TemTripPRO

MOTOR PROTECTIVE RELAY
(Type PRS-1S)

INSTRUCTION MANUAL

- Be sure to read this instruction manual before using the product.
- Keep this manual handy and safely.
- Make sure that the product is set, adjusted or tested by a competent person.

TERASAKI ELECTRIC CO., LTD.

Table of Contents

1. Safety Notices

Thank you for purchasing the TERASAKI motor protective relay, *TemTrip PRO*.

This chapter contains important safety information.

Be sure to carefully read these safety notices, instructions in this manual, and other documents accompanying the motor protective relay (herein referred to as the "protective relay") to familiarize yourself with safe and correct procedures or practices before using the protective relay.

Safety notices in this manual are categorized as "CAUTION" in terms of the hazard level:

⚠ CAUTION: A caution notice with this symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and/or property damage.

Note that failure to observe a caution notice could result in serious injury/damage in some situations. Because safety notices contain important information, be sure to read and observe them.

⚠ CAUTION

Common to transportation, operations and storage

Do not store the product in a place where it is subject to direct sunlight, high temperatures, high humidity, dusty air, corrosive gases, strong vibration and shock, or other unusual conditions. (Storage temperature: -25°C to 75°C).

Maintain the ambient temperature in a range of -10°C to 55°C and the ambient humidity in a range of 30% to 90% RH (15°C to 35°C without condensation). Failure to do so may result in malfunction.

Before cleaning, first turn the power OFF, use towels twisted to be dry after soaked with warm water. Use of diluents or other organic solvents may dissolve or discolor the product surface

Transportation

Do not drop or impact the product. Carefully handle the product as this is an electronic device. Failure to do so may result in malfunction.

Operations

Make sure that the product is set, adjusted or tested by a competent person.

After completion of a function check involving setting changes, be sure to return the settings to the original values. Failure to do so may cause a burnout or fire.

Packing items

① TemTrip PRO

Connectors: 7 connectors (8 connectors for specification with communication function)

② ③ ④

⑤ ⑥
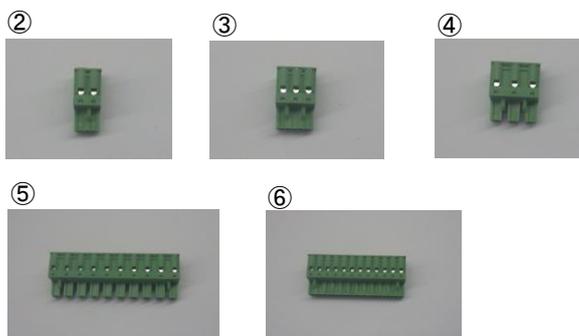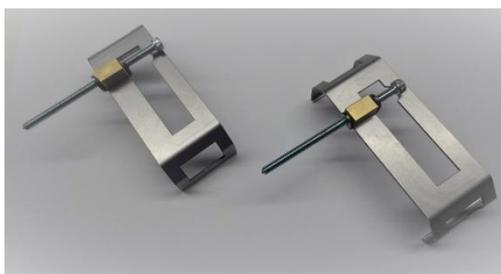
⑦ Mounting tool: x2

	Packing items		Q'ty
①	TemTrip PRO		1
②	Connector	2pin	1
③	Connector	3pin (1)	2*1
④	Connector	3pin (2)	1
⑤	Connector	10pin	1
⑥	Connector	12pin	2
⑦	Mounting tool		2

*1：For specification with communication function, three of them packaged.

2. Specifications

Specifications of the type PRS-1S protective relay are shown in Table 1 below.

Table 1 Specifications of protective relay (●: Standard feature, ○: Option)

		Presence/absence	Reference section
Protective function	Applied current anomaly detection setting*2	●	3，7-4-3
	Overload element detection *1 *2	●	3，7-4-3-1
	Short-circuit protection setting*3	●	3，7-4-3-1
	Motor heating detection setting*1	●	3，7-4-3-3
	Unbalanced current trip (UB) *1	●	3，7-4-3-3
	Motor startup time, startup count *1	●	3，7-4-3-3
	Directional ground overcurrent trip (DGR) *1	●	3，7-4-3-3
	Temperature sensor detection setting*1	●	3，7-4-3-4
	Open-phase protection*1	●	3，7-4-3-4
	Undercurrent protection (LC/HC) *1	●	3，7-4-3-4
	Negative phase sequence current protection setting*1	●	3，7-4-3-4
	External anomaly detection setting*1	●	3，7-4-3-4
Operation indication	LED indication and LCD screen	●	4
Measurement/event indication	Present current (respective phase current)	●	3, 7-3
	Leakage current and voltage values	●	3, 7-3
	Temperature indication	●	3, 7-3
	Alarm event log (100 events) *4	●	3, 7-6, 7-7
	Trip event log (100 events) *4	●	3, 7-6, 7-7
	Trip/alarm event log (200 events) *5	●	3, 7-6, 7-7
Communication function *5		○	3, 7-5
Control power supply		Required	-

*1: Two modes are available; one where the protective relay is tripped and operation indication is provided and the other where the protective relay is not tripped and no operation indication is provided.

*2: Either of the following modes is available; one where the protective relay is not tripped and only operation indication is provided and the other where the protective relay is not tripped and no operation indication is provided.

*3: Two modes are available; one where the protective relay is tripped and the other where the protective relay is not tripped

*4: Logs 100 pieces of data each for trip and alarm events and allows the user to display the cause, concerned value and operating time of each event.

*5: Logs 200 pieces of data each for trip, alarm, reset, and other events. The details (concerned value and operating time) need confirmation of each event log.

*6: The data format is Modbus RTU.

Table 1-1 General specifications of protective relay

Control voltage	110VDC (82.5VDC – 143VDC)
VA consumption	5VA
External dimensions	W96 × H144 × D116 mm (including the terminals on the back)
Operating temperature	-10°C – +55°C
Storage temperature	-25°C – +75°C
Humidity	95% or lower (no condensation)
Mass	0.7kg
Applicable standards	IEC60255: Measuring relays and protection equipment IEC60947-4-1 Part4: Contactors and motor-starters

3. Characteristics
3-1. Representation Format of Type

Type: PRS-1S $\underline{N}$ $\underline{T}$ $\underline{1}$
　　　　　　　①　②　③

	Specification	Symbol	Description
Standard	① Communication function	N	Without communication function
		C	With communication function
	② Temperature sensor type	T	THERMISTOR
		P	RTD
	③ CT rated current	1	1A
		5	5A

3-2. About Characteristic Settings

Table 2 shows the characteristic settings of the protective relay.

Table 2 Characteristic settings parameter

Protective function	Selection	Setting range	STEP	Remarks
Frequency	50Hz / 60Hz	-	-	-
CT rated current (Ict)	(Sec.) 1A/5A	(Pri.): (10.0 –1500) A	1A	-
Rated current (FLC) (In)	-	(0.30 –1.00) X Ict A	0.1A	However, 0.30 x Ict or more
Zero-phase voltage	190V (Not adjustable)			
Trip activation time setting	-	(4.00 –10.00) X In or OFF	0.10	-
Input setting 1 (IN1)	Remote Reset / External fault 1 (NO) / External fault 1 (NC)	-	-	-
Input setting 2 (IN2)	Remote Reset / External fault 2 (NO) / External fault 2 (NC)	-	-	-
AN. OUT ADJ (4-20)	-	(90.0 – 110.0)%	0.1%	4-mA (0 output) adjustment
	-	(90.0 – 110.0)%	0.1%	20-mA output adjustment
	-	(1.00 – 1.20) X Ict	0.01	Full range setting
Transmission address setting	(1-31)	-	-	-
Transmission rate setting	9600 / 19200 (bps)	-	-	-
Parity setting	NONE / ODD / EVEN	-	-	-
RY contact output	HOLD / PULSE	-	-	Selectable for each RY
I1, I2, I3 adjustment	-	90.0 –110.0%	0.1%	Use this function to adjust the value on the LCD screen to the customer's reference value without affecting the protection characteristics.
Date/time setting	Year, month, day, hour, and minute	-	-	-

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Table 2 Characteristic settings parameter (continued)

Protective function	Selection	Setting range	STEP	Remarks
Motor startup time detection setting	TRIP / ALARM / OFF	(1 –250)s	1s ±2%+0.1-0s	(When the calculated value is time equal to or greater than 1.10 x overload pick up)
Motor startup count detection setting	TRIP / ALARM / OFF	(1 –10)	1	"Too Many Starts" is displayed when startup count is detected during the period specified for STARTS PERIOD.
Detection time	-	(1 –60) min	1min	-
Undercurrent protection setting (LVL1) (Low current)	TRIP / ALARM / OFF	(0.20 –0.90) X In (0.5,1 –60)s	0.01 ±3% (relative to the CT rating) 1s ±5%+0.1-0s	The relay is activated when a current value above the set value continues for the specified time limit or longer with the motor in a running state.
Startup disabled time	-	(0.0 –30.0)s	0.5s +0.1-0s	-
DEAD BAND	-	(0.005 – 0.050) X Ict (when the motor is about to turn ON)	0.001	-
Undercurrent protection setting (LVL2) (High current)	TRIP / ALARM / OFF	(0.20 –1.50) X In (0.5, 1 –60)s	0.01±3% (relative to the CT rating) 1s ±5%+0.1-0s	The relay is activated when a current value above the set value continues for the specified time limit or longer with the motor in a running state.
Startup disabled time	-	(0.0 –30.0)s	0.5s +0.1-0s	-
DEAD BAND	-	(0.005 – 0.050) X Ict (when the motor is about to turn OFF)	0.001	-
Applied current anomaly detection setting Overload element	ALARM / OFF	(1.00 –1.50) X In	0.01 ±2.0%	The relay is activated when the mean current value exceeds this set current value for five seconds or longer with the motor in a running state.
Overload protection	TRIP / ALARM / OFF	(1.00 – 5.00) X In (0.5 –10.0)s	0.01 ± 10% 0.1s ±10% +0.1-0s	This function is for JAM/stall protection. The relay is activated when the mean current value exceeds this set current value for five seconds or longer with the motor in a running state.

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Table 2 Characteristic settings parameter (continued)

Protective function	Selection	Setting range	STEP	Remarks
Short-circuit protection	TRIP / OFF	(4.00 –12.00) X In (0.0 –4.0)s	0.10 ±10% 0.1s ±10%±25ms (When 0 is set: 75 ±25 ms)	This function is for short-circuit protection. It can be activated when the motor is started or running. Short-circuit protection becomes locked if the maximum phase current exceeds the trip activation disable setting when the motor is started or running.
Overload pick up (The following three elements are used to calculate thermal capacity.)	-	(1.00 –1.30) X In	0.01 ±2.0%	Current setting for motor heating detection setting (LVL1/LVL2) Trips based on motor heating detection setting (LVL1/LVL2) are not activated when the current value is equal to or lower than this current setting. If the current value reaches or exceeds this current setting, the relay will be activated according to the time limit dependent on the present current value, thermal capacity, or T6X TIME.
Trip activation time setting	-	(0.5 –120.0)s	0.5s ±15%+0.1s-0s	This element sets trip activation time for "cold" motor at a current value six times the value specified for OVERLOAD PICKUP.
Motor heat capacity ratio	-	(0.20 –1.00) X Motor heat capacity	0.01	This element sets the ratio of the motor heat capacity applied to "hot" motor and the motor heat capacity applied to "cold" motor.
Motor time constant ratio	-	(1 –15)	1	This element sets the ratio of the time constant of cooling for a stopped motor and the time constant of heating/cooling for a running motor.
Motor heating detection setting (LVL1)	TRIP / ALARM / OFF	(0.50 –0.99) X max Thermal capacity	0.01	This function simulates motor heating status. Heating is related to the square of the maximum phase current. The percentage of cooling is directly related to the heating status and present value of the motor.
Motor heating detection setting (LVL2)	TRIP / ALARM / OFF	-	-	Motor heat capacity 100% is equal to motor drive at the maximum allowable temperature. In this state, tripping must be activated. (LvL2)

*1: Motor START state (starting state) refers to the state in which the root-means-square (RMS) of three-phase current values exceeds the value of overload pick up×110% (from the state in which the current value is less than Ict×15%) once and then falls below the value of overload pickup×110% once.

*2: Motor RUN state (running state) refers to the state in which the current value falls below the value of Ict×8% after the motor starting state ends. The motor running state also applies when the current value falls below the value of overload pickup×110% once and then exceeds the value of pick up×110% again before it falls below the value of Ict×15%.

*3: Motor STOP state (stopped state) refers to a pre-startup state in which the root-means-square (RMS) of three-phase current values does not yet exceed the value of overload pickup×110%. It also includes a state in which the operating state is "complete".

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Table 2 Characteristic settings parameter (continued)

Protective function	Selection	Setting range	STEP	Remarks
Unbalanced current protection setting (LVL1)	TRIP / ALARM / OFF	-	-	"Unbalanced current protection setting (LVL1)" is 50% ±2% (relative to the set value) of "Unbalanced current protection setting (LVL2)". Time limit: 5 s (Not adjustable)
Unbalanced current protection setting (LVL2)	TRIP / ALARM / OFF	(0.20 –0.40) × ("In" or maximum phase current, whichever is greater)	0.01 ±2% (relative to the set value)	Characteristic: I2t = C (C = 0.01) * Set time limit (MAX T in "Unbalanced current protection setting (LVL2)")
MAX T	-	(5 –30)s	1s (±10%)+0.1s-0s	Time limit is applicable when 10% is set Time limit is counted after "Unbalanced current protection setting (LVL1)" is activated.
Directional Ground fault detection current	TRIP / ALARM / OFF	(1.0 –10.0)mA	0.1mA±10%	Secondary
Directional Ground fault detection voltage	-	(0.050 –0.150) X V0n	0.001 ±25%	V0n: 190V
Phase	-	(0 –90)deg or OFF	10deg	Setting "OFF" means that no direction is set.
Phase difference	-	(0.1 –10.0)s	0.1s (±15%)+0.1-0s	Phase difference between -3 V and I0 The relay is activated when I0 is within 90° of -3V.
Temperature sensor	RTD / THERMISTOR	-	-	*1
Type	NTC / PTC	-	-	*2
Temperature sensor detection (LVL1)	TRIP / ALARM / OFF	(0 –250)°C	1°C (±1%)±1°C	TEMP1 (When RTD is set)
		(0.1 –30.0)kΩ	0.1kΩ (±5%)±0.1kΩ	OHM1 (When THERMISTOR is set)
		(0 –60)s	1s (±5%)+0.1-0s	
Temperature sensor detection (LVL2)	TRIP / ALARM / OFF	(0 –250)°C	1°C (±1%)±1°C	TEMP2 (When RTD is set)
		(0.1 –30.0)kΩ	0.1kΩ (±5%)±0.1kΩ	OHM2 (When THERMISTOR is set)
		(0 –60)s	1s (±5%)+0.1-0s	
Negative phase sequence current protection	TRIP / ALARM / OFF	-	-	Checked within 0.5 s The relay is activated when the current value reaches or exceeds the "overload pick up" setting.
External anomaly detection 1	TRIP / ALARM / OFF	-	-	This function is enabled only when specified in "Input setting 1 (IN1)".
External anomaly detection 2	TRIP / ALARM / OFF	-	-	This function is enabled only when specified in "Input setting 2 (IN2)".
Open-phase protection	TRIP / ALARM / OFF	-	-	The relay is activated when the current value is equal to or less than 50% of the set current value (In) .
Current unbalance factor		(0.30 –0.65) X In	0.01 ±10%	
Operating time		(0.5 –5.0)s	0.1s ±10%+0.1-0s	

*1: The customer must specify this item when placing an order.

*2: When RTD is selected, "PTC" is fixed when displayed.

*3: Negative phase sequence current: $Ins = \sqrt{(IR^2 + IS^2 + 2 \times IR \times IS \times \cos\theta)}/\sqrt{3}$

(IR: R-phase current, IS: S-phase current, θ: Phase difference with S-phase current shifted from R-phase current by 60°)

3-3. Characteristic Curve

Figure 1 shows the operating characteristic curve of the protective relay.

Motor heating trip

Overload trip

Short-time delay trip

Trip caused by unbalanced current
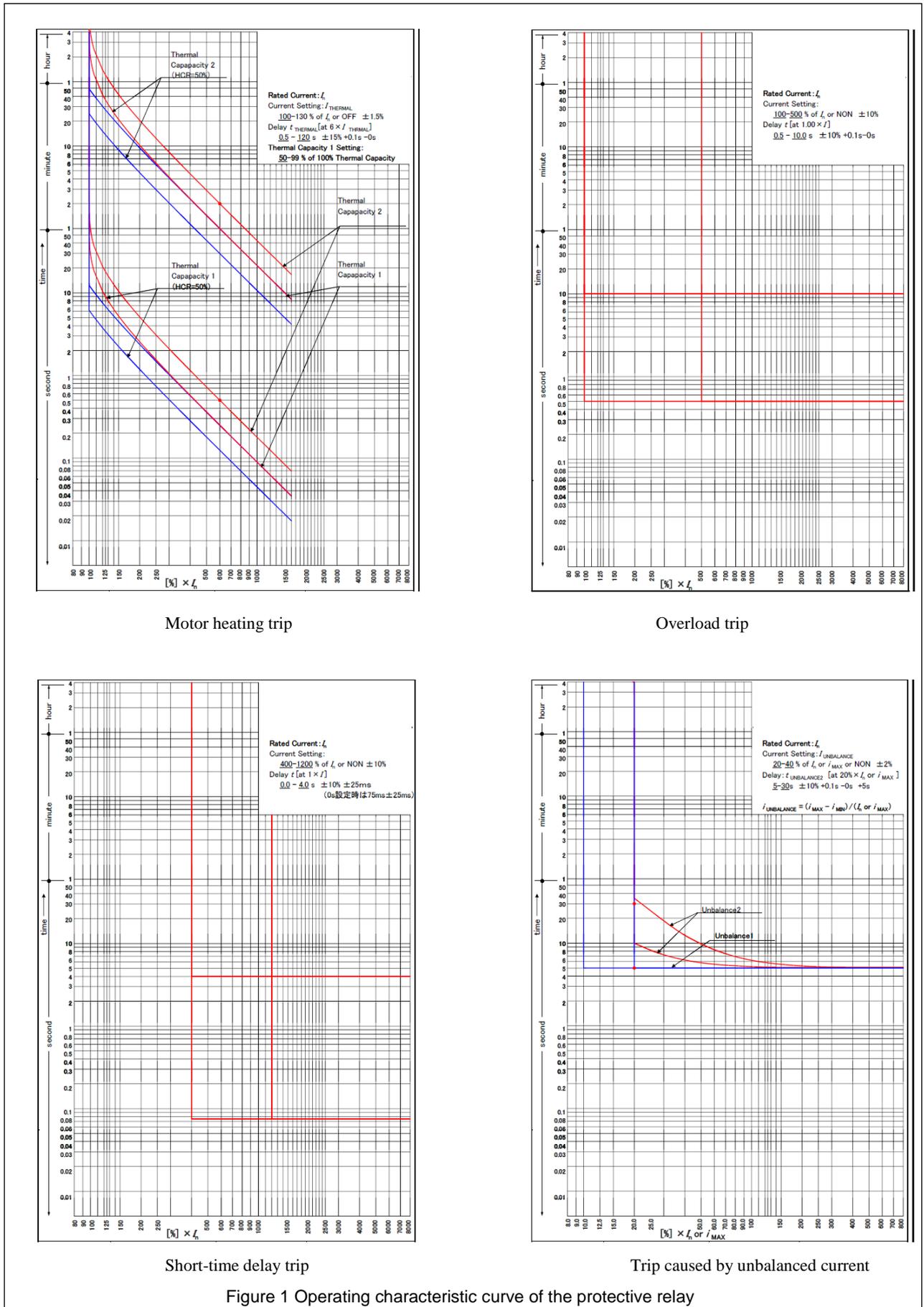
Figure 1 Operating characteristic curve of the protective relay

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4. Component Identifications

Figure 1 provides general views of the protective relay.

①Display screen

② Arrow buttons

(Front face)
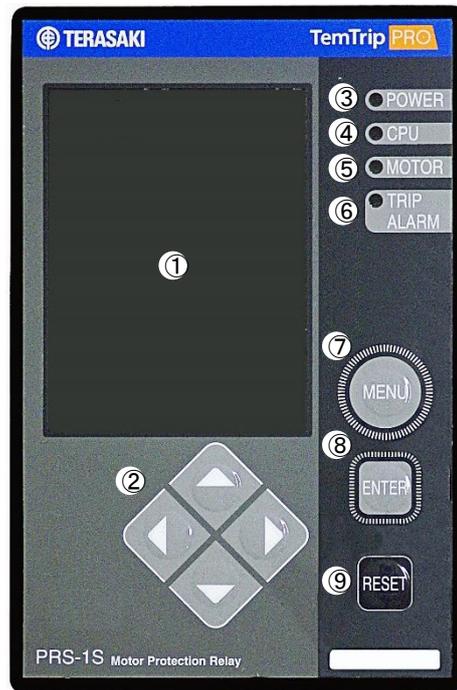
③ POWER lamp
Lit in white while control power is being applied

④ CPU lamp
Lit in green while the internal CPU is operating

⑤ MOTOR lamp
Lit in green while the motor is running (Blinking in green while the motor is starting)

⑥ TRIP ALARM lamp
Lit in red when tripping occurs or blinking in red when an alarm occurs

⑦ MENU button
Used to switch the screen

⑧ ENTER button
Used to change the set values

⑨ RESET button
Used to reset the relay or extinguish the LEDs

For specification with communication function, there is a terminal.

⑩ Control circuit terminals
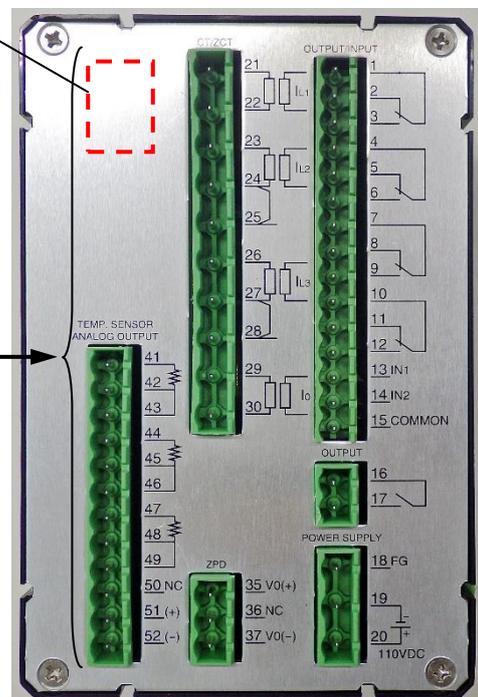
(Rear face)

Figure 2 protective relay

5. Installation

This chapter describes how to install the protective relay.

