Instruction Manual

UT15L FM APPROVED LIMIT CONTROLLER

CONTENTS

1. WHEN YOU RECEIVE THIS INSTRUMENT

Thank you for purchasing the UT15L. FM approved Limit Controller. Please read this "Instruction Manual" carefully, and use the instrument correctly.

Notes on Handling the UT15L

Cleaning of the front panel, key switches, etc., should be limited to wiping lightly with a dry cloth.

Do not use any solvents such as alcohol, benzine, etc.

1.1 Checking Accessory Items

Check that all of the following items are present.

- UT15L main unit ..... 1 unit
- Bracket (installation hard ware) ..... 2 pcs.
- Unit seals (labels) ..... 1 sheet
- Instruction Manual (main text) ..... 1 copy
- Instruction Manual (communication volume) .. 1 copy*

  * Included only when option / RS422 is specified.

1.2 Verifying Product Specifications

Verify that the product delivered agrees with the model code ordered.

Model	Suffix code	Description
UT15L	·····	Limit Controller
Style code	*A	Style A
Optional features	/RET	Retransmission (4 to 20mA DC)
	/RS422	RS-422A Communication interface

1.3 Verifying Measurement Input Type and Control Output Type

- Unless otherwise specified, the UT15L is shipped from the factory set up as follows:
- Measurement input range code : 0 (thermocouple type K, −200 to 1200°C)

2. INSTALLATION

2.1 Installation Location

Install the instrument in a location that meets the following criteria.

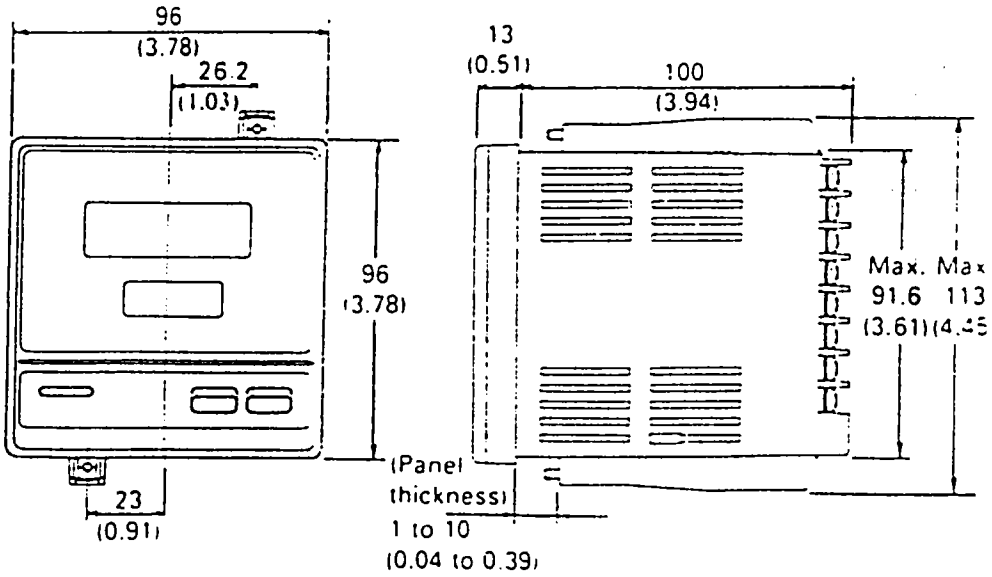
(1) Little or no mechanical vibration.
(2) No corrosive gases.
(3) Minimal temperature fluctuation, and near normal temperature (32°F to 122°F).
(4) Not directly subject to radiant heat.
(5) Not subject to strong electromagnetic fields.
(6) No direct exposure to water.

2.2 Installation Procedure

(1) Insert the instrument from the front of the panel.
(2) To fasten the instrument to the panel, use the accessory installation brackets provided.
Take care not to overtighten the bracket screws when mounting.

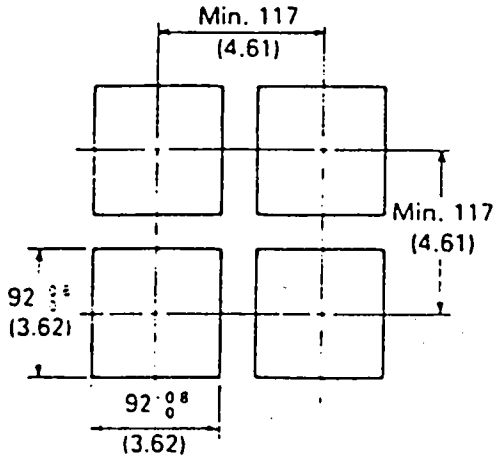
2.3 Outside Dimensions and Panel Cutout Dimensions

Dimensions



Panel Cutout and Spacing

Unit: mm
(approx. inch)



3. WIRING

3.1 Wiring Procedure

When wiring, see Section 3.3, "Terminal Wiring Diagrams", and observe the following precautions.

(1) In the case of thermocouple input, use the proper thermocouple extension wire type (compensating leads).

(2) For RTD input, use wiring having low conductor resistance, and no significant differences in resistance among the three conductors.

(3) For power supply wiring, use a cable or wiring with characteristics equal to or better than 600V vinyl insulated wire (JIS C3307). If necessary, insert a noise filter in the power supply circuit.

(4) The ground conductor should have at least a $2mm^2$ crosssectional area, with resistance to ground not exceeding 100Ω maximum.

(5) Plan the input circuit wiring so as to avoid noise pickup.

(a) The input circuit wiring should be kept as far away as possible from power and ground circuits.

(b) Use of shielded wire is effective against noise due to electrostatic induction. If necessary, connect the shield to the ground terminal of the UT15L. (Be careful that this does not result in a two-point ground.)

(c) Use of conductor pairs twisted with a short and constant spacing between twists is relatively effective against noise due to electromagnetic induction.

(6) For connecting the wiring to the terminals, we recommend use of crimp terminal lugs (3.5mm screw) with insulated sleeves.

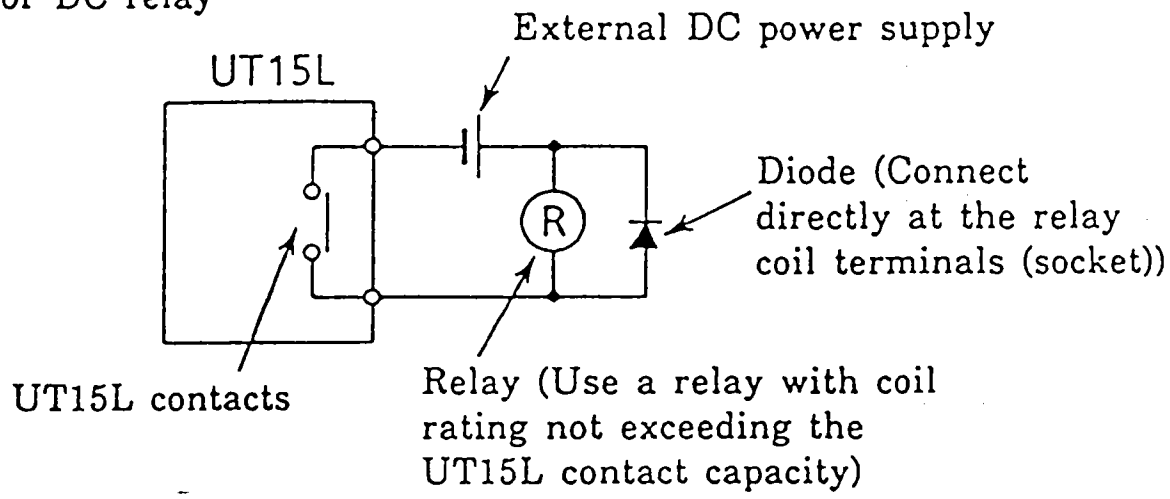
3.2 Cautions When Wiring

(1) There is no fuse or power supply switch in this instrument. If required, these must be provided separately.
For fusing, use time-lag fuses with a rated voltage of 250V, and a rated current of 1A.

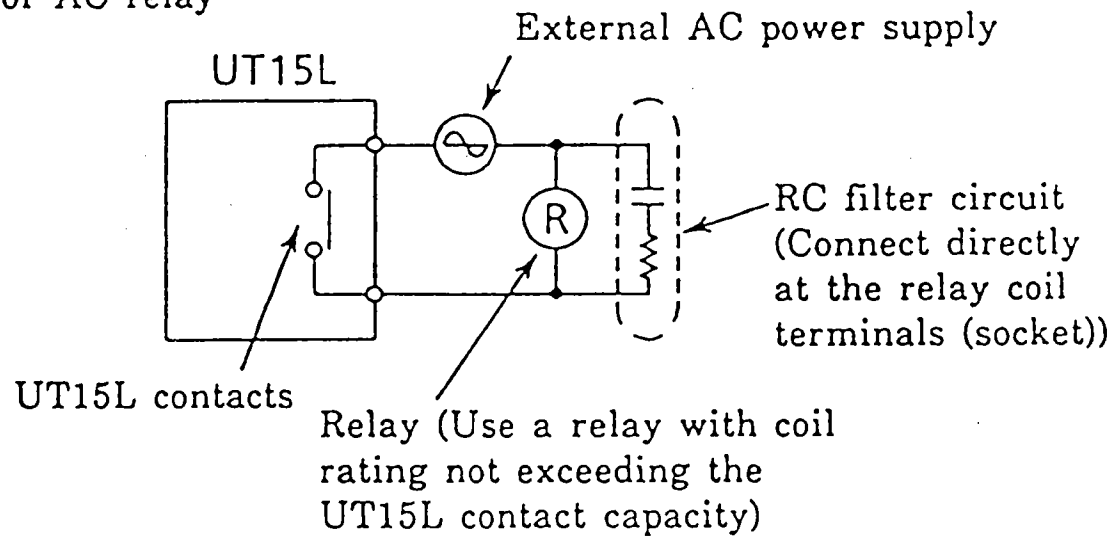
(2) If a load exceeds a relay output contact rating (control output : 250V, 3A AC resistive load : alarm output 250V AC, 1A resistive load), use an auxiliary relay to turn the load on and off.

