

Specifications

Seismic Monitoring System with Display

Model: TM-0013-SW

Contents

	Page
1. Outline of this system.....	3
2. System configuration.....	4
2-1. Configuration of the equipment	4
2-2. System configuration diagram.....	5
3. Specifications of the system.....	6
3-1. Specifications of hardware	6
3-2. Description of main functions	8
3-3. Description of screens	11
3-4. Block diagram	21
4. Outline dimension drawings.....	22
4-1. Seismic monitoring system with display (TM-0013-SW).....	22
4-2. Dedicated cabinet	23
5. Generals.....	24
5-1. Allocation of work	24
5-2. Installation place for TM-0013-SW	24
6. Warranty	24

1. Outline of this system

○ Seismic monitoring system with display TM-0013-SW

Up to three units of the above seismic monitors can be connected to TM-0013-SW, which enables view and recording of earthquake information obtained by three seismic monitors, setting change and collection of waveform data recorded by the seismic monitors. Also, TM-0013-SW provides logic judgment output [AND / OR/ 2 out of 3] relative to seismic alarms issued by three seismic monitors.

■ Alarm output

This system incorporates eight relay contact output circuits, which can be used for seismic alarms in seven levels, and FAULT alarm (system error + power failure).

■ Digital input

This system incorporates one open-collector or non-voltage contact input circuit.

For the function of input, either of the following can be selected:

[Seismic alarm reset / Time correction]

■ Analog output

This system provides two channels of 4 to 20 mA DC level outputs for each seismic monitor. All monitors' outputs (6 channels) can be obtained via the system.

■ Data recording function

Earthquake information observed by each seismic monitor can be recorded in the memory card, and history and details can be viewed on the screen of this unit.

TM-0013-SW operation log can be recorded in the memory card, and viewed on the screen of this unit.

Seismic waveform data observed by each monitor can be saved as a CSV file and recorded in the memory card.

■ Communication function

This system is equipped with LAN interface, enabling transmission of earthquake information by E-mail, NTP automatic time correction, and earthquake information output via socket communication. (The client software is optionally available.)

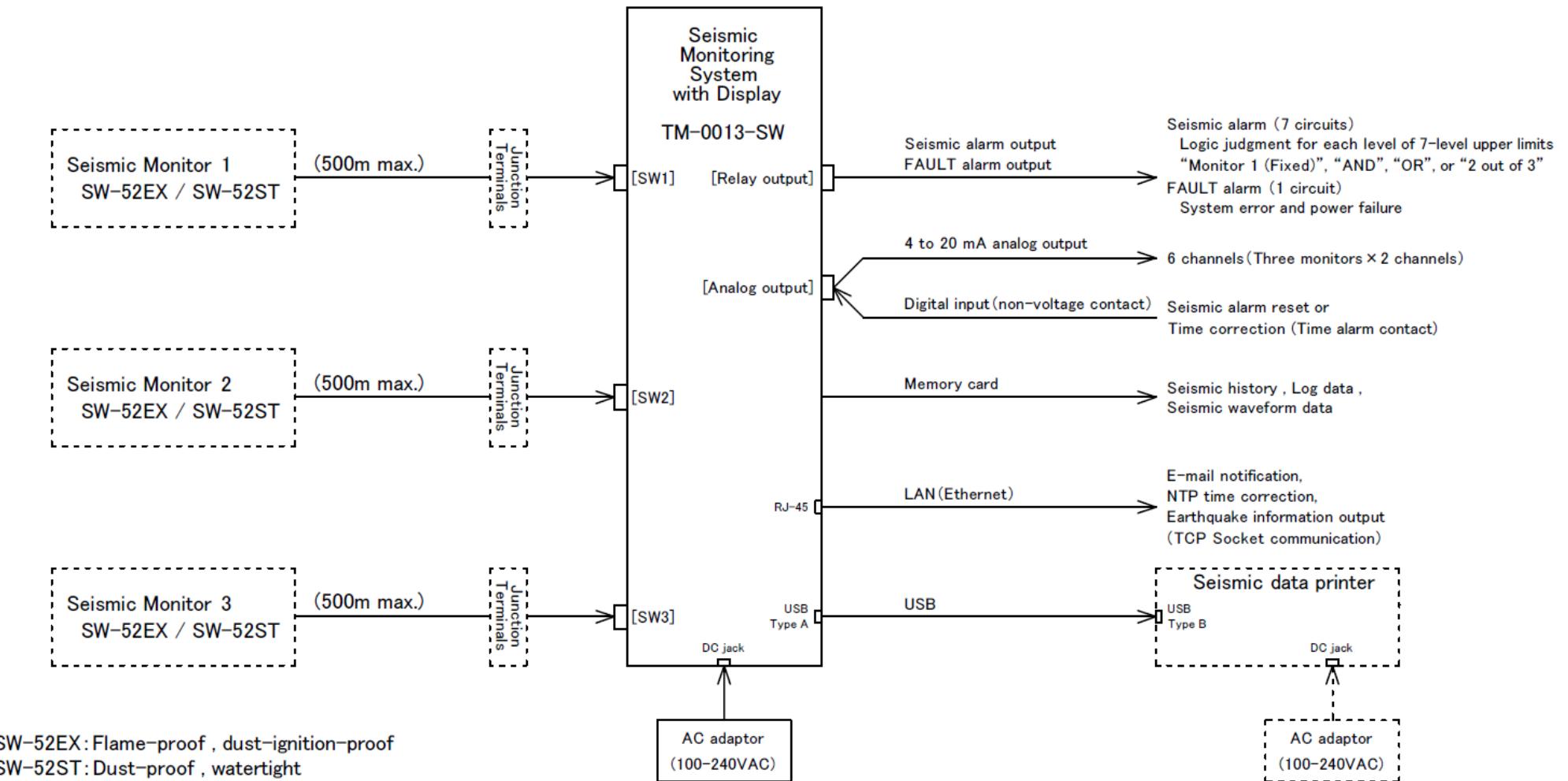
This system is equipped with USB interface, enabling printing of earthquake information with an optional printer.

2. System configuration

2-1. Configuration of the equipment

	Product name	Model or size	Quantity	Remarks
Component	Seismic monitoring system with display	TM-0013-SW	1	4 GB memory card as standard accessory.
	Dedicated cabinet	With power supply terminal (M4 × 3 P)	1	Incorporating AC adaptor
	I/O cable (SW-52ST)	Length: TBD	1	Cable with connectors on both sides
	I/O cable (SW-52EX)	Length: TBD	1	Cable with connector on one side
Option	Relay output cable	Length: 5 m	1	Terminal: Crimp terminal for M3 screw
	Analog output/digital input cable	Length: 5 m	1	Terminal: Crimp terminal for M3 screw
	Seismic data printer	RP-E11	1	USB
	Seismic Information Display Software	DS-0013-SW	1	LAN

2-2. System configuration diagram



3. Specifications of the system

3-1. Specifications of hardware

1) Screen display

Size	7.0 inch, 800 (H) × 480 [V] dots
Display method	TN 262,144 colors
Drive method	TFT active matrix
Backlight	High-brightness, white LED (OFF time setting and brightness adjustment functions are provided.)
Touch panel:	Resistive film type analog tablet

2) Interface

Connection of seismic monitors Quick-lock connector × 3 ports

[SW1, SW2, SW3] (14 pin/socket contact)

Pin No.	Signal (Seismic monitor)
1/2	Power supply + /Power supply –
3/4	RS-485+ / RS-485-
5/6	D-OUT 1 / D-OUT 2
7/8	D-OUT 3 / D-IN
9/10	D-GND / A-GND
11/12	CH1 4-20 mA / CH2 4-20 mA
13/14	RY-NO / RY-C

Alarm output

Quick-lock connector (16 pin/pin contact)

[Relay output] Number of relay output circuits: 8 circuits (Panasonic AQV252GA)

Contact rating: 60 V, 2.5 A (For AC and DC, Peak value)

RY1 to RY7: Seismic alarm output (Logic judgment for each level of 7-level upper limits)

Operation of contact: Monitoring: Open / Alarm: Closed

Type of logic judgment: "Monitor 1 (Fixed)", "AND", "OR", or "2 out of 3" can be selected.