1) External dimensions and panel drilling plan

See Figure 3 below. The thickness of each panel is 2 to 4 [mm].

| Front view | Side view | Rear view | Panel drilling plan |

Figure 3 External dimensions and panel drilling plan of the protective relay
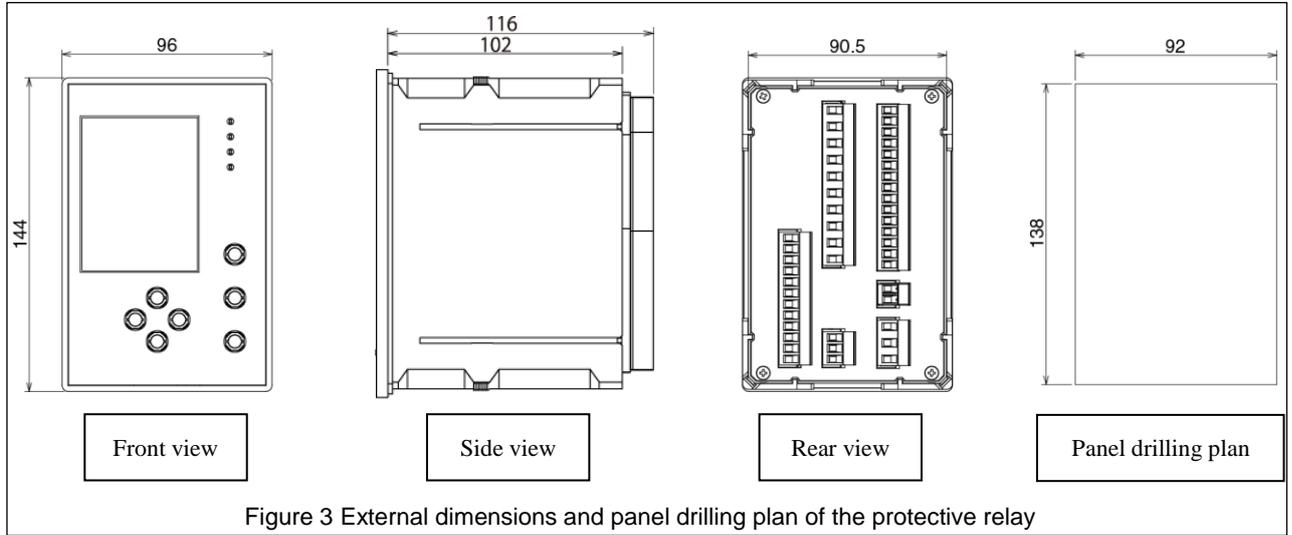
2) Install and remove the mounting tool method

(Install)

Protective relay

Mounting tool insertion groove

Panel surface

Mounting tool

①Insert the protective relay into the panel and then insert mounting tool into mounting tool insertion groove. (2 position above and below)

Hexagonal wrench

Screw of mounting tool

②Use a hexagon wrench to tighten the mounting screws(tighttening torque: 20 to 30 cN.m) secure the body.(2 position above and below)

(Remove)

①Use a hexagon wrench to loosen the mounting screws(2 position above and below)

Hexagon wrench

Flatblade screwdriver

②Attach a flatblade screwdriver to the "○" in the figure above and remove the mounting tool from the body. (2 position above and below) *Do not hook a flatblade screwdriver other than the "○" in the figure above. The shape of the fixture may change.

Figure 3 Attaching the mounting clips

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6. Connection

6-1. Circuits and Ratings

The connection diagram and terminal description of type PRS-1S protective relay are shown in Figure 5 and Tables 3, respectively.

Figure 5 Connection diagram for the protective relay

Table 3 Terminal description

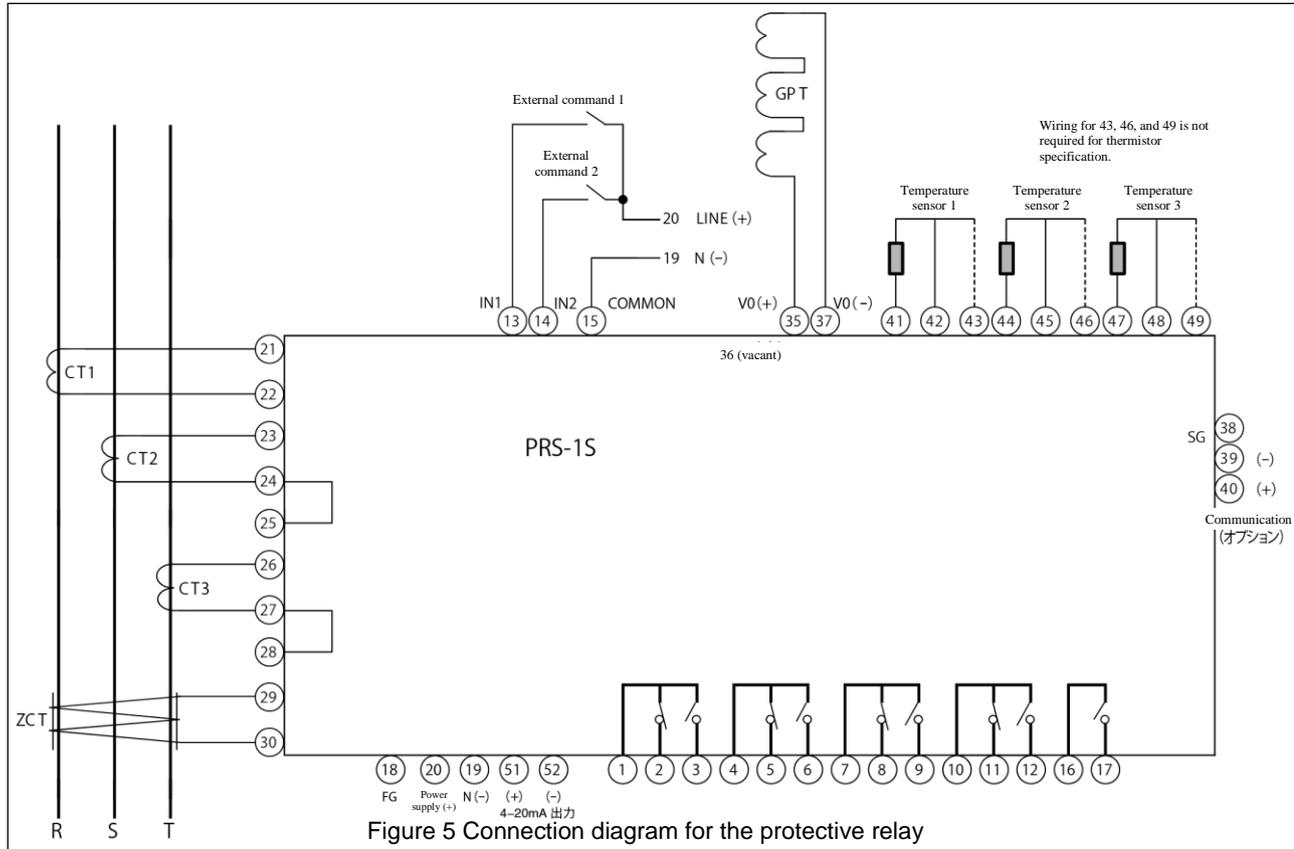| I/O terminal name	Terminal number	Note
Control power input	20 — 19	110VDC
Current detection CT	21 — 22 (R-phase) 23 — 24, 25 (S-phase) 26 — 27, 28 (T-phase)	Overcurrent detection CT CT rated current: 1 A or 5 A *1
ZCT	29 — 30	Output current signal from external ZCT 1 to 10 mA
GPT	35 — 37	Rated voltage of signal from ZFD for detection V0n: 190V (when completely grounded)
External command input signal 1	13 — 15	This terminal inputs external commands. The content of each command is as below. Activation display: Reset, External FAULT: N/O, External FAULT: N/C
External command input signal 2	14 — 15	
4-20 mA output	51 (+) — 52 (−)	Current
Communication output	40 (+) — 39 (−)	For only specifications with communication facility
	38 (SG)	For only specifications with communication facility
Operation signal output *2	1 — 3 (RY 1)	1: COMMON, 2: Normally closed contact (NC), 3: Normally open contact (NO)
	4 — 6 (RY 2)	4: COMMON, 5: Normally closed contact (NC), 6: Normally open contact (NO)
	7 — 9 (RY 3)	7: COMMON, 8: Normally closed contact (NC), 9: Normally open contact (NO)
	10 — 12 (RY 4)	10: COMMON, 11: Normally closed contact (NC), 12: Normally open contact (NO)
CPU operating status *2	16 — 17	-
Temperature measurement circuit 1	41 — 43	41: COMMON, 42: Normally closed contact (NC), 43: Normally open contact (NO)
Temperature measurement circuit 2	44 — 46	44: COMMON, 45: Normally closed contact (NC), 46: Normally open contact (NO)
Temperature measurement circuit 3	47 — 49	47: COMMON, 48: Normally closed contact (NC), 49: Normally open contact (NO)

*1: To be stated when ordering

*2: The contact output ratings are 8A at 250 VAC and 5A at 24 VDC (Minimum load: 5 VDC, 10 mA).

*3: Terminal No. 36 is vacant.

6-2. Terminal Connection Procedure

⚠ **CAUTION**
• After connecting each wire to the connector, recheck their respective connection positions. Incorrect connections may result in failure.

Figures 6-1 and 6-2 show the connection procedure.

① Press each connector release button (orange) with a small flathead screwdriver.

② With the release button pressed, insert each wire into the corresponding square hole on the connector.

③ Release the release button with the wires inserted.

Figure 6-1 Connecting to input terminals
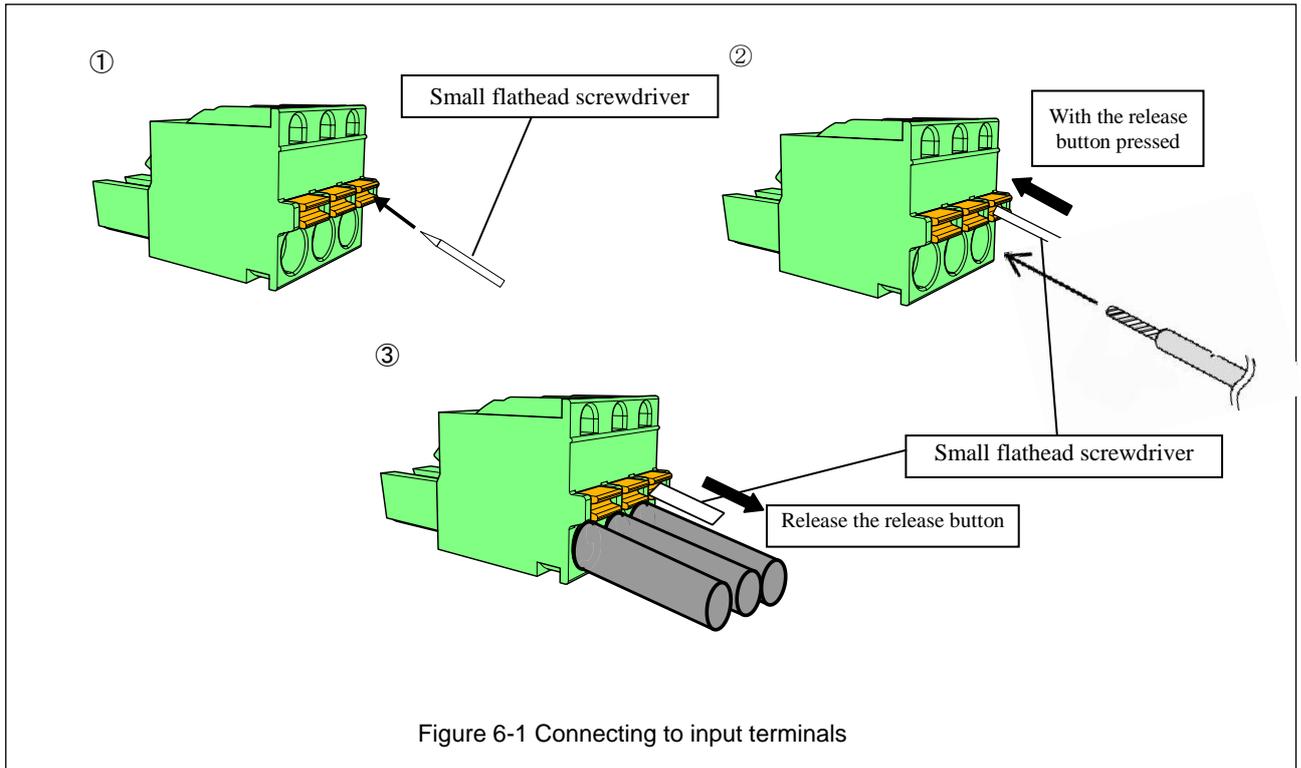
Terminal No.	Connector	Wire size [mm²]		Wire stripping length [mm]
		Solid wire	Stranded wire	
1-12	⑥	0.2-2.25	0.2-2.25	7
13-15	③	0.2-0.75	0.2-0.75	7
16,17	②	0.2-0.75	0.2-0.75	7
18-20	④	0.2-1.25	0.2-1.25	7
21-27	⑤	0.2-2.0	0.2-2.0	7
28-30	⑤	0.2-0.75	0.2-0.75	7
35-37	③	0.2-0.75	0.2-0.75	7
38-40	③	0.2-0.3	0.2-0.3	7
41-52	⑥	0.2-0.3	0.2-0.3	7

Figure 6-2 Control circuit terminal numbers of Tem Trip PRO and wire sizes for each connector used

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7. How to Display Measurements and Make Settings

⚠ **CAUTION**
• Make sure that the protective relay is adjusted by a competent person.

The following describes how to display measurements and make settings of the protective relay.

7-1. General

1) Make sure that control power is supplied. Control power supply is required to display measurements.

2) The MENU, arrow (up, down, right, left), ENTER, and RESET buttons (seven buttons in total) are used to display measured values and set characteristics. In the figures shown in Sections 7-2 to 7-7, the following button symbols are used to indicate the buttons that must be pressed.

   (Button symbols and their descriptions)

   [M]: Press the MENU button.

   [U]: Press the up arrow button.

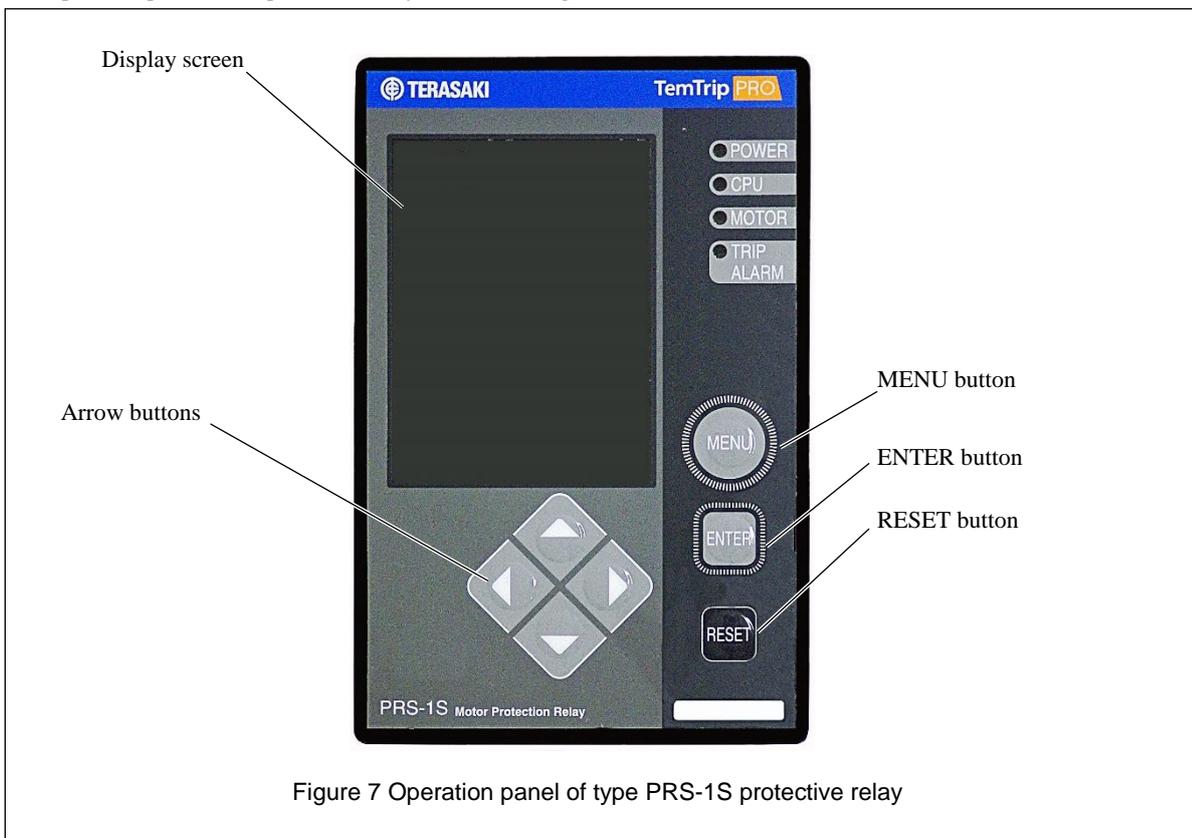   [D]: Press the down arrow button.

   [R]: Press the right arrow button.

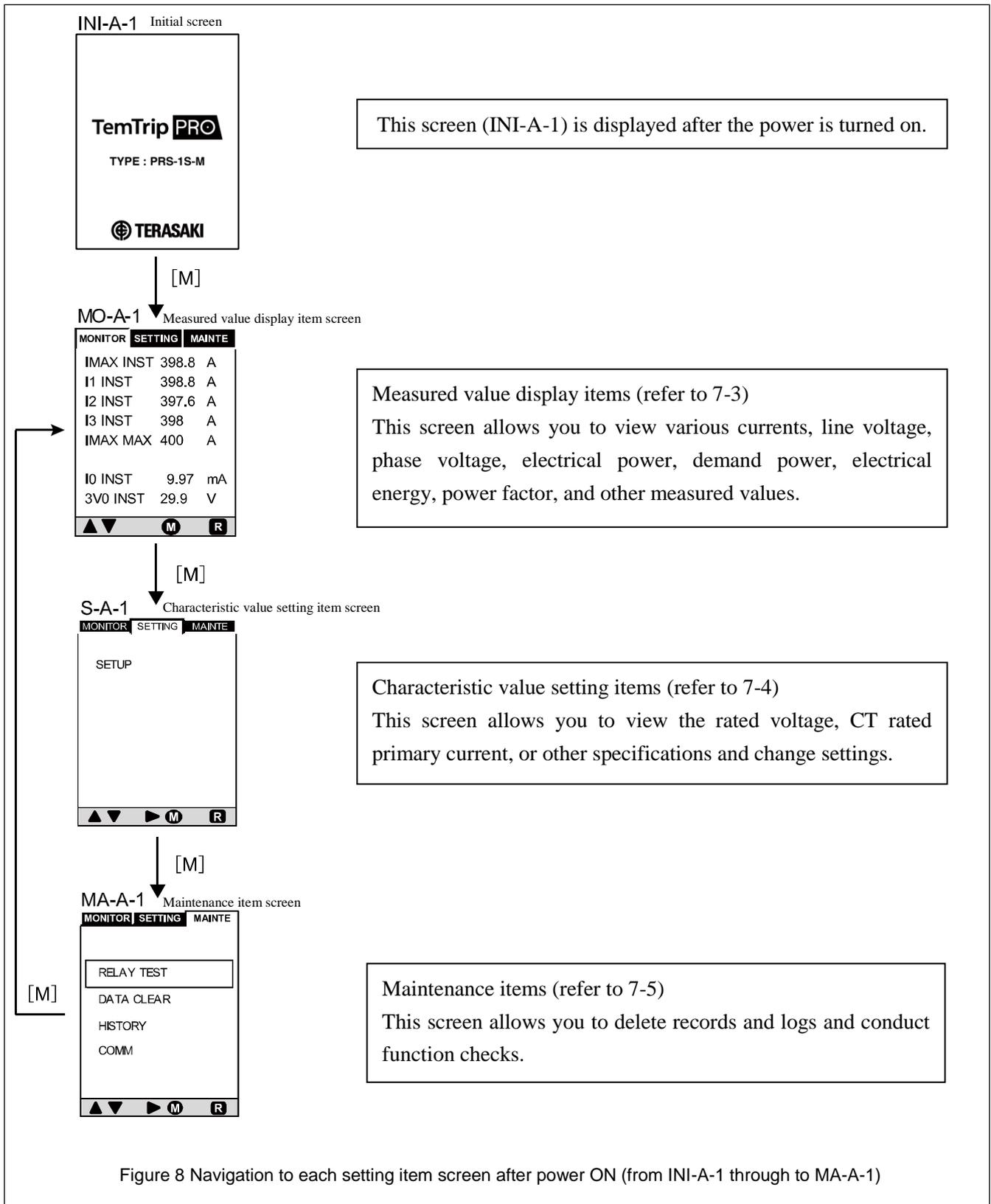   [L]: Press the left arrow button.

   [E]: Press the ENTER button.

   [R]: Press the RESET button.

The operation panel of the protective relay is shown in Figure 7 below.

Figure 7 Operation panel of type PRS-1S protective relay

7-2. Navigation to Each Setting Item Screen After Power ON (from INI-A-1 through to MA-A-1)

This motor protective relay is provided with measured value display items, characteristic value setting items, and maintenance items that are used to display histories and conduct function checks. Figure 8 below shows how to navigate to each item.

INI-A-1   Initial screen

TemTrip **PRO**

TYPE : PRS-1S-M

TERASAKI

[M]

This screen (INI-A-1) is displayed after the power is turned on.

MO-A-1   Measured value display item screen

MONITOR	SETTING	MAINTE

IMAX INST 398.8 A
I1 INST 398.8 A
I2 INST 397.6 A
I3 INST 398 A
IMAX MAX 400 A

I0 INST 9.97 mA
3V0 INST 29.9 V

▲▼ Ⓜ Ⓡ

[M]

Measured value display items (refer to 7-3)
This screen allows you to view various currents, line voltage, phase voltage, electrical power, demand power, electrical energy, power factor, and other measured values.

S-A-1   Characteristic value setting item screen

MONITOR	SETTING	MAINTE

SETUP

▲▼ ▶Ⓜ Ⓡ

[M]

Characteristic value setting items (refer to 7-4)
This screen allows you to view the rated voltage, CT rated primary current, or other specifications and change settings.

MA-A-1   Maintenance item screen

MONITOR	SETTING	MAINTE

RELAY TEST
DATA CLEAR
HISTORY
COMM

[M]

▲▼ ▶Ⓜ Ⓡ

Maintenance items (refer to 7-5)
This screen allows you to delete records and logs and conduct function checks.