(3) If using an inductive load such as an auxiliary relay on a relay contact output, connect a diode (for DC) or an RC filter (for AC) in parallel as a surge suppressor circuit to suppress sparking.

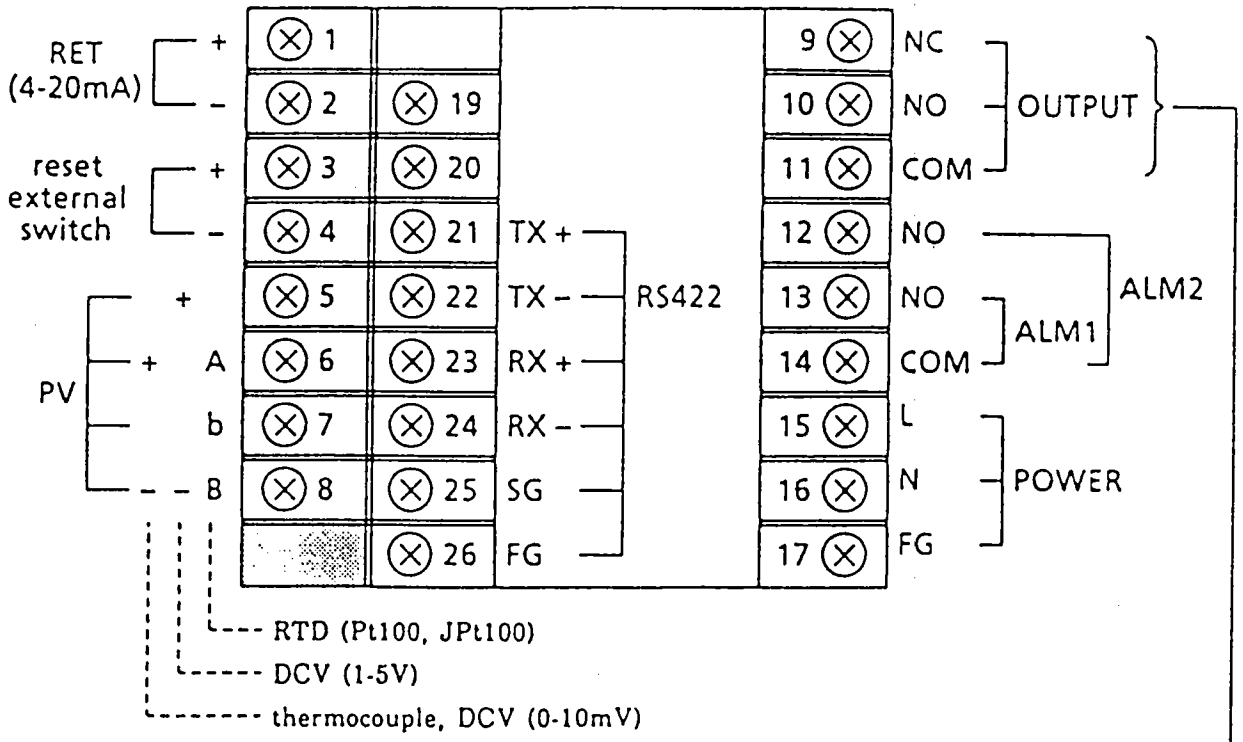
- For DC relay



- For AC relay



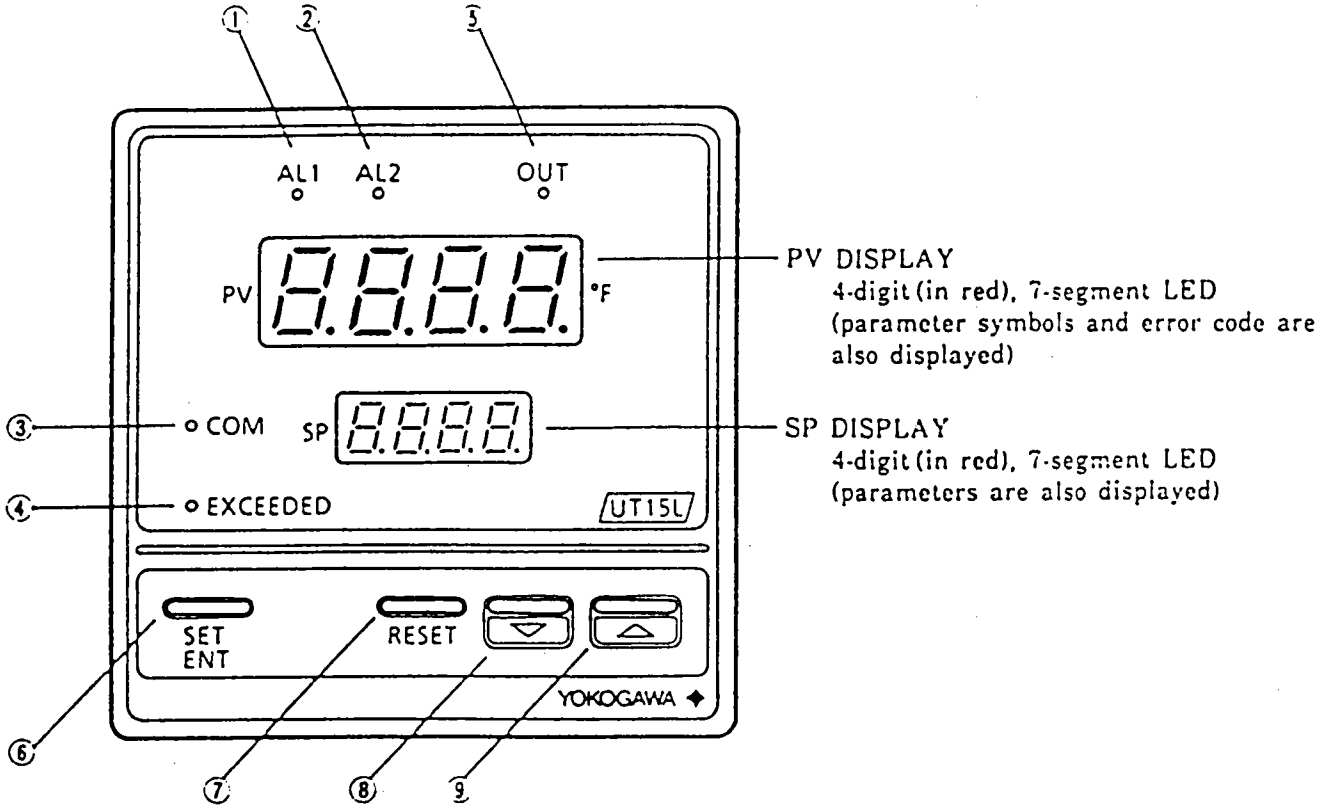
3.3 Terminal Wiring Diagram



state of output terminals

	NC (⑨ - ⑪)	NO (⑩ - ⑪)
power off	close	open
limit on	close	open
limit off	open	close

4. FRONT PANEL DISPLAY AND USE



DISPLAY

①AL1 ··· Alarm indication lamp
: Lights up when the upper-limit alarm of a measured value occurs.

②AL2 ··· Alarm indication lamp
: Lights up when the lower-limit alarm of a measured value occurs.

③COM ··· Status indication lamp
: Lights up during communication ; flashes when a communication error occurs.

④EXCEED ··· Status indication lamp
: Lights up when the process variable exceeds the set point.

⑤OUT ··· Output indication lamp
: Lights up when relay output is ON.

KEY

⑥ SET ENT ··· Set-Entry key
: Used to set a value ; Changes when a parameter is selected.

⑦ RESET ··· Reset key
: Used to certify output ; Reset parameters.

⑧ ▽ ··· Down key
: Each digit automatically decreases.

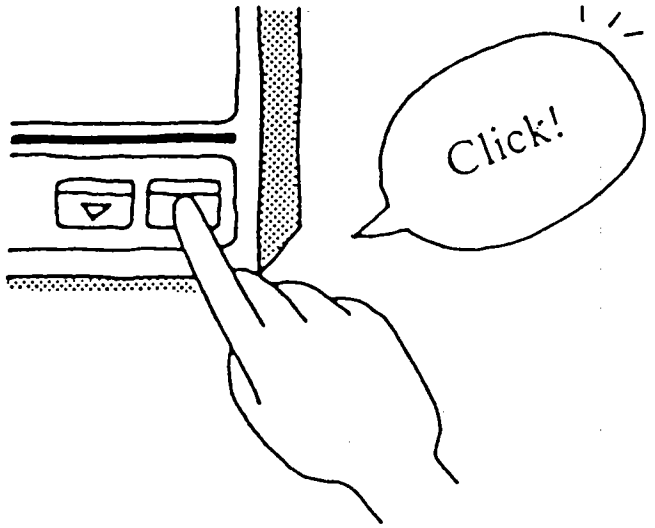
⑨ △ ··· Up key
: Each digit automatically increases.

note : SET ENT 3sec : press SET ENT (Set-Entry key) holding more than 3 second.

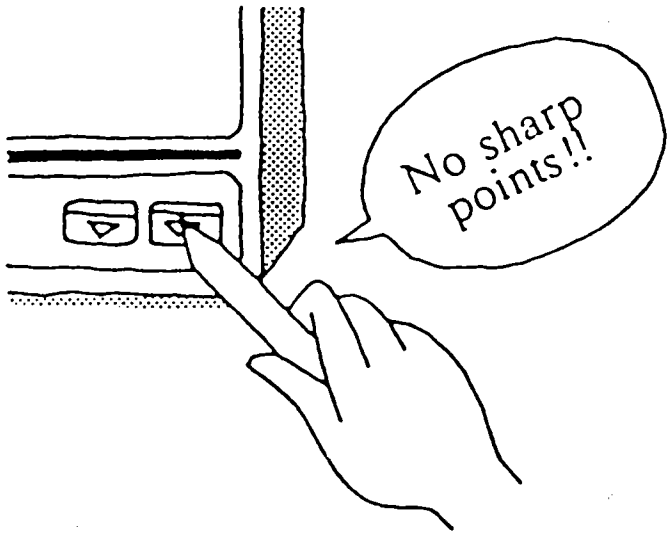
5. OPERATIONS

Notes on Key Operation

① The keys on this instrument have been designed with tactile feedback, and will click when pressed. Press firmly with your finger until you feel this click.