RY8: FAULT alarm output (System error and power failure)

Operation of contact: Normal operation: Closed / Stop: Open

Pin No.	Signal
1/2	RY1-NO / RY1-C
3/4	RY2-NO / RY2-C
5/6	RY3-NO / RY3-C
7/8	RY4-NO / RY4-C
9/10	RY5-NO / RY5-C
11/12	RY6-NO / RY6-C
13/14	RY7-NO / RY7-C
15/16	RY8-NO / RY8-C (Normally excited)

* RY1 to RY7 are normally unexcited. (Excited at alarm detection)

Analog output / Digital input Quick-lock connector (16-pin/socket contact)
 [Analog output] 4 to 20 mA analog output × 6 channels (Three monitors × 2 channels)

Load resistance: 300 Ω or less

Digital input (1 input) (Open-collector or non-voltage contact)

Open voltage: Approx. 10 V (ViH: 2.4 V or more ViL: 0.8 V or less)

Input pulse width: 0.2 sec. or more

Functions: Seismic alarm reset, Time correction (Time alarm contact)

Pin No.	Signal
1/2	Monitor 1-CH1 4 to 20 mA+ / 4-20 mA-
3/4	Monitor 1-CH2 4 to 20 mA+ / 4-20 mA-
5/6	Monitor 2-CH1 4 to 20 mA+ / 4-20 mA-
7/8	Monitor 2-CH2 4 to 20 mA+ / 4-20 mA-
9/10	Monitor 3-CH1 4 to 20 mA+ / 4-20 mA-
11/12	Monitor 3-CH2 4 to 20 mA+ / 4-20 mA-
13/14	D-IN+ / D-IN- (Non-voltage contact input)
15/16	(N.C.) / (N.C.)

Ethernet RJ45 connector
 10BASE0T/100BASE-TX
 Functions: Earthquake information notification by E-mail, Time correction (NTP), Earthquake information output

USB Type A connector
 USB2.0 (for high speed)
 Function: Earthquake information printing using optional printer

SD/MMC SD, 1 slot
 Storage data: Seismic history and log data (Automatic storage)
 Acceleration waveform data (Manual storage)
 System operation setting file (Indispensable)

HDMI Type A connector
 Function: Not supported

Power supply input DC jack (ϕ5.5 - 2.5, center plus)
 Input power supply: 24 V DC

3) General specifications

Clock	Accuracy: 20 ppm (Daily error: 2 seconds) or less Seismic monitor time control: Synchronization with the main unit every hour on the hour.
Installation method	Wall-hanging , rack mounting (with dedicated cabinet)
Operating temperature range	0 to 40°C
Operating humidity range	20 to 85% RH (no condensation)
Power supply	100 to 240 V AC ±10%, 100 W or less (When three seismic monitors are connected)
Battery	Power failure drive time: 10 minutes or longer (When three seismic monitors are connected)
Outline dimensions	See the outline drawing.
Mass	Display body: Approx. 2 kg Dedicated cabinet: Approx. 8 kg

3-2. Description of main functions

1) Alarm output

Seismic alarm output

Logic judgement mode can be individually specified for 7 levels of alarms (RY1 to RY7).

Monitor 1 (Fixed): Alarm is output depending on alarm status of monitor 1.

AND: Alarm is output when all connected seismic monitors are activated.

OR: Alarm is output when any of connected seismic monitors is activated.

2 out of 3: Alarm is output depending on majority rule of connected seismic monitors.

The system judges alarm status of each monitor in each alarm level to control the relay output.

Therefore, alarm level and reset timer setting functions are not incorporated in the TM-0013-SW.

These settings shall be conducted with the seismic monitor.

FAULT alarm output

The FAULT alarm is output depending on “monitor error”, “system error” or “system power failure”.

System error: Initialization error, memory card error

Monitor error: Initialization error, communication error, seismic monitor FAULT detection

2) Digital input

Alarm reset

The system resets alarm outputs of seismic monitors at once, with priority over the reset timer setting on the seismic monitors.

This input also resets the seismic alarm output of the TM-0013-SW.

Time correction

TM-0013-SW's time setting is corrected by ±30 sec.

At detection of this signal input, time of the TM-0013-SW is set at “00 sec.”.

(When the time of the TM-0013-SW's clock before correction is 30 to 59 seconds, it advances to the next minute.)

3) Recording data

Seismic history

Earthquake information measured by each seismic monitor is recorded as a CSV file, and stored in the memory card.

Trigger time, Peak time, End time, MMI scale

VEC peak acceleration, NS/EW/UD peak acceleration, SI value

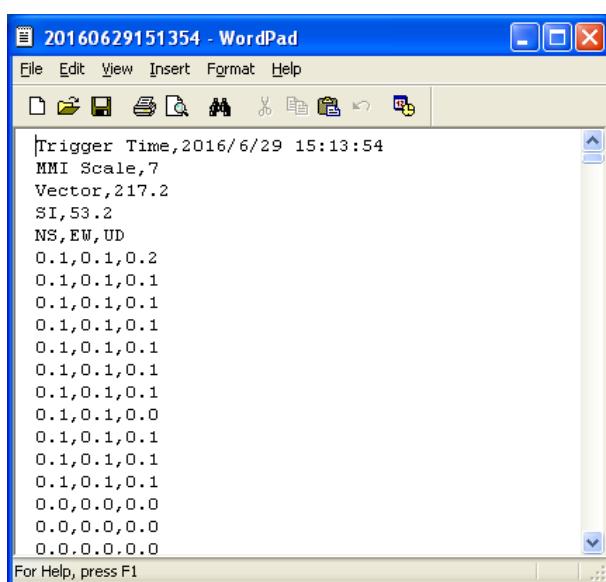
Log data

Error events detected by the TM-0013-SW are recorded as a text file.