Figure 8 Navigation to each setting item screen after power ON (from INI-A-1 through to MA-A-1)

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7-3. Navigating between Measured Value Display Item Screens (from MO-A-1 through to MO-G-2)

Figure 9 shows how to navigate between measured value display item screens (from MO-A-1 through to MO-G-2). See Table 4 for items that are actually displayed on the screen.
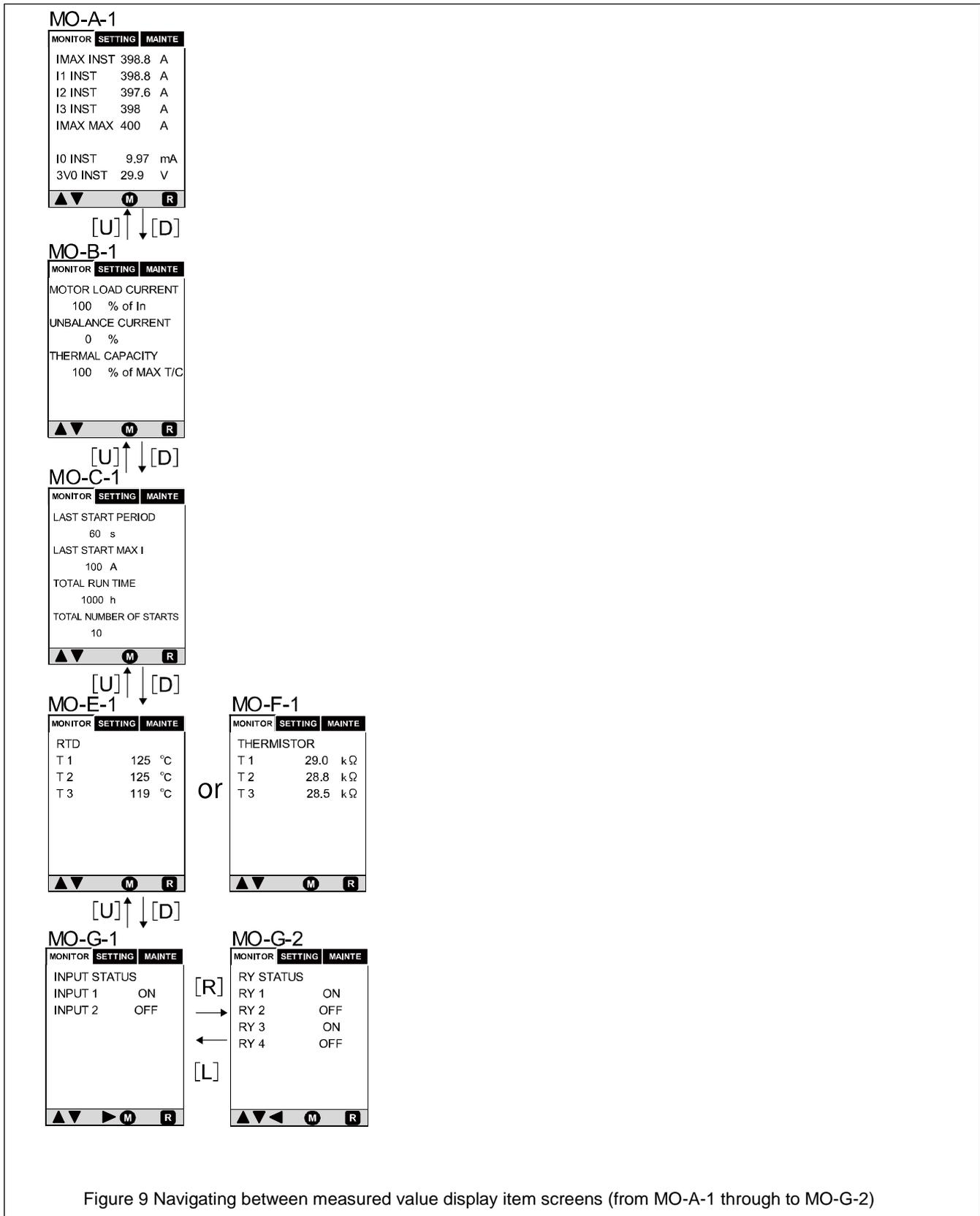

Figure 9 Navigating between measured value display item screens (from MO-A-1 through to MO-G-2)

Table 4 Display items and descriptions of measured value display item screens (MO-A-1to MO-G-2)

Screen No.	Display	Item	Remarks
MO-A-1	IMAX INST	Maximum phase current value (present value)	
	I1 INST	Phase 1 (R-phase, A-phase) current value (present value)	
	I2 INST	Phase 2 (S-phase, B-phase) current value (present value)	
	I3 INST	Phase 3 (T-phase, C-phase) current value (present value)	
	IMAX MAX	Maximum phase current value to the present time	
	I0 INST	Leakage current value (present value)	
	3V0 INST	Leakage voltage value (present value)	
MO-B-1	MOTOR LOAD CURRENT	Motor load current	
	UNBALANCE CURRENT	Unbalanced current	
	THERMAL CAPACITY	Motor heat capacity	
MO-C-1	LAST START PERIOD	Startup time	
	LAST START MAX I	Starting current	
	TOTAL RUN TIME	Operating time	
	TOTAL NUMBER OF STARTS	Operation count	
MO-E-1	RTD T1	Temperature measured by temperature sensor 1	Temperature value measured by RTD (platinum resistance temperature detector)
	RTD T2	Temperature measured by temperature sensor 2	
	RTD T3	Temperature measured by temperature sensor 3	
MO-F-1	THERMISTOR T1	Temperature measured by temperature sensor 1	Temperature value measured by thermistor
	THERMISTOR T2	Temperature measured by temperature sensor 2	
	THERMISTOR T3	Temperature measured by temperature sensor 3	
MO-G-1	INPUT1	External command 1 input status	The status of the external command input terminal (terminal number 13) is displayed.
	INPUT2	External command 2 input status	The status of the external command input terminal (terminal number 14) is displayed.
MO-G-2	RY1	External contact output status 1	The output status of terminal number 1 is displayed.
	RY2	External contact output status 2	The output status of terminal number 4 is displayed.
	RY3	External contact output status 3	The output status of terminal number 7 is displayed.
	RY4	External contact output status 4	The output status of terminal number 10 is displayed.

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7-4. Navigating between Characteristic Value Setting Item Screens (from S-A-1 through to S-D-1)

Figure 10 shows how to navigate between characteristic value setting item screens (from S-A-1 through to S-D-1). See Table 5 for items that are actually displayed on the screen.
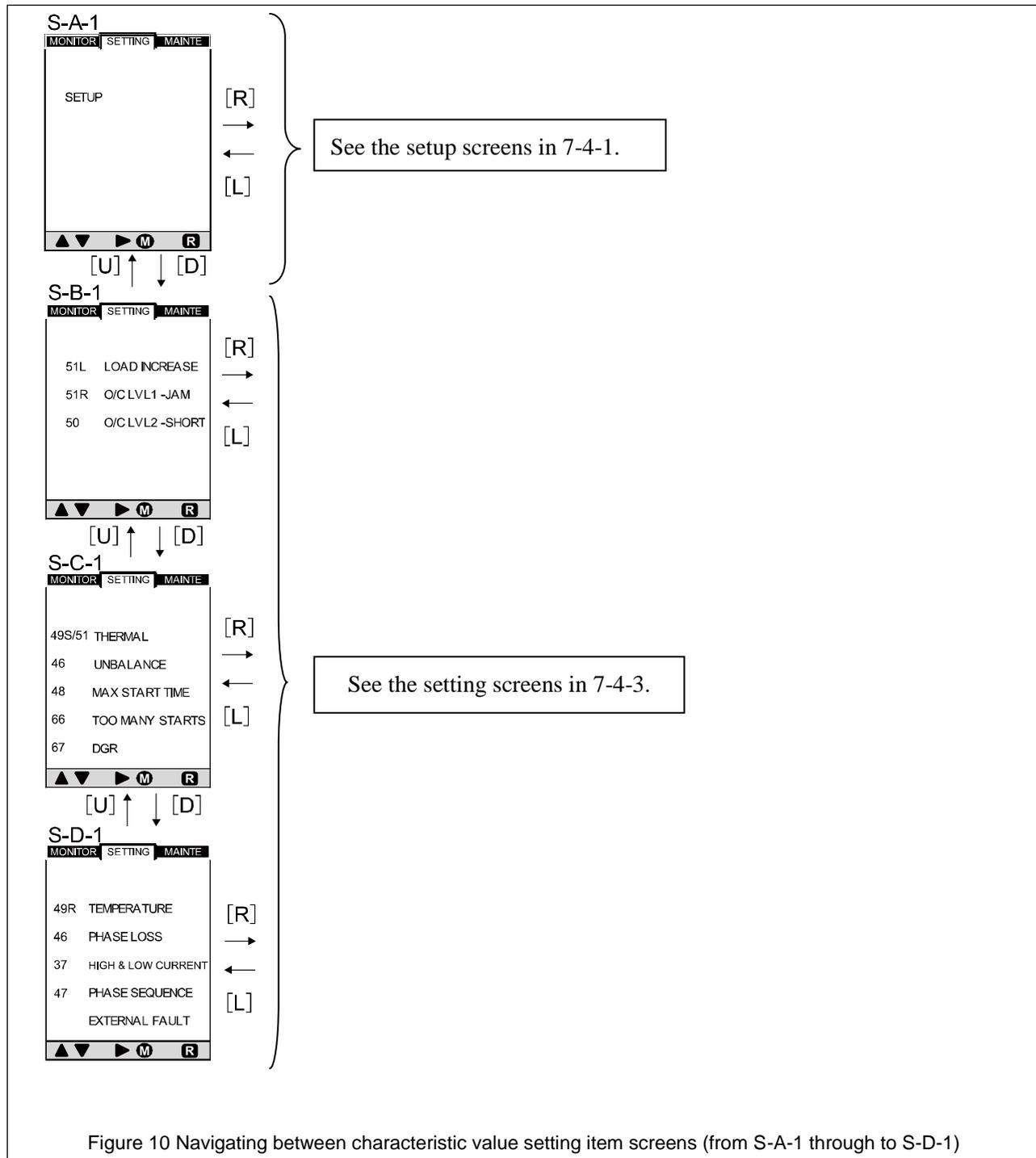

Figure 10 Navigating between characteristic value setting item screens (from S-A-1 through to S-D-1)

Table 5 Setting items and display details of characteristic value setting item screens (S-A-1 through to S-D-1)

Screen No.	Setting items and display details		Remarks
	Display	Item	
S-A-1	SET UP	Initial display of setting mode	
S-B-1	LOAD INCREASE	Applied current anomaly detection setting	
	O/C LVL1-JAM	Overload protection setting	
	O/C LVL2-SHORT	Short-circuit protection setting	
S-C-1	THERMAL	Motor heating detection setting	
	UNBALANCE	Unbalanced current protection setting	
	MAX START TIME	Motor startup time monitor setting	
	TOO MANY STAR	Motor startup count monitor setting	
	DGR	Ground fault detection setting	
S-D-1	TEMPERATURE	Temperature sensor detection setting	
	PHASE LOSS	Open-phase protection setting	
	HIGH & LOW CURRENT	Undercurrent protection setting	
	PHASE SEQUENCE	Negative phase sequence current protection setting	
	EXTERNAL FAULT	External anomaly detection setting	

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7-4-1. Navigating between setup item screens (from S-A-1 through to SU-L-1)

Figures 11 to 11-2 show how to navigate between setup item screens (from S-A-1 through to SU-L-1). See Table 6 for items that are actually displayed on the screen. When each setting item is changed, your password needs authentication once. Refer to "7-4-2. Navigating between password setting/authentication screens".
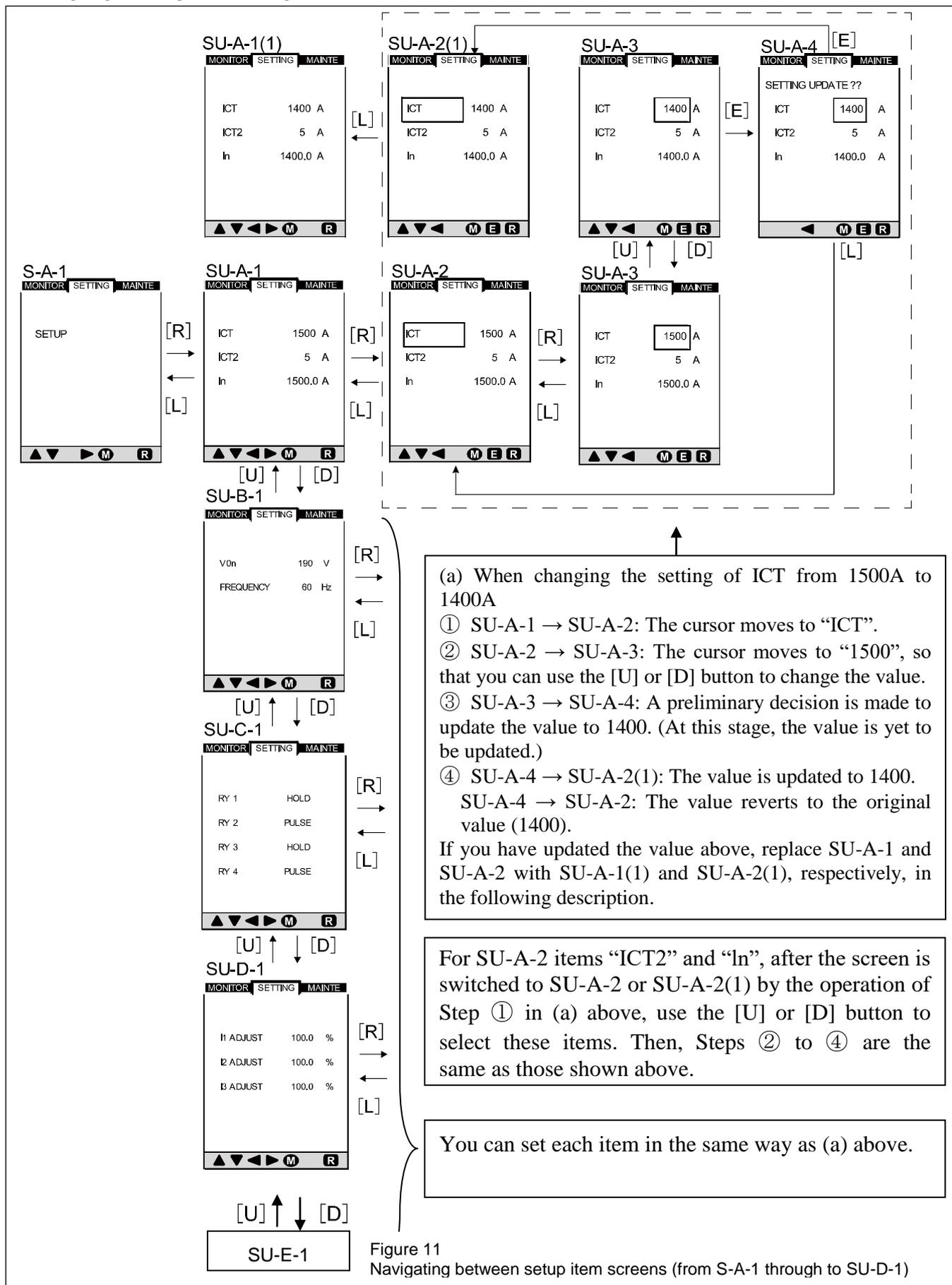

(a) When changing the setting of ICT from 1500A to 1400A
① SU-A-1 → SU-A-2: The cursor moves to "ICT".
② SU-A-2 → SU-A-3: The cursor moves to "1500", so that you can use the [U] or [D] button to change the value.
③ SU-A-3 → SU-A-4: A preliminary decision is made to update the value to 1400. (At this stage, the value is yet to be updated.)
④ SU-A-4 → SU-A-2(1): The value is updated to 1400.
　 SU-A-4 → SU-A-2: The value reverts to the original value (1400).
If you have updated the value above, replace SU-A-1 and SU-A-2 with SU-A-1(1) and SU-A-2(1), respectively, in the following description.

For SU-A-2 items "ICT2" and "ln", after the screen is switched to SU-A-2 or SU-A-2(1) by the operation of Step ① in (a) above, use the [U] or [D] button to select these items. Then, Steps ② to ④ are the same as those shown above.

You can set each item in the same way as (a) above.

Figure 11
Navigating between setup item screens (from S-A-1 through to SU-D-1)

SU-D-1

[U] ↑ ↓ [D]

SU-E-1

MONITOR SETTING MAINTE

TRIP INHIBIT   4.00   ×In

CONFIG INPUT 1   REMOTE RST

CONFIG INPUT 2   EXT FLT2 N/O

▲ ▼ ◄ ► Ⓜ Ⓡ

[R]
→
←
[L]

[U] ↑ ↓ [D]

SU-F-1

MONITOR SETTING MAINTE

ANALOG OUTPUT

FULL RANGE   1.00   ×ICT

FULL ADJUST   100.0   %

ZERO ADJUST   100.0   %

▲ ▼ ◄ ► Ⓜ Ⓡ

[R]
→
←
[L]

[U] ↑ ↓ [D]

SU-J-1

MONITOR SETTING MAINTE

COMMUNICATION

ADDRESS   1

BAUD RATE   19200   bps

PARITY   EVEN

▲ ▼ ◄ ► Ⓜ Ⓡ

[R]
→
←
[L]

[U] ↑ ↓ [D]

SU-K-1

MONITOR SETTING MAINTE

YEAR   2019

MONTH   04

DAY   01

HOUR   23

MINUTE   59

▲ ▼ ◄ ► Ⓜ Ⓡ

[R]
→
←
[L]

[U] ↑ ↓ [D]

SU-M-1

MONITOR SETTING MAINTE

BRIGHTNESS   100   %

CONTRAST   100   %

▲ ▼ ◄ ► Ⓜ Ⓡ

[R]
→
←
[L]

[U] ↑ ↓ [D]

SU-L-1
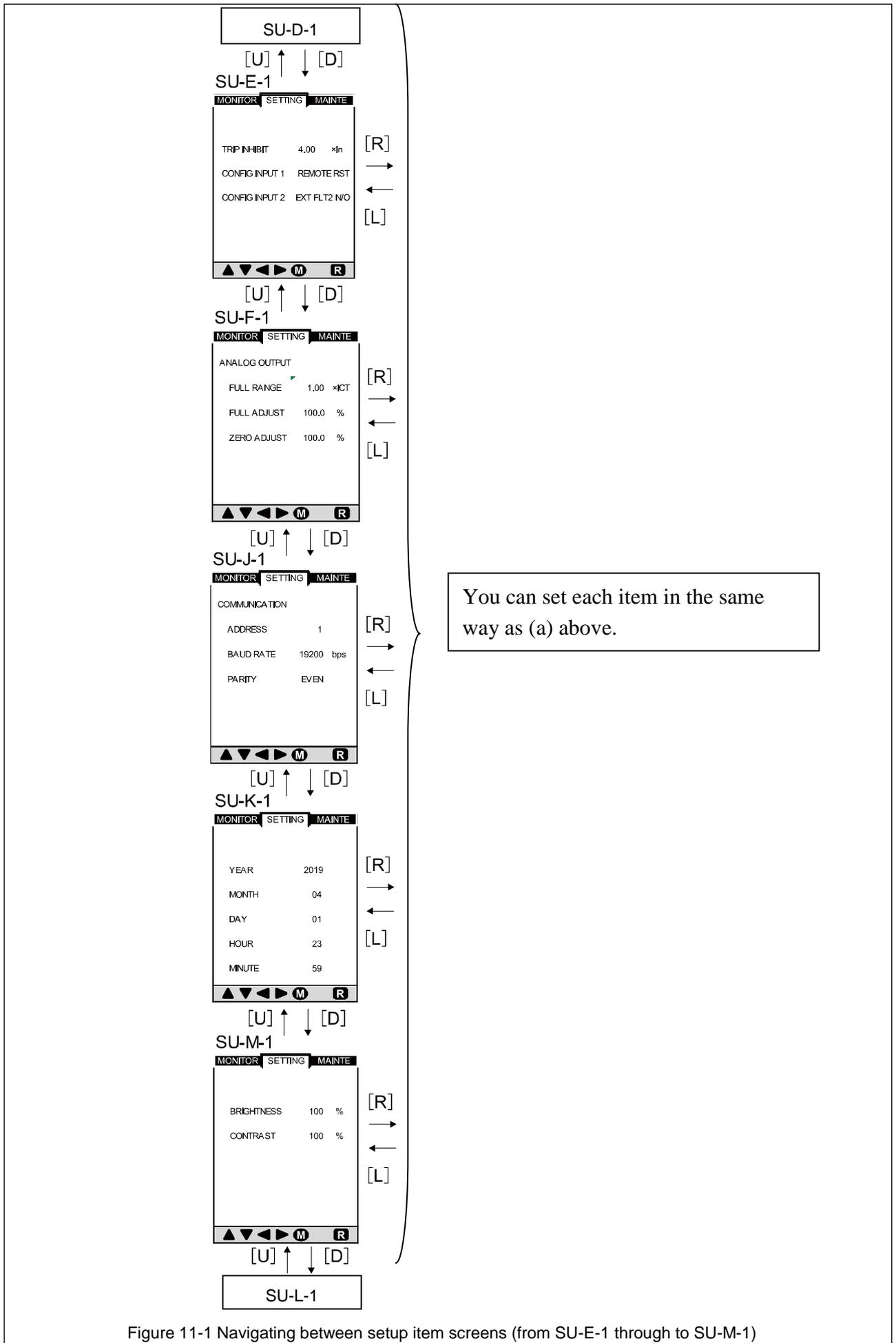
You can set each item in the same way as (a) above.

Figure 11-1 Navigating between setup item screens (from SU-E-1 through to SU-M-1)
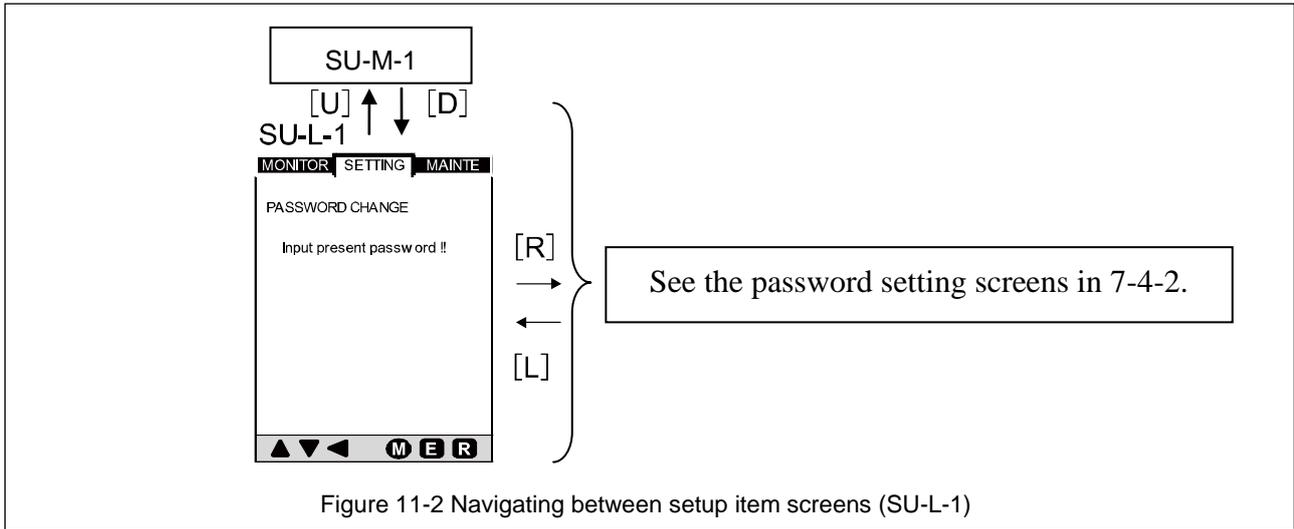
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Figure 11-2 Navigating between setup item screens (SU-L-1)

Table 6 Setting items and display details of setup item screens (S-A-1 to SU-L-1)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-A-1	Initial display of setting mode		-	-	Refer to 7-4.
SU-A-1	ICT	CT primary current	-	10-1500A	-
	ICT2 *1	CT secondary current	1A/5A	-	-
	In	Rated current	-	3.0-1500A	-
SU-B-1	V0n	Zero-phase voltage	190V (Not adjustable)		
	FREQUENCY	Frequency	50Hz/60Hz	-	-
SU-C-1	RY1 RY2 RY3 RY4	Relay output mode	HOLD/PULSE	-	This item can be set separately for each relay output.
SU-D-1	I1 ADJUST I2 ADJUST I3 ADJUST	Phase current adjustment range	-	90-110%	This item is used for fine adjustment between the phase current value actually measured at the installation location and the measured value displayed.
SU-E-1	TRIP INHIBIT	Trip activation disable setting	-	(4.00-10.00) x In/OFF	-
	CONFIG INPUT1	External input 1 setting	Remote Reset/ External Fault1NO/ External Fault1 NC	-	-
	CONFIG INPUT2	External input 2 setting	Remote Reset/ External Fault2 NO/ External Fault2 NC	-	-
SU-F-1	FULL RANGE	20-mA output setting	-	(1-1.2)×Ict	-
	FULL ADJUST	20-mA output adjustment	-	90.0-110.0%	-
	ZERO ADJUST	4-mA (0 output) adjustment	-	90.0-110.0%	-
SU-J-1 *2	ADDRESS	Transmission address setting	-	1-31	-
	BAUD RATE	Transmission rate setting	9600/19200	-	-
	PARITY	Parity setting	NONE/ODD/EVEN	-	-
SU-K-1	YEAR	Date/time setting (Year/month/day/hour/ minute)	-	-	-
	MONTH		-	-	-
	DAY		-	-	-
	HOUR		-	-	-
	MINUTE		-	-	-
SU-M-1	BRIGHTNESS	Display brightness	-	10-100%	-
	CONTRAST	Display contrast	-	10-100%	-
SU-L-1	PASSWORD CHANGE	Password change mode	Any number (four digits)*3	-	Refer to 7-4-2.