② Never use a sharp point to press the keys, as this can cause failure of the key.



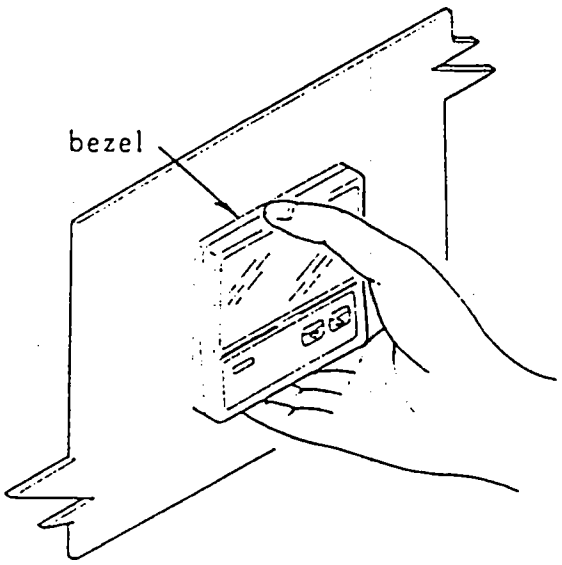
5.1 Input Change Procedures

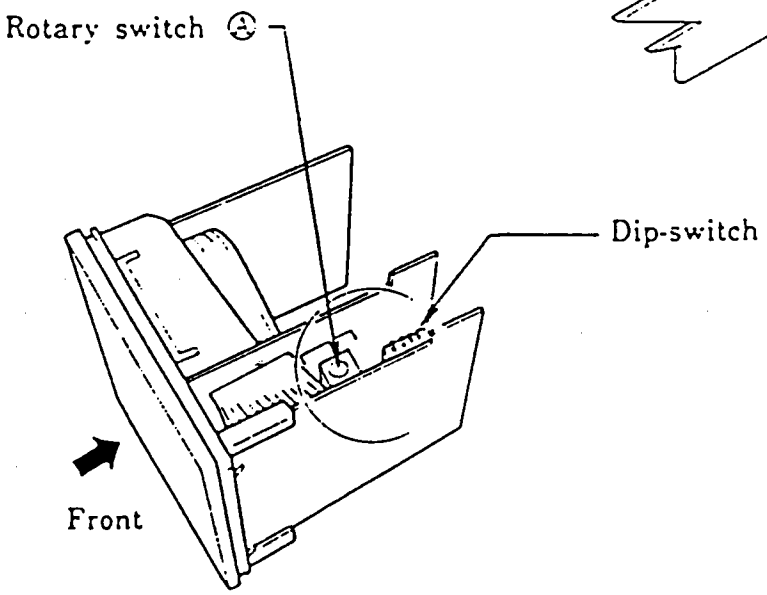
Follow the procedure below to remove and reinsert the internal unit.

(1) Remove power from the UT15L (turn off).

(2) Pull out the internal unit.

While pressing up with your finger on the bezel stopper (latch), pull the entire bezel toward you, and remove the internal unit.





By setting rotary switch ⊛ inside the instrument and changing the terminal (for PV input) connections, you can switch the instrument to whichever of the input types and ranges in Table 1 that you desire.

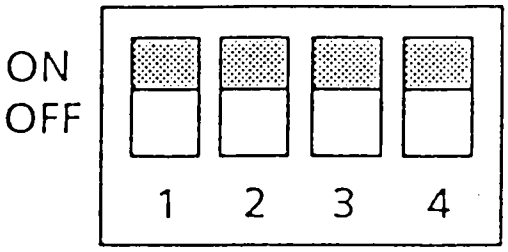
Table 1. Input Range Codes

Input type / instrument range					Input range code
TC	JIS	K	-200 to 1200°C	-300 to 2300°F	0
		K	-199.9 to 200.0°C	-300 to 400°F	1
		J	-199.9 to 800.0°C	-300 to 1500°F	2
		T	-199.9 to 400.0°C	-300 to 750°F	3
		E	-199.9 to 800.0°C	-300 to 1500°F	4
		R	0 to 1700°C	0 to 3100°F	5
		B	0 to 1800°C	0 to 3300°F	6
		S	0 to 1700°C	0 to 3100°F	7
	DIN	L	-199.9 to 800.0°C	-300 to 1500°F	8
		U	-199.9 to 400.0°C	-300 to 750°F	9
RTD*1	JPt100		-199.9 to 500.0°F	-199.9 to 999.9°F	A
	Pt100				B
mV, V, mA	0 to 10mV		-1999 to 9999°F		C
	0 to 100mV		-199.9 to 999.9°F		D
	0 to 5V		-19.99 to 99.99°F		E
	1 to 5V		-1.999 to 9.999°F		F
	4 to 20mA				F*2

*1 JIS'89 JPt100, JIS'89 Pt100 / DIN

*2 4 to 20mA requires 250Ω, 0.1% (accuracy) resistor between

5.2 Initialize by DIP switch



bit 1: Key lock
- ON : key unlocked
- OFF : key locked

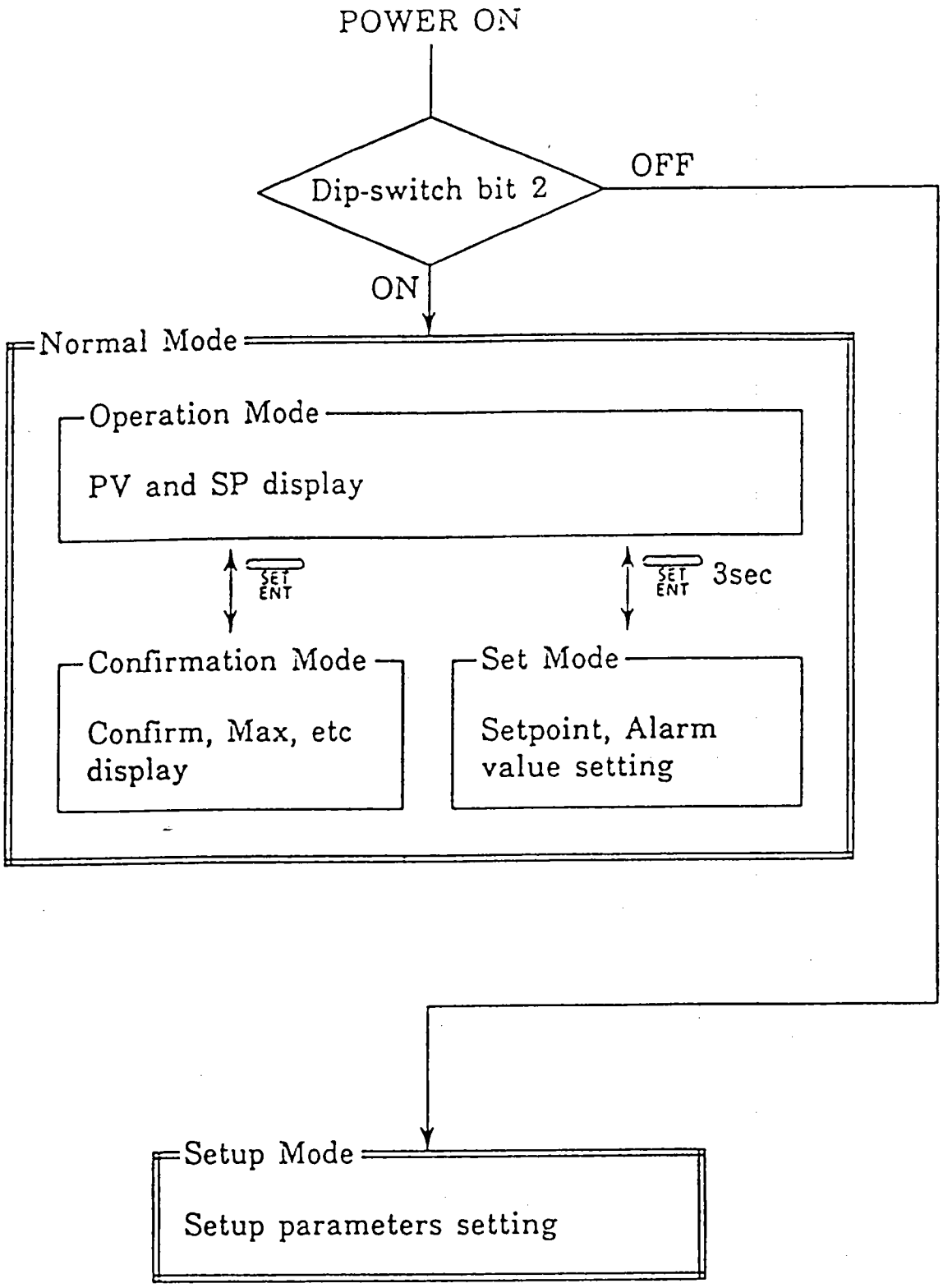
bit 2: mode (See Page 6 : 5. Key operation rules)
- ON : normal mode
- OFF : setup mode

bit 3: confirmation select (See Page 12 : 7.1 Confirmation)
- ON : RESET (RESET key)
- OFF : external contact switch

bit 4: limit type (See Page 9 : 6. Limit Control action)
- ON : high limit type
- OFF : low limit type