Trigger time, Event message

Seismic waveform data

Seismic waveform data recorded in the seismic monitor's internal memory is saved in a CSV file and stored in the memory card through touch panel operation.



```

Trigger Time,2016/6/29 15:13:54
MMI Scale,7
Vector,217.2
SI,53.2
NS,EW,UD
0.1,0.1,0.2
0.1,0.1,0.1
0.1,0.1,0.1
0.1,0.1,0.1
0.1,0.1,0.1
0.1,0.1,0.1
0.1,0.1,0.1
0.1,0.1,0.0
0.1,0.1,0.1
0.1,0.1,0.1
0.1,0.1,0.1
0.0,0.0,0.0
0.0,0.0,0.0
0.0,0.0,0.0
For Help, press F1

```

4) Communication (LAN, USB)

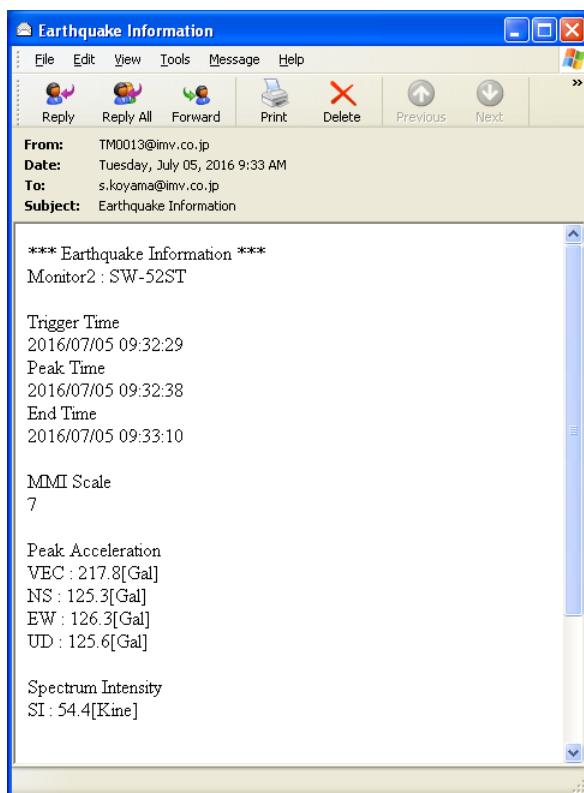
E-mail notification

At cease of earthquake, earthquake information measured by a seismic monitor is notified by E-mail.

Seismic monitor No., Name of seismic monitor,

Trigger time, Peak time, End time, MMI scale

VEC peak acceleration, NS/EW/UP peak acceleration, SI value



NTP time correction

With a setting of a target NTP server or IP address, periodic time correction is automatically executed.

Earthquake information output

Earthquake information is notified via socket communication.

For information output, up to 16 client PCs can be connected.

The system outputs three types of messages: "Seismic monitor status notification", "Realtime earthquake information" and "Confirmed earthquake information".

Printer output

The optional USB printer can be connected.

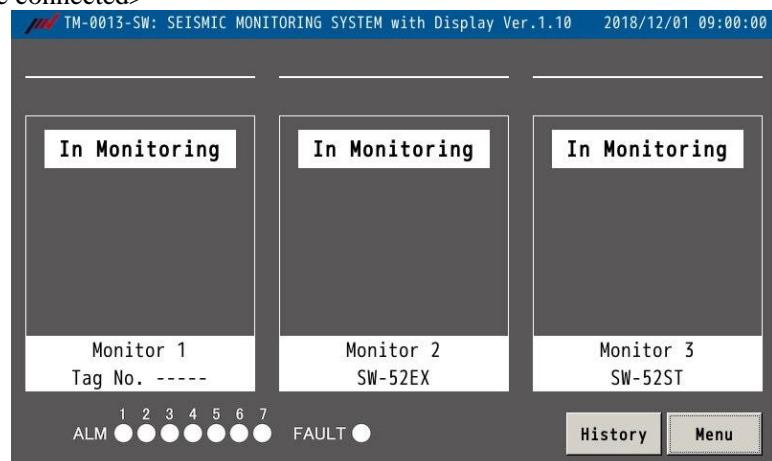
In addition to automatic printing of "Earthquake information" at end of earthquake, printing of "System settings" and "Seismic monitor settings" are enabled through manual operations.

3-3. Description of screens

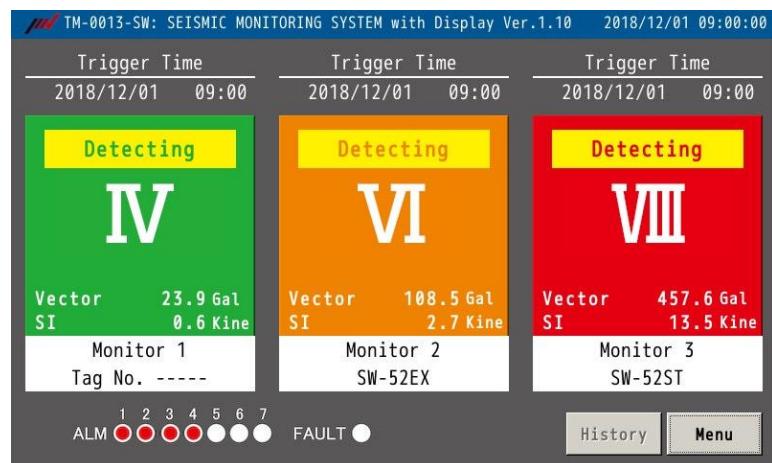
1) Main screen

<When three seismic monitors are connected>

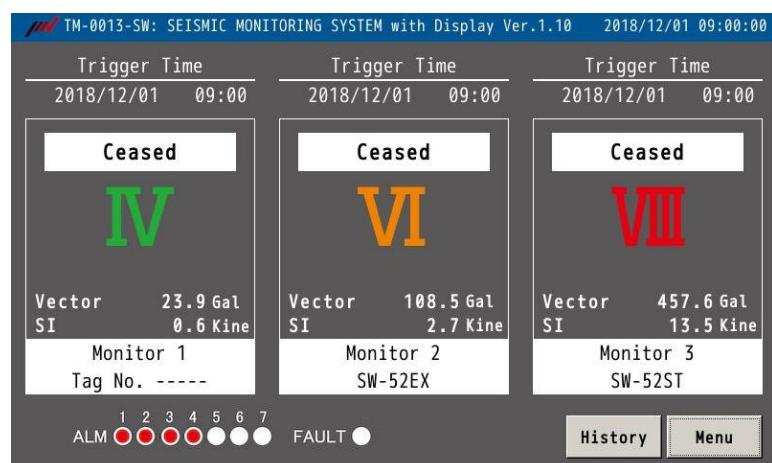
When earthquake monitoring is in progress