*1: To be stated when ordering

*2: Not displayed for products without communication specification

*3: This item is factory-set to "0000".

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7-4-2. Navigating between password setting/authentication screens (from SU-L-1 through to P-A-4)

Figure 12 shows how to navigate between password setting screens (from SU-L-1 through to SU-L-6). See Table 7 for items that are actually displayed on the screen.
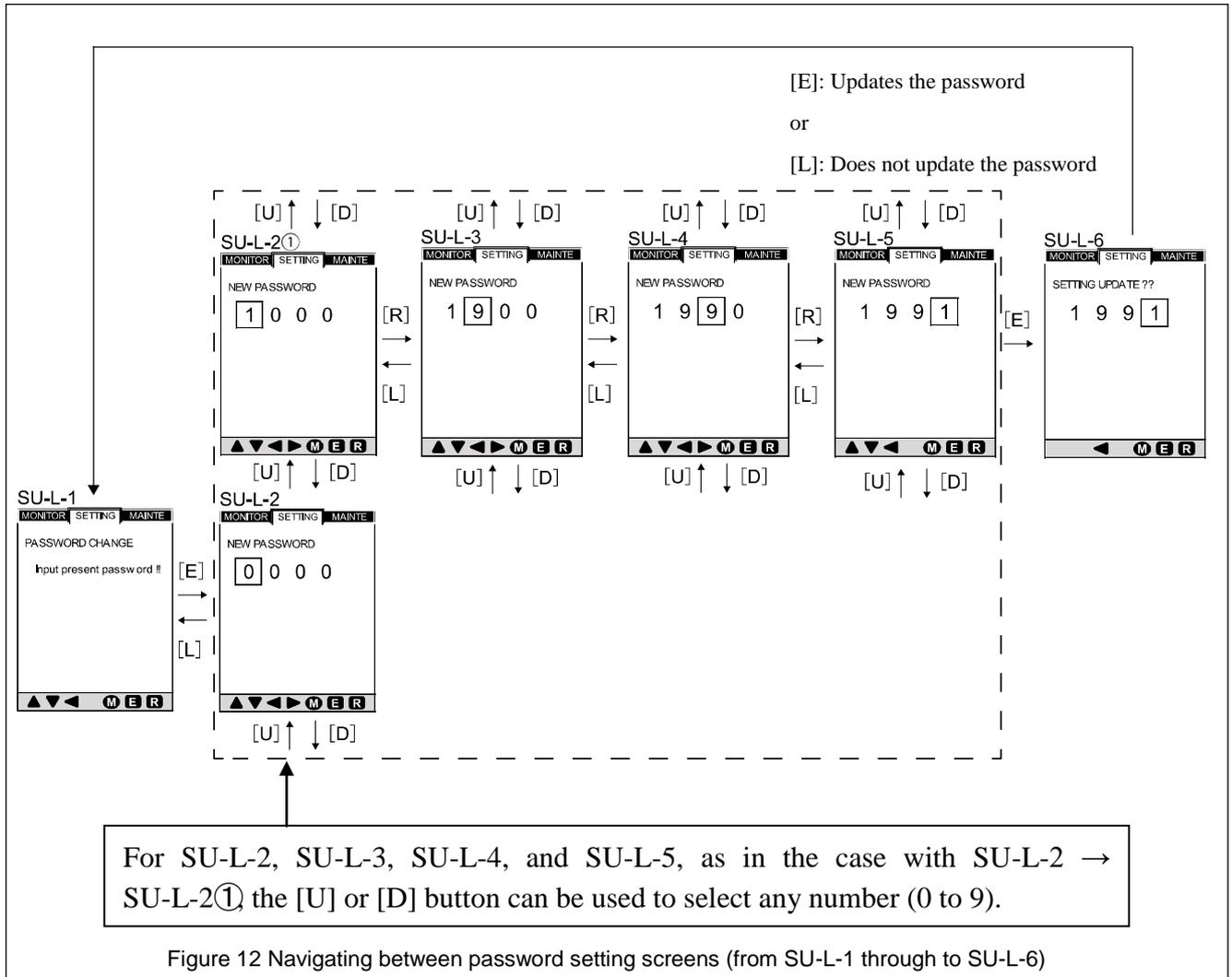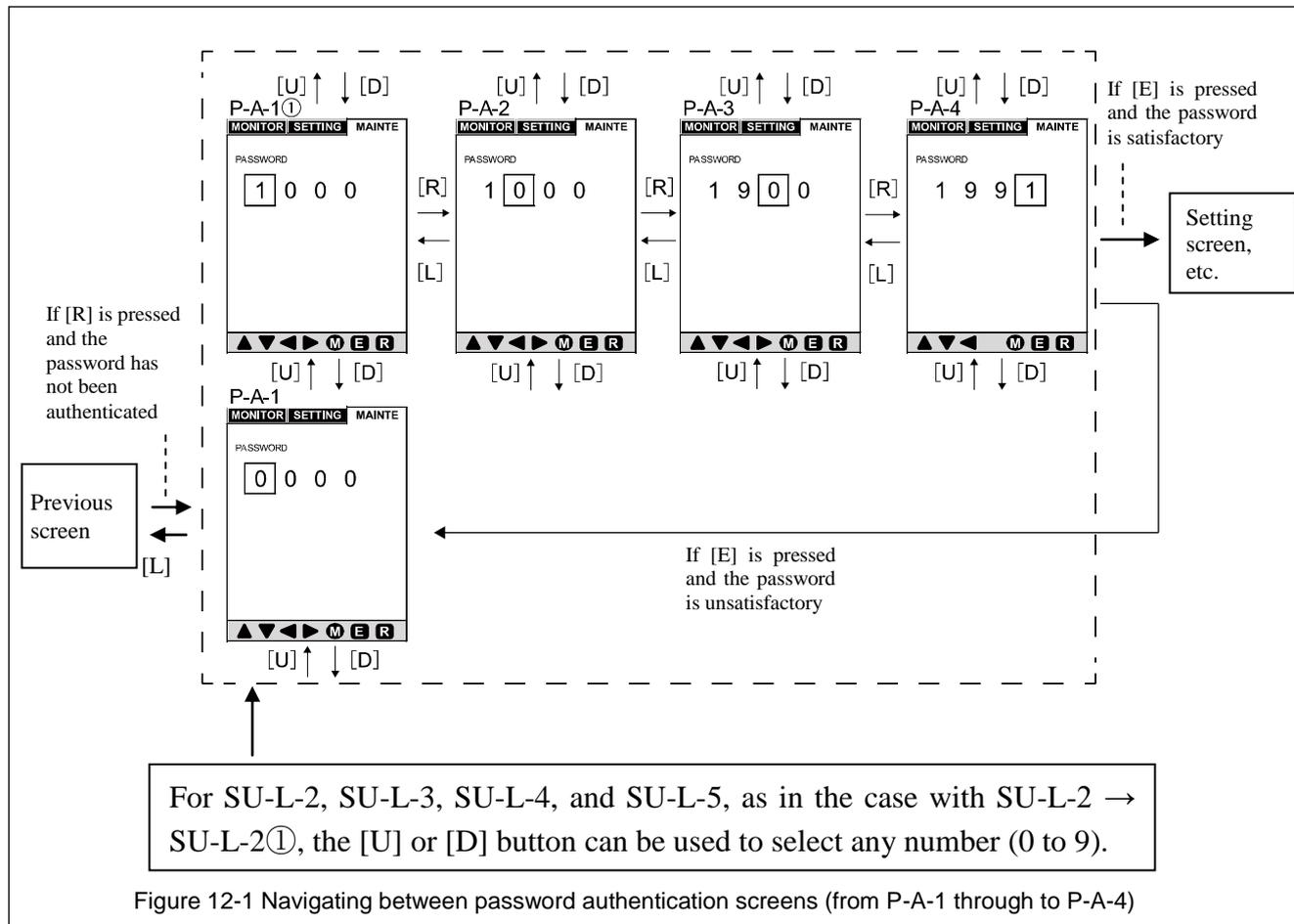

Figure 12 Navigating between password setting screens (from SU-L-1 through to SU-L-6)

Table 7 Setting items and display details of password setting screens (SU-L-1 to SU-L-6)

Screen No.	Display/setting item	Setting range	Remarks
SU-L-1	Password change mode	-	Initial display
SU-L-2	Password setting: 1st digit	0-9	With the cursor staying in one of the digits, pressing the [U] arrow button increments the number in the digit or pressing the [D] arrow button decrements the number in the digit.
SU-L-3	Password setting: 2nd digit	0-9	
SU-L-4	Password setting: 3rd digit	0-9	
SU-L-5	Password setting: 4th digit	0-9	
SU-L-6	Checking the password change	-	This screen is displayed when you press the ENTER button after changing the password using screens SU-L-2 to SU-L-5. Pressing the ENTER button again updates the current password to the new one. Pressing the [L] arrow button instead of the ENTER button returns the display to the initial screen (SU-L-1) without changing the password.

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Figure 12-1 shows how to navigate between password authentication screens (from P-A-1 through to P-A-4). See Table 7-1 for items that are actually displayed on the screen. Your password needs authentication in the following cases:

• When you press the [M] button to navigate to the maintenance item screen or measured value display item screen as shown in 7-2 and then change settings for each setting item on the characteristic value setting item screen

• When you change your password and then each characteristic value setting item

• When you navigate to the maintenance item screen and then delete histories

Figure 12-1 Navigating between password authentication screens (from P-A-1 through to P-A-4)

Table 7-1 Setting items and display details of password authentication screens (P-A-1 to P-A-4)

Screen No.	Display/setting item	Setting range	Remarks
P-A-1	Password input: 1st digit	0-9	With the cursor staying in one of the digits, pressing the [U] arrow button increments the number in the digit or pressing the [D] arrow button decrements the number in the digit.
P-A-2	Password input: 2nd digit	0-9	
P-A-3	Password input: 3rd digit	0-9	
P-A-4	Password input: 4th digit	0-9	

7-4-3. Navigating between setting item screens (from S-A-1 through to ST-A2-3①)

Figure 13 shows how to navigate between setting item screens (from S-A-1 through to AT-A2-3①). See Table 8 for items that are actually displayed on the screen.
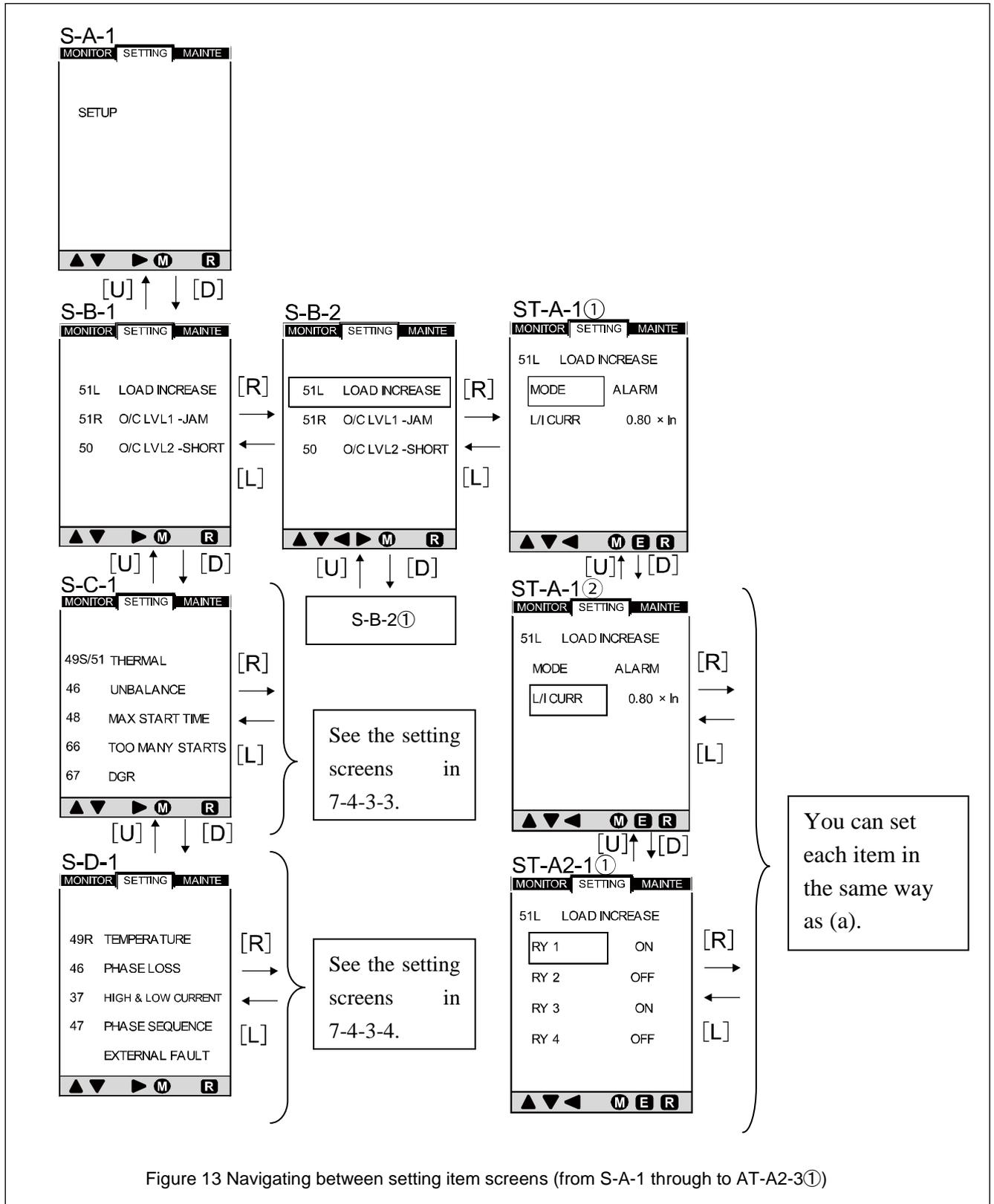

Figure 13 Navigating between setting item screens (from S-A-1 through to AT-A2-3①)

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Table 8 Setting items and display details of setting item screens (S-A-1 to AT-A2-3①)
(overcurrent anomaly detection setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-B-1	Initial display of setting mode		-	-	Refer to page 18.
S-B-2	Setting item selection switching		-	-	Use the [U] or [D] arrow button to switch the item to be set.
ST-A-1①	MODE	Mode setting	ALARM/OFF	-	At the ST-A-1① or ST-A-1② screen, use the [U] or [D] arrow button to select the item to be set, press the [R] arrow button, and then use the [U] or [D] arrow button to set a mode or numerical value. The procedure is the same as that described on page 20.
ST-A-2②	L/I CURR	Trip pickup current value setting	-	(1.00-1.50) x In	
ST-A2-1①	External output setting item switching		-	-	Use the [U] or [D] arrow button to switch the item to be set. The procedure is the same as that described on page 20.
ST-A2-2①	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

7-4-3-1. Navigating between setting item screens (from S-B-2① through to ST-B2-1)

Figure 14 shows how to navigate between setting item screens (from S-B-2①to ST-B2-1). See Table 9 for items that are actually displayed on the screen.
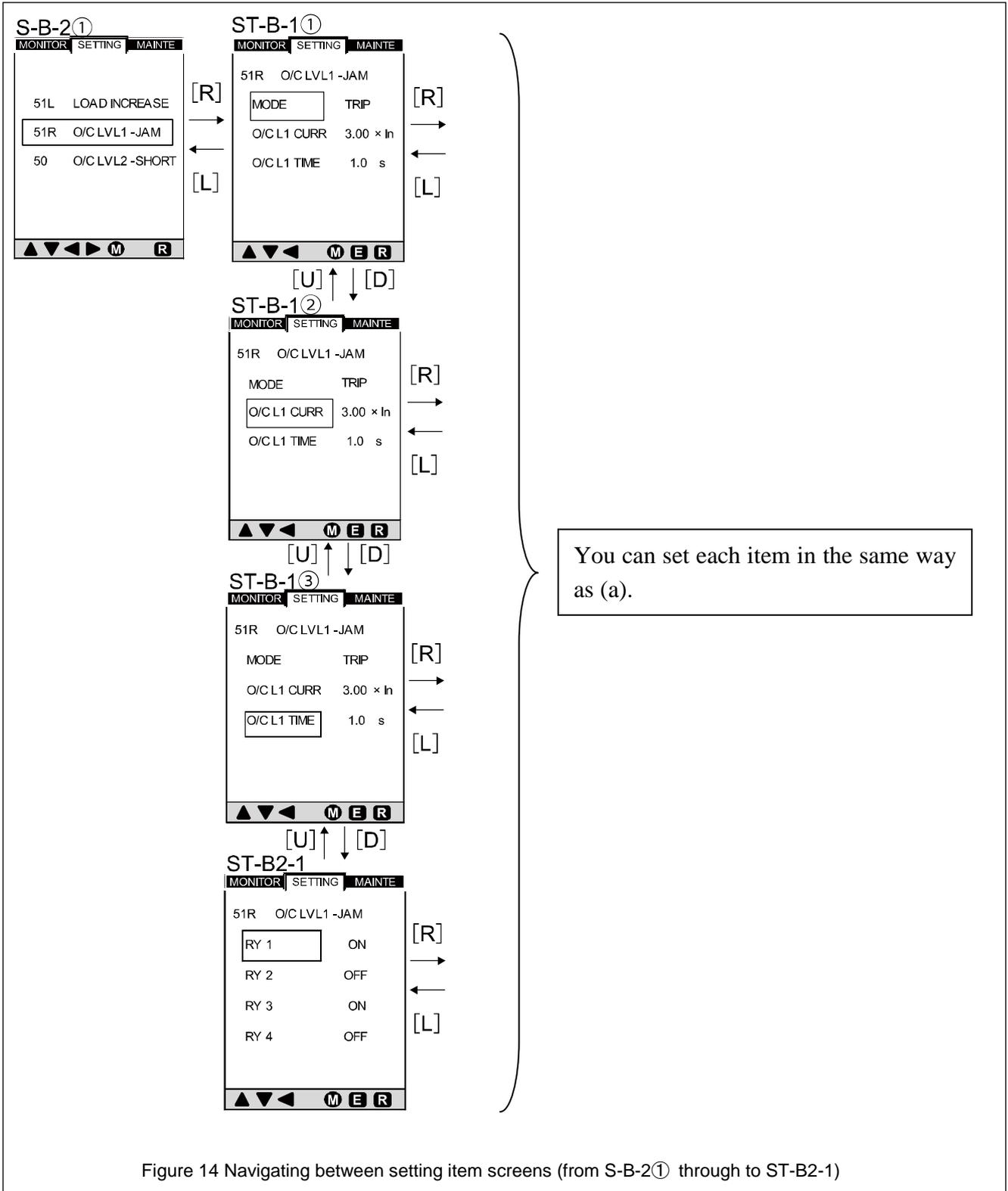

You can set each item in the same way as (a).