5.3 Key Operation Rules

5.3.1 Basic Principles

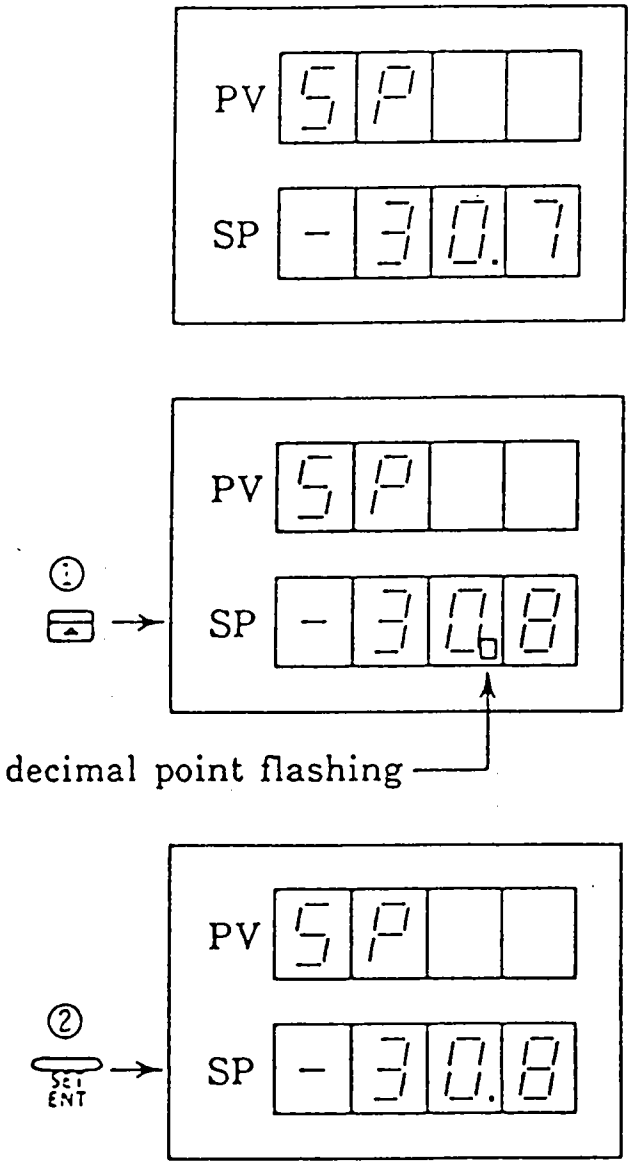


5.3.2 Data Change Process

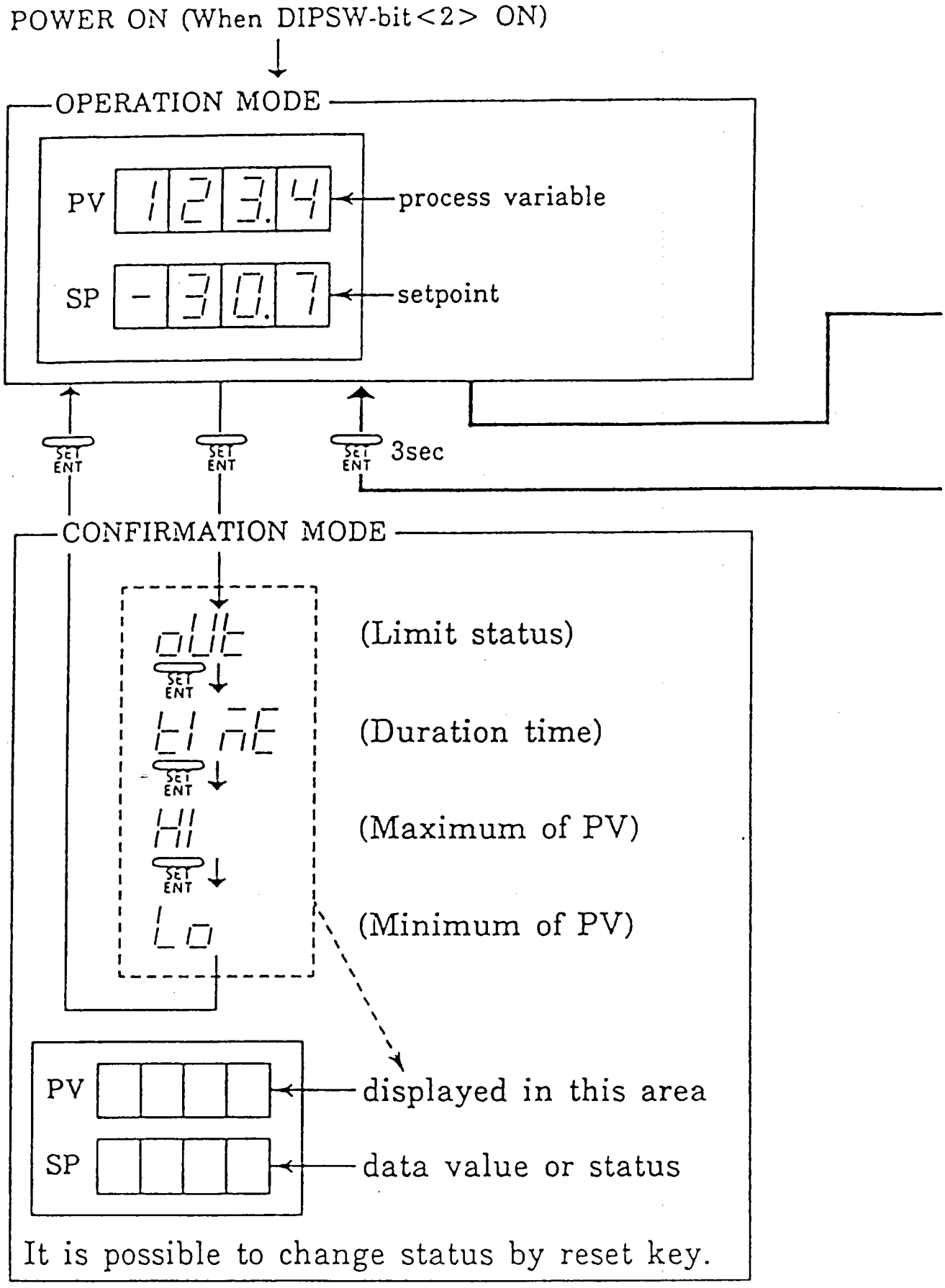
When ▲ (Up key) (▼ (Down key)) is pressed, display data increments (decrements) and decimal point begins flashing (①).

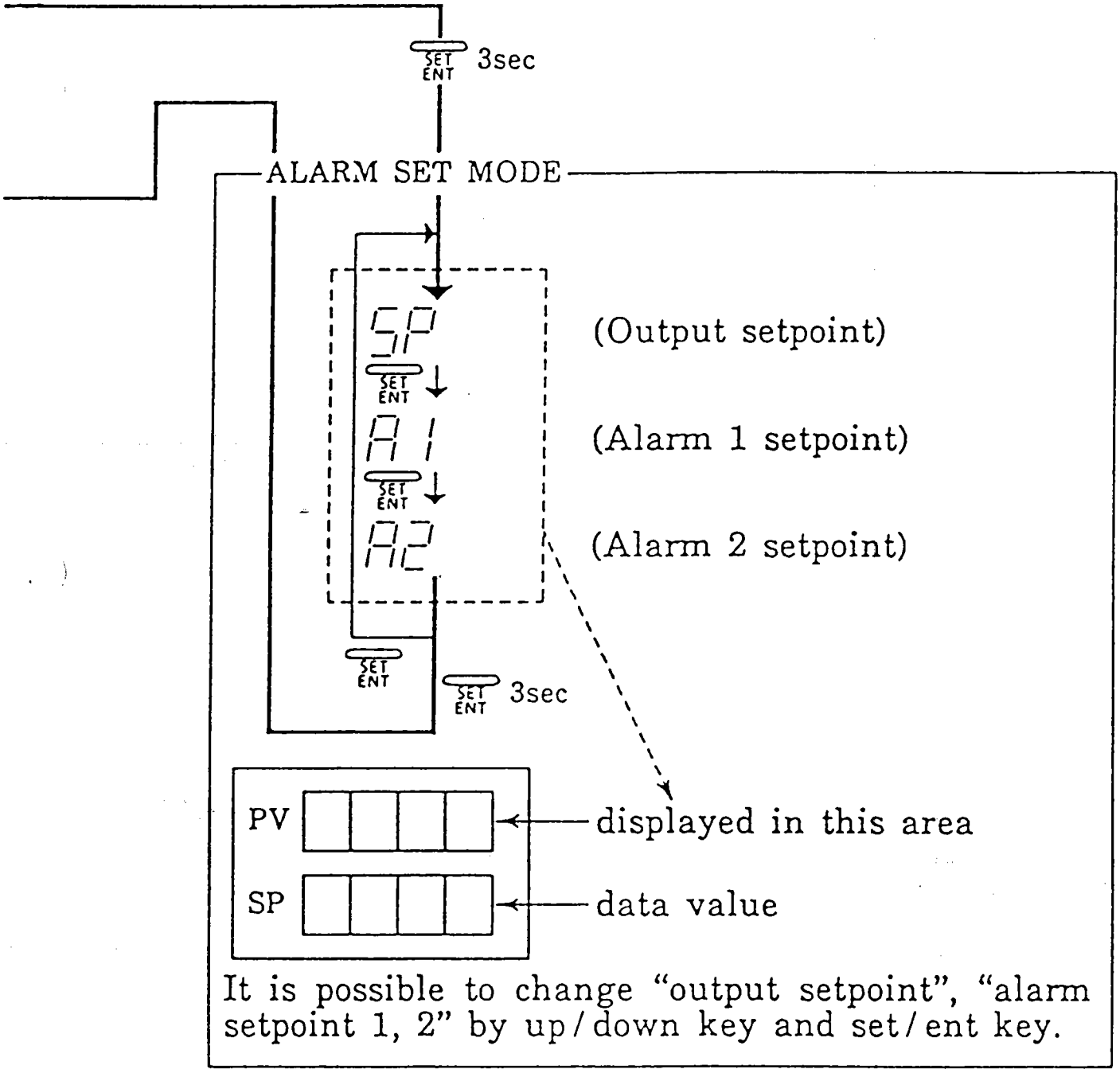
And SET ENT (Set-Entry key) is pressed then, display data is stored into memory (EEPROM) and decimal point stops flashing (②).

