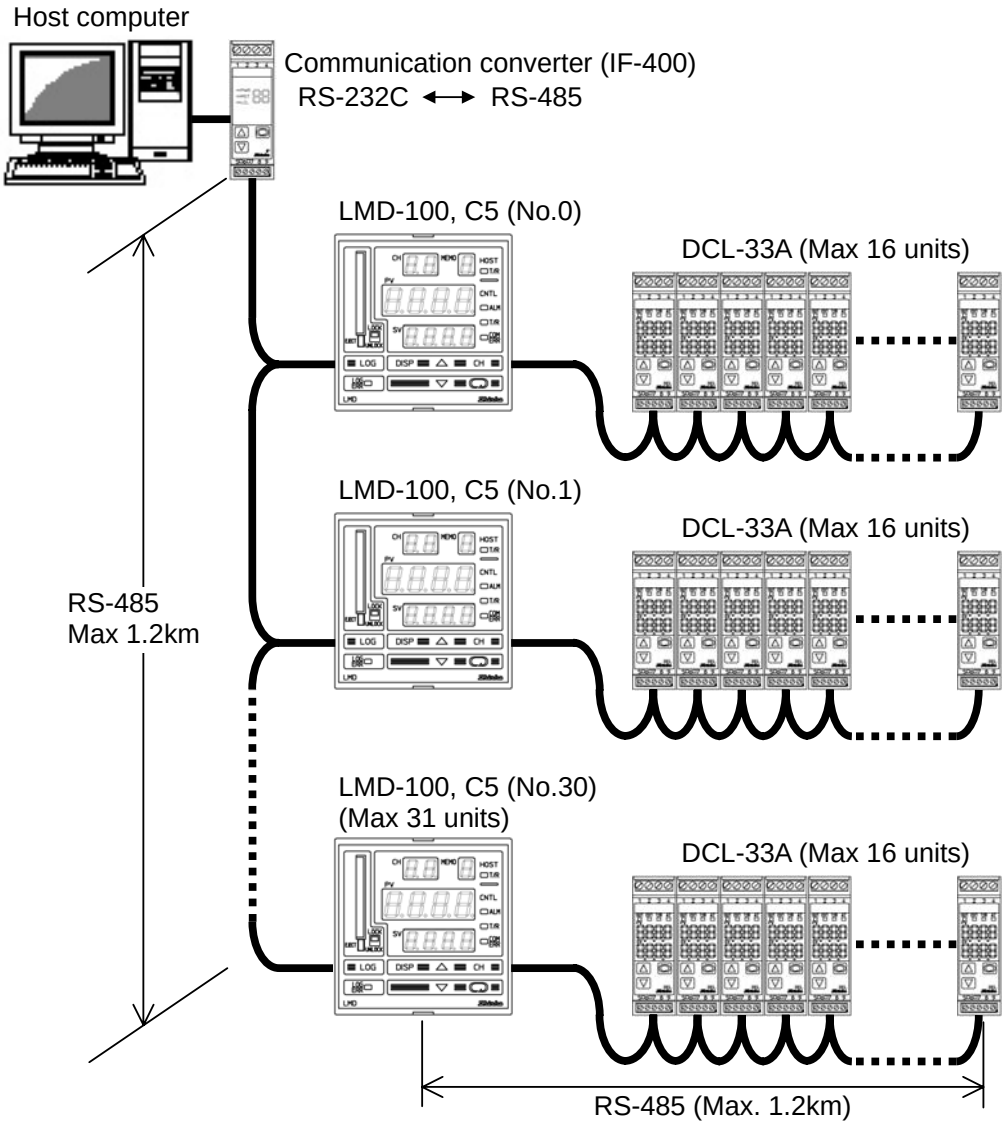
System configuration of the LMD-100 is shown below.

System configuration example 1



(Fig. 1.2-1)

System configuration example 2



(Fig. 1.2-2)

2. Unpacking

2.1 Checking the accessories

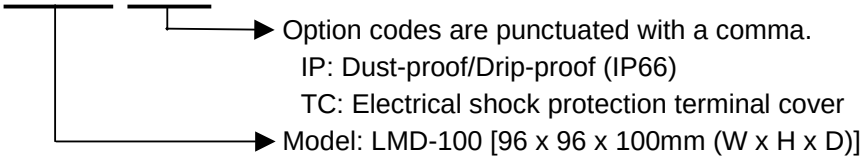
Check whether the following accessories are included.

Name	Q'ty
Mounting brackets	1 set
Instruction manual	1 copy
CF card (32MB)	1
Waterproof cover (IP option)	1 piece
Terminal cover (TC option)	2 pieces

2.2 Model

Model and option codes are indicated as shown below.

(e.g.) LMD-100, IP, TC



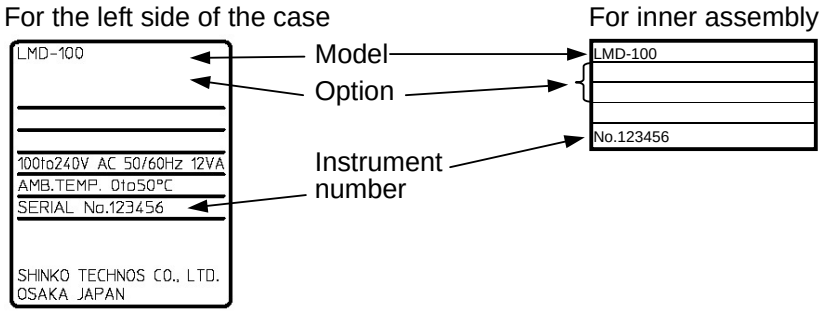
Option codes

(Table 2.2-1)

Code	Name
C5	Serial communication: RS-485
IP	Dust-proof/Drip-proof (IP66)
TC	Electrical shock protection terminal cover
BK	Color: Black (Front panel frame, case)

2.3 How to read the model label

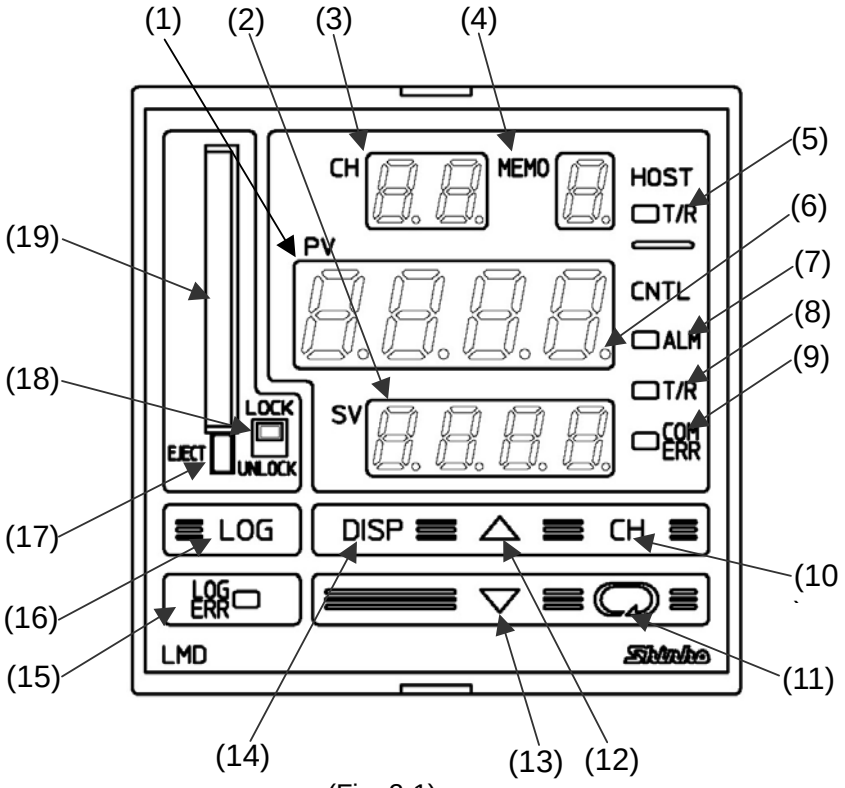
The model labels are attached to the left side of the case and inner assembly.



(Fig. 2.3-1)

(Fig. 2.3-2)

3 Name and functions of the sections



(Fig. 2-1)

(1) PV display

Indicates PV (Process variable) of the connected controller, or setting characters during the setting mode with a red LED.

(2) SV display

Indicates SV (Desired value) or set value during the setting mode of the controller with a green LED.

(3) CH (Channel) display

Indicates the channel number of the indicated PV (Process variable), SV and alarm status with a yellow LED.

(4) MEMO (Memory number) display

Indicates a set value memory number with a yellow LED.

(5) HOST T/R indicator (Host communication indicator)

The yellow LED Lights during Serial communication (C5 option) (TX output) with the host.

(6) AT indicator

When the controller of the indicated channel number is performing auto-tuning or auto-reset, the 1st decimal point from the right on the PV display flashes.

(7) CNTL ALM indicator (Controller alarm indicator)

The red LED lights when the controller alarm of the indicated channel is ON.

JCS-33A, JCM-33A, JCR-33A, JCD-33A: Alarm 1, Alarm 2, Heater burnout alarm, Loop break alarm, Overscale, Underscale

JCL-33A: Alarm 1, Alarm 2, Overscale, Underscale

DCL-33A: Alarm, Heater burnout alarm, Loop break alarm, Overscale, Underscale

NCL-13A: Alarm 1, Alarm 2, Alarm 3, Alarm 4, Heater burnout alarm 1, Heater burnout alarm 2, Loop break alarm, Overscale, Underscale, Actuator short circuit alarm 1, Actuator short circuit alarm 2, Memory defect

ACS-13A: Alarm 1, Alarm 2, Heater burnout alarm, Overscale, Underscale

(8) CNTL T/R indicator (Controller communication indicator)

The yellow LED lights during Serial communication (TX output) with the controller.

(9) CNTL COM ERR indicator (Controller communication error indicator)

The red LED lights when communication errors occur during Serial communication between the LMD-100 and any controller(s).

(10) CH (Channel) key

The channel number indication can be switched manually with this key if “Manual switching” is selected in the PV/SV display mode.

In Main setting mode or Sub setting mode, pressing this key registers the set value, and switches to the next channel.

(11) Mode key

Switches the setting mode or registers the set (selected) value.

To register the set (selected) value, press this key.

(12) △ Increase key

Increases the numeric value.

(13) ▽ Decrease key

Decreases the numeric value.

(14) DISP (Display) key

Selects automatic or manual switching of the channel number to be indicated.

If automatic switching is selected, the channel number is automatically switched from [1 → 2 → 3 → (Number of connected units) → 1] every 2 seconds.

If manual switching is selected, the 1st decimal point from the right on the CH (Channel) display flashes.

The channel number can be manually changed by pressing the CH (Channel) key.

(15) LOG ERR indicator (Logging error indicator)

The red LED lights if errors occur during data logging, if CF card is defective, if the LOG (Logging) key is pressed without setting time, or while battery runs down.

(16) LOG (Logging) key

Starts or stops data logging.

Data logging stops by pressing this key for 1 second or more.

Data logging does not start if items in the Data logging condition setting mode are not set.

Data logging does not start if CF card is not inserted (logging error).

(17) EJECT (CF card eject button)

Pressing this button ejects the CF card.

(18) CF card LOCK switch (logging indicator)

Switch for preventing the CF card from being taken out during logging.

LOCK : Data logging Enabled

UNLOCK : Data logging Disabled

Data logging stops when switched to UNLOCK.

This switch also functions as a Logging indicator. The red LED lights during logging, and flashes while accessing the CF card.

(19) CF card insertion slot

Slot to insert the CF card.