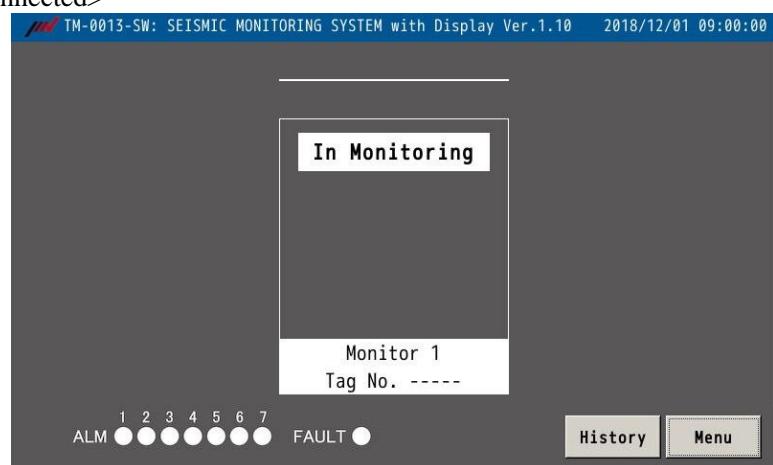
When earthquake occurs



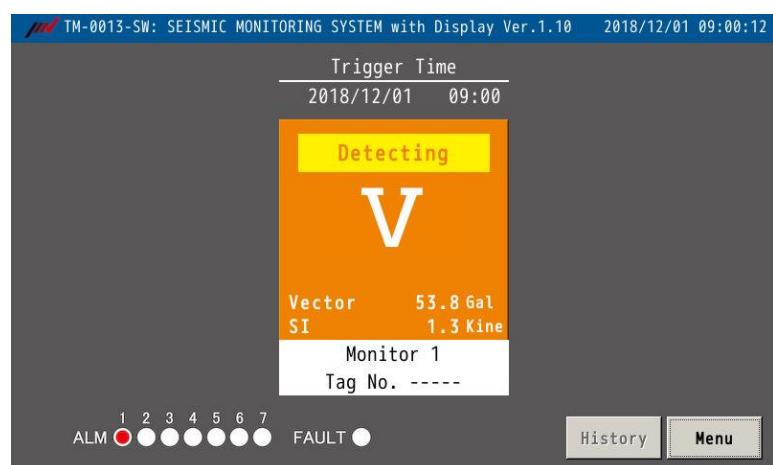
When earthquake is ceased



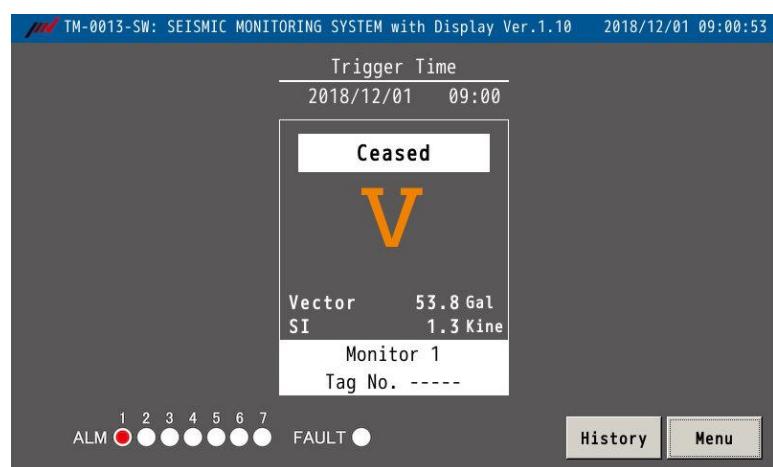
<When one seismic monitor is connected>



When earthquake monitoring is in progress

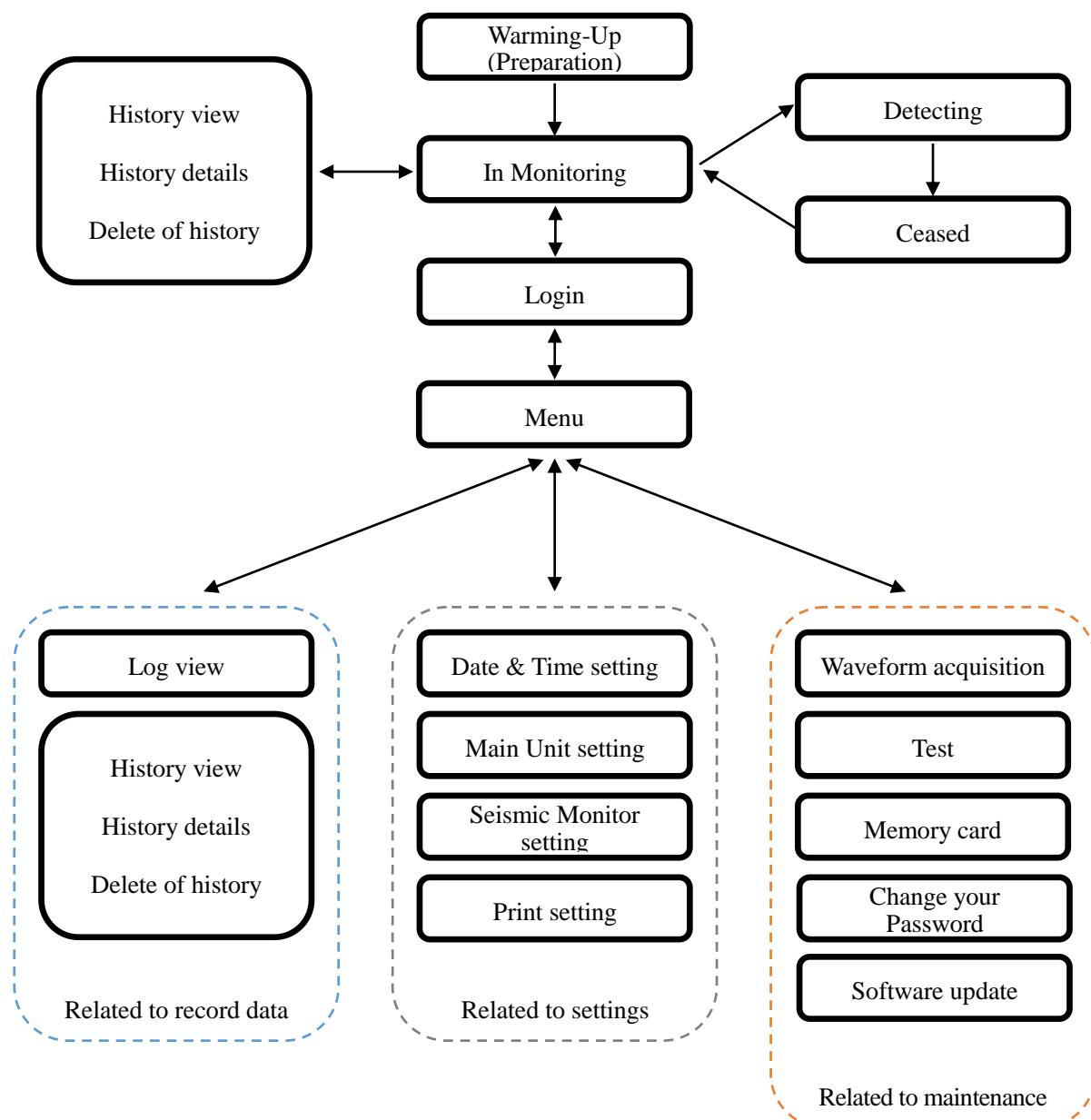


When earthquake occurs

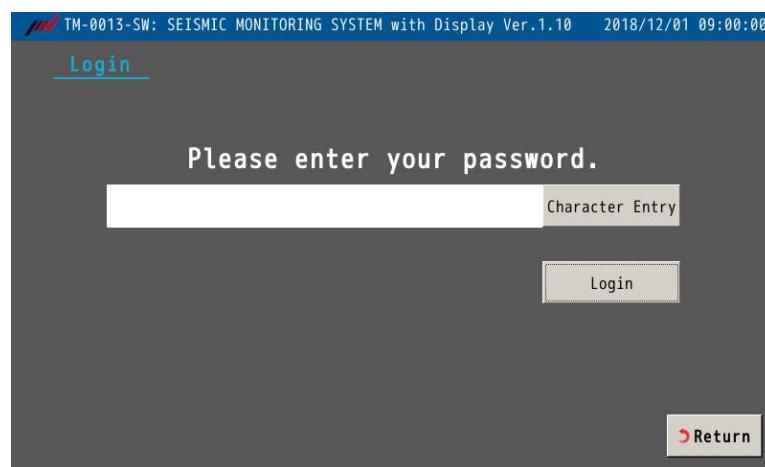


When earthquake is ceased

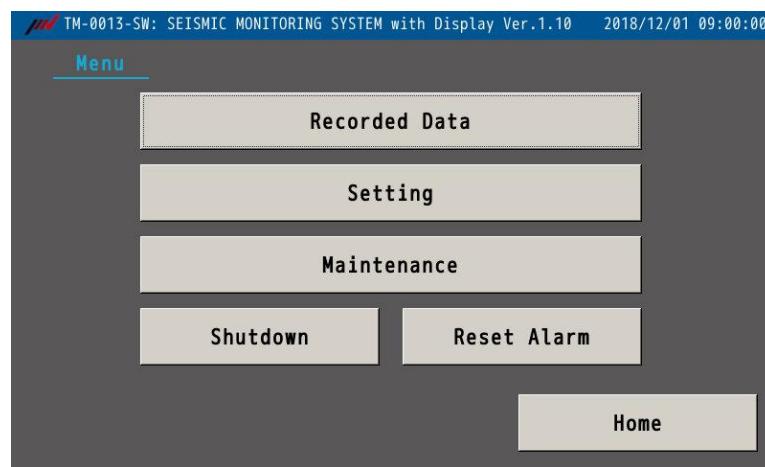
2) Screen configuration: Menu screen
 <Screen configuration>