EX) SP change to −30.8 from −30.7

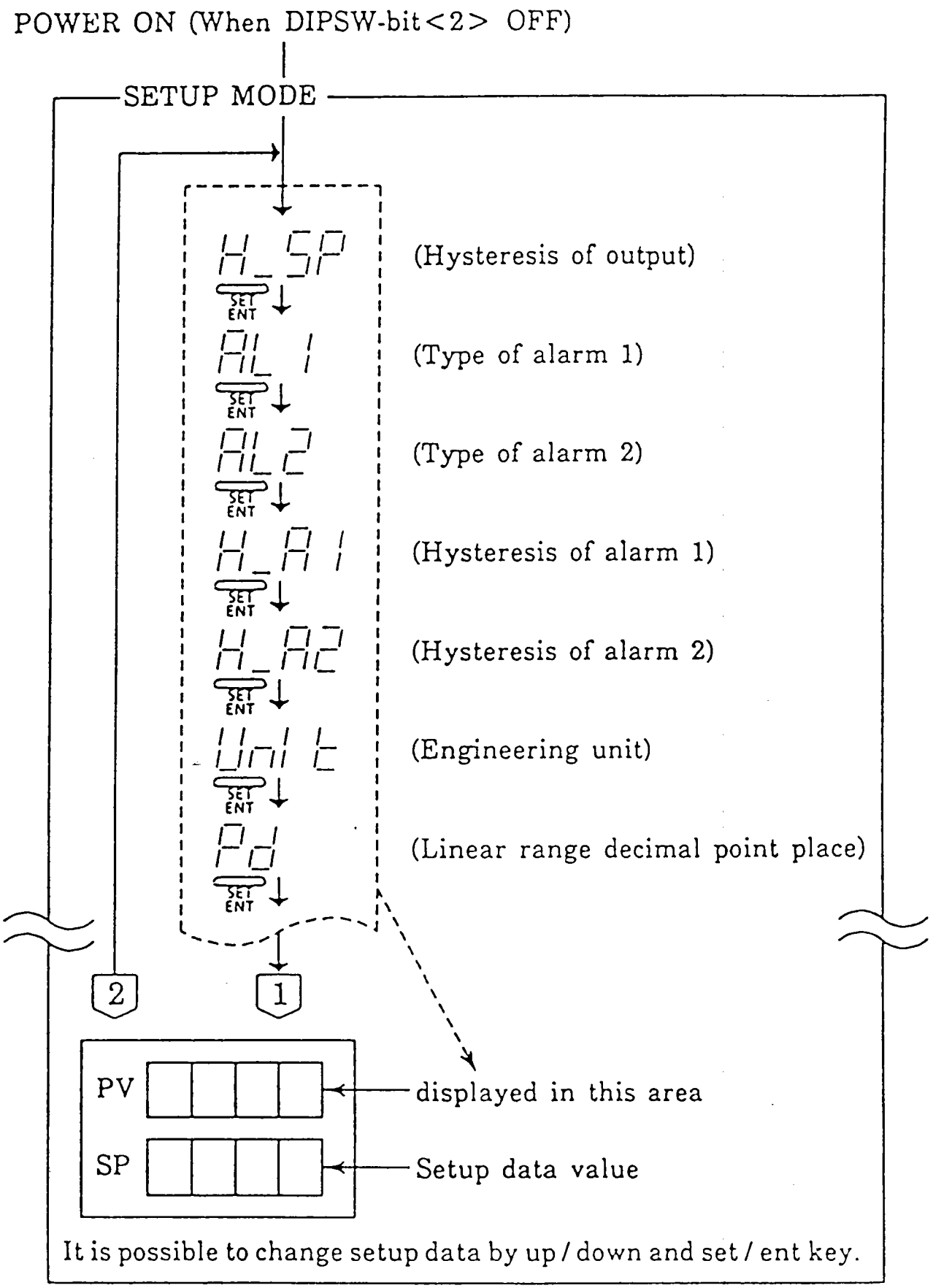


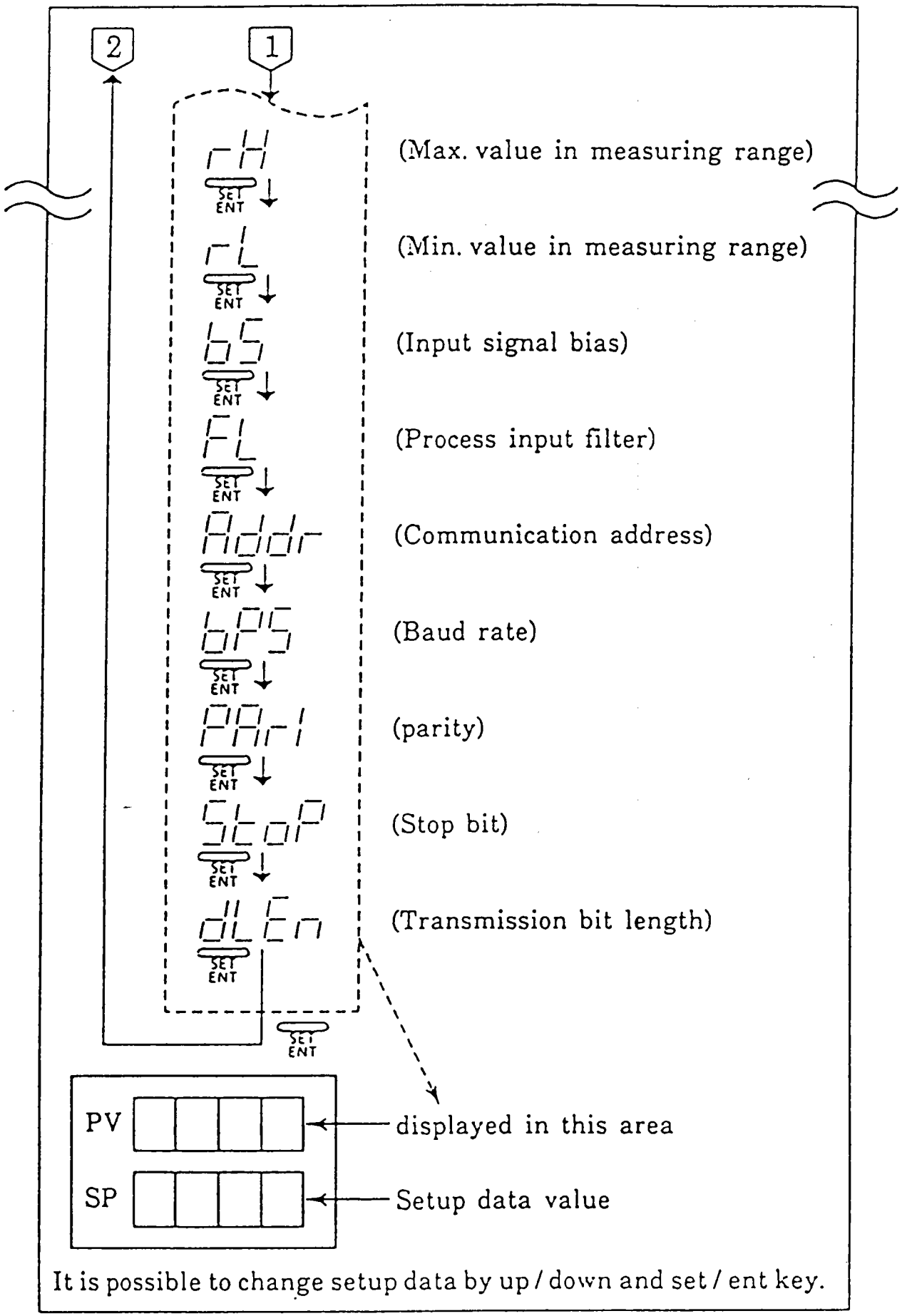
5.3.3 Normal Mode




SET ENT
3sec
ALARM SET MODE
SP
(Output setpoint)
SET ENT
A1
(Alarm 1 setpoint)
SET ENT
A2
(Alarm 2 setpoint)
SET ENT
SET ENT
3sec
PV
displayed in this area
SP
data value
It is possible to change "output setpoint", "alarm setpoint 1, 2" by up/down key and set/ent key.

5.3.4 Setup Mode




2
1
rH
SET ENT
(Max. value in measuring range)
rL
SET ENT
(Min. value in measuring range)
bS
SET ENT
(Input signal bias)
FL
SET ENT
(Process input filter)
Addr
SET ENT
(Communication address)
bPS
SET ENT
(Baud rate)
PAr1
SET ENT
(parity)
StoP
SET ENT
(Stop bit)
dLEn
SET ENT
(Transmission bit length)
SET ENT
PV
displayed in this area
SP
Setup data value
It is possible to change setup data by up / down and set / ent key.