Figure 14 Navigating between setting item screens (from S-B-2① through to ST-B2-1)

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Table 9 Setting items and display details of setting item screens (S-B-2① to ST-B2-1) (overload protection setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-B-2①	Setting item switching		-	-	This screen is displayed when you press the [D] arrow button once at the S-B-2 screen (shown on page 25).
ST-B-1①	MODE	Mode setting	TRIP/ALARM/OFF		At the ST-B-1① or ST-B-1② screen, use the [U] or [D] arrow button to select the item to be set, press the [R] arrow button, and then use the [U] or [D] arrow button to set numerical values.
ST-B-1②	O/C L1 CURR	Trip pickup current value setting	-	(1.00-5.00)xIn	
ST-B-1③	O/C L1 TIME	Activation time limit setting	-	(0.5-10.0)s	The procedure is the same as that described on page 20.
ST-B2-1	External output setting item selection/setting		-	-	Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

7-4-3-2. Navigating between setting item screens (from S-B-2② through to ST-C2-1)

Figure 15 shows how to navigate between setting item screens (from S-B-2②through to ST-C2-1). See Table 10 for items that are actually displayed on the screen.
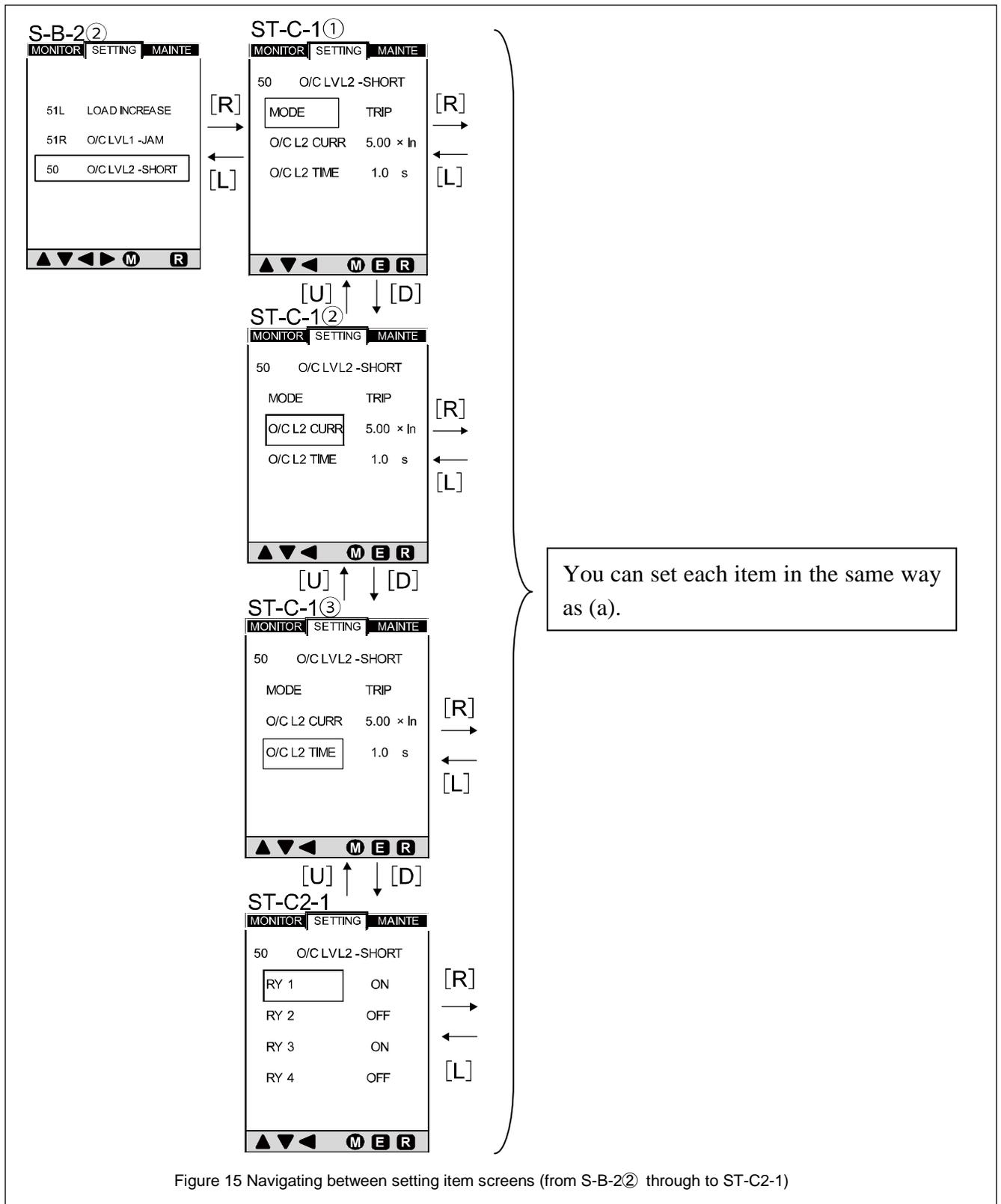

Figure 15 Navigating between setting item screens (from S-B-2② through to ST-C2-1)

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Table 10 Setting items and display details of setting item screens (S-B-2② to ST-C2-1) (short-circuit protection setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-B-2②	Setting item switching		-	-	This screen is displayed when you press the [D] arrow button twice at the S-B-2 screen (shown on page 25).
ST-C-1①	MODE	Mode setting	TRIP/ALARM/OFF	-	At the ST-C-1① or ST-C-1② screen, use the [U] or [D] arrow button to select the item to be set, press the [R] arrow button, and then use the [U] or [D] arrow button to set numerical values. The procedure is the same as that described on page 20.
ST-C-1②	O/C L2 CURR	Trip pickup current value setting	-	(4.00-12.00) x In	
ST-C-1③	O/C L2 TIME	Activation time limit setting	-	(0.0-4.0)s	
ST-C2-1	External output setting item selection/setting		-	-	Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

7-4-3-3. Navigating between setting item screens (from S-C-1 through to ST-L-1)

Figures 16 shows how to navigate between setup item screens (from S-C-1 through to ST-F2-1). See Table 11 for items that are actually displayed on the screen.
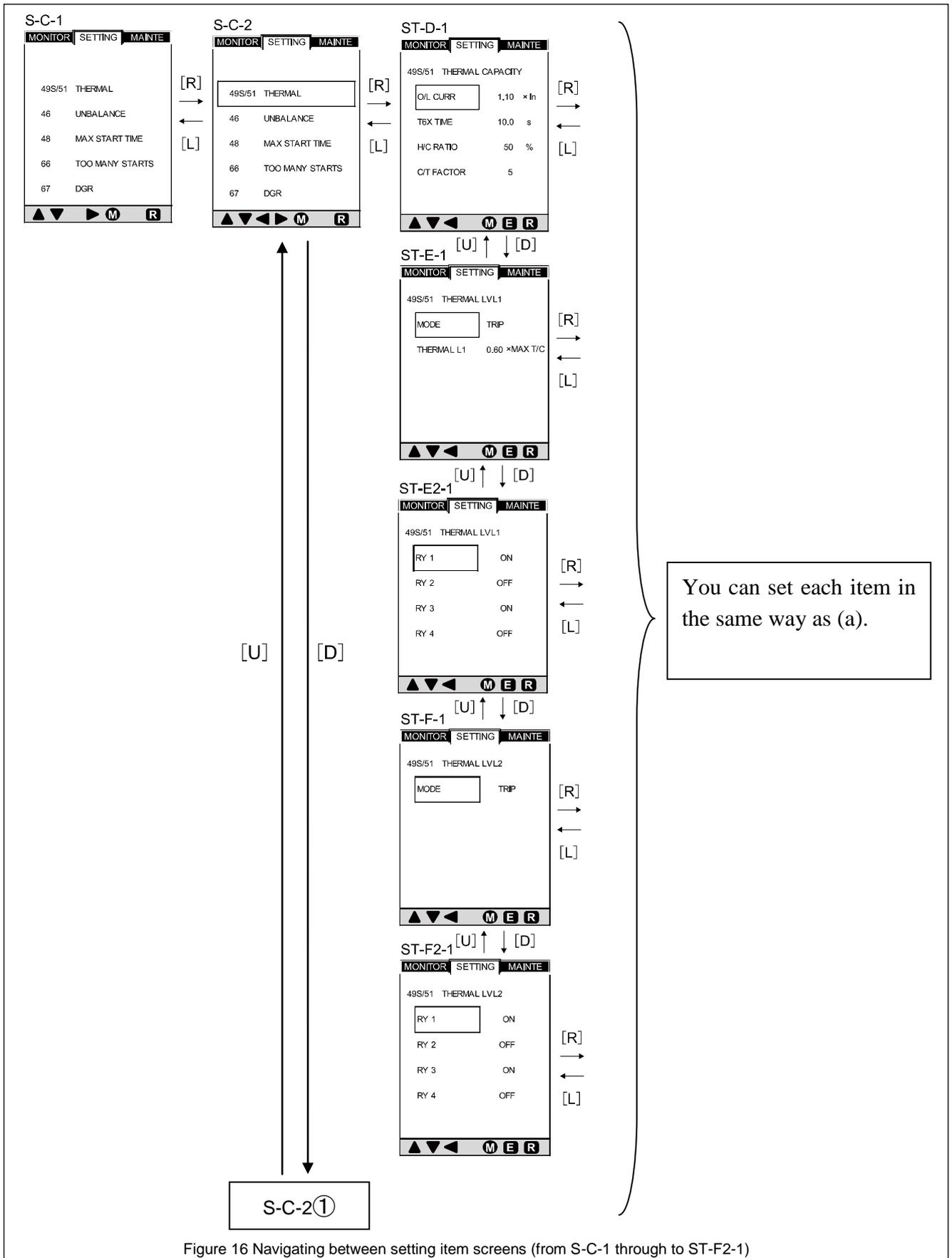

Figure 16 Navigating between setting item screens (from S-C-1 through to ST-F2-1)

Table 11 Setting items and display details of setting item screens (S-C-1 to ST-F2-1) (OVERLOAD PICKUP setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-C-1	Initial display of setting mode		-	-	See page 18.
S-C-2	Setting item selection switching		-	-	Use the [U] or [D] arrow button to switch the item to be set.
ST-D-1	O/L CURR	Trip pickup current value setting	-	(1.00-1.30) x In	At the ST-D-1 screen, use the [U] or [D] arrow button to select the item to be set, press the [R] arrow button, and then use the [U] or [D] arrow button to set numerical values. The procedure is the same as that described on page 20.
	T6X TIME	Trip activation time setting	-	(0.5-120.0)s	
	H/C RATIO	Motor heat capacity ratio	-	(0.20-1.00) x (Motor heat capacity)	
	C/T FACTOR	Motor time constant ratio	-	1-15	
ST-E-1	MODE	Mode setting	TRIP/ALARM/OFF	-	This screen is displayed when you press the [D] arrow button with "C/T FACTOR" selected on the ST-D-1 screen. Use the [U] or [D] arrow button to select the item to be set, press the [R] arrow button, and then use the [U] or [D] arrow button to set a mode or numerical value. The procedure is the same as that described on page 20.
	THERMAL L1	Heat capacity setting	-	(0.50-0.99)x (Motor heat capacity)	
ST-E2-1	External output setting item selection/setting		-	-	Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.
ST-F-1	MODE	Mode setting	-	TRIP/ALARM/OFF	This screen is displayed when you press the [D] arrow button with "RY4" selected on the ST-E2-1 screen. You can use the [U] or [D] arrow button to select a desired mode.
ST-F2-1	External output setting item selection/setting		-	--	Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

Figure 16-1 shows how to navigate between setting item screens (from S-C-2①through to ST-H2-1). See Table 11-1 for items that are actually displayed on the screen.
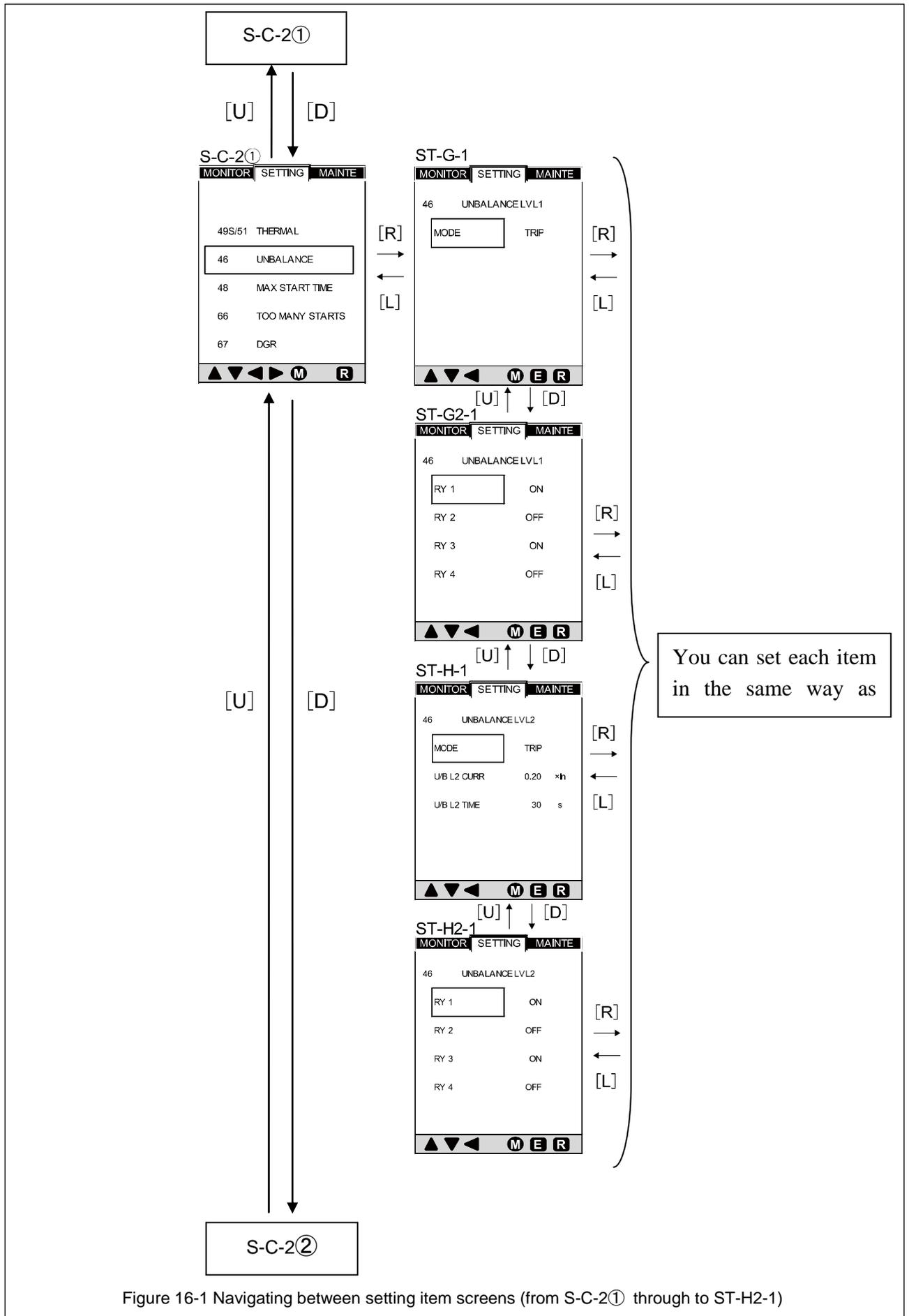

Figure 16-1 Navigating between setting item screens (from S-C-2① through to ST-H2-1)

Table 11-1 Setting items and display details of setting item screens (S-C-2① to ST-H2-1)
(unbalanced current protection setting)

External output setting screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-C-2①	Setting item selection switching		-	-	This screen is displayed when you press the [D] arrow button once at the S-C-2 screen (shown on page 31).
ST-G-1	MODE	Unbalanced current protection setting (LVL1) mode setting	TRIP/ALARM/OFF	-	This screen allows you to select a desired mode by using the [U] or [D] arrow button after pressing the [R] arrow button once.
ST-G2-1	Unbalanced current protection setting (LVL1) External output setting item selection/setting		-	-	Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.
ST-H-1	Unbalanced current protection setting (LVL2) Mode/current value/operating time setting		-	-	This screen is displayed when you press the [D] arrow button with "RY4" selected on the ST-G2-1 screen. The figure on the previous page shows the state in which trip pickup current value setting (U/B L2 CURR) is selected. You can use the [U] or [D] arrow button to select other items.
	MODE	Unbalanced current protection setting (LVL2) mode setting	TRIP/ALARM/OFF	-	You can use the [U] or [D] arrow button to select a desired mode.
	U/B L2 CURR	Trip pickup current value setting	-	(0.20-0.40)xIn	Use the [U] or [D] arrow button to increment or decrement the value to be set.
	U/B L2 TIME	Operating time setting	-	(5-30)s	Use the [U] or [D] arrow button to increment or decrement the value to be set.
ST-H2-1	Unbalanced current protection setting (LVL2) External output setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "U/B L2 TIME" selected on the ST-H-1 screen. Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

Figure 16-2 shows how to navigate between setting item screens (from S-C-2② through to ST-J2-1). See Tables 11-2 and 11-3 for items that are actually displayed on the screen.
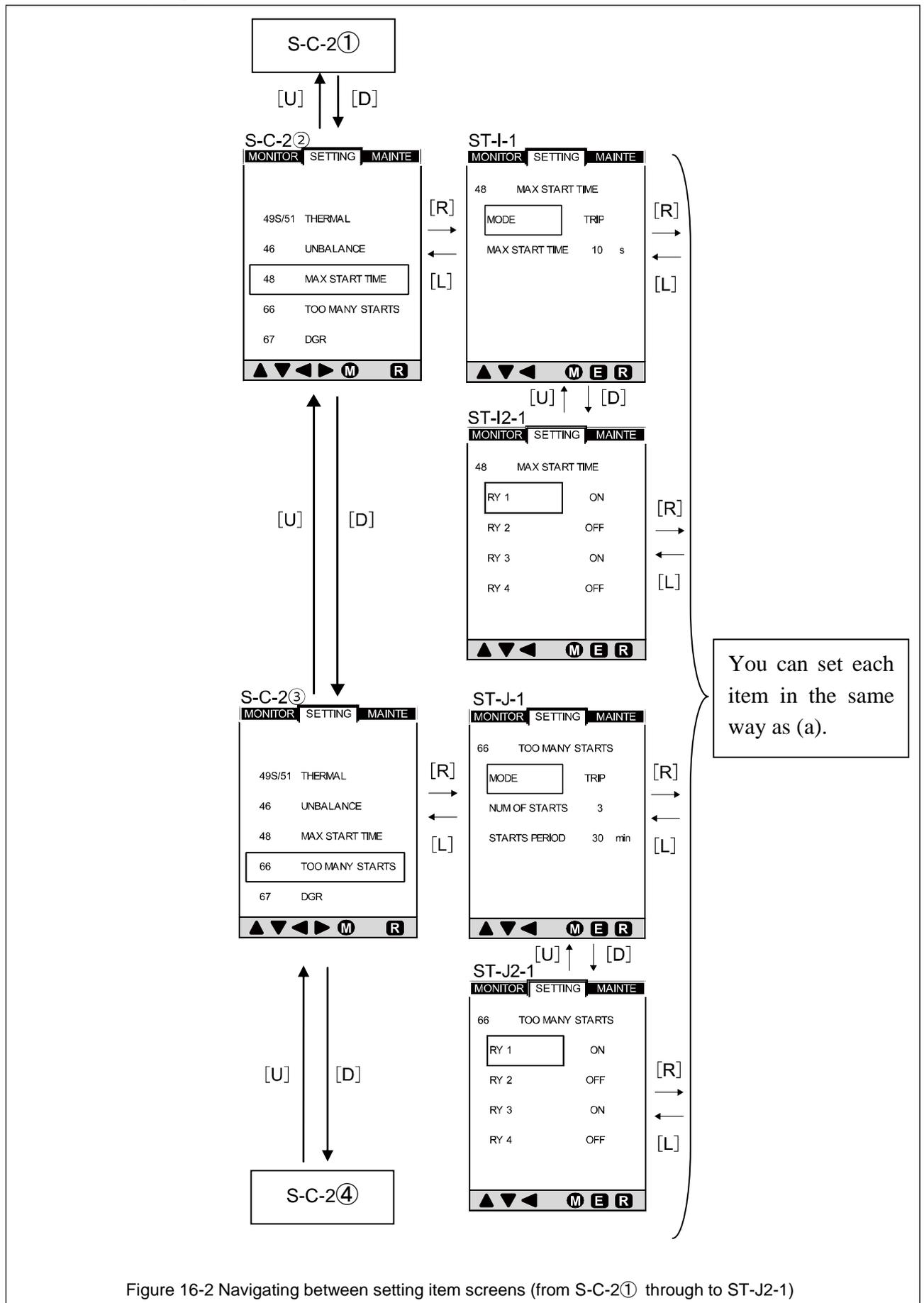

Figure 16-2 Navigating between setting item screens (from S-C-2① through to ST-J2-1)

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Table 11-2 Setting items and display details of setting item screens (S-C-2① to ST-I2-1)
(motor startup time monitor setting)

External output setting screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-C-2②	Setting item selection switching		-	-	This screen is displayed when you press the [D] arrow button once at the S-C-2① screen (shown on page 33).
ST-I-1	Setting item selection switching		-	-	The figure on the previous page shows the state in which startup time setting (MAX START TIME) is selected. You can use the [U] or [D] arrow button to select a desired setting item.
	MODE	Maximum motor startup time detection mode setting	TRIP/ALARM/ OFF	-	You can select one of the modes shown to the left by pressing the [U] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
	MAX START TIME	Motor startup time detection setting	-	(1-250)s	This setting item specifies the length of startup time at which operation is output. You can set startup time by pressing the [U] arrow button once at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
ST-I2-1	Maximum motor startup time detection External output setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "MAX START TIME" selected on the ST-I-1 screen. Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

Table 11-3 Setting items and display details of setting item screens (S-C-2③ to ST-J2-1)
(motor startup count monitor setting)

External output setting screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-C-2③	Setting item selection switching		-	-	This screen is displayed when you press the [D] arrow button once at the S-C-2② screen (shown on page 35).
ST-J-1	Setting item selection switching		-	-	The figure on the previous page shows the state in which startup time setting (MAX START TIME) is selected. You can use the [U] or [D] arrow button to select a desired setting item.
	MODE	Motor startup count detection mode setting	TRIP/ALARM/ OFF	-	You can select one of the modes shown to the left by pressing the [U] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
	NUM OF START	Motor startup count detection setting	-	(1-10)	This setting item specifies the motor startup count at which operation is output. You can set startup count by pressing the [U] arrow button once at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	STARTS PERIOD	Motor startup count detection time setting	-	(1-60)min	This setting item specifies the time during which the number of motor startups is counted. You can select this setting item by pressing the [D] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
ST-J2-1	Motor startup count detection External output setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "STARTS PERIOD" selected on the ST-J-1 screen. Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

Figure 16-4 shows how to navigate between setting item screens (from S-C-2④through to ST-L-1). See Table 11-4 for items that are actually displayed on the screen.
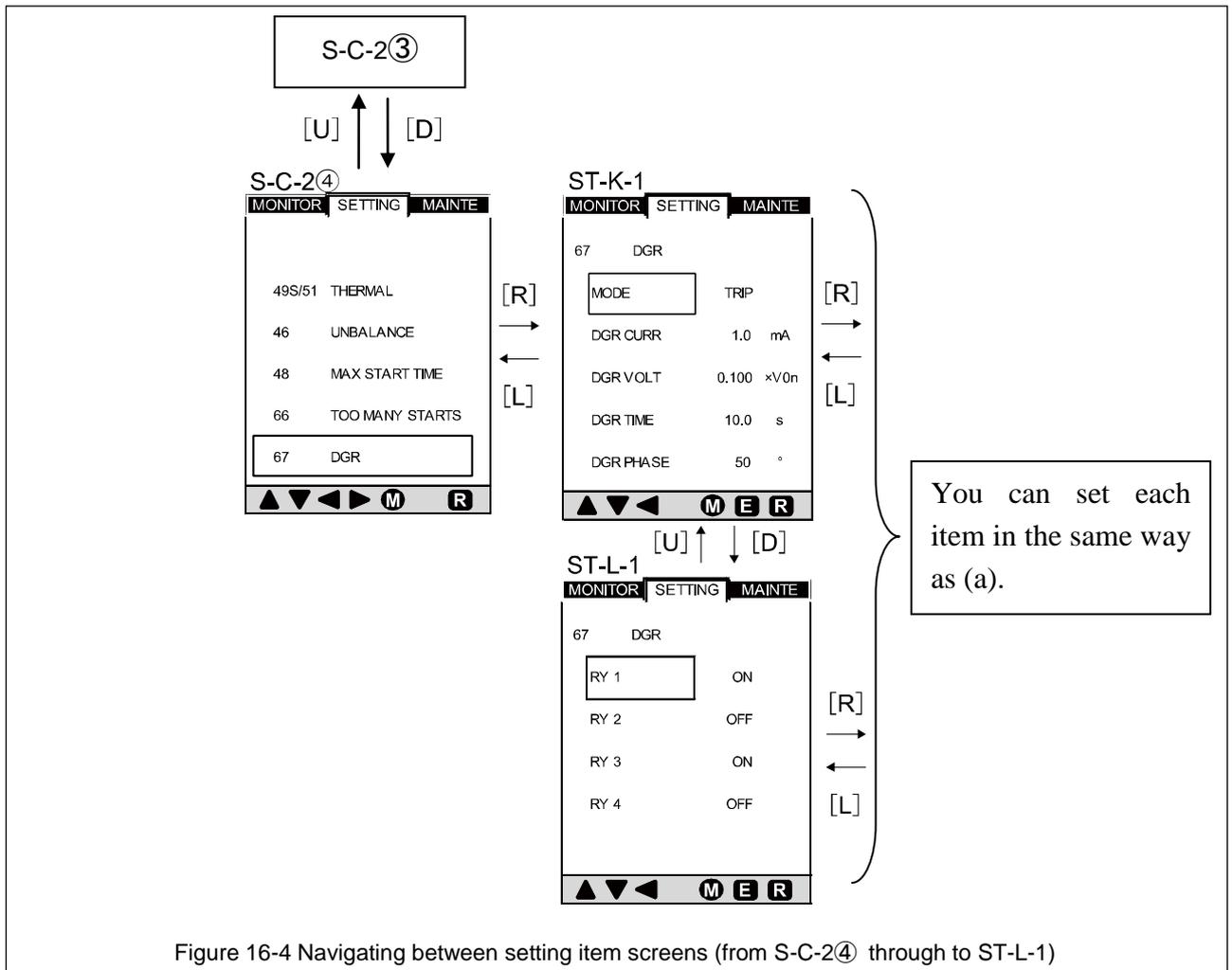