4. Mounting to the control panel

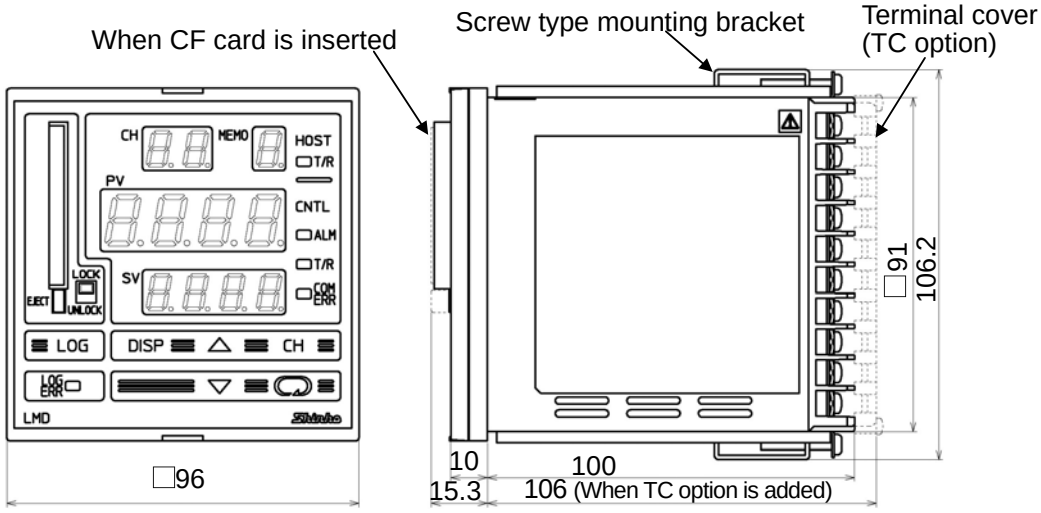
4.1 Site selection

This instrument is intended to be used under the following environmental conditions (IEC61010-1): Overvoltage category Ⅱ, Pollution degree 2

Ensure the mounting location corresponds to the following conditions:

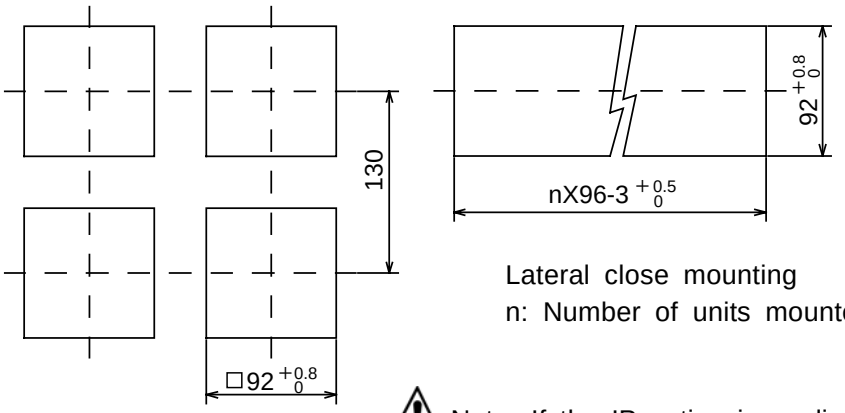
(1) A minimum of dust, and an absence of corrosive gases
(2) No flammable, explosive gases
(3) No mechanical vibrations or shocks
(4) No exposure to direct sunlight, an ambient temperature of 0 to 50℃ (32 to 122℉) that does not change suddenly
(5) An ambient non-condensing humidity of 35 to 85%RH
(6) No large capacity electromagnetic switches or cables through which large current is flowing
(7) No water, oil or chemicals or where the vapors of these substances can come into direct contact with the instrument

4.2 External dimensions (unit: mm)



(Fig. 4.2-1)

4.3 Panel cutout (unit: mm)



Lateral close mounting
n: Number of units mounted

Note: If the IP option is applied, take the space for opening the waterproof cover into consideration.

(Fig. 4.3-1)

4.4 Mounting

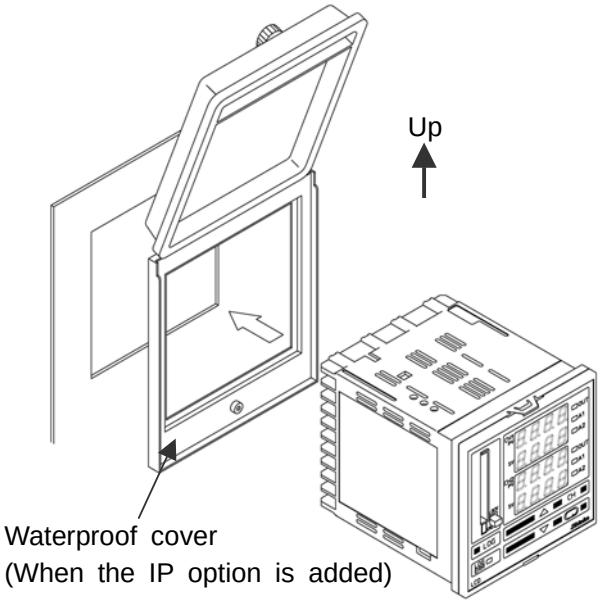
> **⚠ Notice**
>
> As the case is made of resin, do not use excessive force while screwing in the mounting bracket, or the case or screw type mounting bracket could be damaged. The torque is approximately 0.12N•m.

Mountable panel thickness is 1 to 15mm.
Insert the LMD-100 from the front of the control panel.
For the IP option, fitting the waterproof cover to the control panel cutout, mount it between the panel and the face of the LMD-100. (Fig. 4.4-1)

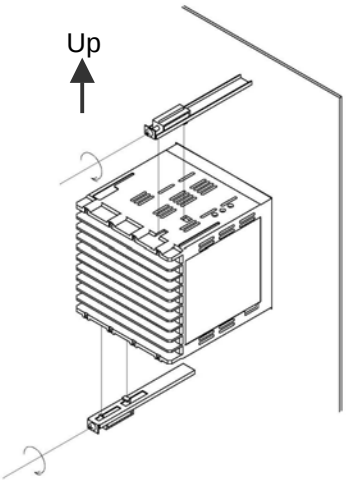
Waterproof cover

Cover : Polycarbonate 94V-2
Packing : Chloroprene rubber
Panel : SUS304

Slot the mounting bracket to the holes at the top and bottom of the case, and screw in place. (Fig. 4.4-2)



(Fig. 4.4-1)



(Fig. 4.4-2)

5. Wiring

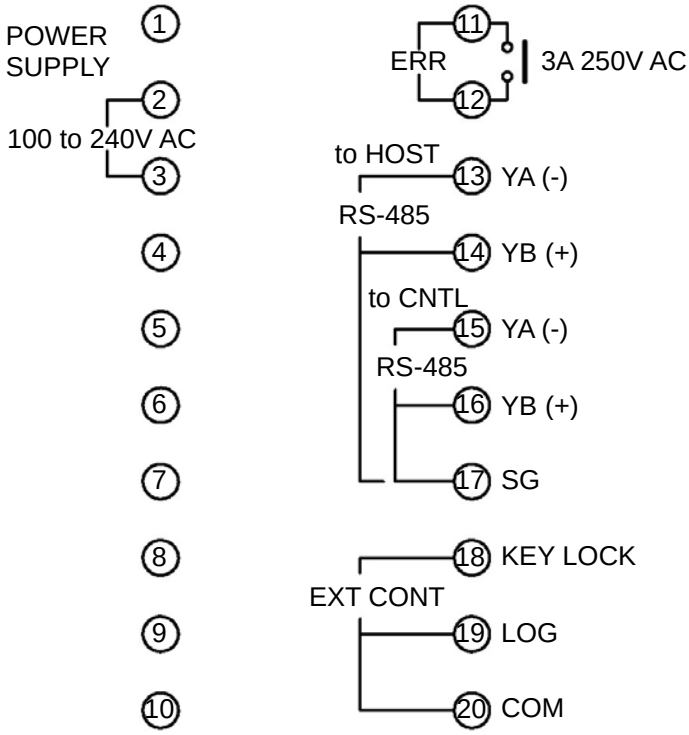
⚠ Warning

Turn the power supply to the instrument off before wiring or checking. Working or touching the terminal with the power switched on may result in severe injury or death due to Electric Shock.
Moreover, the instrument must be grounded before the power supply to the instrument is turned on.

⚠ Notice

The terminal block of this instrument is designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened with the terminal screw.

5.1 Terminal arrangement



(Fig. 5.1-1)

Power supply : 100 to 240V AC

ERR : Error output
Outputs if errors occur during data logging, if the CF card is defective, while battery runs down, or if the LOG key is pressed without setting time.

RS-485 (to HOST) : Serial communication RS-485 (connection to Host) (C5 option)

RS-485 (to CNTL) : Serial communication RS-485 (connection to controller)

EXT CONT (KEY LOCK) : External operation input (Front key LOCK/UNLOCK)

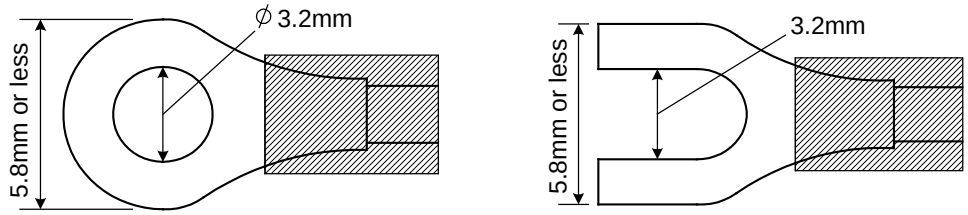
EXT CONT (LOG) : External operation input (Logging Start/Stop)

● **Solderless terminal**

Use a solderless terminal with an insulation sleeve in which the M3 screw fits as shown below.

The torque is approximately 0.6N•m to 1.0N•m.

Solderless terminal	Manufacturer	Model	Tightening torque
Y type	Nichifu Terminal Industries CO.,LTD.	1.25Y-3	0.6N•m Max. 1.0N•m
	Japan Solderless Terminal MFG CO.,LTD.	VD1.25-B3A	
Round type	Nichifu Terminal Industries CO.,LTD.	1.25-3	
	Japan Solderless Terminal MFG CO.,LTD.	V1.25-3	



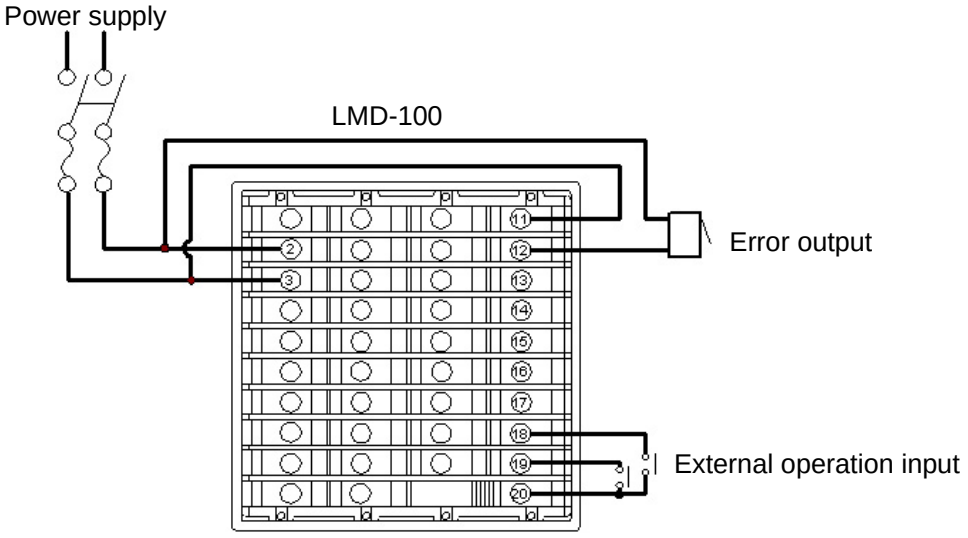
(Fig. 5.1-2)

5.2 Wiring examples

⚠ Caution

- This instrument has neither a built-in power switch, circuit breaker nor a fuse. Therefore, it is necessary to install them in the circuit near the external instrument. (Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)
- When wiring, keep power lines away from communication lines.

5.2.1 Wiring example of power supply, error output and external operation input



(Fig. 5.2.1-1)

5.2.2 Wiring example of Serial communication RS-485 (connection to controller)

(1) DCL-33A (Fig. 5.2.2-1)

Connection between LMD-100 and DCL-33A

Use CDM communication cable (sold separately).

Connect CDM modular plug to DCL-33A modular jack.

For CDM "Y" terminal connection, refer to the following.