6. LIMIT CONTROL ACTION

6.1 Control Action

<Lock in action>

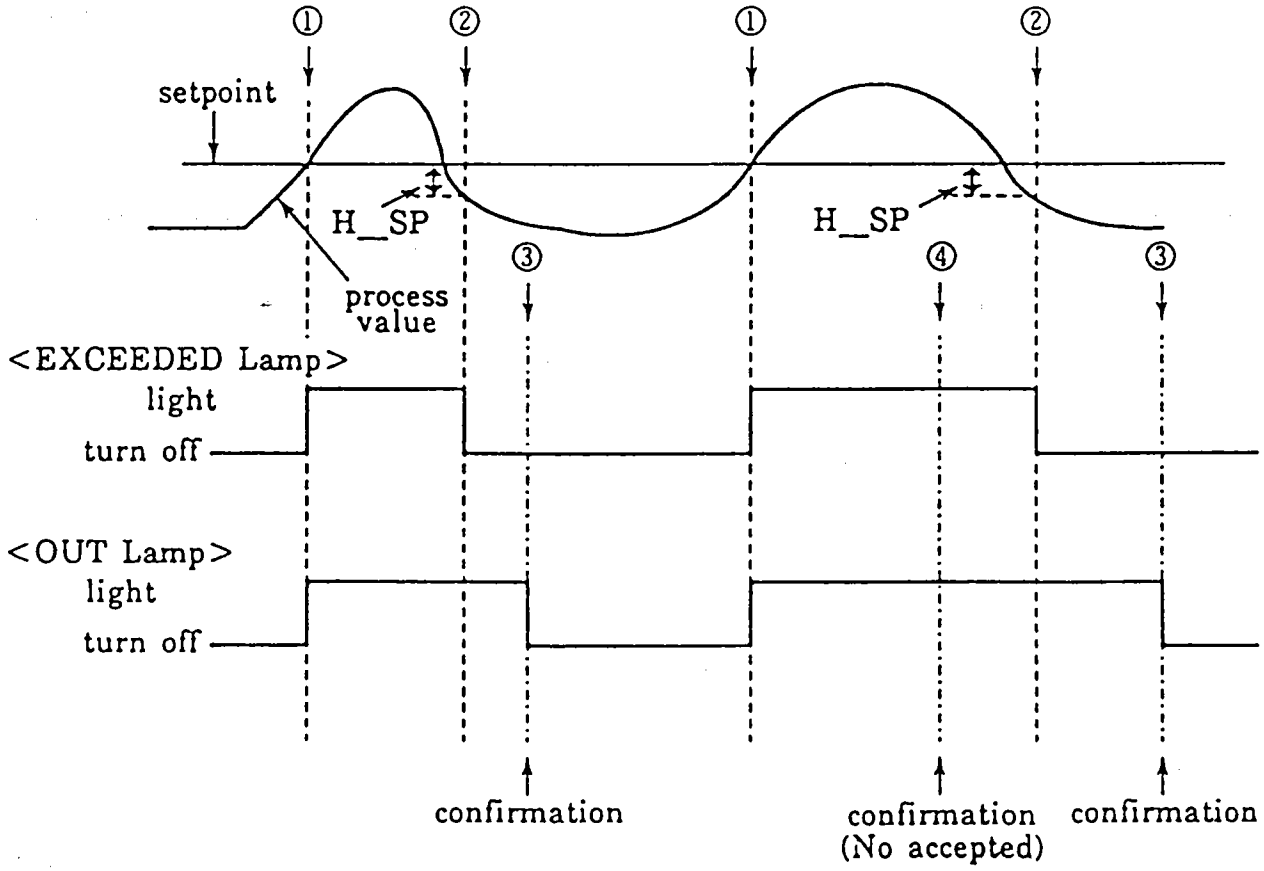
When process variable (PV) exceeds a setpoint (SP), "EXCEEDED" lamp and "OUT" lamp turn on (①).

"EXCEEDED" lamp turns off when PV goes into normal condition, however "OUT" lamp is stays on as it is (②).

"OUT" lamp turns off when a confirming operation is done by a operator (③) the way to confirm is pushing RESET (Reset key).

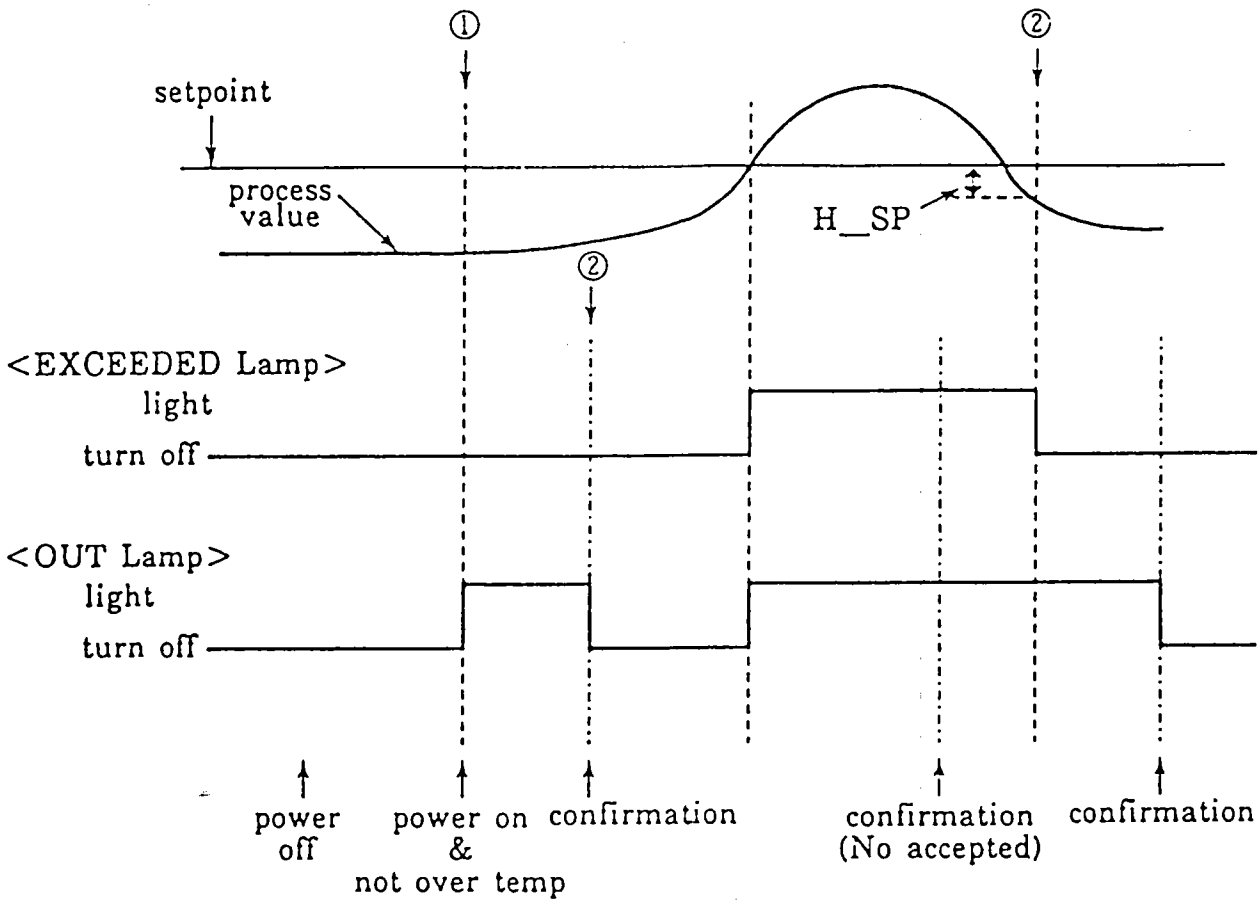
The confirming operation is not accepted during PV exceeds SP (④).

State of output relay is di-energized, whenever "OUT" lamp is on. (It is same as power off, that is NC Terminal : CLOSE, NO Terminal : OPEN)



6.2 Power on Status

State of output relay is always di-energized at power on even if PV does not exceed SP (①), (NC Terminal : CLOSE, NO Terminal : OPEN) and after confirmation (manual reset) state of output relay is energized (②). (NC Terminal : OPEN, NO Terminal : CLOSE)



State of output relay is di-energized, whenever "OUT" lamp is on. (It is same as power off, that is NC Terminal : CLOSE, NO Terminal : OPEN)

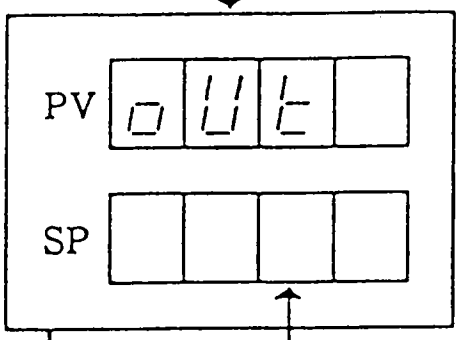
7. CONFIRMATION MODE

To operation mode

From operation mode

SET ENT

SET ENT



<LIMIT CONFIRMATION PANEL>

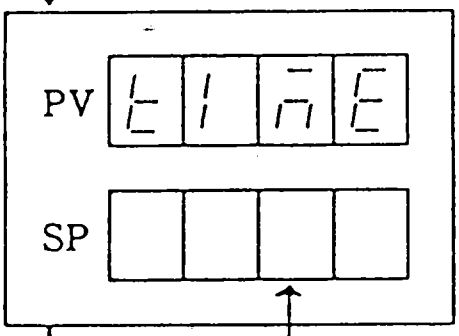
Confirm a limit Control on this panel.

Push RESET (Reset key) to confirm "Limit".

SET ENT

Display of "SP"	status
"on"	PV exceeded SP, but no confirmation is done yet.
"oFF"	PV does not exceed SP, and confirmation is already done, or PV has not exceeded SP since power was turned on.

<DURATION TIME DISPLAY PANEL>



This panel displays the time that PV exceeded SP.

Push RESET (Reset key) to reset duration time.

Duration time=0.0~999.9 Min

The decimal point flashes when the controller is counting the duration time.

SET ENT

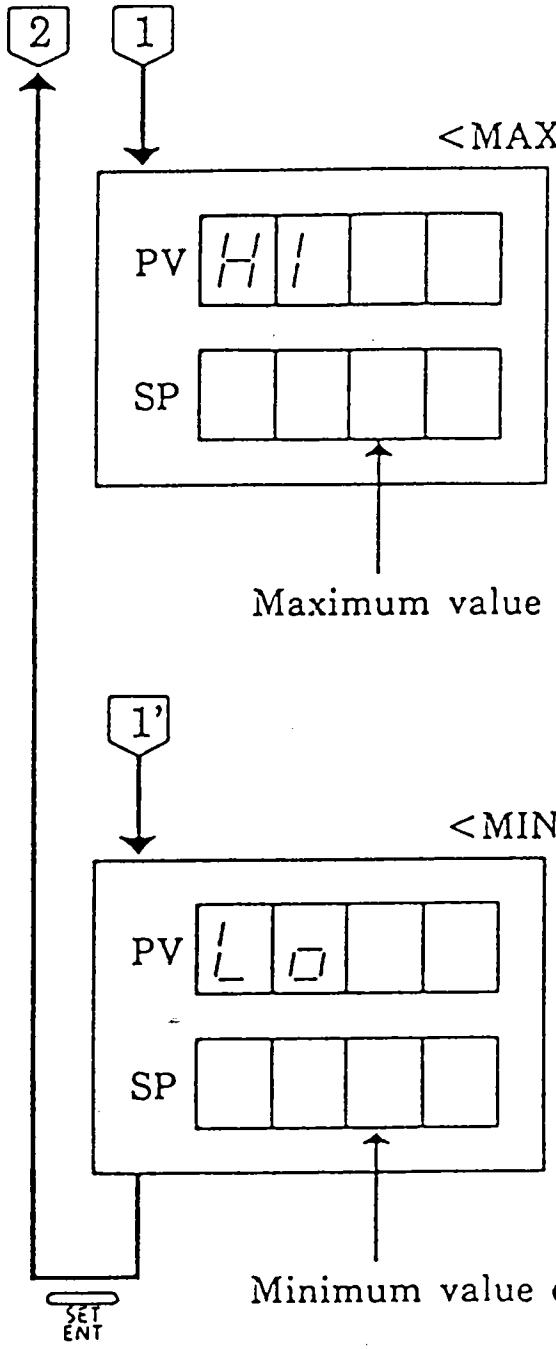
Display of "SP"	status
"NNNN" (Duration time)	PV exceeds SP.
"0.0"	PV does not exceed SP, and confirmation is already done, or PV has not exceeded SP since power was turned on.

