TTM-200 brief operation manual

Thank you for purchasing our TTM-200. Please thoroughly read this manual.
This manual is a brief version of the operation manual. Please refer to the full version of the operation manual for details. (Payment will incur.)

Cautions

For safety purpose, following symbols are used in this manual.

⚠ Warning	The case that a user may receive fatal damage, electric shock, or severe burn injury when the product is incorrectly used
⚠ Caution	The case that a user may receive minor damage or the equipment may get damage

⚠ Warning	Verify correct wiring before turning on electricity since incorrect wiring may cause an equipment failure or a fire. Modification of this equipment may cause malfunctioning or a fire. Do not add modification on this equipment. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
⚠ Caution	Wiring: Do not use empty terminals for irrelevant purposes. Operation: Do not use a sharp-pointed tool for operating keys.

- Hand over this operation manual to a person who actually operates the product.
- Do not reprint or duplicate this manual without permission.
- Content of this manual may be subject to modification without prior notice.
- Keep a password in a note if it is set.

Verification of the product

1) Verification of the model: Refer the model name printed in the packing box to the order sheet.
2) Verification of accessories: Mounting attachment and this manual
3) Model table: TTM－20□- □ － □ □ － □ □ □ □ □ － □

Model	
4	48x48
5	96x48
7	72x72
9	96x96

Casing color	
Q	Black
X	Gray

*Not selectable for TTM-204

Output 1/2	
N	None
R	Relay contact (250 VAC, 3A)
P	SSR drive (0-12 VDC)
A	Open collector (24 VDC, 100 mA)
K	Voltage: 0-1 VDC
J	Voltage: 0-5 VDC
F	Voltage: 1-5 VDC
G	Voltage: 0-10 VDC
I	Current: 4-20 mADC
H	Voltage: 0-10 mVDC

Output 3・4・5・6・7	
A	Open collector (24 VDC, 100 mA)
R	Relay contact (250 VAC, 1A)

*From output 5 to 7 are not selectable for TTM-204.
*Output 6 is not selectable for TTM-207.

Option	
S	CT1 input
T	CT2 input
U	Event 1 input
V	Event 2 input
W	Event 3,4 input
M	Communication (RS-485)

*Selectable either W (Event 3 only available) or output 7 for TTM-207.
*Combination of ST, SV and UV are only available for TTM-204 and 207.

AI input	
Y	Multiple input (Voltage / current only)

*Not selectable for TTM-204

Power supply voltage	
	100-240VAC50/60Hz TTM-204 is 10VA Others are 11VA
L	24VAC/DC 50/60Hz TTM-204 is 4W Others are 5W

Environmental condition

(1) Service temperature/humidity range: 0-50 °C, 20-90 % RH (no dew condensation)
(2) Storage temperature/humidity range: -20-70 °C (no freezing or dew condensation), 5-95 % RH (no dew condensation)
(3) Equipment environment: 1) No corrosive gases, dust, and oil
2) As far away as possible from an electric noise source, and little effect from electromagnetic field
3) As few as possible with mechanical vibrations or impacts
4) No direct sunlight
5) Installation(overvoltage) category II /Pollution Degree 2
6) Indoor use / Altitude up to 2000m
7) Mains supply voltage fluctuations not to exceed ± 10 percent of the nominal voltage

Prior to control operation

- Non-volatile memory is used for storing settings, which stays in the storage even when the power is cut.
- Input form can be switched (Thermocouple, temperature measuring resistor, voltage, and current). Match the selected input form with input setting on the product.
- PID control and ON/OFF control are possible. Advantage/disadvantage of them are as follows. Select the control in consideration of the advantage / disadvantage.

* A self-tuning function is equipped on this product so that constants for PID are automatically calculated and reflected to the control at start of control operation or change of SV.

	PID control	ON/OFF control
Advantage	Better control result than ON/OFF control	Longer service life than that of PID control
Disadvantage	Short service life of the relays due to frequent on/off of output	Larger temperature fluctuation than that of PID control

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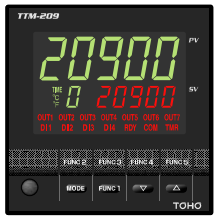
Drawing No. 20-0786-A

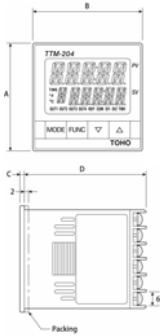
Front panel - names and tasks

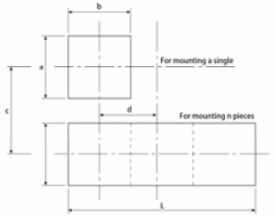


*Depending on size, some functions may not be available.
Refer to model table for details concerning individual functions.

OUT1 to OUT7	Output 1 to 7 monitor (It appears when output)
RDY	RDY lamp (to light up at READY status)
COM	COM lamp (to flicker during communication)
DI1 to DI4	DI 1 to 4 monitor (It appears when DI 1 to 7 operates)
TMR	TMR lamp (to light up during timer operation)
TIME	To light up when setting is for timer
° C／° F	To light up when setting is for temperature
PV	Reading indication, character indication, and timer setting time indication
SV	Setting indication, operation amount indication, and timer remained time indication
MODE	Mode key To be used when screen is switched.
FUNC	Function key To execute set function
△	Up key To be used for increasing setting value To be used for switching input setting mode
▽	Down key To be used for decreasing setting value To be used for switching input setting mode

Dimensions and panel cut





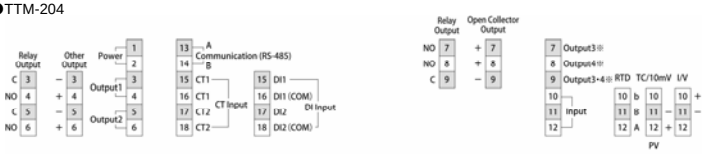
⚠ Caution * When mounting in series, pay much attention to interference with terminals on the adjacent equipment.