CDM "Y" terminal number	LMD-100 terminal number
4	15 YA (-)
3	16 YB (+)
1, 6	17 SG

CDM cable length: 3000mm (Can be extended in units of 1000mm fixed length)

Connection between DCL-33A units

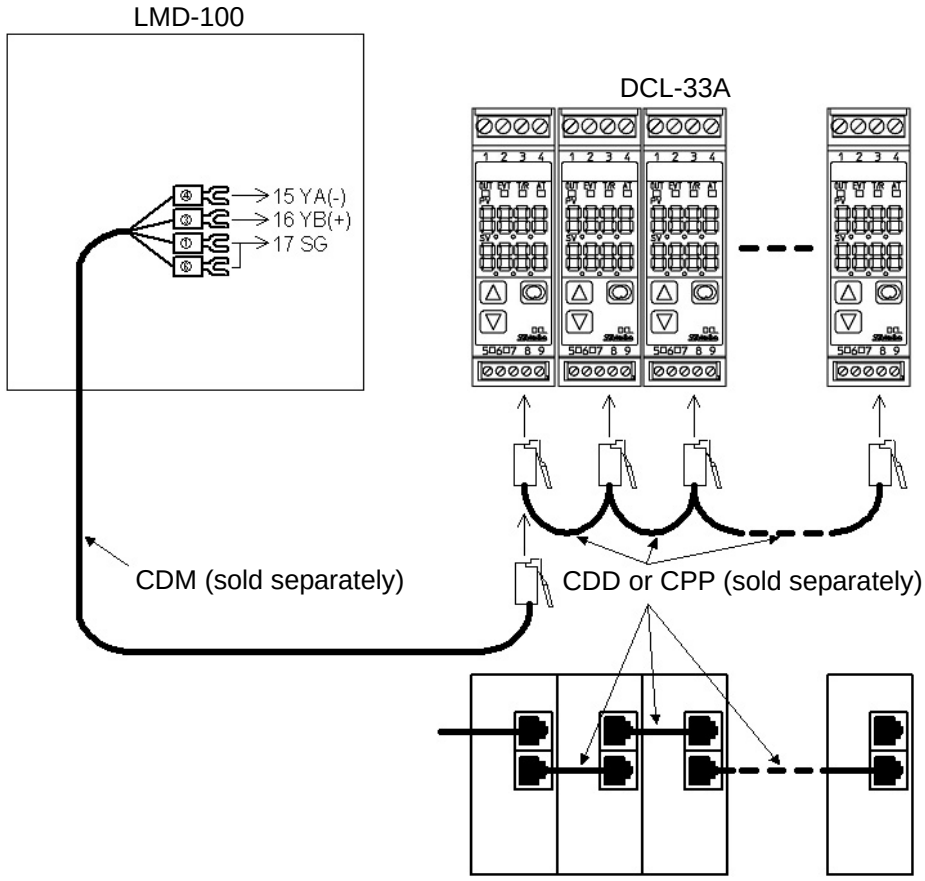
Use communication cable CDD or CPP (sold separately), and plug into modular jack.

Cable length of CDD: 60mm. For distances larger than 60mm, use the CPP cable.

Cable length of CPP: 500mm.

(For distances larger than 500mm, the CPP can be extended in units of 500mm fixed length.

For distances less than 500mm, the CPP can be cut down in units of 100mm fixed length.)



(Fig. 5.2.2-1)

(2) ACS-13A, JCL-33A, JCS-33A, JCM-33A, JCR-33A, JCD-33A (Fig. 5.2.2-2)

Connection between LMD-100 and controller (ACS-13A/JCL-33A/JCS-33A/JCM-33A/JCR-33A/JCD-33A)

Connection between controllers (ACS-13A/JCL-33A/JCS-33A/JCM-33A/JCR-33A/JCD-33A)

Connect YA (-) to YA (-), YB (+) to YB (+) and SG to SG respectively, using a shielded wire.

Connect only one side of the shielded wire to the FG terminal so that current cannot flow to the shielded wire.

If both sides of the shielded wire are connected to the FG terminal, the circuit will be closed between the shielded wire and the ground. As a result, current will run through the shielded wire, and this may cause noise.

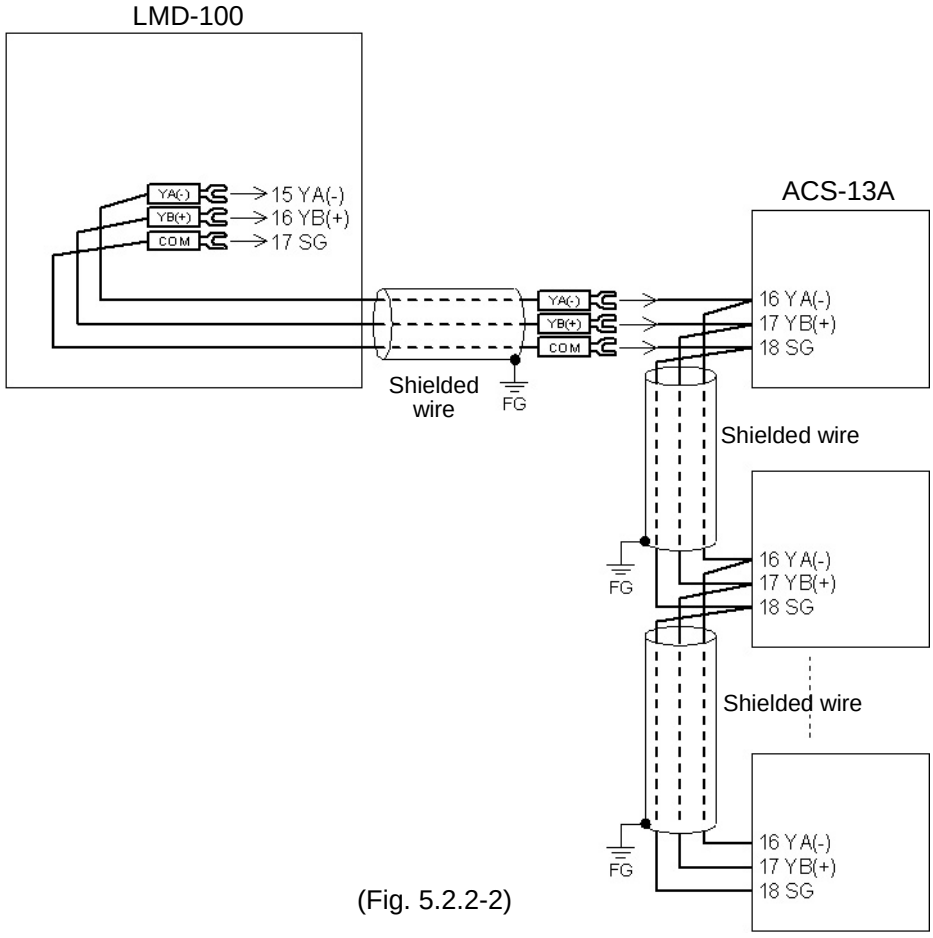
Be sure to ground FG terminal.

Recommended cable: OTSC-VB 2PX0.5SQ (made by Onamba Co., Ltd.) or equivalent
(Use a twisted pair cable.)

Wiring example between LMD-100 and ACS-13A (Fig. 5.2.2-2)

Terminal numbers for connection differ depending on a controller model as follows.

LMD-100	JCL-33A	JCS-33A	JCM-33A	JCR-33A	JCD-33A
15 YA (-)	10 YA (-)	13 YA (-)	10 YA (-)	11 YA (-)	11 YA (-)
16 YB (+)	11 YB (+)	14 YB (+)	13 YB (+)	14 YB (+)	14 YB (+)
17 SG	12 SG	15 SG	14 SG	17 SG	17 SG



(Fig. 5.2.2-2)

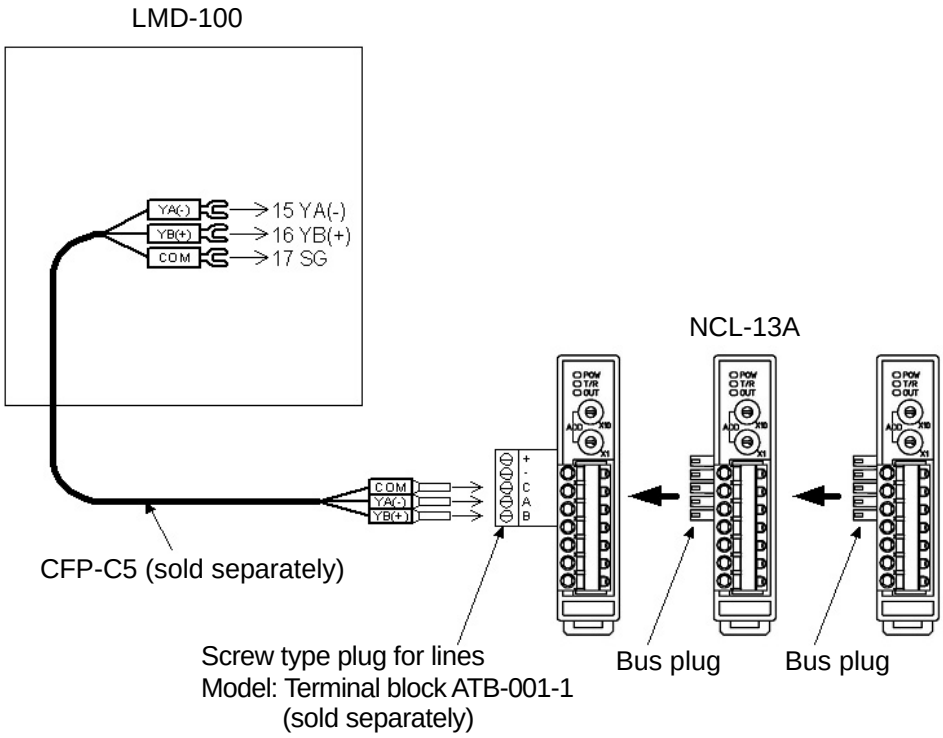
(3) NCL-13A (Fig. 5.2.2-3)

Connection between LMD-100 and NCL-13A

Connect YA (-) to YA (-), YB (+) to YB (+) and SG to SG respectively, using the communication cable CFP-C5 (sold separately).

Connection between NCL-13A units

Connect bus plug to bus plug.



(Fig. 5.2.2-3)

6 Settings

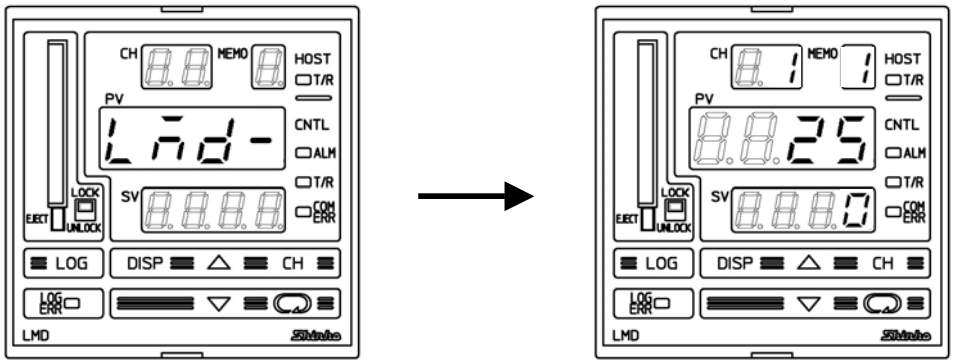
6.1 Setting of controller

Controllers should to be set as the following.
(Refer to the instruction manual for the controller connected to the LMD-100.)

(1) Controller communication protocol : **Shinko protocol**
(2) Controller instrument number : **From 1 in numerical order**
(e.g.) Set from 1 to 5 when 5 units of controller is connected.
(3) Controller communication speed : **19200bps**

6.2 Turn the power supply to the LMD-100 ON (warm-up indication)

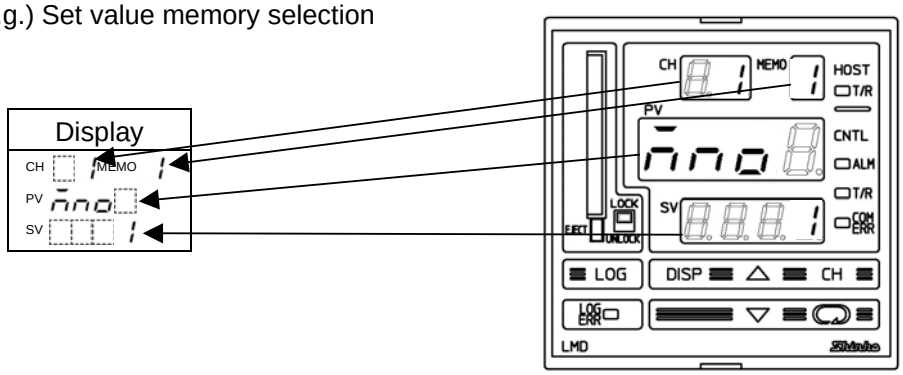
Turn the power supply to the LMD-100 ON.
After power-on, the PV display indicates "LMD-" for approx. 5 seconds. (Fig. 6.2-1)
After that, the LMD-100 reads PV, SV and alarm status of the connected controller, and indicates them for each channel (in the case of automatic switching of the channel number, the channel is automatically switched every 2 seconds.). (Fig. 6.2-2)



(Fig. 6.2-1) (Fig. 6.2-2)

6.3 Display explanation

In this manual, the following display is used for purposes of explanation.
☐ means no indication.
(e.g.) Set value memory selection

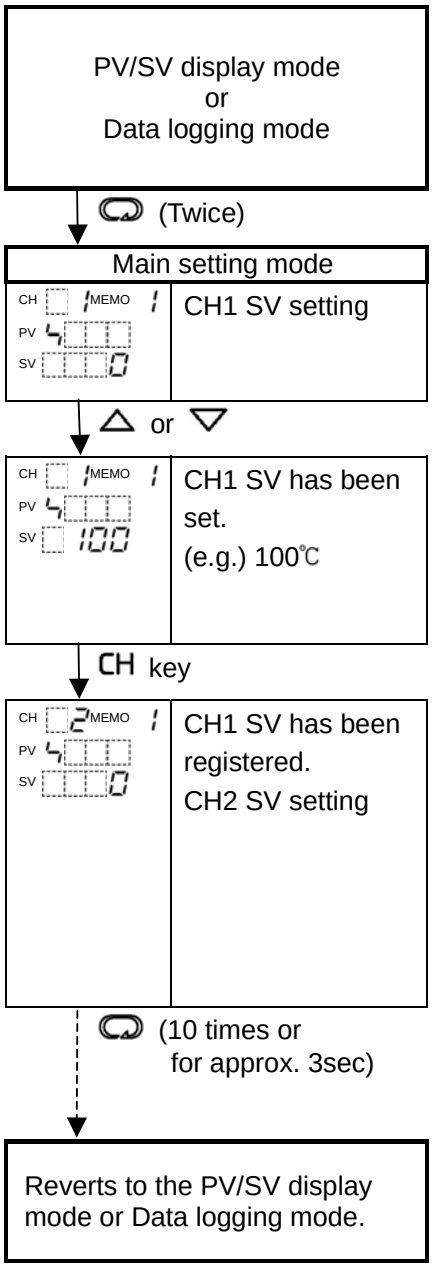


(Fig. 6.3-1)

6.4 Basic operation

SV setting (e.g. 100℃) is used for purposes of explanation of basic operation.