<Login screen>



<Menu screen>



3) Screens related to record data

Earthquake history view

Used to view a list of earthquake history and details stored in the memory card, and to delete history.

<History view>

TM-0013-SW: SEISMIC MONITORING SYSTEM with Display Ver.1.10 2018/12/01 09:00:00					
History		All	Details	Delete History	Return
Monitor	Trigger Time	MMI Scale	Vector	SI	
1	2018/12/01 08:45:00	5	53.1	1.2	
2	2018/12/01 08:45:00	8	356.3	5.6	
3	2018/12/01 08:45:00	9	763.0	10.6	
4	2018/12/01 08:50:00	5	48.9	1.2	
5	2018/12/01 08:50:00	7	235.3	5.4	
6	2018/12/01 08:50:00	8	446.2	10.4	
7	2018/12/01 09:00:00	8	457.6	13.5	

<Details of the history>

TM-0013-SW: SEISMIC MONITORING SYSTEM with Display Ver.1.10 2018/12/01 09:00:00	
Details of the History	
Print History	
【Monitor 2】	Trigger Time : 2018/12/01 08:45:00
	Peak Time : 2018/12/01 08:45:08
	End Time : 2018/12/01 08:45:50
MMI Scale :	8
Peak Acceleration	
VEC :	356.3[Gal]
NS :	86.6[Gal]
EW :	231.8[Gal]
UD :	343.7[Gal]
Spectrum Intensity	
SI :	5.6[Kine]

Log view

Enables view and deletion of log data stored in the memory card.

TM-0013-SW: SEISMIC MONITORING SYSTEM with Display Ver.1.10 2018/12/01 09:00:00	
Logs	
2018/12/01 08:40:25	System is started.
2018/12/01 08:40:25	Network cable is not connected.
2018/12/01 08:41:31	Network cable is connected.
2018/12/01 08:45:03	Monitor 1: Connection error.
2018/12/01 08:47:53	Monitor 2: Sensor failure detected.
2018/12/01 08:48:19	Monitor 3: Seismic monitoring error.
2018/12/01 08:52:46	Monitor 2: Maintenance mode failure.
	Up
	Down
	Delete Log Return

4) Screens related to settings

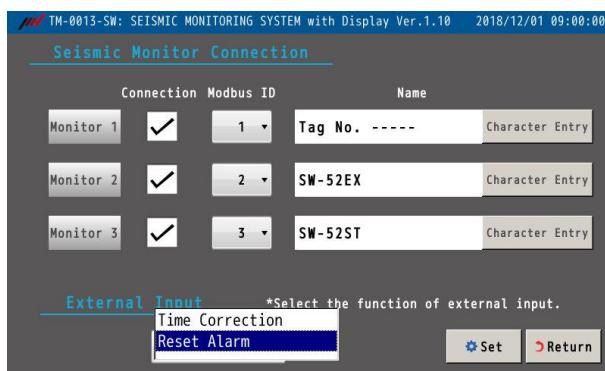
4-1) Main unit setting

Monitor connection/External input

Seismic monitor connection status (To be specified with checkbox)

Modbus ID setting, Display name setting: 16 half-width alphanumeric characters

Selection of function for digital input: [Reset Alarm / Time Correction]



Seismic alarm output

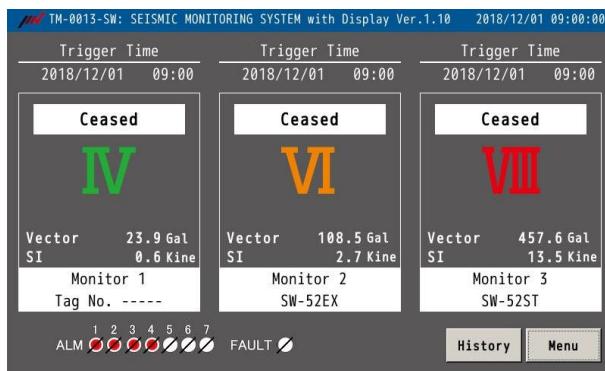
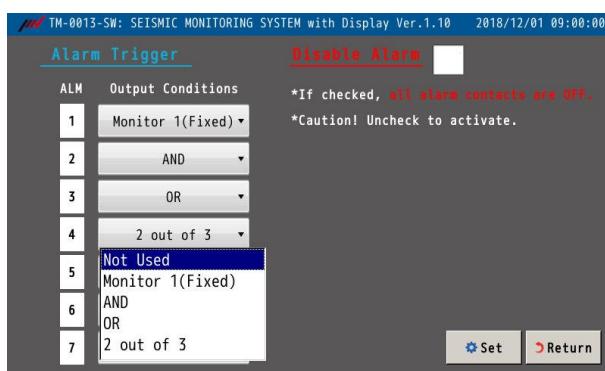
Logic judgement mode can be individually specified for RY1 to YR7.

[Monitor 1 (Fixed) / AND / OR / 2 out of 3]

* To control relay output depending on each seismic monitor's output status, alarm level and reset timer are based on seismic monitor's settings.

Alarm output disabled

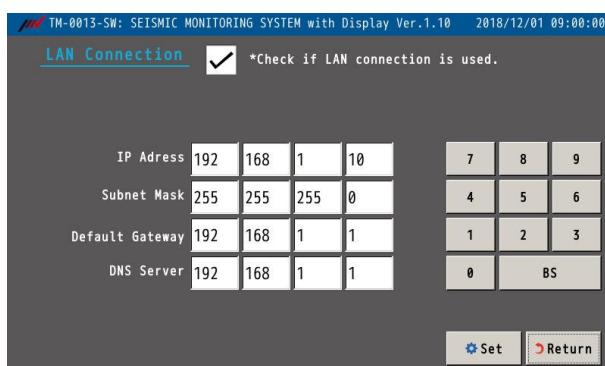
All alarm relay operations are fixed to the normal monitoring status (RY1 to RY7: Open, RY8: Close). (While alarm output is disabled, a slash is indicated for the alarm indicator lamp on the monitor screen.)