Figure 16-4 Navigating between setting item screens (from S-C-2④ through to ST-L-1)

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Table 11-4 Setting items and display details of setting item screens (S-C-2④ to ST-L-1) (ground fault protection setting)

External output setting screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-C-2④	Setting item selection switching		-	-	This screen is displayed when you press the [D] arrow button once at the S-C-2③ screen (shown on page 35).
ST-K-1	Ground fault protection setting item selection/setting		-	-	The figure on the previous page shows the state in which ground fault current setting (DGR CURR) is selected. You can use the [U] or [D] arrow button to select a desired setting item.
	MODE	Ground fault protection mode setting	TRIP/ALARM/OFF	-	You can select one of the modes shown to the left by pressing the [U] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
	DGR CURR	Ground fault current setting	-	(1.0-10.0)mA	This setting item specifies the ground fault current value at which operation is output. You can select this setting item by pressing the [R] arrow button once at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	DGR VOLT	Ground fault voltage setting	-	(0.050-0.150) x V0n	This setting item specifies the ground fault voltage value at which operation is output. You can select this setting item by pressing the [D] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	DGR TIME	Ground fault detection time setting	-	(0.1-10.0)s	This setting item specifies the length of time during which ground fault must be detected. You can select this setting item by pressing the [D] arrow button twice and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	DGR PHASE	Phase difference setting	-	(0-90)deg/OFF	This setting item specifies the phase difference between current and voltage that is detected as a ground fault. You can select this setting item by pressing the [D] arrow button three times and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
ST-L-1	Ground fault protection output setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "DGR PHASE" selected on the ST-K-1 screen. Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

7-4-3-4. Navigating between setting item screens (from S-D-1 through to ST-W-1)

Figure 17 shows how to navigate between setting item screens (from S-D-1 through to ST-N2-1). See Table 12 for items that are actually displayed on the screen.
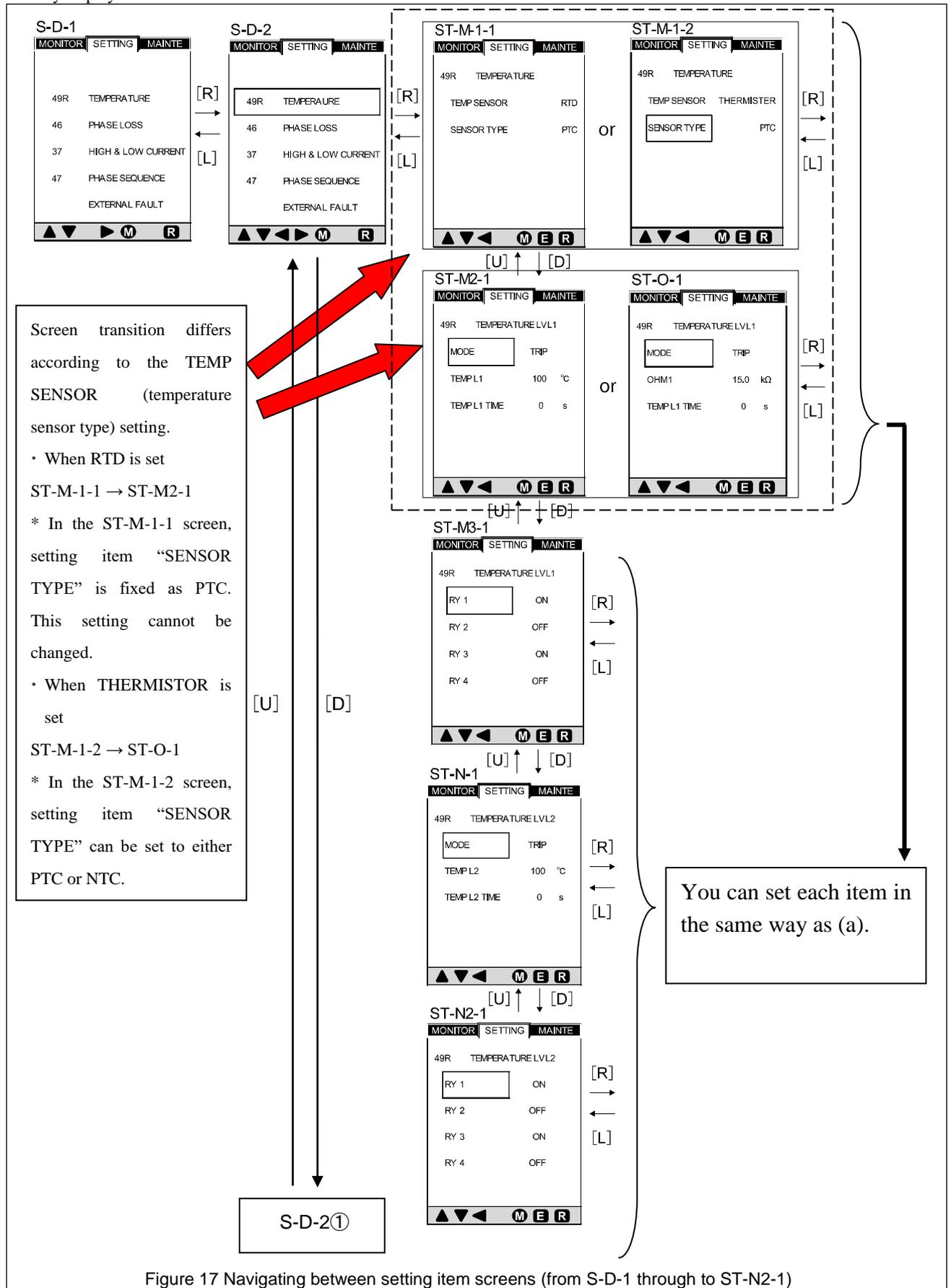

Screen transition differs according to the TEMP SENSOR (temperature sensor type) setting.
・When RTD is set
ST-M-1-1 → ST-M2-1
* In the ST-M-1-1 screen, setting item "SENSOR TYPE" is fixed as PTC. This setting cannot be changed.
・When THERMISTOR is set
ST-M-1-2 → ST-O-1
* In the ST-M-1-2 screen, setting item "SENSOR TYPE" can be set to either PTC or NTC.

You can set each item in the same way as (a).

Figure 17 Navigating between setting item screens (from S-D-1 through to ST-N2-1)

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Table 12 Setting items and display details of setting item screens (S-D-1 to ST-N2-1) (temperature detection setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-D-1	Initial display of setting mode		-	-	See page 25.
ST-D-2	Setting item selection switching		-	-	This screen is displayed when you press the [D] arrow button once at the S-D-1 screen (shown on page 25). Use the [U] or [D] arrow button to select a desired setting item.
ST-M-1	Temperature detection setting item selection/setting		-	-	The figure on the previous page shows the state in which temperature sensor type setting (TEMP SENSOR) is selected. You can use the [U] or [D] arrow button to select a desired setting item.
ST-M-1-1 ST-M-1-2	SENSOR TYPE	Temperature sensor characteristic setting	NTC/PTC	-	The screen differs according to the temperature sensor type. The ST-M-1-1 screen is displayed when the temperature sensor type is "RTD" and the ST-M-1-2 screen is displayed when the temperature sensor type is "THERMISTOR". When the temperature sensor type is "RTD", the "PTC" setting is fixed and cannot be changed.
ST-M2-1 ST-O-1	Temperature level 1 setting item selection/setting		-	-	The screen differs according to the temperature sensor type. The ST-M2-1 screen is displayed when the temperature sensor type is "RTD" and the ST-O-1 screen is displayed when the temperature sensor type is "THERMISTOR".
	MODE	Temperature level 1 mode setting	TRIP/ALARM/OFF	-	You can select one of the modes shown to the left by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
ST-M2-1	TEMPL1	Temperature level 1 detection temperature setting	-	(0-250)°C (When the temperature sensor type is "RTD")	You can select this setting by pressing the [D] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
ST-O-1	OHM1		-	(0.1-30.0) kΩ (When the temperature sensor type is "THERMISTOR")	
ST-M2-1 ST-O-1	TEMPL1 TIME	Temperature level 1 temperature detection time setting	-	(0-60)s	This setting item specifies the length of time during which temperature must be detected. You can select this setting item by pressing the [D] arrow button twice and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	Temperature level 1 output setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "TEMPL1 TIME" selected on the ST-M2-1 or ST-O-1 screen. Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
ST-M3-1	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.
ST-N-1	Temperature level 2 setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "RY4" selected on the ST-M3-1 screen. This screen on the previous page is displayed when the temperature sensor type is "RTD". When the temperature sensor type is "THERMISTOR", "OHM2" (unit: kΩ) is displayed as the detection temperature setting item.
	MODE	Temperature level 2 mode setting	TRIP/ALARM/OFF	-	You can select one of the modes shown to the left by pressing the [U] arrow button and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
	TEMPL2	Temperature level 2 detection temperature setting	-	(0-250)°C (When "RTD" is selected)	You can select this setting by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	OHM2		-	(0.1-30.0) kΩ (When "THERMISTOR" is selected)	
	TEMPL2 TIME	Temperature level 2 temperature detection time setting	-	(0-60)s	This setting item specifies the length of time during which temperature must be detected. You can select this setting item by pressing the [D] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	Temperature level 2 output setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "TEMPL2 TIME" selected on the ST-N-1 screen. Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
ST-N2-1	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

Figure 17-1 shows how to navigate between setting item screens (from S-D-2① through to ST-S-1). See Tables 12-1 and 12-2 for items that are actually displayed on the screen.
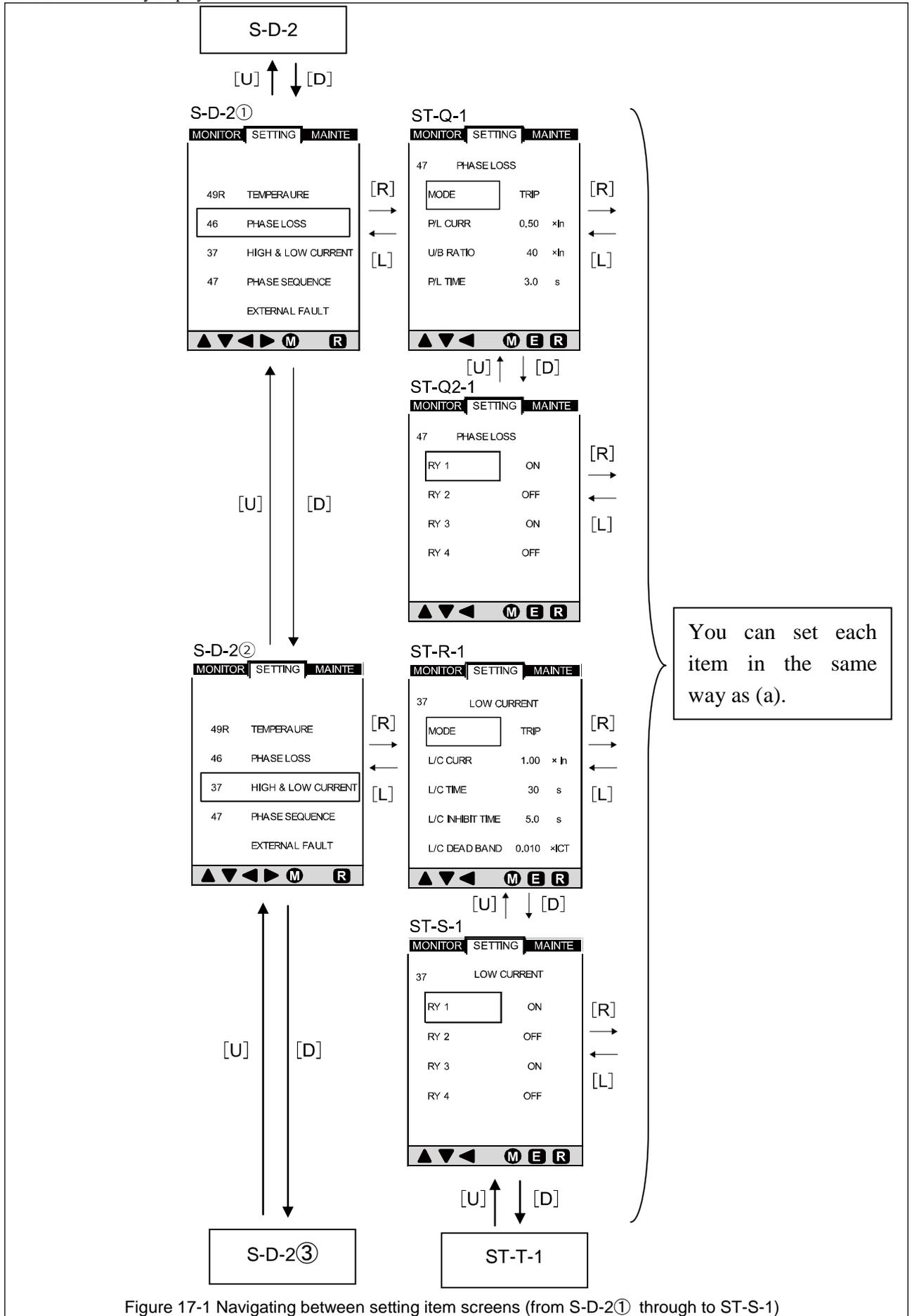

Figure 17-1 Navigating between setting item screens (from S-D-2① through to ST-S-1)

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Table 12-1 Setting items and display details of setting item screens (S-D-2① to ST-Q2-1)
(open-phase protection setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
ST-D-2①	Setting item selection switching		-	-	This screen is displayed when you press the [D] arrow button once at the S-D-2 screen (shown on page 39). Use the [U] or [D] arrow button to select a desired setting item.
ST-Q-1	Open-phase protection setting item selection/setting		-	-	The figure on the previous page shows the state in which open-phase protection mode setting (MODE) is selected. You can use the [U] or [D] arrow button to select a desired setting item.
	MODE	Open-phase protection mode setting	TRIP/ALARM/OFF	-	You can select one of the modes shown to the left by pressing the [U] arrow button three times and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
	P/L CURR	Open-phase current setting	-	$0.50 \times \ln$	This value is fixed.
	U/B RATIO	Current unbalance factor setting	-	(0.30-0.65) x In	This setting item specifies the current unbalance factor at which operation is output. You can select this setting item by pressing the [U] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	P/L TIME	Open-phase detection time setting	-	(0.5-5.0)s	This setting item specifies the length of time during which open-phase must be detected. You can select this setting item by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
ST-Q2-1	Open-phase protection output setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "P/L TIME" selected on the ST-Q-1 screen. Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

Table 12-2 Setting items and display details of setting item screens (S-D-2② to ST-S-1)
(undercurrent protection setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
ST-D-2②	Setting item selection switching		-	-	This screen is displayed when you press the [D] arrow button once at the ST-D-2① screen (shown on page 41). Use the [U] or [D] arrow button to select a desired setting item.
ST-R-1	Undercurrent protection setting item selection/setting		-	-	The figure on the previous page shows the state in which the undercurrent setting (L/C CURR) in this screen is set to 1.00. You can use the [U] or [D] arrow button to select a desired setting item.
	MODE	Undercurrent protection mode setting	TRIP/ALARM/OFF	-	You can select one of the modes shown to the left by pressing the [U] arrow button three times and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
	L/C CURR (LOW CURRENT)	Undercurrent setting	-	(0.20-0.90) xIn	This setting item specifies the undercurrent value at which operation is output. You can select this setting item by pressing the [R] arrow button once at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	L/C TIME	Undercurrent detection time setting	-	(0.5,1-60)s	This setting item specifies the length of time during which undercurrent must be detected. You can select this setting item by pressing the [U] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	L/C INHIBIT TIME	Undercurrent detection disabled time setting	-	(0.0-30.0)s	You can select this setting item by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	L/C DEAD BAND		-	(0.005-0.050) xIct	You can select this setting item by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
ST-S-1	Undercurrent protection output setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "L/C DEAD BAND" selected on the ST-R-1 screen. Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

Figure 17-2 shows how to navigate between setting item screens (from S-D-2④ through to ST-X2-1). See Table 12-3 for items that are actually displayed on the screen.
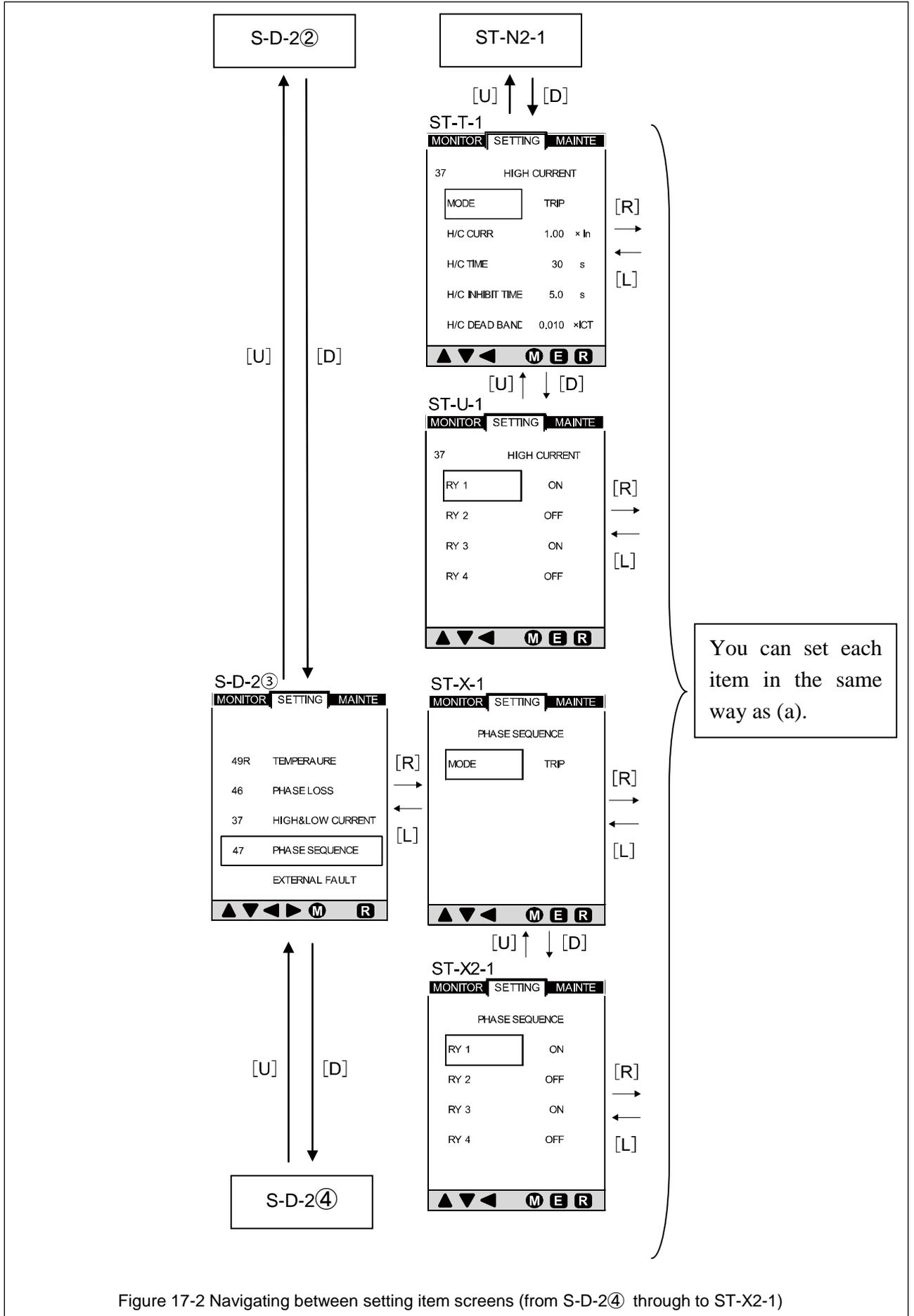

Figure 17-2 Navigating between setting item screens (from S-D-2④ through to ST-X2-1)

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Table 12-3 Setting items and display details of setting item screens (ST-T-1 to ST-U-1) (undercurrent protection setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
ST-T-1	Current protection setting item selection/setting		-	-	The figure on the previous page shows the state in which current value setting (H/C CURR) is selected. You can use the [U] or [D] arrow button to select a desired setting item.
	MODE	Current protection mode setting	TRIP/ALARM/OFF	-	You can select one of the modes shown to the left by pressing the [U] arrow button three times and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
	H/C CURR(HIGH CURRENT)	Current value setting	-	(0.20-1.50) x In	This setting item specifies the undercurrent value at which operation is output. You can select this setting item by pressing the [R] arrow button once at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	H/C TIME	Current detection time setting 2	-	(0.5,1-60)s	This setting item specifies the length of time during which undercurrent must be detected. You can select this setting item by pressing the [D] arrow button once and then the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	H/C INHIBIT TIME	Current detection disabled time setting 2	-	(0.0-30.0)s	You can select this setting item by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
	H/C DEAD BAND		-	(0.005-0.050) xIct	You can select this setting item by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to increment or decrement the value to be set.
ST-U-1	Undercurrent protection output setting item selection/setting		-	-	This screen is displayed when you press the [D] arrow button with "H/C DEAD BAND" selected on the ST-T-1 screen. Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

Table 12-4 Setting items and display details of setting item screens (S-D-2③ to ST-X2-1) (open-phase protection setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
ST-D-2③	Setting item selection switching		-	-	This screen is displayed when you press the [D] arrow button once at the S-D-2② screen (shown on page 41). Use the [U] or [D] arrow button to select a desired setting item.
ST-X-1	MODE	Open-phase protection mode setting	TRIP/ALARM/OFF	-	You can select one of the modes shown to the left by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
ST-X2-1	Open-phase protection output setting item selection/setting		-	-	Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