To set (or select) each setting item, use the △ or ▽ key, then register the value with the ⟲ or CH key.



Press the ⟲ key twice in the PV/SV display mode or Data logging mode.
The unit proceeds to the SV setting in Main setting mode.

Set CH1 SV, using the △ or ▽ key.

(e.g.) 100℃
Pressing the CH key registers CH1 SV, and proceeds to the CH2 SV setting.

CH2 SV can be set continuously.
Set other channel number controllers in the same way.

Press the ⟲ key 10 times or for approx. 3sec.
The unit Reverts to the PV/SV display mode or Data logging mode.

6.5 Controller setting mode

Select controller model and number of controller units to communicate with the controller.
Press the ⟲ key for approx. 3 seconds while holding down the ▽ key in the PV/SV display mode or Data logging mode.
The unit will proceed to the Controller setting mode.

To set (or select) each setting item, use the △ or ▽ key, then register the value with the ⟲ key. The setting item will be switched.

Display	Name, Function, Setting range	Default value
CH □ 1 MEMO 1 PV cnrL SV □□□0	**Controller model selection** • Selects controller type connected to the LMD-100. • Selection item □□□0: DCL-33A □□□1: JCS-33A, JCM-33A, JCR-33A, JCD-33A □□□2: NCL-13A □□□3: JCL-33A □□□4: ACS-13A	DCL-33A
CH □ 1 MEMO 1 PV Unit SV □□□1	**Number of controllers setting** • Sets the number of controller units connected to the LMD-100. • Setting range: 1 to 16	1 unit

6.6 Logging condition setting mode

Logging date, time, logging item, logging cycle, etc. can be set for data logging.

Press the LOG key for approx. 3 seconds while holding down the ▽ key in the PV/SV display mode or Data logging mode. The unit will proceed to Logging condition setting mode.

To set (or select) each setting item, use the △ or ▽ key, then register the value with the ↵ key. The setting item will be switched.

Display	Name, Function, Setting range	Default value
CH □ 1 MEMO 1 PV YEAr SV □□□0	**Year setting** • Sets the year. Not available during data logging. • Setting range: 0 to 99 (2000 to 2099)	0 (2000)
CH □ 1 MEMO 1 PV MonT SV □□□ 1	**Month setting** • Sets the month. Not available during data logging. • Setting range: 1 to 12 (January to December)	1 (January)
CH □ 1 MEMO 1 PV dAY□ SV □□□ 1	**Day setting** • Sets the day. Do not set a non-existent day such as 31st Feb. or 31st Nov. Logging file name and updated date will not coincide. Not available during data logging. • Setting range: 1 to 31	1 (1st)
CH □ 1 MEMO 1 PV HoUr SV □□□0	**Hour setting** Sets the hour. Not available during data logging. • Setting range: 0 to 23	0
CH □ 1 MEMO 1 PV MI n□ SV □□□0	**Minute setting** • Sets the minute. Not available during data logging. • Setting range: 0 to 59	0
CH □ 1 MEMO 1 PV LGPY SV on□□	**PV logging selection** • Selects PV logging. Not available during data logging. • Selection item: oFF□ Not effective on□□ Effective	Effective
CH □ 1 MEMO 1 PV LGSV SV oFF□	**SV logging selection** • Selects SV logging. Not available during data logging. • Selection item: oFF□ Not effective on□□ Effective	Not effective
CH □ 1 MEMO 1 PV LGMV SV oFF□	**OUT1 MV logging selection** • Selects OUT1 MV logging. Not available during data logging. • Selection item: oFF□ Not effective on□□ Effective	Not effective

Display	Name, Function, Setting range	Default value
CH □ MEMO 1 PV LGA2 SV oFF□	**OUT2 MV logging selection** • Selects OUT2 MV logging. Not available during data logging. • Selection item: oFF□: Not effective on□□: Effective	Not effective
CH □ MEMO 1 PV LGST SV oFF□	**Status logging selection** • Selects status logging. Not available during data logging. • Selection item: oFF□: Not effective on□□: Effective	Not effective
CH □ MEMO 1 PV AUTo SV oFF□	**Logging auto-start selection** • Selects Logging auto-start. Not available during data logging. • Selection item: oFF□ : Not effective on□□: Effective	Not effective
CH □ MEMO 1 PV STI M SV 00:00	**Logging auto-start timer (start) setting** • Sets logging auto-start time. Not available during data logging or if "Not effective" is selected during Logging auto-start selection. • Setting range: 00:00 to 23:59 (Hour:Minute)	00:00
CH □ MEMO 1 PV ETI M SV 00:00	**Logging auto-start timer (end) setting** • Sets logging auto-start end time. If logging auto-start start and end time are the same, logging continues until power-off or until CF card capacity is exceeded. Not available during data logging or if "Not effective" is selected during Logging auto-start selection. • Setting range: 00:00 to 23:59 (Hour:Minute)	00:00
CH □ MEMO 1 PV LGCY SV 00.10	**Logging cycle selection** • Selects the data logging cycle. • Selection item: 00.01: 1 second 00.02: 2 seconds 00.05: 5 seconds 00.10: 10 seconds 00.15: 15 seconds 00.20: 20 seconds 00.30: 30 seconds 01.00: 1 minute 02.00: 2 minutes 05.00: 5 minutes 10.00: 10 minutes 15.00: 15 minutes 20.00: 20 minutes 30.00: 30 minutes 60.00: 60 minutes	10 seconds

Display	Name, Function, Setting range	Default value
CH MEMO 1 PV cFU5 SV 0.0	**CF card used memory indication** • Used CF card memory is indicated as a percentage from 0.0 to 100.0%. Take this into consideration when logging data. Available only when the CF card is inserted.	
CH MEMO 1 PV cF.cr SV oFF	**CF card format selection** • Selects whether to format the CF card. Not available during data logging or if the CF card is not inserted • Selection item: oFF: No format on : Format	No format
CH MEMO 1 PV cF.ot SV oFF	**CF card format confirmation** • Confirms whether to format the CF card. Not available if “No format” is selected during CF card format selection • Selection item: oFF: No format on : Format	No format
CH MEMO 1 PV EU5L SV EU1 r	**External operation input (LOG) priority** • Selects whether priority is given to the external operation. • Selection item: EU1 r: External operation input (LOG) has priority. tEY: The LOG key has priority.	External operation input (LOG) has priority
CH MEMO 1 PV cnno SV 0	**Instrument number setting** • Sets the instrument number individually to each instrument when communicating by connecting plural instruments in serial communication. Not available during data logging or if C5 option is not added • Setting range: 0 to 95	0
CH MEMO 1 PV cn5P SV 96	**Communication speed selection** • Selects the communication speed equal to that of the host computer. • To communicate with the controllers, the communication speed of the host computer and LMD-100 should be set to **19200bps**. Not available during data logging or if C5 option is not added • Selection item: 96: 9600bps 192: 19200bps	9600bps

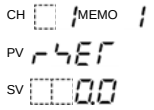
6.7 Main setting mode

SV, Alarm 1 value and PID parameters, etc. of the connected controller can be set.
Press the ⟲ key in the PV/SV display mode or Data logging mode.
The unit will proceed to the Main setting mode.

To set (or select) each item, use the △ or ▽ key.
Pressing the CH key registers the value, and switches the channel number.
Pressing the ⟲ key registers the value, and switches the setting item.

Display	Name, Function, Setting range	Default value
CH □ 1 MEMO 1 PV Ano□ SV □□□ 1	**Set value memory number selection** • Selects the Set value memory number. • Up to 6 groups of SV of the connected controller can be saved. If the ⟲ key is pressed after selecting Set value memory number, SVs in the selected memory number are sent to the controllers. (See p.38 for registering Set value memory number.) [When a lot of controllers are connected, operations at the next setting mode (SV setting) cannot be performed until all connected controllers SV changes are completed.] • If set values are changed from the controller side, the LMD-100 reads and saves the sending items the LMD-100 already has: Sending items of the LMD-100: SV, Alarm 1 value, OUT1 proportional band, OUT2 proportional band, Integral time, Derivative time, ARW, OUT1 proportional cycle, OUT2 proportional cycle, Manual reset, Set value lock, Auto-tuning/Auto-reset However, if SV is changed from the controller side, the SV of the Set value memory number cannot be changed. To change SV of the Set value memory number, set it in the next "SV setting" mode. • Setting range: 1 to 6	1
CH □ 1 MEMO 1 PV 5□□□ SV □□□0	**SV setting** • Sets the SV of the connected controllers and SV of the Set value memory number selected during Set value memory number selection. • Setting range: Scaling low limit to Scaling high limit SV low limit to SV high limit	
CH □ 1 MEMO 1 PV A 1□□ SV □□□0	**Alarm 1 value setting** • Sets the action point of Alarm 1 output of the connected controller. Setting the value to 0 or 0.0 disables the function. (Excluding process high alarm and process low alarm) • When No alarm action is selected for the controller, the SV display is unlit, and this setting is impossible. • Setting range depends on the alarm type of the connected controller.	
CH □ 1 MEMO 1 PV P□□□ SV □□2.5	**OUT1 proportional band setting** • Sets OUT1 proportional band of the connected controllers. OUT1 becomes ON/OFF action when set to 0 or 0.0. • Setting range: DCL-33A, JCL-33A, ACS-13A : 0.0 to 110.0% JCS-33A, JCM-33A, JCR-33A, JCD-33A: 0 to 1000℃ (2000℉) Thermocouple, RTD input with decimal point: 0.0 to 1000.0℃(℉) DC voltage, current input: 0.0 to 100.0%	

Display	Name, Function, Setting range
CH □ 1 MEMO 1 PV P_b□ SV □□ 1.0	**OUT2 proportional band setting** • Sets OUT2 proportional band of the connected controllers. OUT2 becomes ON/OFF action when set to 0.0. If D□ option is not added to the controller, or if OUT1 is ON/OFF action, the SV display is unlit, and this setting is impossible. • Setting range: 0.0 to 10.0 times (to OUT1 proportional band) (e.g.) When OUT1 proportional band is 2.5%: If OUT2 proportional band is set to 1.0 time, OUT2 proportional band: 2.5% x 1.0= 2.5% If OUT2 proportional band is set to 2.0 times, OUT2 proportional band: 2.5% x 2.0= 5.0%
CH □ 1 MEMO 1 PV I □□□ SV □200	**Integral time setting** • Sets OUT1 integral time of the connected controllers. Setting the value to 0 disables the function. • If OUT1 is ON/OFF action, the SV display is unlit, and this setting is impossible. • Setting range: 0 to 1000 seconds
CH □ 1 MEMO 1 PV d□□□ SV □□50	**Derivative time setting** • Sets OUT1 derivative time of the connected controllers. Setting the value to 0 disables the function. • If OUT1 is ON/OFF action, the SV display is unlit, and this setting is impossible. • Setting range: 0 to 300 seconds
CH □ 1 MEMO 1 PV n□□□ SV □□50	**ARW setting** • Sets OUT1 ARW (anti-reset windup) of the connected controller. • For control actions other than PID, the SV display is unlit, and this setting is impossible. • Setting range: 0 to 100%
CH □ 1 MEMO 1 PV c□□□ SV □□30	**OUT1 proportional cycle setting** • Sets OUT1 proportional cycle for the connected controller. • **For the relay contact output type, if the proportional cycle time is decreased, the frequency of the relay action increases and the life of the relay contact is shortened.** If OUT1 is ON/OFF action or DC current output type, the SV display is unlit, and this setting is impossible. • Setting range: 1 to 120 seconds
CH □ 1 MEMO 1 PV c_b□ SV □□30	**OUT2 proportional cycle setting** • Sets OUT2 proportional cycle for the connected controller. • **For the relay contact output type, if the proportional cycle time is decreased, the frequency of the relay action increases and the life of the relay contact is shortened.** If D□ option is not added to the controller, or if OUT2 is ON/OFF action, the SV display is unlit, and this setting is impossible. • Setting range: 1 to 120 seconds

	**Manual reset setting** • Sets the reset value manually for the connected controller. For control actions other than P and PD, the SV display is unlit, and this setting is impossible. Available only when DCL-33A, NCL-13A, JCL-33A is selected during Controller model selection. • Setting range: ±Proportional band converted value (For DC voltage and current input, the placement of the decimal point follows the selection.)