2

1

or

1'



<MAXIMUM VALUE DISPLAY PANEL>

This panel is displayed when high limit type is selected, and shows the maximum value of PV.

Push RESET (Reset key) to reset maximum value.

(This panel is not displayed when low limit type is selected.)

Maximum value of PV is indicated on "SP" display.

<MINIMUM VALUE DISPLAY PANEL>

This panel is displayed when low limit type is selected, and shows the minimum value of PV.

Push RESET (Reset key) to reset minimum value.

(This panel is not displayed when high limit type is selected.)

Minimum value of PV is indicated on "SP" display.

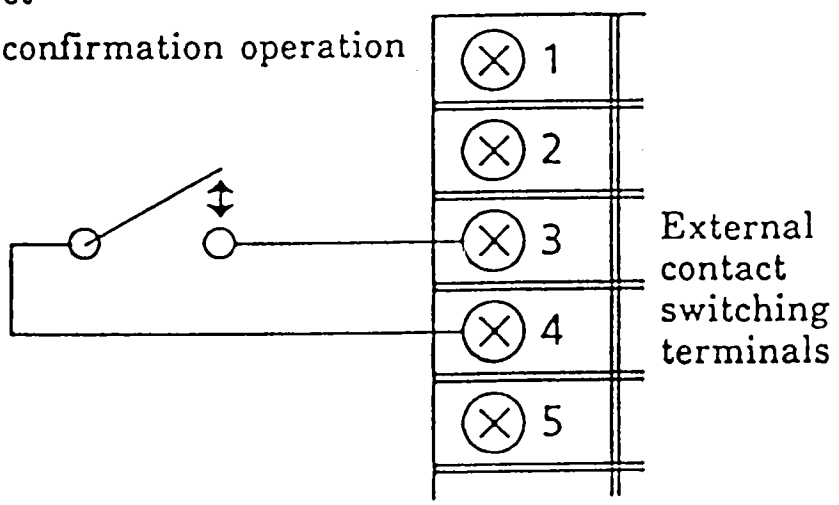
7.1 Confirmation (LIMIT CONFIRMATION PANEL)

- "ON" (ON) lights (on LIMIT CONFIRMATION PANEL) when PV exceeds SP.
- "OFF" (OFF) is displayed when a limit confirmation operation (push RESET (Reset key)) is done during PV goes back to normal status.
- "ON" is still lighted when PV exceeds SP even if operator makes confirmation operation.
- External contacts can be used for LIMIT confirmation. Closing external contacts is equal to push RESET (Reset key)) for confirmation.
  If you use external contacts for confirmation, you can confirm on other panel (not always LIMIT CONFIRMATION PANEL, See Page 7 : 5.3 Normal Mode).
- Two types of confirmation operation can be selected by dip-switch bit-3 on PCB., which is RESET (Reset key)) on front panel operation or external contact operation.
  If dip-switch bit 3 is "ON" then key operation is enabled. (external contact operation is disabled)
  If dip-switch bit 3 is "OFF" then external contact operation is enabled. (key operation is disabled)

note : External contacts can not be used for duration time reset and maximum value or minimum value of PV reset.

■ External contact

OFF → ON : confirmation operation



7.2 Limit Duration (DURATION TIME DISPLAY PANEL)

- The time (during PV exceeds SP) is counted and displayed.
- Display time range : 0.0~999.9 minutes.
- Push RESET (Reset key) to reset time count (Reset key) to reset time count when "DURATION TIME DISPLAY PANEL" is displayed.
  And the time count are to be reset when power is turned on.
  When the time count are reset, "0.0" is displayed until PV exceeds SP again.
  If PV exceeds SP again during the old time count is retained in the memory, the old data should be reset and new time counting start from "0.0".

  note : It is impossible to reset time count during PV exceeds SP by any operation.

7.3 Min/Max Memory

- The maximum value or minimum value of PV is displayed and stored in the memory.
- If RESET (Reset key)) is pushed during the controller displays maximum value or minimum value on the display, memory is reset and a PV (which is measured on that time) should be recognized as maximum value or minimum value.
  If PV exceeds SP again when the maximum value or minimum value is retained in the memory, the maximum value or minimum value should be reset and the first PV should be recognized as maximum value or minimum value.

  note : When power is turned on, the memory should be reset and the first PV should be recognized as maximum value or minimum value.
  Maximum value : When high limit type is selected.
  Minimum value : When low limit type is selected.

8. PARAMETERS LIST

8.1 Normal Mode Parameters

MODE	CODE	SETTING ITEM	UNIT	INITIAL VALUE	SETTING RANGE, DESCRIPTION
OPERATION MODE	———	———————	—	———	———————————
CONFIRMATION MODE	oUt	Limit status	—	ON	ON, OFF
	tI mE	Duration time	Min	0.0	0.0 to 999.9
	HI	Maximum of PV	EU	first PV	EU (0%) to EU (100%)
	Lo	Minimum of PV	EU	first PV	EU (0%) to EU (100%)
ALARM SET MODE	SP	Output setpoint	EU	EU (0%)	EU (0%) to EU (100%)
	A1	Alarm 1 setpoint	EU	EU (100%)	EU (0%) to EU (100%) EU (0%) S to EU (100%) S (EU ( ) S in deviation alarm)
	A2	Alarm 2 setpoint	EU	EU (0%)	

8.2 Setup Mode Parameters

MODE	CODE	SETTING ITEM	UNIT	INITIAL VALUE	SETTING RANGE, DESCRIPTION
SET UP MODE	H_SP	Hysteresis of output	EU	EU (0.5%) S	EU (0%) S to EU (100%) S
	AL 1	Type of alarm 1	—	1	OFF, 1 to 8, 11 to 18 *1 (See Page 15 : Table 1)
	AL2	Type of alarm 2	—	2	
	H_A1	Hysteresis of alarm 1	EU	EU (0.5%) S	EU (0%) S to EU (100%) S
	H_A2	Hysteresis of alarm 2	EU	EU (0.5%) S	EU (0%) S to EU (100%) S
	Unit	Engineering unit	—	°C	°C, °F
	Pd	Linear range decimal point place	—	1	0:0 to 9999 1:0.0 to 999.9 2:0.00 to 99.99 3:0.000 to 9.999
	rH	Max.value in measuring range		ACCORDING TO RANGE CODE	For TC or RTD input RL<RH≦ (Range Max. value) For linear input RL<RH≦9999
	rL	Min.value in measuring range		ACCORDING TO RANGE CODE	TC, RTD input (Range Min.value) ≦RL<RH For linear input −1999≦RL<RH
	bS	Input signal bias	EU	EU (0%) S	EU (−100%) S to EU (100%) S
	FL	Process input filter	S	OFF	OFF and 1 to 120
	Addr	Communication address	—	1	1 to 16
	bPS	Baud rate	—	6	0:150, 1:300, 2:600, 3:1200, 4:2400, 5:4800, 6:9600
	PAr1	Parity	—	0	0:None, 1:Even, 2:Odd
	StoP	Stop bit	—	1	1:1 bit, 2:2 bit
	dLEn	data bits	—	8	7:7 bit, 8:8 bit

9. ALARM

Alarm setpoint 2 point
Output Relay 1A 250VAC NO contacts
LED lamp 2 point (AL1, AL2, on front panel)
Alarm type OFF, or 1~8, 11~18
(See Table 1 for the relationship between alarm types and parameter codes)

Table 1 (1/2)

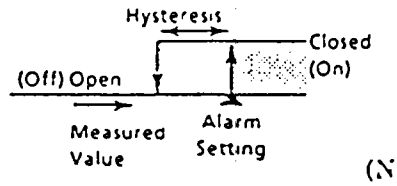
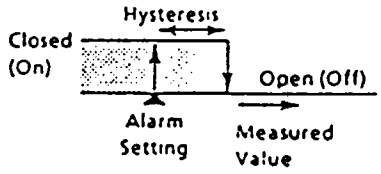
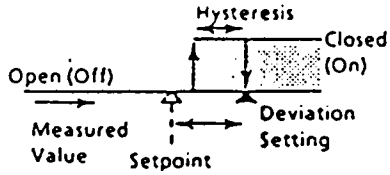
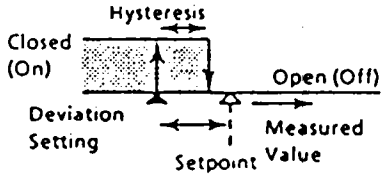
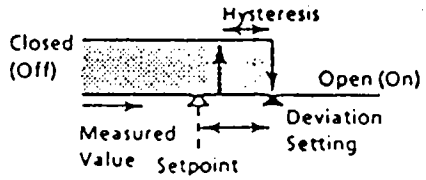
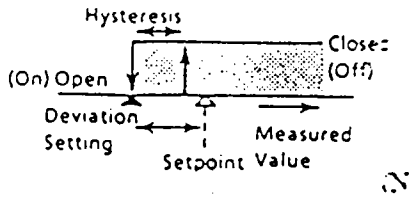
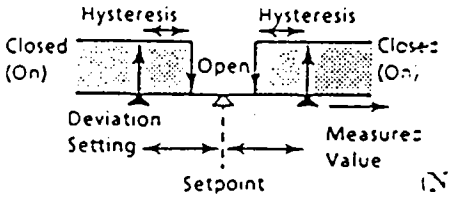
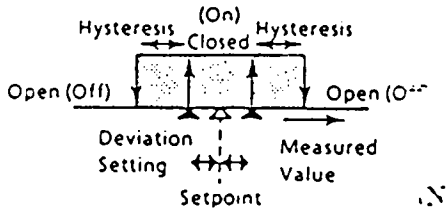
Code	Alarm type	Action
OFF	No alarm	No Action
1	Measured value high limit alarm	 (NOTE 1)
11	Measured value high limit alarm with standby	
2	Measured value low limit alarm	 (NOTE 1)
12	Measured value low limit alarm with standby	
3	Deviation upper limit	 (NOTE 1)
13	Deviation upper limit with standby	
4	Deviation lower limit	 (NOTE 1)
14	Deviation lower limit with standby	
5	De-energized on deviation upper limit	 (NOTE 2)
15	De-energized on deviation upper limit with standby	