LAN connection

Network connection status (To be specified with checkbox)

IP address, subnet mask, default gateway, DNS address



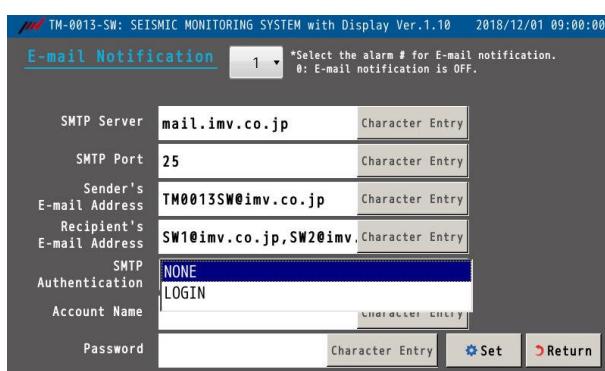
The screenshot shows the 'LAN Connection' configuration screen. At the top, there is a checkbox labeled 'Check if LAN connection is used.' followed by a note: '*Check if LAN connection is used.' Below this, there are four sets of input fields for network parameters:

IP Adress	192	168	1	10		7	8	9
Subnet Mask	255	255	255	0		4	5	6
Default Gateway	192	168	1	1		1	2	3
DNS Server	192	168	1	1		0	BS	

At the bottom right are two buttons: 'Set' and 'Return'.

E-mail notification

SMTP server, SMTP port, E-mail address of sender/recipient, SMTP authentication, user ID, password, notification start alarm No.



The screenshot shows the 'E-mail Notification' configuration screen. At the top, there is a dropdown menu labeled 'Select the alarm # for E-mail notification.' with '1' selected. A note below it says '0: E-mail notification is OFF.' Below this, there are several input fields for email settings:

SMTP Server	mail.imv.co.jp	Character Entry
SMTP Port	25	Character Entry
Sender's E-mail Address	TM0013SW@imv.co.jp	Character Entry
Recipient's E-mail Address	SW1@imv.co.jp, SW2@imv.co.jp	Character Entry
SMTP Authentication	NONE	Character Entry
Account Name	LOGIN	Character Entry
Password		Character Entry

At the bottom right are three buttons: 'Set', 'Return', and 'Character Entry'.

Others

Printing start alarm No.

Screen sleep (Backlight OFF) time, Brightness adjustment

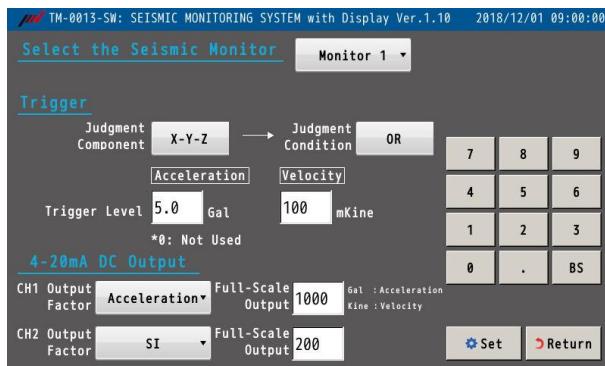
NTP time correction use status (To be specified with checkbox), NTP server

4-2) Seismic monitor setting

Detection trigger / Analog output

Judgement component [XYZ / XY / Z], Judgment condition [AND / OR], Trigger level,

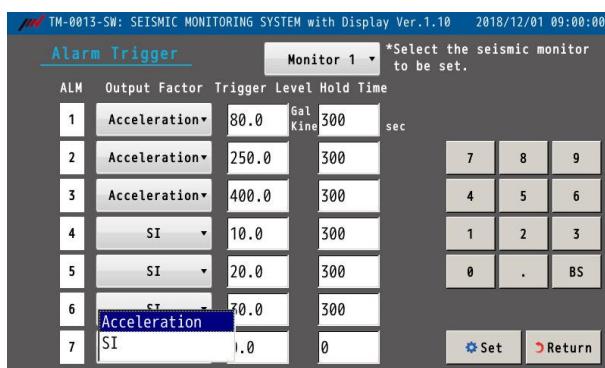
Output type [Acceleration /MMI scale / SI value], Full-scale value



Seismic alarm trigger

Individual settings of 7-level upper limits

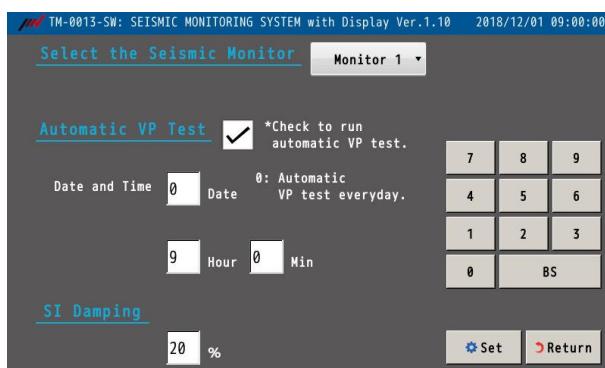
Output type [Acceleration / SI value], alarm level, reset timer



VP test / SI damping

Schedule execution status [ON/OFF], Schedule (date/time)

SI damping coefficient

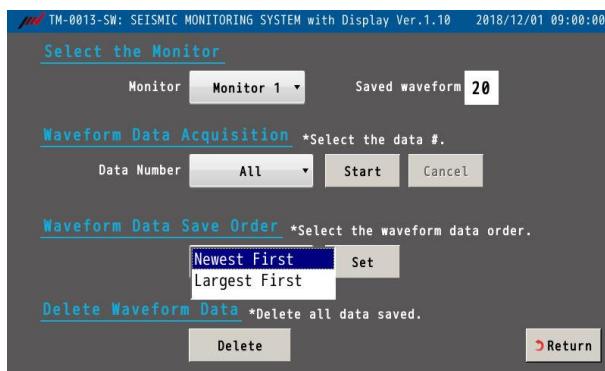


5) Screens related to maintenance

During operation of maintenance items, seismic monitoring is stopped.

Wave form data acquisition

Seismic waveform data recorded in each seismic monitor is stored in the memory card.

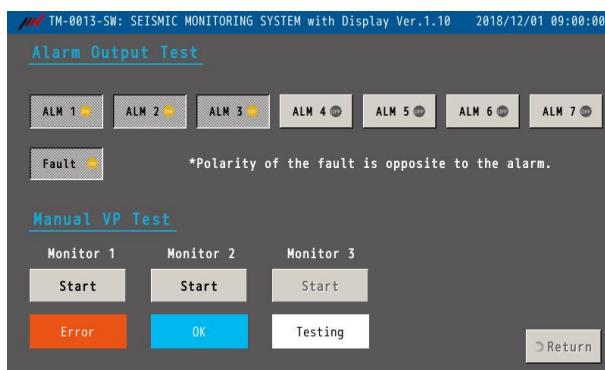


Alarm output test

Each alarm relay ON/OFF status can be manually changed.