6.8 Sub setting mode

Set value lock and Auto-tuning/Auto-reset for the connected controller can be set.
Press the ⟲ key while holding down the △ key in the PV/SV display mode or Data logging mode. The unit will proceed to the Sub setting mode.

To set (or select) each setting item, use the △ or ▽ key.
Pressing the CH key registers the value, and switches the channel number.
Pressing the ⟲ key registers the value, and switches the setting item.

Display	Name, Function, Setting range
CH □ 1 MEMO 1 PV Lock SV ----	**Set value lock selection** • Locks set values to prevent setting errors. The setting item to be locked depends on the selection. Refer to the Instruction manual for the connected controller. When Lock 1 or Lock 2 is selected, PID auto-tuning, auto-reset cannot be performed. • Selection item: **DCL-33A, JCS-33A, JCM-33A, JCR-33A, JCD-33A, JCL-33A, ACS-13A:** ---- (Unlock) All set values can be changed. Loc 1 (Lock 1) None of the set values can be changed. Loc2 (Lock 2) Only main setting mode can be changed. Loc3 (Lock 3) All set values except Input type can be changed. However, changed values revert to their previous value after power is turned off because they are not saved in the non-volatile memory. **Do not change any setting item in Auxiliary function setting mode 2 or Setup mode. If any item in Auxiliary function setting mode 2 or Setup mode is changed, it will affect other setting items such as the SV, Alarm value, etc.** **NCL-13A:** Non-volatile memory data saving selection ---- (Unlock) } Save Loc 1 (Lock 1) } Save Loc2 (Lock 2) } Save Loc3 (Lock 3) Unable to save
CH □ 1 MEMO 1 PV AT□□ SV ----	**Auto-tuning/Auto-reset selection** • Auto-tuning Perform/Cancel can be carried out in the PID action. JCS-33A, JCM-33A, JCR-33A, JCD-33A, ACS-13A: Auto-reset Perform/Cancel can be carried out in the P, PD action. During ON/OFF, PI action, the SV display is unlit, and this setting is impossible. • If Auto-tuning is cancelled during the process, each value of P, I, D and ARW returns to the values before the Auto-tuning was performed. • If the auto-tuning is not finished after 4 hours, it is cancelled automatically. • Auto-reset is cancelled in approximately 4 minutes. It cannot be released while performing this function. • Selection item: ---- : Auto-tuning/Auto-reset Cancel AT□□/RSET : Auto-tuning/Auto-reset Perform

6.9 All set values reading mode

Reads all set values of the connected controllers.

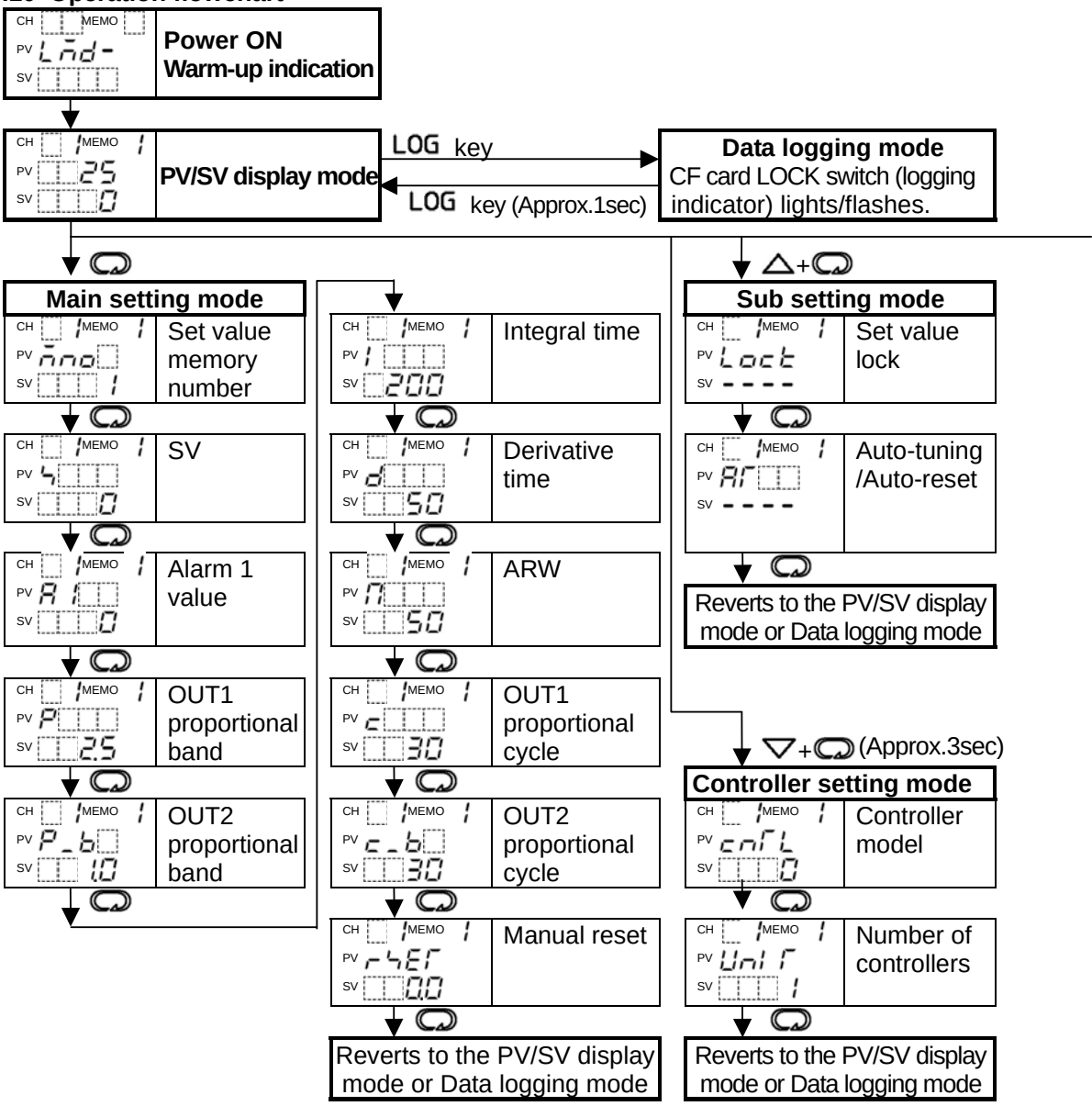
Press the ↺ key for approx. 3 seconds while holding down the △ and ▽ keys in the PV/SV display mode.

The unit proceeds to the All set values reading mode.

During data logging or setting mode, it is impossible to proceed to this mode.

Display	Name, Function, Setting range
CH □□ MEMO □ PV rEAd SV □□□	**All set values reading** • All set values of the connected controllers can be read. The unit automatically reverts to the PV/SV display mode after reading all set values.

6.10 Operation flowchart

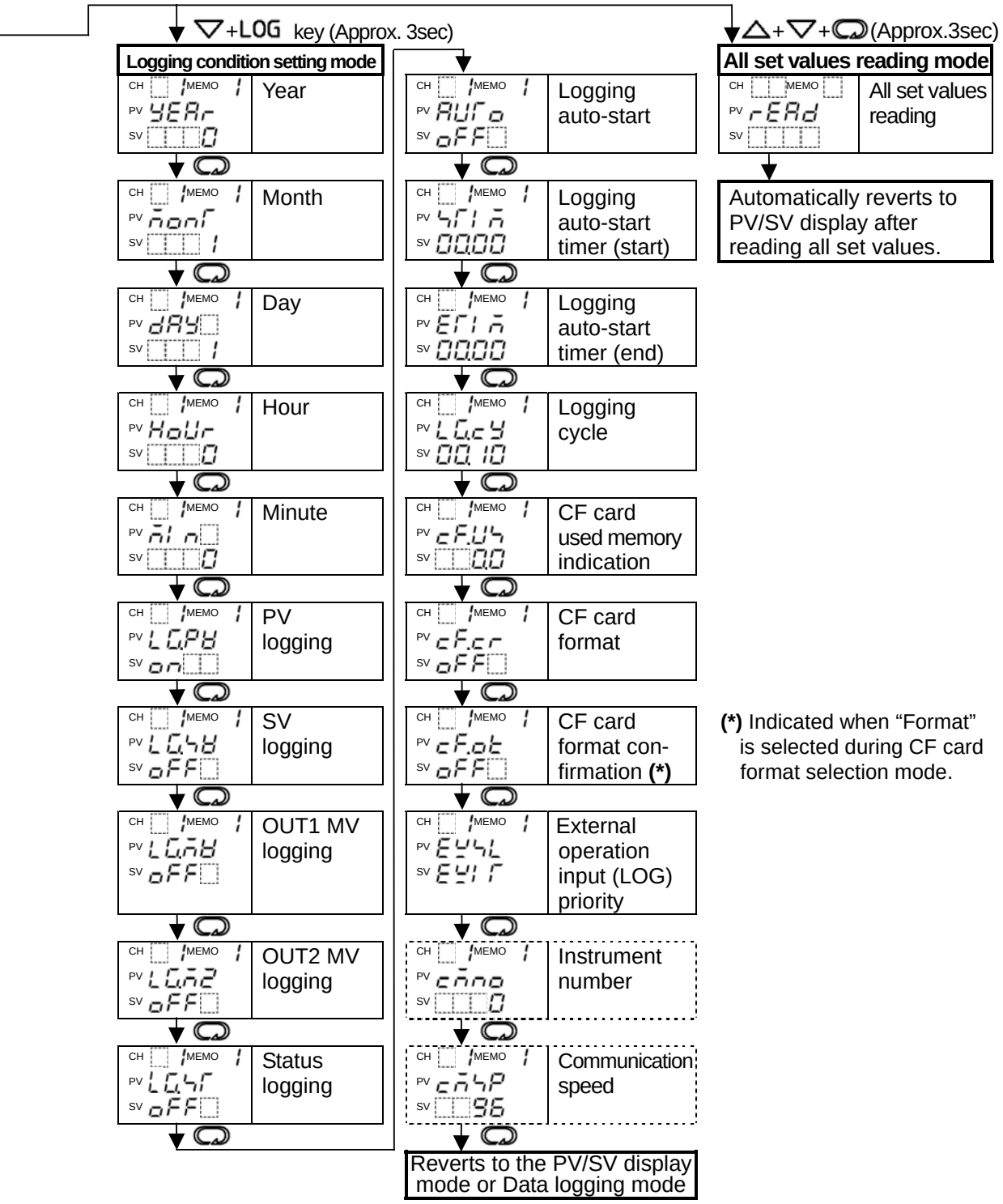


- Setting items with dotted lines are optional, and they appear only when the options are added.
- **Key operations**
  - To set values, use the △ or ▽ key.
    To register the value, press the ⟲ key.
  - ↓⟲: This means that if the ⟲ key is pressed, the unit proceeds to the next setting mode.

- △+⟲ : Press the ⟲ key while holding down the △ key.
- ▽+⟲(Approx.3sec) : Press the ⟲ key for approx. 3sec while holding down the ▽ key.
- ▽+LOG key (Approx.3sec): Press the LOG key for approx. 3sec while holding down the ▽ key.
- △+▽+⟲(Approx.3sec) : Press the ⟲ key for approx. 3sec while holding down the △ and ▽ keys.

● Each setting mode

- During setting mode, logging with the LOG key cannot be started. However, logging can be stopped by pressing the LOG key for approx. 1sec.
- If the ↺ key is pressed for approx. 3sec during setting mode, the unit reverts to the PV/SV display mode.
- If the CH key is pressed in the Main setting mode or Sub setting mode, the set value is registered, and the channel number is switched.
- During data logging or setting mode, it is impossible to enter the All set values reading mode



(*) Indicated when "Format" is selected during CF card format selection mode.

7. Operation

[Before running]

Before running the instrument, check the mounting and wiring carefully, referring to "4. Mounting to the control panel" (p.12) and "5. Wiring" (p.14).