Table 1 (2/2)

Code	Alarm type	Action
6	De-energized on deviation lower limit	 (NOTE 2)
16	De-energized on deviation lower limit with standby	
7	Deviation upper-lower limit	 (NOTE 1)
17	Deviation upper-lower limit with standby	
8	Within upper-lower deviation limits	 (NOTE 1)
18	Within upper-lower deviation limits with standby	

(note1) Contact closes when the alarm "ON".
(note2) Contact opens when the alarm "ON".

Note

When the standby operation is in effect, and any of the following conditions applies, no alarm is output even if a normal alarm condition is present, until the input (PV) has first entered into the normal condition.

- At power ON.
- Setpoint changed.
- Setpoint switched from "main" to "sub".

10. OPERATION

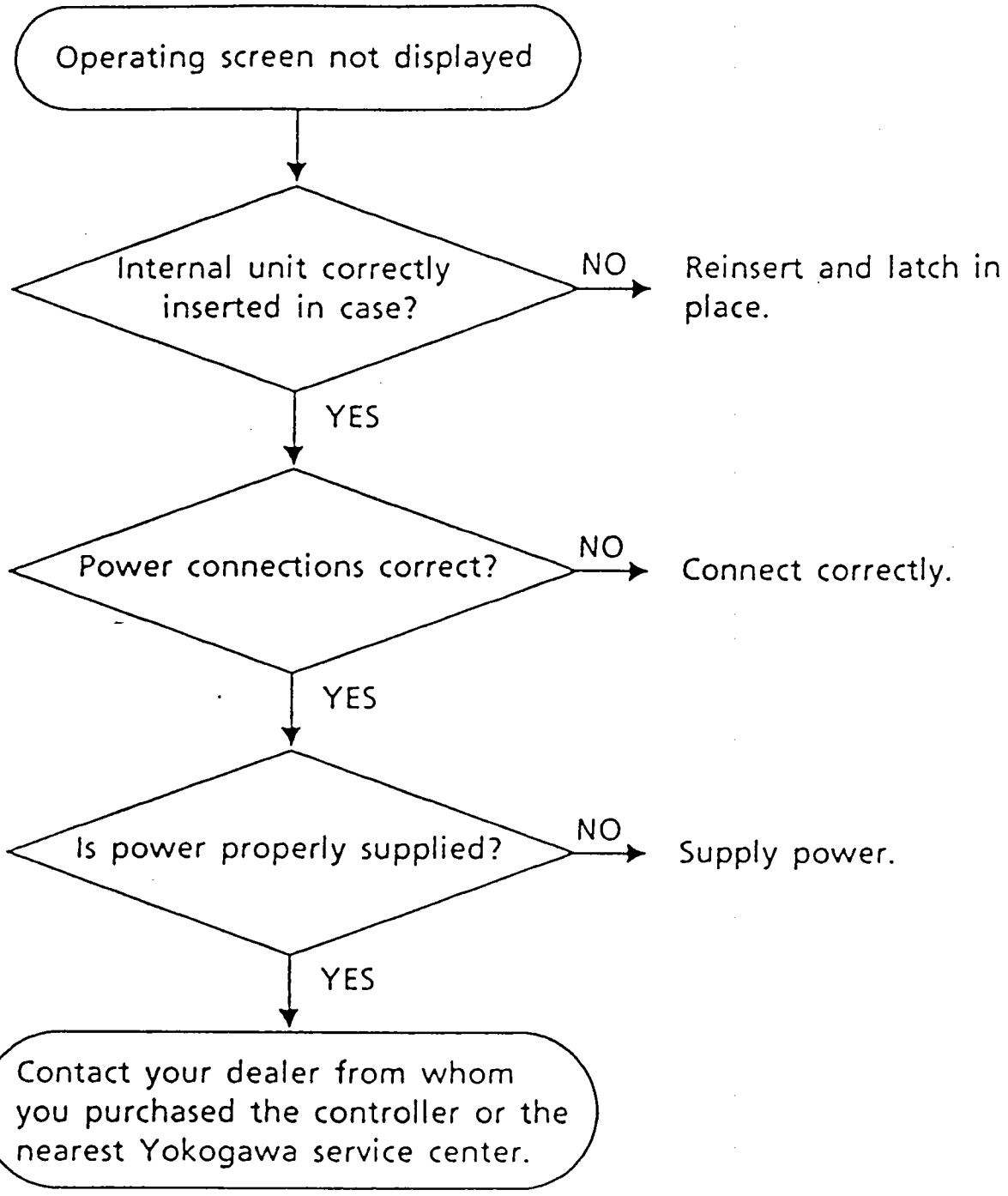
- The UT15L should normally be set up with DIP switch No.2 ON.
  If power is supplied the operating display panel (measured value) should appear.
- If the display goes to an "error display" condition during operation, see Section 11.2 "Error Display", and respond accordingly.
- If power is lost during operation.
  1) Momentary power outages in which power is lost for less than 20ms have no effect on UT15L operation (operation continues normally).
  2) • When power is restored (after a power outage longer than 20ms), the operation in effect immediately before power was cut is continued.
     However, if an alarm with "standby" has been selected, "standby" status goes into effect.
     • For about two seconds after power is restored, the input range code are displayed in the measured value display area.
     • Even when power is lost, values such as alarm values, etc. that have already been entered are maintained.

note : However, if power is lost while a numeric value is being set using the keys, error code E400 may be displayed in some cases. (See Section 11.2 "Error Display".)

11. MAINTENANCE

If the operating display panel is not displayed on the UT15L when power is supplied, take action according to the following troubleshooting flowchart. If a complex problem is suspected, contact your dealer or the nearest Yokogawa agent.

Troubleshooting flowchart



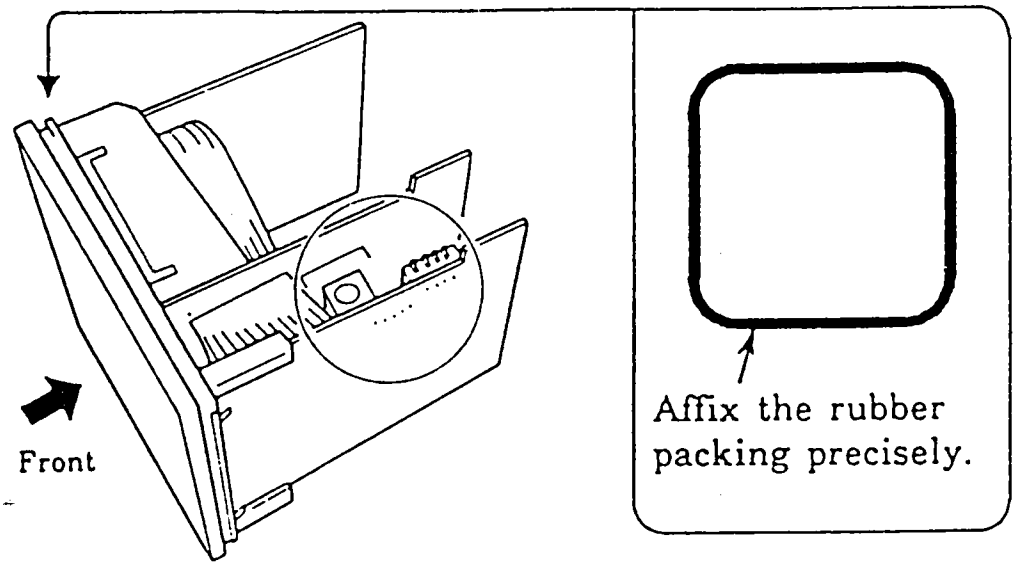
11.1 Replacement of Rubber Packing for Dustproofing

Although the life of the rubber packing for dustproofing is at least five or six years under normal operating conditions, when it deteriorates it should be replaced.

The part number, sales unit, and price of the rubber packing are as follows. (Order from your UM05/UM04 sales representative.)

Type	Part number	Sales unit	Price
UM05	B9877AJ	1 piece	$8

note : Turn the power OFF when removing the internal unit.



11.2 Error Display

If any of the following are displayed, an error has been detected. Respond to these errors as indicated in by the individual "action" entries.

Error display	Description of error	Action
E000 (E000)	RAM error	Request repair
E001 (E001)	ROM error	
E002 (E002)	System data error	
E300 (E300)	A/D converter error	Request repair
E400 (E400)	Parameter entry error	Check whether any parameters are incorrect, and reenter
Undefined display	Program failure	Request repairs

Error display	Description of error	Action
Measured value (PV) decimal point flashes.	Calibration data error	Request repair.
Measured value (PV) flashes.	Non-volatile memory error	
r_JC (RJC) and measured value (PV) alternately displayed	Reference junction compensation error	
b.oUt (B.OUT)	Burnout (including RTD)	Check thermocouple, RTD connections
oUr (OVR)	Over-scale	Check that measurement input range and sensor connections are correct.
-oUr (–OVR)	Under-scale	