Figure 17-3 shows how to navigate between setting item screens (from S-D-2④ through to ST-W-1). See Table 12-5 for items that are actually displayed on the screen.
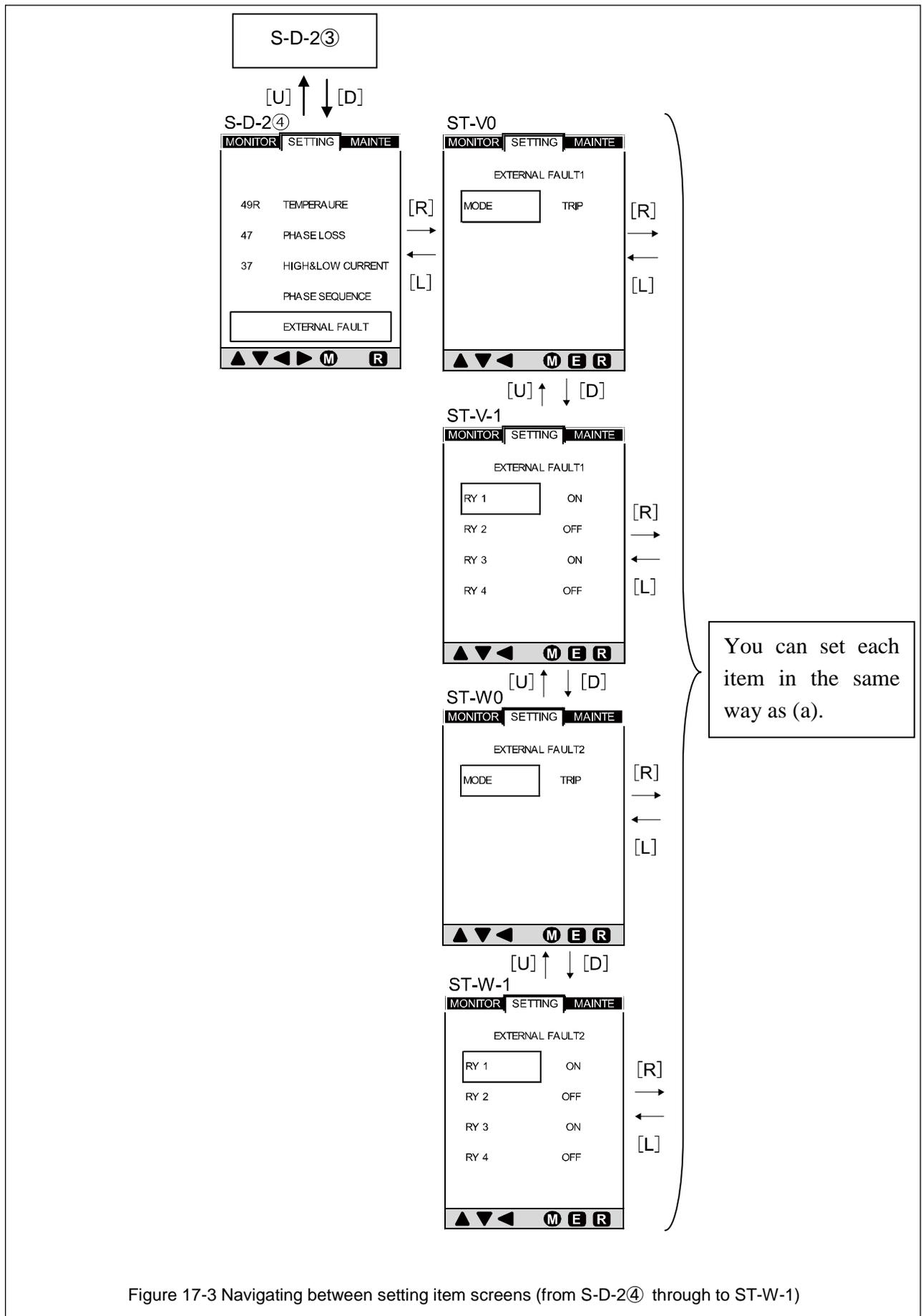

Figure 17-3 Navigating between setting item screens (from S-D-2④ through to ST-W-1)

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Table 12-5 Setting items and display details of setting item screens (S-D-2④ to ST-W-1)
(external anomaly protection setting)

Screen number	Setting items and display details		Selection	Setting range	Remarks
	Display	Item			
S-D-2④	Setting item selection switching		-	-	This screen is displayed when you press the [D] arrow button once at the S-D-2③ screen (shown on page 43). Use the [U] or [D] arrow button to select a desired setting item.
ST-V0	MODE	External anomaly protection 1 mode setting	TRIP/ALARM/OFF	-	You can select one of the modes shown to the left by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
ST-V-1	External anomaly protection 1 output setting item selection/setting		-	-	Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.
ST-W0	MODE	External anomaly protection 2 mode setting	TRIP/ALARM/OFF	-	This screen is displayed when you press the [D] arrow button with "RY4" selected on the ST-V-1 screen. You can select one of the modes shown to the left by pressing the [R] arrow button at this screen. Use the [U] or [D] arrow button to switch the mode to be set.
ST-W-1	External anomaly protection 2 output setting item selection/setting		-	-	Use the [U] or [D] arrow button to select the item to be set, and press the [R] arrow button and then change the output settings. The setting procedure is the same as that described on page 20.
	RY1	External output setting	ON/OFF	-	This setting item specifies whether to output to terminal number 1.
	RY2		ON/OFF	-	This setting item specifies whether to output to terminal number 4.
	RY3		ON/OFF	-	This setting item specifies whether to output to terminal number 7.
	RY4		ON/OFF	-	This setting item specifies whether to output to terminal number 10.

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7-5. Navigating between Maintenance Item Screens (from MA-A-1 through to MA-I-2)

Figure 18 shows how to navigate between maintenance item screens (from MA-A-1 through to MA-E-1). See Tables 13 and 13-1 for items that are actually displayed on the screen.
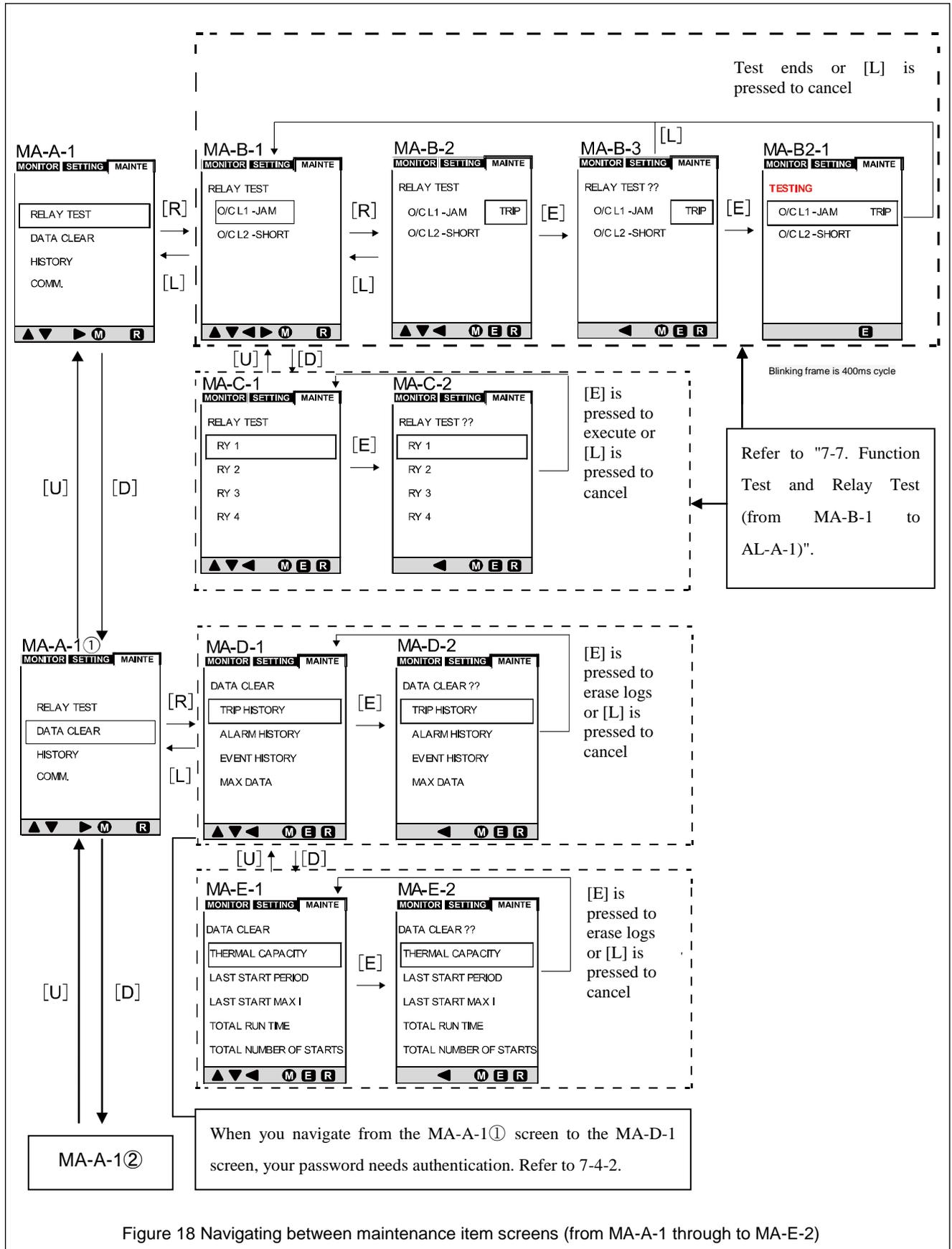

Figure 18 Navigating between maintenance item screens (from MA-A-1 through to MA-E-2)

Table 13 Setting items and display details of maintenance item screens (MA-A-1 to MA-C-2)

Screen number	Setting items and display details		Selection	Setting range	Remarks
MA-A-1	Maintenance items		-	-	See page 15. The figure on the previous page shows the state in which the relay activation test item (RELAY TEST) is selected.
MA-B-1	Protective function activation test item selection				This screen allows you to conduct an activation test for the motor winding temperature protection, overload protection, or short-circuit protection function. Use the [U] or [D] arrow button to switch the item to be selected.
	THERMAL	Motor winding temperature protection activation	-	-	
	O/CL1-JAM	Overload protection activation	-	-	
	O/CL2-SHORT	Short-circuit protection activation	-	-	
MA-B-2	Relay activation setting		TRIP/ NON TRIP	-	The figure on the previous page shows the state in which the relay activation setting item (RELAY TEST) is selected for the motor winding temperature protection function. Use the [U] or [D] arrow button to switch the item to be set. TRIP: When the relay is activated, both relay contact output and the indicator on the operation panel turn on. NON TRIP: When the relay is activated, only the indicator on the operation panel turns on without turning on relay contact output.
MA-B-3	Protective function activation test start check		-	-	This screen is displayed when you press the ENTER button after setting the above item.
MA-B2-1	Protective function activation test start		-	-	This screen is displayed when you press the ENTER button again with the MA-B-3 screen displayed, and a protective function activation test starts. When the test finishes, the display returns to the MA-B-1 screen.
MA-C-1	Relay activation test item selection				This screen allows you to select the relay for which an activation test is to be conducted. (The figure on the previous page shows the state in which Relay 1 (RY 1) is selected.) Use the [U] or [D] arrow button to switch the item to be selected.
	RY1	Relay 1	-	-	
	RY2	Relay 2			
	RY3	Relay 3			
	RY4	Relay 4			
MA-C-2	Relay activation test start check		-	-	This screen is displayed when you press the ENTER button after selecting the relay for which an activation test is to be conducted, in the above screen. Pressing the ENTER button again starts a relay activation test. When the test finishes, the display returns to the MA-C-1 screen.

Table 13-1 Setting items and display details of maintenance item screens (MA-A-1① to MA-D-2)
(historical data clearing)

Screen number	Setting items and display details		Remarks
MA-A-1 ①	Maintenance items		This screen is displayed when you press the [D] arrow button once at the MA-A-1 screen (shown on page 47). The figure on the previous page shows the state in which the historical data clearing item (DATA CLEAR) is selected.
MA-D-1	Historical data clearing item selection		Use the [U] or [D] arrow button to switch the item to be cleared. *1
	TRIP HISTORY	Trip activation history	This setting item clears all trip activation histories up to the present time.
	ALARM HISTORY	Alarm activation history	This setting item clears all alarm activation histories up to the present time.
	EVENT HISTORY	Event occurrence history	This setting item clears all event occurrence histories (trip activation histories, alarm activation histories, reset operation histories, and external input histories) up to the present time.
	MAX DATA	Maximum value record	This setting item clears all max phase current and max starting current values up to the present time
MA-D-2	History clearing start check and history clearing start		This screen is displayed when you press the ENTER button after selecting the history item to be cleared, in the above screen. Pressing the ENTER button again clears the selected data.

*1: When you navigate from the MA-A-1① screen to the MA-D-1 screen, your password needs authentication. Refer to "7-4-2. Navigating between password setting/authentication screens".

Table 13-2 Setting items and display details of maintenance item screens (MA-E-1 to MA-E-2)
(measurement data clearing)

Screen No.	Setting items and display details		Remarks
MA-E-1	Measurement data clearing item selection		
	THERMAL CAPACITY	Motor heat capacity	This setting item clears all motor heat capacity data up to the present time.
	LAST START PERIOD	Startup time	This setting item clears all startup time data up to the present time.
	LAST START MAX I	Starting current	This setting item clears all starting current data up to the present time.
	TOTAL RUN TIME	Operating time	This setting item clears all operating time data up to the present time.
	TOTAL NUMBER OF STARTS	Operation count	This setting item clears all operation count data up to the present time.
MA-E-2	Measurement data clearing start check and measurement data clearing start		This screen is displayed when you press the ENTER button after selecting the measurement data item to be cleared, in the above screen. Pressing the ENTER button again clears the selected data.

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Figure 18-1 shows how to navigate between maintenance item screens (from MA-A-1② to MA-H-41). For items that are actually displayed on the screen, refer to Table 13-3 and "7-8. History and Trip/Alarm Activation Display Screens".
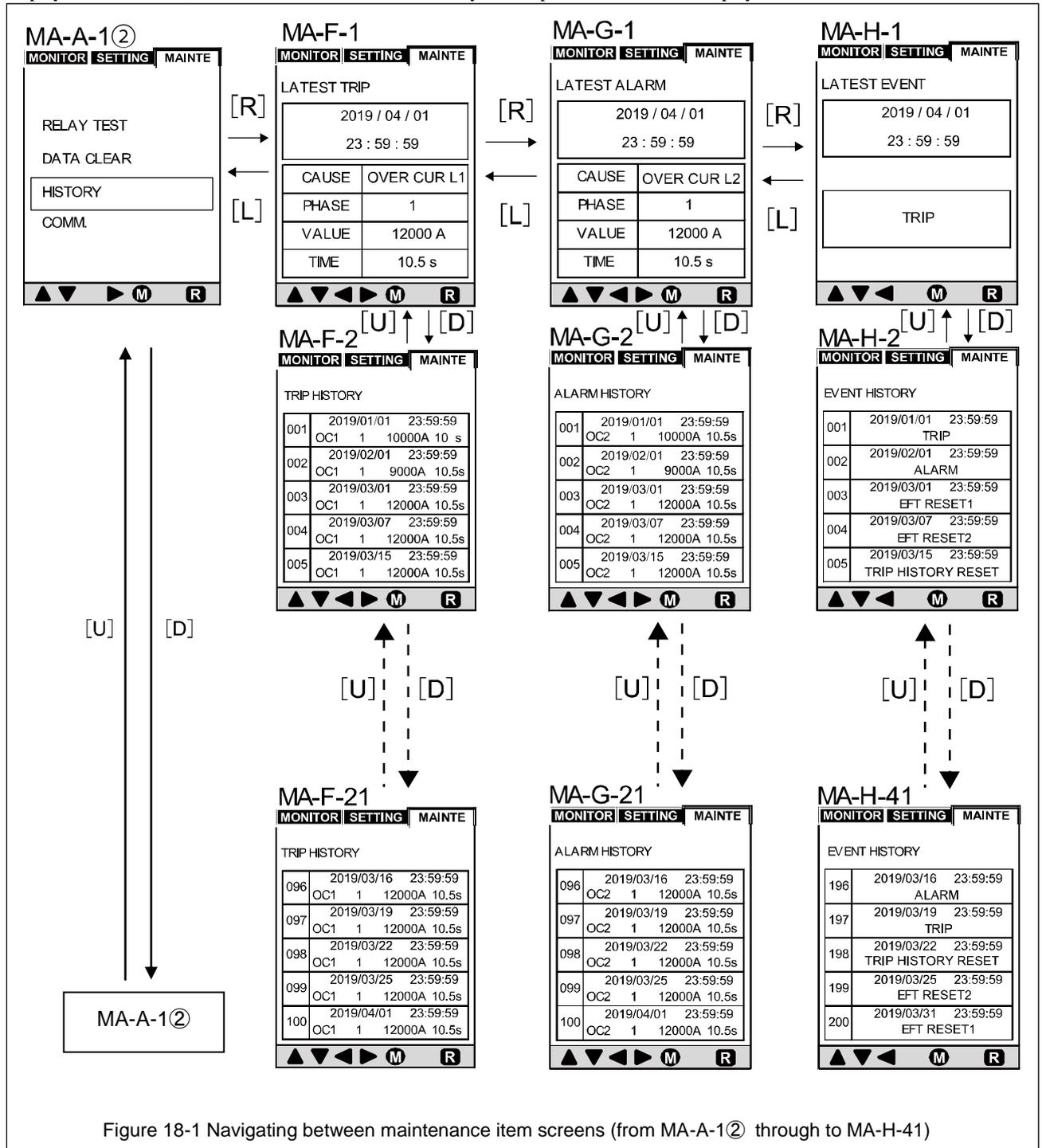

Figure 18-1 Navigating between maintenance item screens (from MA-A-1② through to MA-H-41)

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Table 13-3 Setting items and display details of maintenance item screens (MA-A-1② to MA-H-41) (history display)

Screen No.	Setting items and display details		Remarks
MA-A-1②	Maintenance items		This screen is displayed when you press the [D] arrow button once at the MA-A-1 screen (shown on page 47). The figure on the previous page shows the state in which history display (HISTORY) is selected.
MA-F-1	LATEST TRIP	Trip activation data	This screen displays the occurrence time, cause, phase, concerned value, and operating time for the latest trip activation.
MA-G-1	LATEST ALARM	Alarm activation data	This screen displays the occurrence time, cause, phase, concerned value, and operating time for the latest alarm activation.
MA-H-1	LATEST EVENT	Event occurrence data	This screen displays the occurrence time and description for the latest event that has occurred.
MA-F-2 to MA-F-21	TRIP HISTORY	Trip activation history	This screen displays the occurrence times, causes, phases, concerned values, and operating times for the recorded trip activations (up to 100 events) in chronological order. The screen shown on the previous page displays five histories. Use the [U] or [D] arrow button to switch the histories to be displayed.
MA-G-2 to MA-G-21	ALARM HISTORY	Alarm activation history	This screen displays the occurrence times, causes, phases, concerned values, and operating times for the recorded alarm activations (up to 100 events) in chronological order. The screen shown on the previous page displays five histories. Use the [U] or [D] arrow button to switch the histories to be displayed.
MA-H-2 to MA-H-21	EVENT HISTORY	Event occurrence history	This screen displays the occurrence times, causes, phases, concerned values, and operating times for the recorded events (up to 200 events) in chronological order. The screen shown on the previous page displays five histories. Use the [U] or [D] arrow button to switch the histories to be displayed.

Figure 18-2 shows how to navigate between maintenance item screens (from MA-A-1③ to MA-I-2). See Table 13-4 for items that are actually displayed on the screen. For specifications without communication function, neither "COMM." in the MA-A-1③ screen nor the MA-I-1 and MA-I-2 screens are displayed.
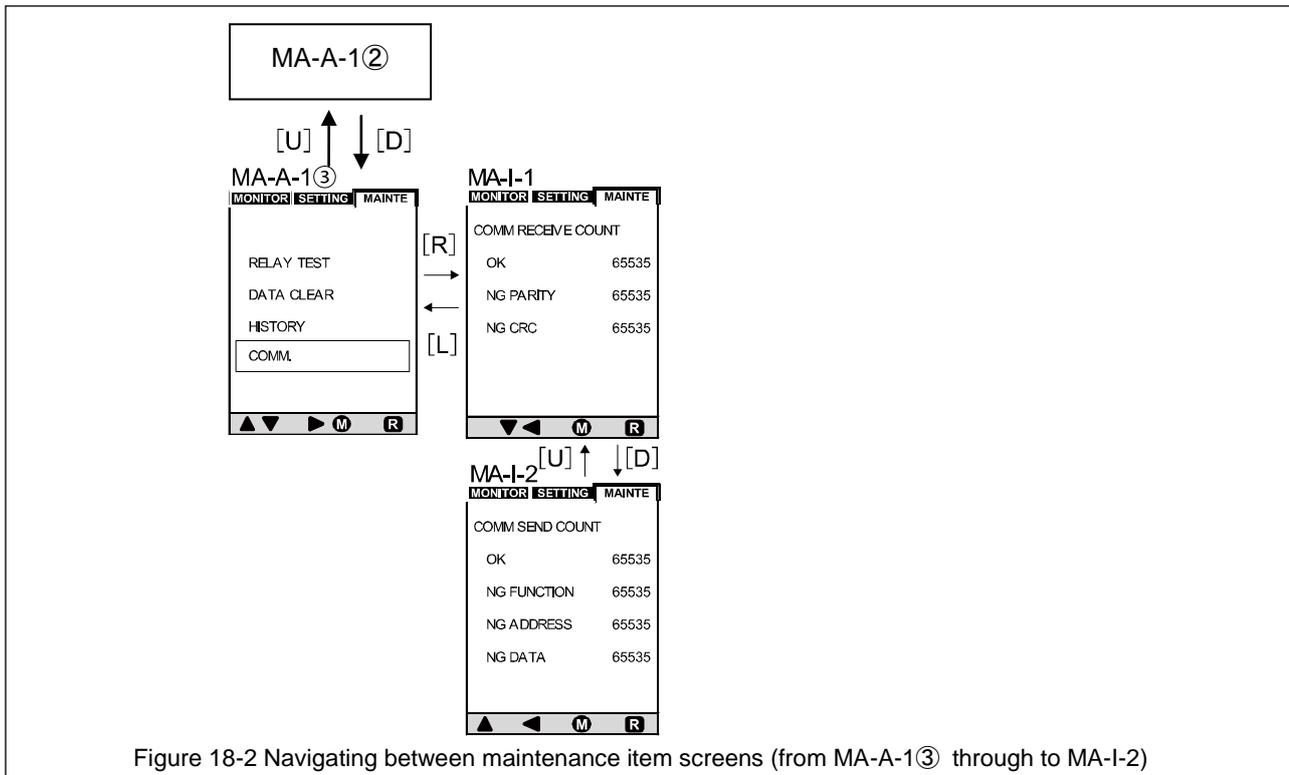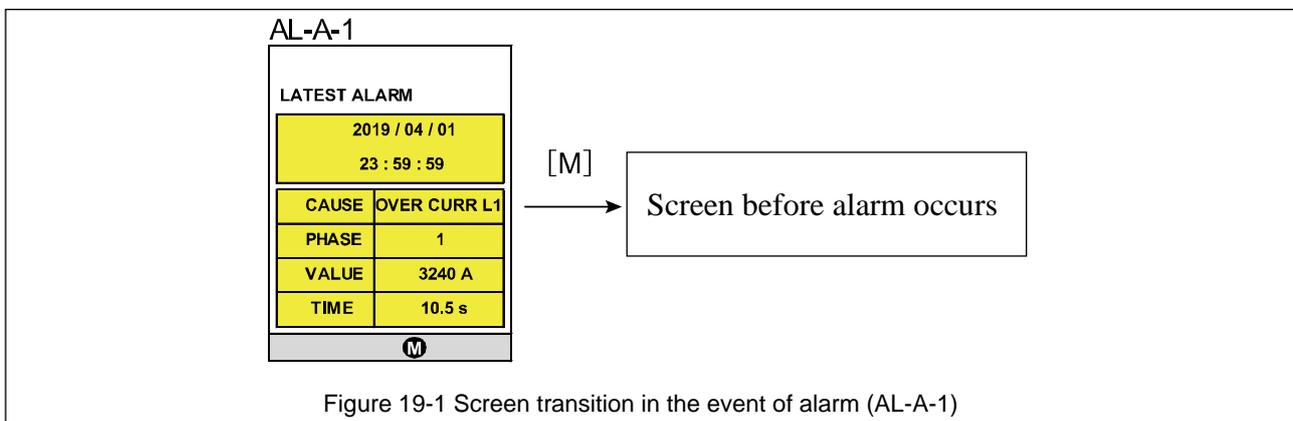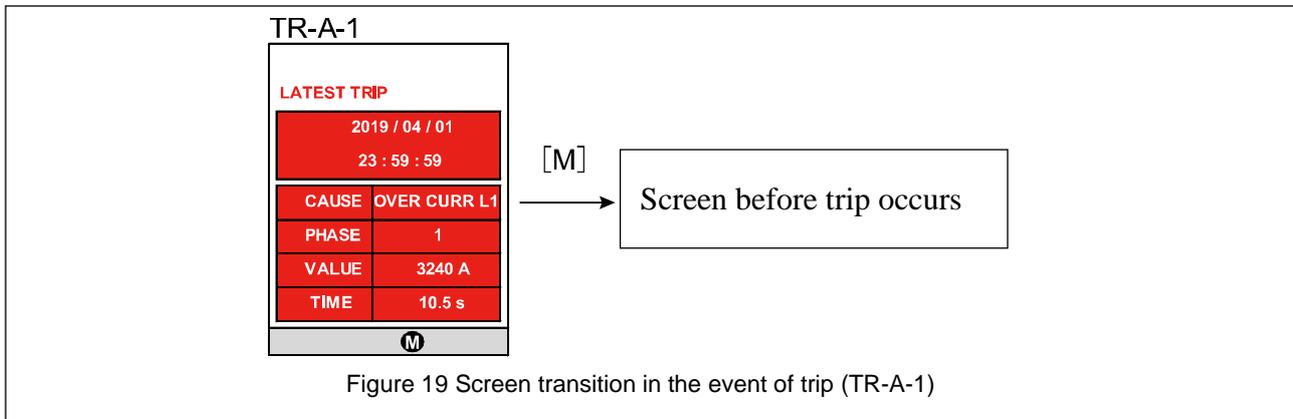

Figure 18-2 Navigating between maintenance item screens (from MA-A-1③ through to MA-I-2)

Table 13-4 Setting items and display details of maintenance item screens (MA-A-1③ to MA-I-2)
(communication status display (for specifications with communication facility))

Screen number	Setting items and display details	Remarks
MA-A-1③	Maintenance items	This screen is displayed when you press the [D] arrow button once at the MA-A-1② screen (shown on page 49). The figure above shows the state in which communication status display (COMM.) is selected.
MA-I-1	Status of communication with communication device (on the reception side)	When data is received normally, the count in the "OK" field on the screen is incremented. When data is not received normally, the count in the "NG PARITY" or "NG CRC" field on the screen is incremented.
MA-I-2	Status of communication with communication device (on the transmission side)	When data is sent normally, the count in the "OK" field on the screen is incremented. When data is not sent normally, the count in the "NG FUNCTION", "NG ADDRESS", or "NG DATA" field on the screen is incremented.