Check whether settings are applicable for the users' conditions, referring to "6 Settings" (p.19).

7.1 Running the LMD-100

(1) Turn the power supply to the LMD-100 and connected controllers ON.

Turn the power supply to the LMD-100 and connected controllers ON.

For 5 seconds after the power is turned on, the PV display indicates [Lnd-].

After that, the LMD-100 reads PV, SV and alarm status of the connected controllers.

If automatic switching is selected, the channel number is automatically switched every 2 seconds, indicating PV, SV and alarm status.

(2) Input set values of the LMD-100.

Input each set value of the LMD-100, referring to "6. Settings" (p.19).

(3) Turn the load circuit power of the connected controllers ON.

Turn the load circuit power of the connected controllers ON.

Control action starts so as to keep the control target at the SV.

7.2 Preparation for data logging

7.2.1 CF card included

Please use the CF card included.

Media	: Type I (Thickness 3.3mm), Maximum capacity 256MB
Format	: FAT16
Writing method	: Writing in a new file (Opens a new file every time logging starts, and saves data in it.)
CF card memory usage	: In the case of 2 controller units being connected, and when logging all items with a logging cycle of 5 seconds, 1.7 to 2.0MB of the CF card can be used every 24 hours.

7.2.2 Data reliability when power failure occurs during data logging

The set data of the LMD-100 is backed up in the non-volatile IC memory.

The time it takes between detecting power failure and turning the power to the LMD-100 OFF is approx. 260ms for 85V AC and 4 seconds for 264V AC.

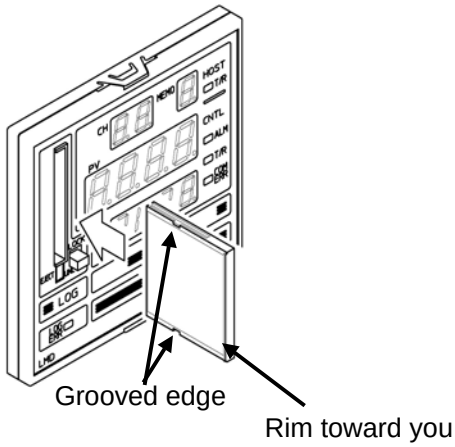
For the CF card included, writing time is 200ms and closing process time is 40ms. Thus total time is 240ms. Writing and closing of the CF card can be finished within Shinko instruments' power failure process time. Therefore data reliability can be maintained.

If any other CF cards (commercially available) are used, the data reliability is not guaranteed.

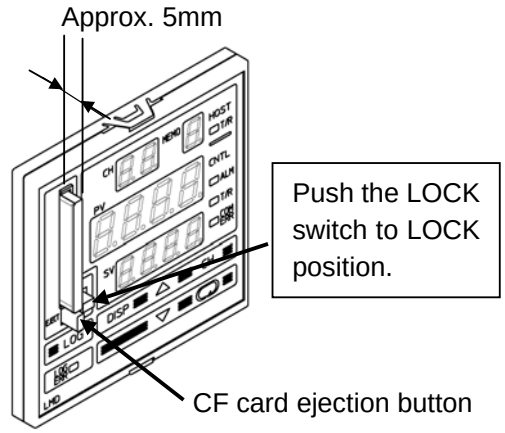
7.3 CF card insertion

(1) Insert the CF card with the rim toward you. See (Fig. 7.3-1).
The groove width of the top and bottom of the card differ so that the CF card will be inserted correctly. However, do not insert the card forcibly in the wrong direction. After insertion, the card should protrude approx. 5mm from the front of the instrument with the CF card ejection button also protruding. See (Fig. 7.3-2).

(2) Push the LOCK switch to LOCK position. See (Fig. 7.3-2).



(Fig. 7.3-1)



(Fig. 7.3-2)

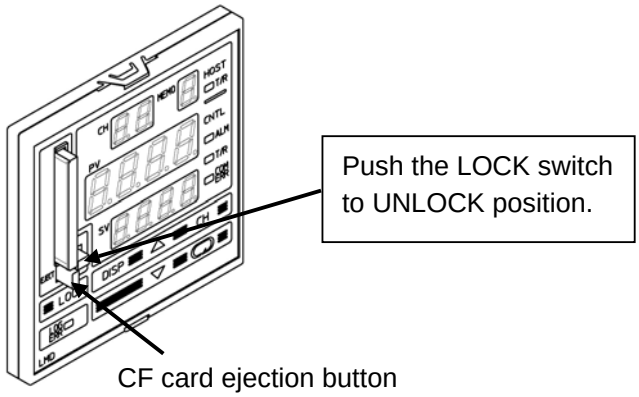
7.4 CF card ejection

⚠ Caution

- Make sure not to press the card ejection button too hard, as this may cause the CF card to fall to the ground.
- Be sure to pull the CF card out by pressing the CF card ejection button.
- If a defective CF card is inserted, the reset function to prevent malfunction is initiated, and the instrument reverts to the warm-up status.

(1) Push the LOCK switch to UNLOCK. See (Fig. 7.4-1).

(2) To eject the CF card, press the CF card ejection button. See (Fig. 7.4-1).



(Fig. 7.4-1)

7.5 How to start data logging

7.5.1 Data logging start

There are 2 ways to start data logging. One is with the LOG key, and the other is using the external operation input.

Data logging start with the LOG key

Press the LOG key.

Data logging starts under conditions which have been set during Data logging condition setting mode.

The LOG indicator is lit during data logging, and flashes while writing to the CF card.

Data logging start using the external operation input

Connect External operation input LOG terminals 19 and 20 (Contact Closed).

Data logging starts under conditions which have been set during Data logging condition setting mode.

The LOG indicator is lit during data logging, and flashes while writing to the CF card.

7.5.2 Logging auto-start function

If “Effective” is selected during “Logging auto-start selection” in Data logging condition setting mode (p.23), Logging auto-start function will initiate after power-on.

Logging automatically starts between Auto-start start and end time.

If Logging auto-start start and end time are the same, logging continues until power-off or until CF card capacity is exceeded.

After power is restored, Auto-start function is enabled if logging is within the selected time between Auto-start start and end time, and logging is performed.

During logging, usual Logging start/stop can be performed.

During logging, if external operation input LOG terminals 19 and 20 are connected (Contact Closed), logging will continue even if the logging end time has expired.

Even within the data logging time, logging stops by disconnecting LOG terminals 19 and 20 (Contact Open).

7.5.3 CF card file

Every time the LMD-100 starts data logging, LMD-100 writes the data in a new file.

When logging data reaches 65,000 lines, the file is closed and a new file is opened for data writing, considering editing on spreadsheet applications.

The file is named as shown below.

yymmdd_hhmmss.CSV

- yy : Lower 2 digits of the year (2006: 06)
- mm : Month (January: 01)
- dd : Day (the 1st : 01)
- hh : Hour (8 a.m.: 08, 8 p.m.: 20)
- mm : Minute
- ss : Second

For example, if data logging is started at 8:30 a.m. on January 1st, 2006, the file will be named as “060101_083000.CSV”.

7.5.4 File limits

A maximum of 170 files can be saved in the CF card.
If the number of files exceeds 170, an error message E_E2 (Excess CF card memory capacity) appears on the PV display regardless of the remaining memory capacity in the CF card.

7.5.5 Data logging cycle

If logging time of data (depending on number of connected units, and Data logging items) exceeds the logging cycle, previous data will be saved.
(e.g.) If the following are selected:

- Number of connected units: 8
- Data logging items: 5 (PV, SV, OUT1 MV, OUT2 MV, controller status)
- Data logging cycle: 1sec

Controller response time: Approx. 50ms per item
50ms x 5 (items)=250ms
250ms x 8 (units)= Approx. 2000ms
If writing time to CF card is 500ms:
Thus total response time: 2000ms+500ms=2500ms (2.5sec)
As Data logging cycle is 1sec, the previous data will be saved 2 or 3 times.

7.5.6 Power failure during data logging

If power failure occurs during data logging, data is automatically saved in the file.
After the power is restored, data logging is stopped.
However, if external operation input LOG terminals 19 and 20 are connected (Contact Closed), data logging automatically resumes, and writes the data in a new file.
If momentary power failure occurs while writing to the CF card, one batch of logging data might be lost.

7.6 How to stop data logging

7.6.1 Data logging stop

There are 2 ways to stop data logging. One is with the LOG key, and the other is using the external operation input.

To stop logging with the LOG key
Press the LOG key for approx. 1 second.
The LOG indicator goes off, and logging stops.

To stop logging using the external operation input
Disconnect LOG terminals 19 and 20 (Contact Open).
The LOG indicator goes off, and logging stops.

7.6.2 External operation priority

If “External operation input (LOG) has priority” is selected from “External operation priority selection” in the Data logging condition setting mode, and when LOG terminals 19 and 20 are connected (Contact Closed), data logging cannot be stopped by the LOG key.
However, if LOG terminals 19 and 20 are disconnected (Contact Open), logging by the LOG key can be started or stopped.

7.7 How to edit CF card data on the personal computer

To edit the CF card data on the PC, the CF card Reader/Writer is required.

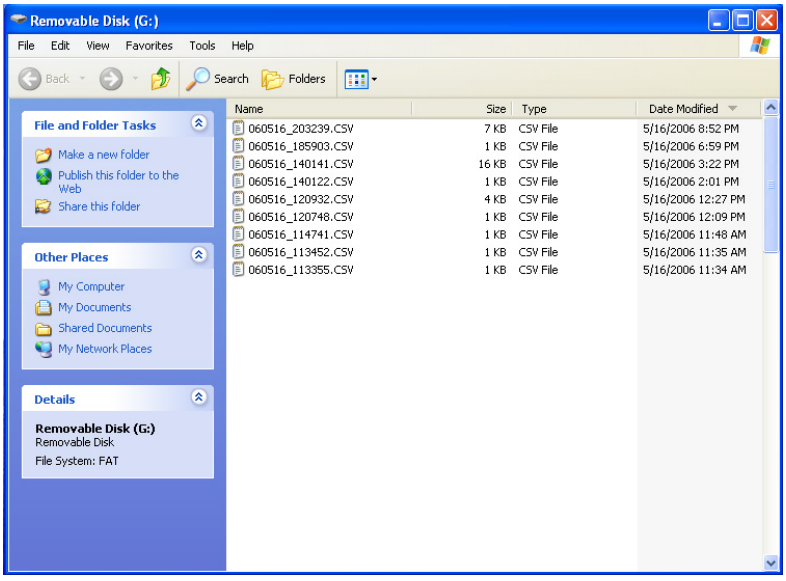
(1) Insert the CF card into the CF card Reader/Writer.

(2) Select the data in the CF card.

The following shows an example using Windows XP.

Select the “Removable Disk” and double-click on the data in the CF card. (Fig. 7.7-1)

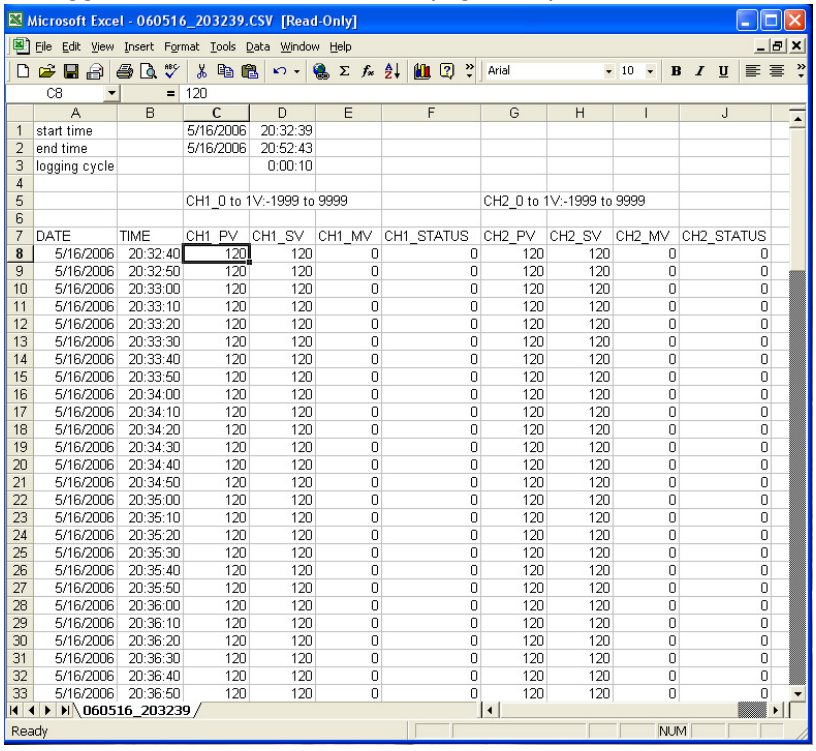
Microsoft EXCEL will start and the file will be opened.