VP test execution

Execution of VP test for each seismic monitor

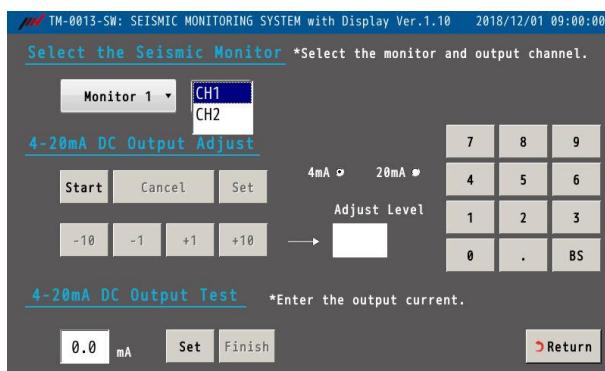


4–20 mA DC output adjustment

4 mA/20 mA output adjustment for CH1 and CH2 of each seismic monitor

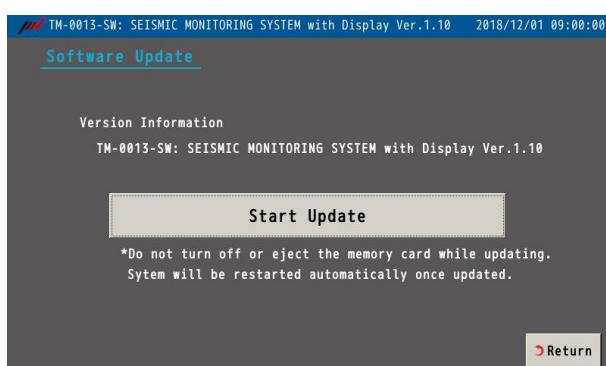
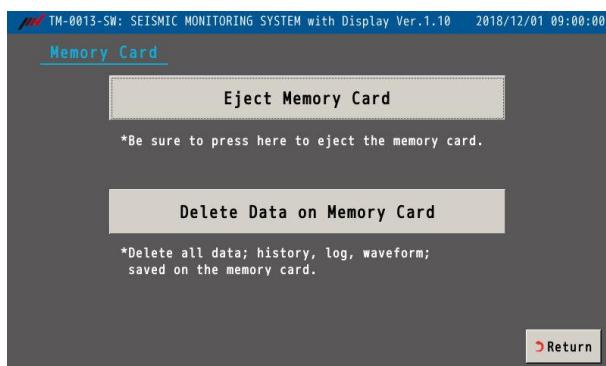
4–20 mA DC output test

CH1 and CH2 outputs of each seismic monitor are activated at arbitrary levels.

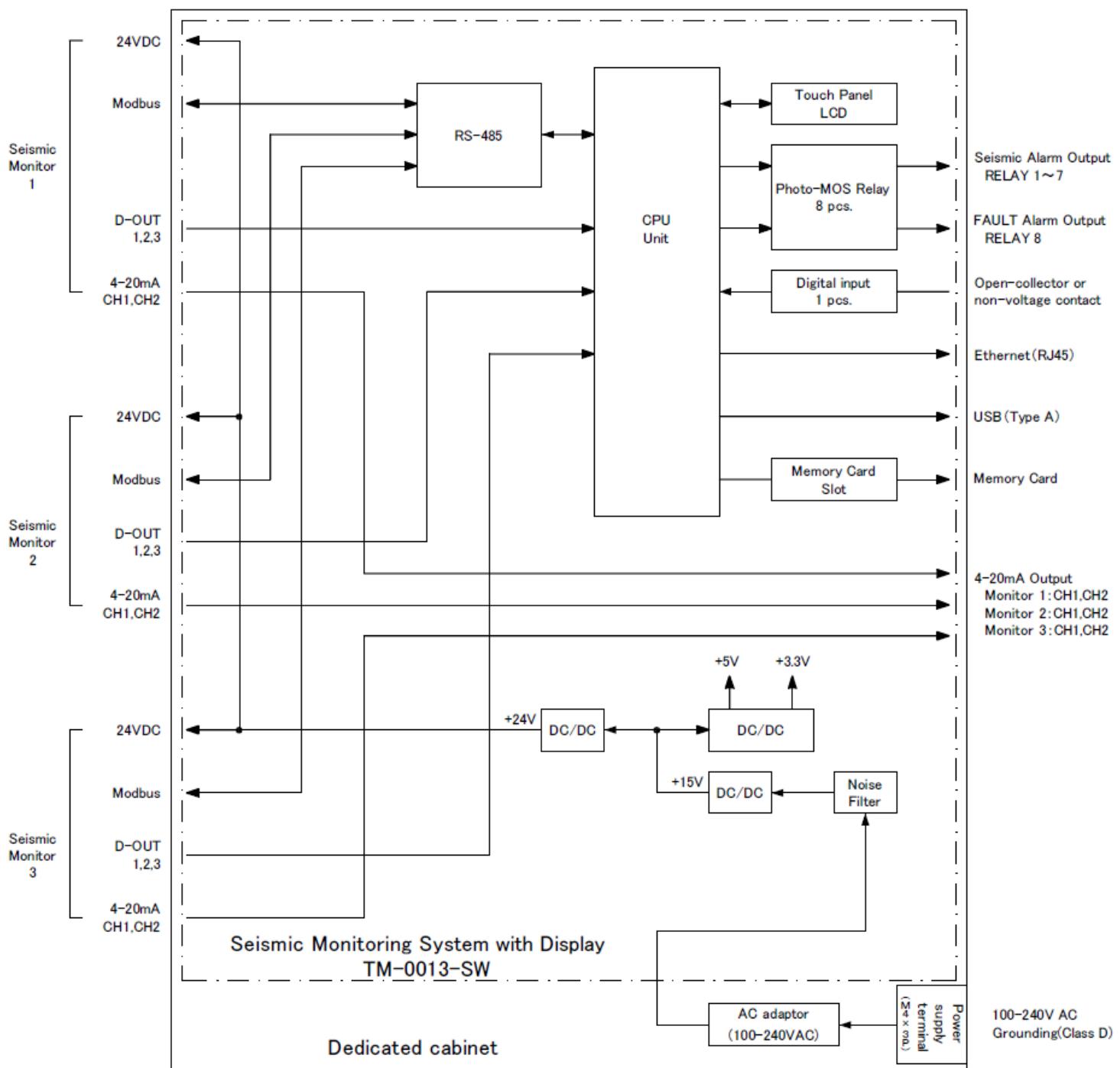


Other functions

- System time setting
- Memory card removal / Data deletion
- Change your password
- Software update (Memory card is used)
- Shutdown