7-6. Screen Transition in the Event of Trip or Alarm (TR-A-1, AL-A-1)

Figures 19 and 19-1 show the respective screens in the event of trip and alarm activations. Pressing [M] returns the display to the pre-activation screen. For the display details of the trip or alarm activation screen, refer to "7-8. History and Trip/Alarm Activation Display Screens".

TR-A-1

LATEST TRIP	
2019 / 04 / 01	
23 : 59 : 59	
CAUSE	OVER CURR L1
PHASE	1
VALUE	3240 A
TIME	10.5 s
Ⓜ	

[M] ——→ Screen before trip occurs

Figure 19 Screen transition in the event of trip (TR-A-1)

AL-A-1

LATEST ALARM	
2019 / 04 / 01	
23 : 59 : 59	
CAUSE	OVER CURR L1
PHASE	1
VALUE	3240 A
TIME	10.5 s
Ⓜ	

[M] ——→ Screen before alarm occurs

Figure 19-1 Screen transition in the event of alarm (AL-A-1)

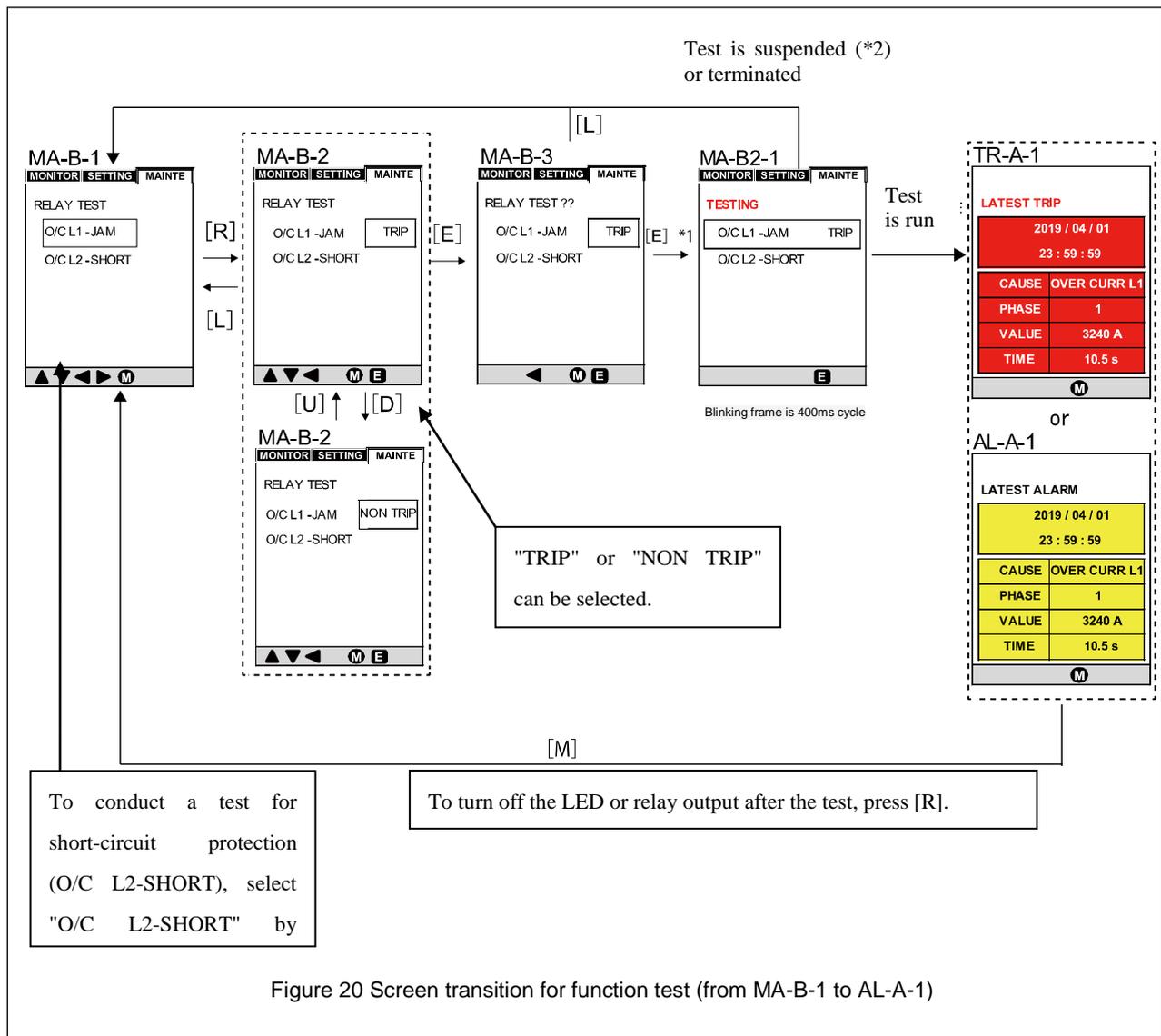# 7-7. Function Test and Relay Test (from MA-B-1 to MA-C-2)

The protective relay allows the user to conduct two types of test: function test and relay test.

(1) Function test (from MA-B-1 to AL-A-1)

You can conduct function tests for overload protection (O/C L1-JAM) and short-circuit protection (O/C L2-SHORT). These tests are activation tests using values equivalent to 1.2 times the set values. You can also conduct each function test by selecting TRIP or NON TRIP. Table 14 shows the LCD screen, LED, relay activation, and log update statuses after each test. Figure 20 shows how to conduct each test.

Table 14 Statuses after function test

Test conducted	MODE setting	Screen display	[TRIP ALARM] LED status	Relay activation	Log update
TRIP	TRIP	Screen in the event of trip activation (TR-A-1)	Lit in red	Activated	Updated
	ALARM	Screen in the event of alarm activation (AL-A-1)	Blinking in red	Activated	Updated
NON TRIP	TRIP	MA-B-1	Lit in red	Not activated	Not updated
	ALARM	MA-B-1	Blinking in red	Not activated	Not updated

Test is suspended (*2) or terminated

[L]

MA-B-1
MONITOR SETTING MAINTE
RELAY TEST
O/C L1 -JAM
O/C L2 -SHORT
▲▼◄►Ⓜ

[R]
[L]

MA-B-2
MONITOR SETTING MAINTE
RELAY TEST
O/C L1 -JAM   TRIP
O/C L2 -SHORT
▲▼◄ ⓂⒺ

[E]

MA-B-3
MONITOR SETTING MAINTE
RELAY TEST ??
O/C L1 -JAM   TRIP
O/C L2 -SHORT
◄ ⓂⒺ

[E] *1

MA-B2-1
MONITOR SETTING MAINTE
TESTING
O/C L1 -JAM   TRIP
O/C L2 -SHORT
Ⓔ
Blinking frame is 400ms cycle

Test is run

TR-A-1
LATEST TRIP
2019 / 04 / 01
23 : 59 : 59
CAUSE   OVER CURR L1
PHASE   1
VALUE   3240 A
TIME   10.5 s
Ⓜ

or

AL-A-1
LATEST ALARM
2019 / 04 / 01
23 : 59 : 59
CAUSE   OVER CURR L1
PHASE   1
VALUE   3240 A
TIME   10.5 s
Ⓜ

[U] ↑ ↓ [D]

MA-B-2
MONITOR SETTING MAINTE
RELAY TEST
O/C L1 -JAM   NON TRIP
O/C L2 -SHORT
▲▼◄ ⓂⒺ

"TRIP" or "NON TRIP" can be selected.

[M]

To conduct a test for short-circuit protection (O/C L2-SHORT), select "O/C L2-SHORT" by

To turn off the LED or relay output after the test, press [R].

Figure 20 Screen transition for function test (from MA-B-1 to AL-A-1)

*1: In the following cases, after [E] is pressed, no test is started and the display returns to the MA-B-1 screen.
・When the function to be tested is set to OFF
・When an applied current value equal to or greater than Ict×10% is detected
・When relay output is in progress
*2: In the following cases, the test is suspended and the display returns to the MA-B-1 screen.
・When an applied current value equal to or greater than Ict×10% is detected
・When relay output occurs
・When [E] is pressed

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(2) Relay test (from MA-C-1 to MA-C-2)

You can conduct relay output tests for RY1 to RY4 as shown in Figure 20-1. When relay output occurs, an "R" mark appears on the bottom right of the screen. To perform a reset, press [R]. When pulse output is used, an automatic reset occurs.
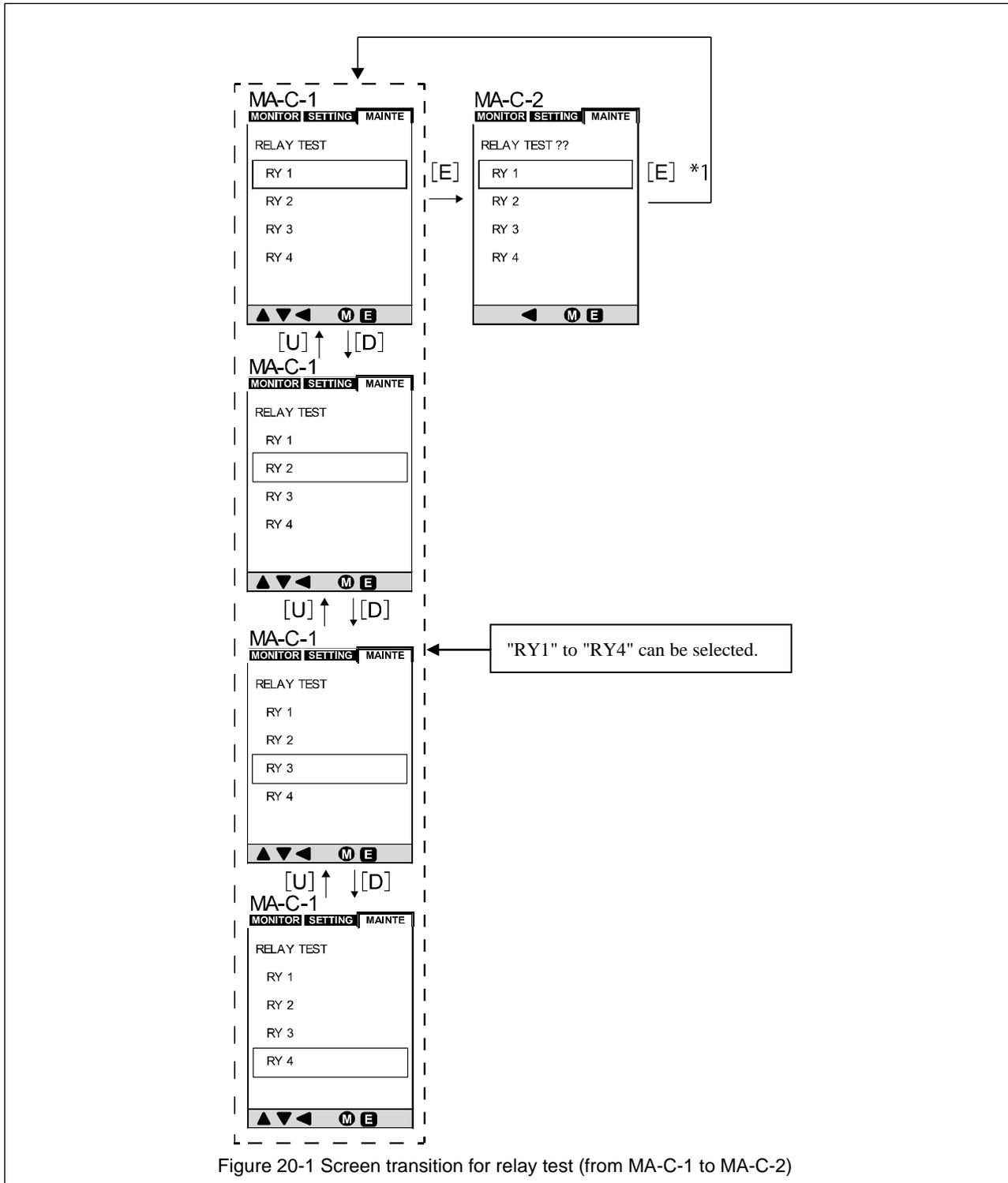

Figure 20-1 Screen transition for relay test (from MA-C-1 to MA-C-2)

*1: Even if you press [E] during relay output, the relay will not be activated.

7-8. History and Trip/Alarm Activation Display Screens

Figure 21 shows the latest trip/alarm history screen, trip/alarm history list screen, and trip/alarm activation display screen, and Tables 15 and 15-1 explain the items displayed on these screens.

Figure 21 Latest history screen, history list screen, and trip/alarm activation display screen
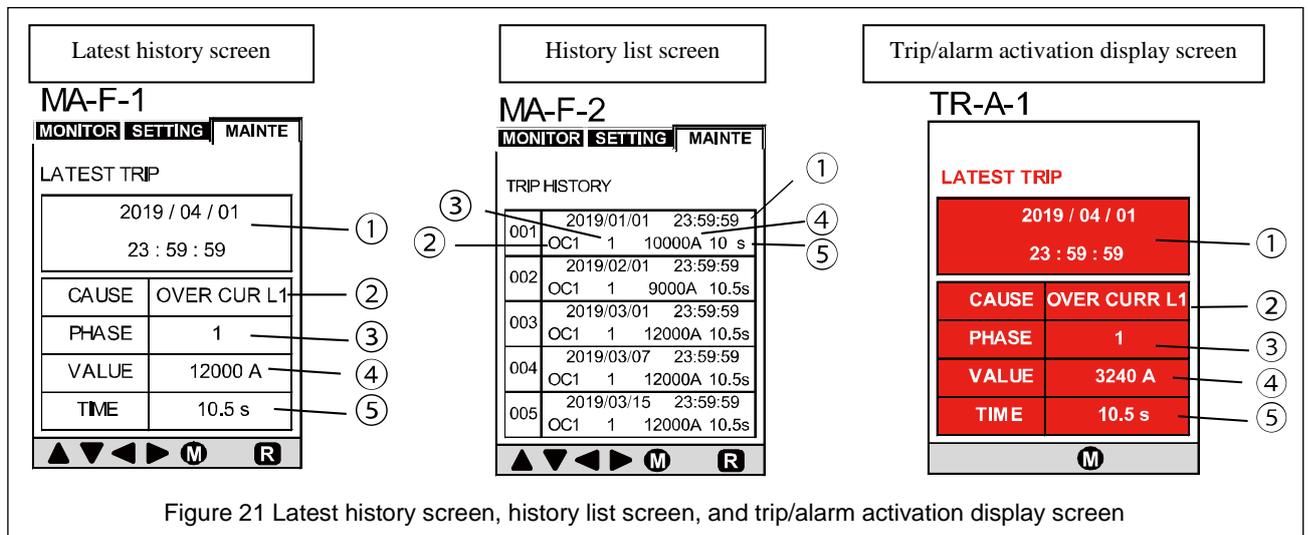
Tables 14 Items displayed on the latest trip/alarm history screen, trip/alarm history list screen, and trip/alarm activation display screen

No.	Display item
①	Indicates the date and time when trip or alarm activation was displayed.
②	Indicates the message for the cause of the trip or alarm activation display. For details, see Table 15-1.
③	Indicates the phase where trip or alarm activation occurred.
④	Indicates the value at which trip or alarm activation was displayed. For the respective units, see Table 15-1.
⑤	Indicates the occurrence time period that caused trip or alarm activation to be displayed. For the respective units, see Table 15-1.

Table 15-1 Messages for the cause of each activation, and the units of values and times displayed

Cause of trip/alarm activation display	② Message (CAUSE)			④ Value that caused trip/alarm activation to be displayed (VALUE)	⑤ Occurrence time period that caused trip/alarm activation to be displayed (TIME)
	Latest trip history screen	Trip history list screen	Trip/alarm activation display screen		
Max Start Time	MAX ST TIME	MST	MAX ST TIME	---	s
Too Many Starts	TOO MANY ST	TMS	TOO MANY ST	---	min
Low Current	LOW CURR	LC	LOW CURR	A	s
High Current	HIGH CURR	HC	HIGH CURR	A	s
Load Increase	LOAD INCR	LI	LOAD INCR	A	s
O/C Lvl1 –Jam	OVER CURR L1	OC1	OVER CURR L1	A	s
O/C Lvl2 –Short	OVER CURR L2	OC2	OVER CURR L2	A	s
Thermal Lvl1	THERMAL L1	TM1	THERMAL L1	%	s
Thermal Lvl2	THERMAL L2	TM2	THERMAL L2	%	s
Unbalance Lvl1	UNBAL L1	UB1	UNBAL L1	%	s
Unbalance Lvl2	UNBAL L2	UB2	UNBAL L2	%	s
DGR	DGR	DGR	DGR	mA	s
Temperature Lvl1	TEMP L1	TP1	TEMP L1	kΩ or °C	s
Temperature Lvl2	TEMP L2	TP2	TEMP L2	kΩ or °C	s
Phase Loss	PHASE LOSS	PLS	PHASE LOSS	None or A	
Phase sequence	PHASE SEQ	PSQ	PHASE SEQ	A	
External Fault 1	EXT FAULT 1	EF1	EXT FAULT 1		
External Fault 2	EXT FAULT 2	EF2	EXT FAULT 2		

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Figure 21-1 shows the latest event history screen and event history list screen, and Tables 15-2 and 15-3 explain the items displayed on these screens.
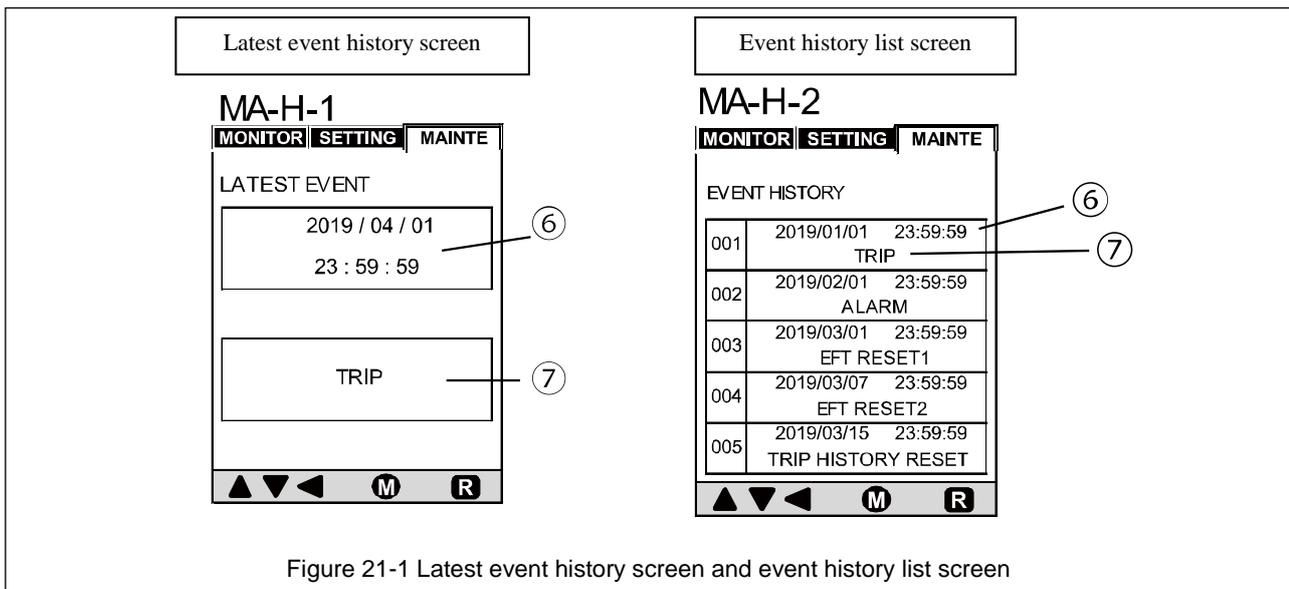

Figure 21-1 Latest event history screen and event history list screen

Table 15-2 Items displayed on the latest event history screen and event history list screen

No.	Display item
⑥	Date and time when an event occurred
⑦	Indicates the messages for each event. For details, see Table 14-3.

Table 15-3 Messages for each event

Event	Messages in ⑦	
	Latest event history screen	Event history list screen
Trip activation	TRIP	TRIP
Alarm activation	ALARM	ALARM
External reset 1	EXT RESET 1	EXT RESET 1
External reset 2	EXT RESET 2	EXT RESET 2
Trip activation history reset	TRIP HISTORY RESET	TRIP HISTORY RESET
Alarm history reset	ALARM HISTORY RESET	ALARM HISTORY RESET
Reset button pressed	RESET BUTTON PRESSED	RESET BUTTON PRESSED
Relay test executed	RY TEST	RY TEST

7-9. Responses to Abnormal Events

● If internal CT circuit wiring is broken or another similar problem occurs, the system will blink the "TRIP" or "ALARM" LED without outputting data and will be reset automatically when it becomes normal. If the system is not reset automatically, contact us.

● In the following cases, values (set values or recorded values) are displayed as "---".
  • Values outside the setting range for each setting item
  • Values within the setting range for each setting item that deviate from the specified step

However, when such values are set, they may be displayed normally by pressing the [U] or [D] arrow button so that the value falls within the setting range. If values are not displayed normally, contact us.

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