(Fig. 7.7-1)

(3) Edit data in the CF card.

The logged data can be edited. See (Fig. 7.7-2).



(Fig. 7.7-2)

7.8 How to format the CF card

⚠ Caution

- Please format the CF card on the LMD-100.
- When formatting on the Windows, use the FAT16.

Clears all data in the CF card, and formats the card on the LMD-100.
The card can also be formatted on Microsoft Windows using commercially available CF card Reader/Writer.
Formatting the CF card is effective only when the CF card is inserted.

The procedures for CF card formatting are shown below.

(1) Enter the Data logging condition setting mode.
Press the LOG key for approx. 3 seconds while holding down the ▽ key.
The unit enters Data logging condition setting mode.

(2) Proceed to the CF card format selection mode.
Press the ↵ key several times until CF card format mode [cF.cr] appears.

(3) Select "on Format" in the CF card format selection mode.
By pressing the △ key, select "on Format" in the CF card format selection mode, then press the ↵ key.
The unit proceeds to the CF card format confirmation mode.

(4) Perform formatting the CF card.
Press the ↵ key after confirming that "on Format" has been selected.
The unit proceeds to External operation input (LOG) priority [EXtL] mode, and the formatting is completed.

7.9 How to lock front key using external contact

Front key LOCK/UNLOCK can be set, using external contact.
Circuit current when contact is closed: 6mA

KEY LOCK terminals18 and 20 are disconnected (Contact Open): Front key "UNLOCK"
KEY LOCK terminals18 and 20 are connected (Contact Closed): Front key "LOCK"

If front key "LOCK" is selected, keys (except DISP and CH keys) cannot be operated.
If front key "LOCK" is selected during setting mode, keys can be operated until the setting mode ends.

7.10 Set value memory function

Up to 6 groups of SV for the connected controllers can be saved.

If the key is pressed after selecting Set value memory number in Main setting mode, SVs in the selected memory number are sent to the connected controllers.

(See p.38 for registering Set value memory number.)

[When a lot of controllers are connected, operations at the next setting mode (SV setting) cannot be performed until all connected controllers SV changes are completed.]

If set values are changed from the controller side

If set values are changed from the controller side, the LMD-100 reads and saves the sending items the LMD-100 already has:

Sending items of the LMD-100: SV, Alarm 1 value, OUT1 proportional band, OUT2 proportional band, Integral time, Derivative time, ARW, OUT1 proportional cycle, OUT2 proportional cycle, Manual reset, Set value lock, Auto-tuning/Auto-reset

However, even if SV is changed from the controller side, the SV of the Set value memory number cannot be changed.

To change SV of the Set value memory number, set it in the “SV setting” mode.

How to register the Set value memory number

(e.g.) When 5 units of controller are connected, 30 types of SV can be registered as follows.

Set value memory No. / Channel No.	1	2	3	4	5	6
1	100℃	200℃	150℃	125℃	140℃	230℃
2	110℃	210℃	170℃	135℃	150℃	230℃
3	120℃	220℃	190℃	120℃	150℃	220℃
4	130℃	230℃	210℃	120℃	160℃	220℃
5	140℃	240℃	230℃	100℃	160℃	210℃

When registering SV in Set value memory number 3

(1) Enter the Main setting mode.

Press the key in the PV/SV display mode or Data logging mode.

Set value memory number selection mode in the Main setting mode appears.

(2) Select the Set value memory number.

Select Set value memory number “3” with the △ or ▽ key, and press the key.

The unit will proceed to the SV setting mode.

(3) Register the SV.

Set SV with the △ or ▽ key, then press the CH key.

SV will be registered and the channel will be switched.

Set SV for other channels in the same way as the above.

(4) Revert to the PV/SV display mode or Data logging mode.

Press the key for 10 times or hold down the key for approx. 3 seconds.

The unit will revert to the PV/SV display mode or Data logging mode.

To set other Set value memory numbers, follow steps (1) to (4) above.

7.11 Setting the same value to all controllers simultaneously (Broadcast setting function)

Press the CH key for approx. 1 second in the Main setting mode or Sub setting mode.
The unit enters Broadcast setting status, indicating bc on the CH display.
Set items, then press the key. The same set value will be set to all connected controllers simultaneously.
If SV is changed, the SV in the Set value memory number will also be changed.
If the controllers connected to the LMD-100 are not under the same condition, broadcast setting is not always possible.
To release Broadcast setting function, press the CH key for approx. 1 second again.

7.12 PV, SV 5-digit indication

When PV or SV is 5-digit number, the indication will be as follows.

- (e.g.) 10000 : [1] and [0000] are alternately indicated.
- (e.g.) –2000 : [-2000] are alternately indicated.
- (e.g.) –10000 : [-1] and [0000] are alternately indicated.

8. Other functions

8.1 Power failure countermeasure

The set data is backed up in the non-volatile IC memory.
If power failure occurs during data logging, the data is automatically saved in the file. After the power is restored, the data logging stops.
However, if external operation input LOG terminals 19 and 20 are connected (Contact Closed), data logging is automatically starts after the power is restored and the data is written in a new file.
If momentary power failure occurs while logging data, one batch of logging data might be lost.

8.2 Self-diagnosis

The CPU is monitored by a watchdog timer, and when an abnormal status is found on the CPU, all outputs are turned off and the LMD-100 is switched to warm-up status.

8.3 Error indication while accessing the CF card

PV display	Error contents
F_E1	Format error (CF card is not inserted)
F_E2	Format error (CF card cannot be formatted. CF card is defective)
U_E1	Error when writing to CF card (Unformatted CF card. CF card format does not coincide with the LMD format.)
U_E2	Error when writing to CF card (CF card is not inserted. Excess CF card memory capacity)
U_E3	Undefined error
r_E1	Error when reading from CF card (CF card is not inserted)
r_E2	Error when reading from CF card (Non-existent file number or data number)

When errors occurred, data logging is stopped, and the error indication remains until it is released by the ↺ key.
The error indication cannot be released with Logging Start/Stop by external operation input.

8.4 Time error indication

PV display	Error contents
r_E1	Clock lithium battery voltage for backup in a power failure is low.
r_E2	Logging when current date or time has not been set (Data logging cannot be started until date and time is set)

When errors occurred, its indication can be released by the ↺ key.

8.5 Error indication during data logging

PV display	Error contents
c_E1	When errors occur during data logging

When errors occurred, it is required to repair the LMD-100, controllers or communication line since it may break.
To release errors, turn the power on again, or press the ↺ key.

8.6 CF card remaining memory indication

SV display	Error contents
cF.E 1	When remaining memory of the CF card is 5% or less SV and cF.E 1 are indicated alternately.

This indication can be released by stopping data logging or by using another card which has sufficient memory.

8.7 Momentary power failure indication

If momentary power failure occurs, the CH display flashes.
This can be released by the ↩ key.

8.8 Error indication during setting mode

PV display	Error contents
c_51	Setting error during the setting mode

When changing settings from the LMD-100

If settings are changed from the LMD-100, and if the controllers are in setting mode, the PV display of the LMD-100 indicates c_51 as above for approx 2 seconds, and the LMD-100 reverts to the PV/SV display mode without updating set values.
At this time, the LMD-100 reads all set values of the controllers, sets them on the LMD-100 to make values even.

When changing settings from the controller

If settings are changed from the controller, and if the LMD-100 is in setting mode, the PV display of the LMD-100 indicates c_51 as above, and the LMD-100 reverts to the PV/SV display mode after updating set values.
At this time, the LMD-100 reads all set values of the controllers, sets them on the LMD-100 to make values even.
If the controller is in setting mode even after all values are read, the LMD-100 reads the changed values.
If the controller completes the setting mode, the LMD-100 releases the error indication.

9. Specifications

9.1 Standard specifications

Model : Console/Data logger
Name : LMD-100
Mounting : Flush
Setting : Input system using membrane sheet key
Display (CH1, CH2)
PV display : Red LED 4 digits, Character size, 14.3 (H) x 8.0 (W)mm
SV display : Green LED 4 digits, Character size, 10.0 (H) x 5.6 (W)mm
CH display : Yellow LED 2 digits, Character size, 10.0 (H) x 5.6 (W)mm
MEMO display : Yellow LED 1 digit, Character size, 10.0 (H) x 5.6 (W)mm
Time setting accuracy: Within ±0.5% ±1 second
Clock
Time indication : 24-hour clock (00:00 to 24:00)
Error : Within ±60 seconds/month (at 25℃ ambient temperature)
Power failure guarantee: Backed up by lithium battery.
Lithium battery life: 10 years or more (at 20℃ ambient temperature)
External memory device
Media : CF card included [Type Ⅰ (thickness 3.3mm)],
Max. capacity 256MB
Format : FAT16 (For commercially available CF card, it may be FAT32)
Writing method : Writing in a new file (Opens a new file every time logging starts, and saves in it)
CF card memory usage: In the case of 2 controller units being connected, and when logging all items with a logging cycle of 5 seconds, 1.7 to 2.0MB of the CF card can be used every 24 hours.
Others : If logging data reaches 65,000 lines, the file is closed and saves the data in a new file.
Note : If a defective CF card is inserted, the reset function to prevent malfunction is initiated, and the instrument reverts to the warm-up status.
Number of files: Max. 170
If the number of files exceeds 170, the error message is indicated regardless of CF card remaining memory capacity.

Console, logging function

Console : Set values can be read and set to the controllers by connecting a maximum of 16 units of controllers in Serial communication (RS-485). The number indicated on the CH display is an instrument number set to the controllers connected. The instrument number is set from 1 (one) in numerical order.
If an error occurs during communication with the controller, the PV display indicates the error message (c_E 1) and the "CNTL COM ERR" (Controller communication error) indicator lights if the error occurred channel is indicated.
The error message (c_E 1) is maintained even if communication is recovered until it is released by pressing the (Mode) key.
If the error message is released, all set values are read.

Logging : The LMD-100 constantly reads data from the connected controller, and writes it on the CF card every logging cycle.
If the LMD-100 cannot save data due to communication failure, there will be no data on the CF card.
If logging time of data (depending on number of connected units, and data logging items) exceeds the logging cycle, the previous data will be saved.

Controller : Controller models are classified as shown below. (Default: DCL-33A)
0: DCL-33A
1: JCS-33A, JCR-33A, JCD-33A, JCM-33A
2: NCL-13A
3: JCL-33A
4: ACS-13A

Logging cycle : 1sec, 2sec, 5sec, 10sec, 15sec, 20sec, 30sec, 1min, 2min, 5min, 10min, 20min, 30min, 60min (Default: 10sec)

Logging item : Selects "Effective" or "Not effective" for PV, SV, OUT1 MV, OUT2 MV and controller status
(Default: PV: "Effective", Others: "Not effective")

Serial communication (Between LMD-100 and Controller)

Communication line : EIA RS-485
Communication method : Half-duplex communication start stop synchronous
Communication speed : 19200bps
Communication protocol: Shinko protocol
Data format Start bit: 1
Data bit: 7
Parity : Even parity
Stop bit: 1

Sending data : SV, Alarm 1 value, OUT1 proportional band, OUT2 proportional band, Integral time, Derivative time, ARW, OUT1 proportional cycle, OUT2 proportional cycle, Manual reset, Set value lock, Auto-tuning/Auto-reset

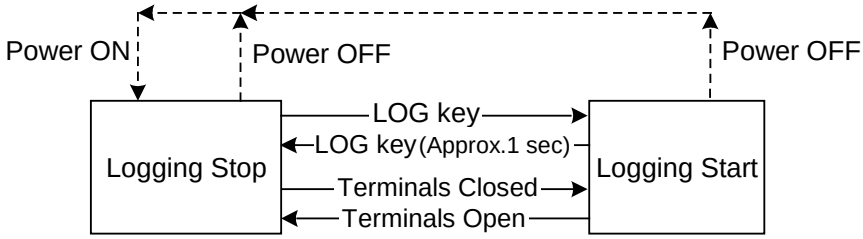
Receiving data : Receives the following data including the sending data.
PV, OUT1 MV, OUT2 MV, controller status

External operation input (edge action)

Logging Start/Stop using External contact:

Logging Start/Stop can be switched using External contact.

LOG terminals 19 and 20 are disconnected (Contact Open): Logging Stop
LOG terminals 19 and 20 are connected (Contact Closed) : Logging Start
Circuit current when closed: 6mA



If power failure occurs during logging, logging stops when power is restored.
If power failure occurs while the External contact is closed, logging automatically starts and the data is saved in a new file.
If priority is given to the external operation, logging cannot be stopped by front key operation while external contact is closed.
However, while external contact is open, logging Start/Stop by front key is possible.

Front key Lock/Unlock using External contact

Front key LOCK/UNLOCK can be set using external contact.