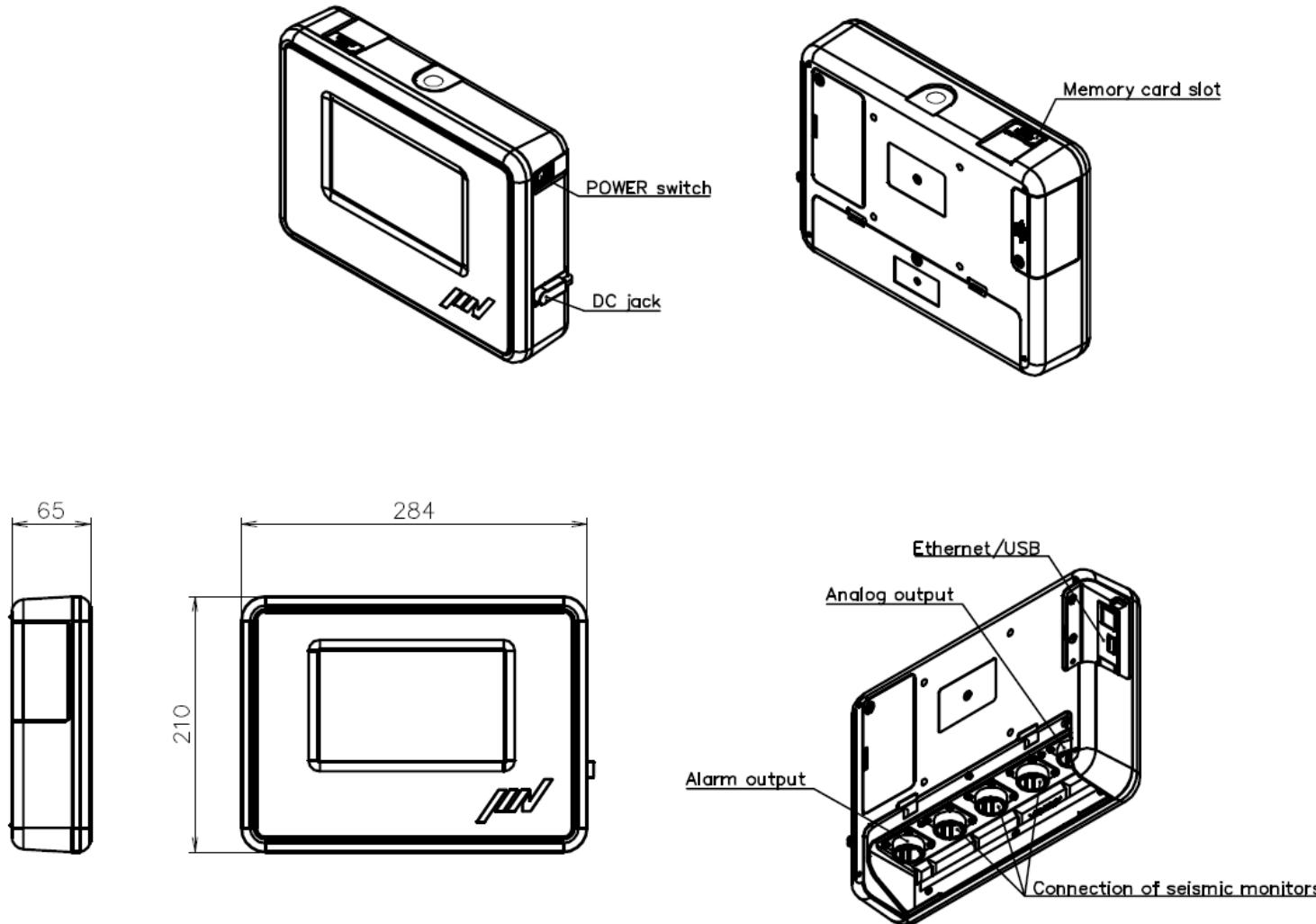


3-4. Block diagram

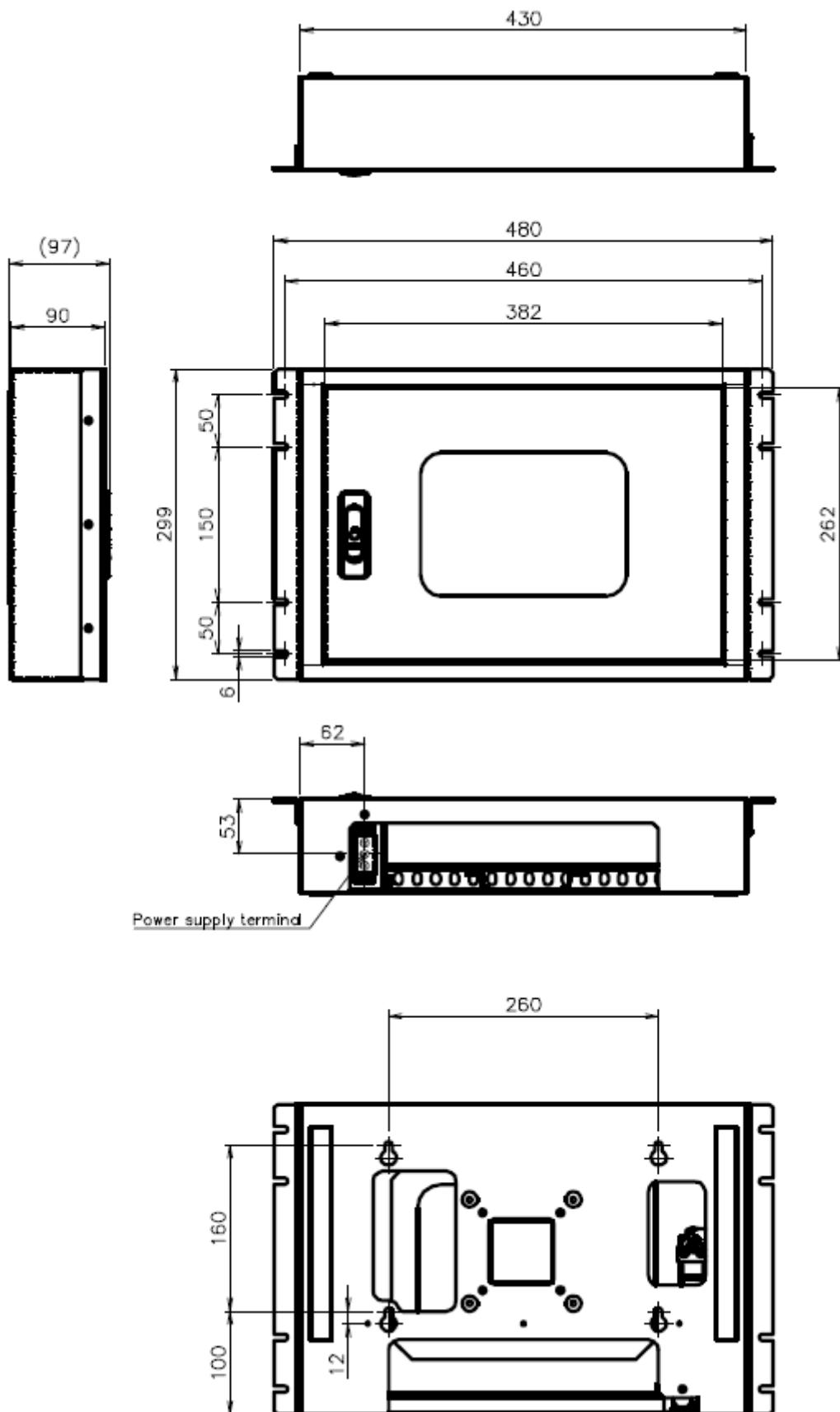


4. Outline dimension drawings

4-1. Seismic monitoring system with display (TM-0013-SW)



4-2. Dedicated cabinet



5. Generals

5-1. Allocation of work

Regarding work related to electric equipment, piping, monitor panel, etc., allocation of work of the user and IMV shall be determined as follows:

Note: Special work other than those specified in this document, witnessed test, and changes in regulations shall be determined through separate discussion.

Scope of user's work: Installation, wiring and piping of power supply, installation and wiring of the equipment and related work

Scope of IMV's work: Manufacturing of the equipment, and delivery of the equipment to user's specified place

5-2. Installation place for TM-0013-SW

Ambient temperature and humidity for installation of the equipment shall be 0 to +40°C, and 20 to 85%RH, respectively.

Do not install and use the equipment in the following places, even if the installation environment is within the above ranges.

- An outdoor place, or place exposed to direct sunlight.
- A place where condensation occurs due to temperature fluctuations.
- A place with much dust
- A place where large vibration or impact may occur.

6. Warranty

If there is any breakdown caused by producing error, material fault, or obviously our fault, we repair or exchange with no charge. This condition is valid only in warranty term and the term is for 1 year after delivered.

However, even if it is under warranty, it will occur some charge on exchanging.

- (A) Any damage and breakdown caused by natural disaster such as fire, earthquake, flood, lightning amage.
- (B) Any transporting, moving, or dropping which does not related us after finishing our delivery.
- (C) Any error operation, unusual power supply input, and the fault caused by disassembling/repairing/modifying by customer.