KEY LOCK terminals18 and 20 are disconnected (Contact Open): Front key “UNLOCK”
KEY LOCK terminals18 and 20 are connected (Contact Closed) : Front key “LOCK”
Circuit current when contact is closed: 6mA

If front key “LOCK” is selected, keys which are related to the setting mode cannot be operated (The DISP key and CH key are operable).
If front key “LOCK” is selected during setting mode, keys can be operated until the setting mode ends.

ERR (error) output

If errors occur during data logging, if the CF card is defective, when the LMD-100 battery runs down, or if the LOG key is pressed without setting time, ERR output is turned ON.
Action: ON/OFF action
Output: Relay contact, 1a
Control capacity, 3A 250V AC (resistive load)
Electric life: 100,000 times

Logging auto-start function

If Logging auto-start "Effective" is selected during Logging auto-start selection (p.23), auto-start start and end time can be set, and logging automatically performs within the selected time after power-on.

If logging auto-start start and end time are the same, logging continues until power-off or until CF card capacity is exceeded.

After power is restored, Auto-start function is enabled if logging is within the selected time between Auto-start start and end time, and logging is performed.

During logging, usual Logging start/stop can be performed.

During logging, if external operation input LOG terminals 19 and 20 are connected (Contact Closed), logging will continue even if the logging end time has expired.

Even within the data logging time, logging stops by disconnecting LOG terminals 19 and 20 (Contact Open).

Set value memory function

Up to 6 groups of SV for the connected controllers can be saved.

If the key is pressed after selecting Set value memory number in Main setting mode, SVs in the selected memory number are sent to the connected controllers.

[When a lot of controllers are connected, operations at the next setting mode (SV setting) cannot be performed until all connected controllers SV changes are completed.]

If set values are changed from the controller side, the LMD-100 reads and saves the sending items the LMD-100 already has:

Sending items of the LMD-100: SV, Alarm 1 value, OUT1 proportional band, OUT2 proportional band, Integral time, Derivative time, ARW, OUT1 proportional cycle, OUT2 proportional cycle, Manual reset, Set value lock, Auto-tuning/Auto-reset

However, even if SV is changed from the controller side, the SV of the Set value memory number cannot be changed.

To change SV of the Set value memory number, set it in the "SV setting" mode.

Broadcast setting function

Press the CH key for approx. 1 second in the Main setting mode or Sub setting mode.

The unit enters Broadcast setting status, indicating bc on the CH display.

Set items, then press the key. The same set value will be set to all connected controllers simultaneously.

If SV is changed, the SV in the Set value memory number will also be changed.

If the controllers connected to the LMD-100 are not under the same condition, broadcast setting is not always possible.

To release Broadcast setting function, press the CH key for approx. 1 second again.

CF card LOCK switch

This switch prevents the CF card being taken out during data logging.

By setting the LOCK switch to LOCK position, data logging can be performed.

By setting the LOCK switch to UNLOCK position, data logging cannot be performed.

If the LOCK switch is set to UNLOCK during logging, logging stops immediately.

This switch also functions as a Logging indicator. The red LED lights during logging, and flashes while accessing the CF card.

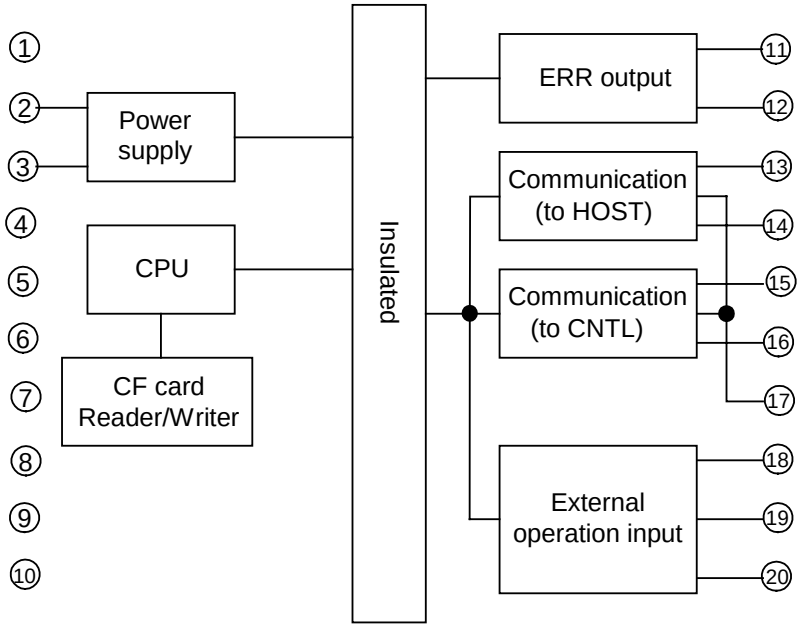
5-digit indication function

When PV or SV is 5-digit number, the indication will be as follows.

- (e.g.) 10000 : [1 0000] and [0000] are alternately indicated.
- (e.g.) –2000 : [-2000] and [2000] are alternately indicated.
- (e.g.) –10000 : [-1 0000] and [0000] are alternately indicated.

Supply voltage : 100 to 240V AC 50/60Hz
Allowable voltage fluctuation: 85 to 264V AC
Ambient temperature : 0 to 50℃ (32 to 122℉)
Ambient humidity : 35 to 85%RH (non-condensing)
Power consumption : Approx. 6VA
Weight : Approx. 400g
External dimensions : 96 x 96 x 100mm (W x H x D)
With waterproof cover, 115.6 x 131.7 x 100mm (W x H x D)
Material : Case, Flame-resistant resin
Color : Case, Light gray

Circuit insulation configuration



Insulation resistance

10MΩ or more, at 500V DC

Dielectric strength

Between power terminal and communication terminal: 1.5kV AC for 1 minute
Between power terminal and output terminal : 1.5kV AC for 1 minute
Between communication terminal and output terminal: 1.5kV AC for 1 minute

Attached functions : Power failure countermeasure
Self-diagnosis
Warm-up indication
Error indications
Momentary power failure indication

Accessories : Mounting brackets 1 set,
Instruction manual 1 copy
CF card (32MB) 1
Waterproof cover 1 piece (When IP option is added)
Terminal cover 2 pieces (When TC option is added)

9.2 Optional specifications

Communication function (Option code: C5)

Data of the LMD-100 and the connected controller can be read and set from the external computer or PLC, etc.

Cable length : Maximum communication distance 1.2km
Cable resistance: Within 50Ω (Terminator is not necessary or 120Ω or more on one side.)

Communication line : EIA RS-485

Communication method : Half-duplex communication start-stop synchronous

Communication speed : 9600, 19200bps (Selectable by keypad) (Default: 9600bps)

Code form : ASCII, binary

Error correction : Command request repeat system

Error detection : Parity check, Checksum

Data format

Communication protocol	Shinko protocol
Start bit	1
Data bit	7
Parity	Even
Stop bit	1

Instrument number : 0 to 95

Dust-proof/Drip-proof (Option code: IP)

Dust-proof/Drip-proof specification waterproof cover (IP66)

Terminal cover (Option code: TC)

Electrical shock protection terminal cover

10. Troubleshooting

If any malfunctions occur, refer to the following items after checking the power and the wiring.

⚠ Warning

Turn the power supply to the instrument off before checking the wiring. Working or touching the terminal with the power switched on may result in severe injury or death due to Electric Shock.

10.1 Indication is abnormal or unstable.

Problem	Presumed cause and solution
The PV display indicates the following. F_E1, F_E2 U_E1, U_E2, U_E3 r_E1, r_E2 r_E1, r_E2 c_E1, c_b1	Error while accessing the CF card, Time error, Error during data logging, Error while changing set values Refer to “8. Other functions”. (p.40, 41)
The SV display indicates cFE1.	Remaining memory capacity of the CF card is low. Refer to “8. Other functions”. (p.41)
The CH display is flashing.	Momentary power failure has occurred. Refer to “8. Other functions”. (p.41)

10.2 Key operation is impossible.

Problem	Presumed cause and solution
Keys cannot be operated.	• Check the Set value lock. (p.28) • Check whether the front keys are locked by external contact. (p.37)

10.3 Data logging is impossible.

Problem	Presumed cause and solution
Data logging is impossible.	• Check whether the CF card LOCK switch is set to LOCK position. (p.33) • Errors occurred during data logging Refer to “8. Other functions”. (p.40, 41)

10.4 Communication failure

Problem	Presumed cause and solution
Communication failure	• The connection or wiring of communication cable is not secure. (p.16 to 18) • Burnout or imperfect contact on the communication cable and the connector. • Communication protocol of the controller does not coincide with that of the LMD-100(Shinko protocol).(p.19) • Communication speed of the controller does not coincide with that of the LMD-100 (19200bps). (p.19) • The instrument numbers are duplicated in multiple controllers. (p.19)
There are setting items which are impossible to communicate.	Check the controller model. (p.21) Check the number of connected controllers. (p.21)

For further inquiries, please consult our agency or the shop where you purchased the unit.

11. Character table

Photocopiable material

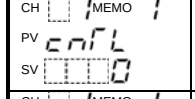
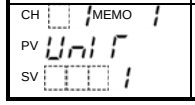
[Main setting mode]

Display	Setting item	Default value	Data
CH 1 MEMO 1 PV mno SV 1	Set value memory number	1	
CH 1 MEMO 1 PV SV SV 0	SV		
CH 1 MEMO 1 PV A1 SV 0	Alarm 1 value		
CH 1 MEMO 1 PV P SV 2.5	OUT1 proportional band		
CH 1 MEMO 1 PV P_b SV 1.0	OUT2 proportional band		
CH 1 MEMO 1 PV I SV 200	Integral time		
CH 1 MEMO 1 PV d SV 50	Derivative time		
CH 1 MEMO 1 PV M SV 50	ARW		
CH 1 MEMO 1 PV c SV 30	OUT1 proportional cycle		
CH 1 MEMO 1 PV c_b SV 30	OUT2 proportional cycle		
CH 1 MEMO 1 PV rSEt SV 0.0	Manual reset		

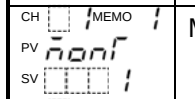
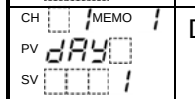
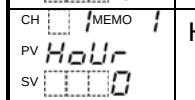
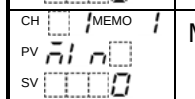
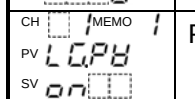
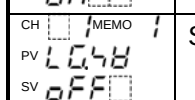
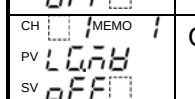
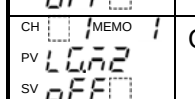
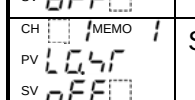
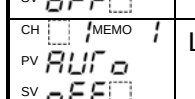
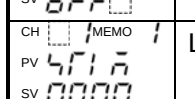
[Sub setting mode]

Display	Setting item	Data
CH 1 MEMO 1 PV Lock SV - - - -	Set value lock	
CH 1 MEMO 1 PV AT SV - - - -	Auto-tuning/Auto-reset	

[Controller setting mode]

Display	Setting item	Default value	Data
	Controller model	DCL-33A	
	Number of controllers	1	

[Data logging condition setting mode]

Display	Setting item	Default value	Data
	Year	0 (2000)	
	Month	1 (January)	
	Day	1 (1st)	
	Hour	0 hours	
	Minute	0 minutes	
	PV logging	Effective	
	SV logging	Not effective	
	OUT1 MV logging	Not effective	
	OUT2 MV logging	Not effective	
	Status logging	Not effective	
	Logging auto-start	Not effective	
	Logging auto-start timer (start)	00:00	

Display	Setting item	Default value	Data
CH 1 MEMO 1 PV ETim SV 00.00	Logging auto-start timer (end)	00:00	
CH 1 MEMO 1 PV LG.cY SV 00. 10	Logging cycle	10 seconds	
CH 1 MEMO 1 PV cF.US SV 0.0	CF card used memory indication		
CH 1 MEMO 1 PV cF.cr SV oFF	CF card format	No format	
CH 1 MEMO 1 PV cF.ok SV oFF	CF card format confirmation	No format	
CH 1 MEMO 1 PV EYSL SV EYIT	External operation input (LOG) priority	External operation input (LOG) has priority	
CH 1 MEMO 1 PV cmno SV 0	Instrument number	0	
CH 1 MEMO 1 PV cmSP SV 96	Communication speed	9600bps	

[All set values reading mode]

Display	Setting item	Default value	Data
CH MEMO PV rEAd SV	All set values reading		

***** Inquiry *****

For any inquiries about this unit, please contact the shop where you purchased the unit after checking the following.

	[Example]
• Model ----------	LMD-100
• Option ----------	IP
• Serial number ----------	No. xxxxxx

In addition to the above, please let us know the details of the malfunction, if any, and the operating conditions.

SHINKO TECHNOS CO.,LTD.
OVERSEAS DIVISION

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