Model	a		b		c	d	A	B	C	D	L	
TTM-204	45	+0.6 -0	45	+0.6 -0	60 (☆1)	48	48	48	2	55	(Bxn-3)	+0.6 -0
TTM-205	92	+0.6 -0	45	+0.6 -0	120	48	96	48	2	65	(Bxn-3)	+1 -0
TTM-207	68	+0.6 -0	68	+0.6 -0	90	72	72	72	2	65	(Bxn-3)	+1 -0
TTM-209	92	+0.6 -0	92	+0.6 -0	120	96	96	96	2	65	(Bxn-3)	+1 -0

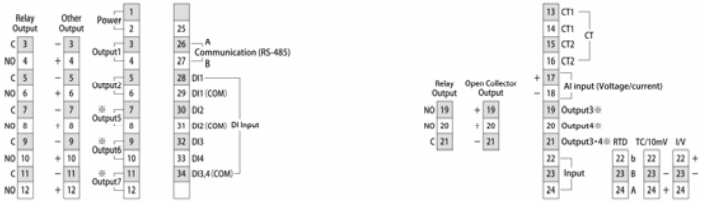
☆1:When using TTM-204, take careful note of dimensions in column c when using loader cable.

Wiring

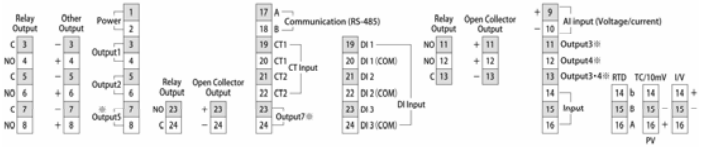
●TTM-204



●TTM-205/209



●TTM-207

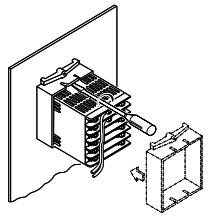


⚠ **Warning** * Use specified size (M3 width 6mm or less) crimped terminals (UL Listed) for wiring and crimping machines & tools (UL Listed).
* A conformity wire: copper/AWG18-24/Temperature rating 80℃.
* Tightening torque: 0.5 Nm (5 kgfm, 4.43lb.fin)
* Wire with care for polarity (+ and -), if applicable.
* For relay contact output, "C: common" and "NO: normal open."
* For output for SSR drive, match the polarity with input of SSR side and connect.
* For CT input, use specified current transformer (CTL-6-P-H).

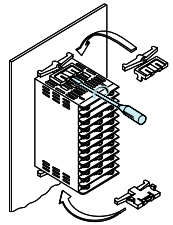
⚠ **Caution** * Do not touch terminals while supplying electricity to the product in order to prevent electric shock.

Mounting

●TTM-204



●TTM-205/207/209



*** Attachment removal technique**
For removal, insert a flathead screwdriver in between body and attachment pawl, and rotate the screwdriver to float the pawl.

*Do not use paint thinner or similar chemical to clean with.
Use standard grade alcohol.

No. of parameters and their descriptions

Table 1 Timer monitor (indicates the time remained): operation mode

01:00 (upper line) On delay
01:00 (lower line) Off delay
During operation, [:] flicks, and the remained time can be changed with ▲/▼ keys.

Table 2 Setting of input type: SET1, Item 1, SET2, Item1

No.	Type of sensor	Measuring/Setting Range
0	K thermocouple	-200.0～1372.0
1	J thermocouple	-200.0～1200.0
2	T thermocouple	-200.0～400.0
3	E thermocouple	-200.0～1000.0
4	R thermocouple	-50～1768
5	S thermocouple	-50～1768
6	B thermocouple	0～1800
7	N thermocouple	-200.0～1300.0
8	U thermocouple	-200.0～400.0
9	L thermocouple	-200.0～900.0
10	WRe5-26	0～2300
11	PR40-20	0～1880
12	PLⅡ	0.0～1390.0
13	Pt100	-200.0～850.0
14	JPt100	-200.0～510.0
15	0-10 mVDC	-19999～29999
16	0-1 VDC	-19999～29999
17	0-5 VDC	-19999～29999
18	1-5 VDC	-19999～29999
19	0-10 VDC	-19999～29999
20	4-20 mADC	-19999～29999

*Setting of input type 2 (SET 2, item 1) is from 16 to 20

Table 3 Setting of function of function keys: SET3, Item 1

No.	Function setting
∗0	No function
∗1	Digit move
∗2	Control mode/control stop
∗3	AT start/AT stop
∗4	Timer start/reset
∗5	Screen reverse travel
∗6	ENT
∗7	Bank switching
∗8	AUTO/MANUAL Swiching
No.	Screen reverse travel
0∗	None
1∗	Pressing time 1 sec
2∗	Pressing time 2 sec
3∗	Pressing time 3 sec
4∗	Pressing time 4 sec
5∗	Pressing time 5 sec

Table 4 Setting of control mode: SET4, Item 5

Symbol	Character	Description
RdY	RdY	Control stop
RUN	RUN	Control start
MAN	MAN	Manual
TIME1	tIME1	Timer 1 operation
TIME2	tIME2	Timer 2 operation
TIME3	tIME3	Timer 3 operation

Table 5 Setting of control type: SET4, Item 6

No.	Primary control	Secondary control
0	Disable	Disable
1	PID	Disable
2	ON／OFF	Disable
3	PID	PID
4	PID	ON／OFF
5	ON／OFF	ON／OFF
6	Position proportionate	Position proportionate

Table 6 Setting of PID control type: SET4, Item 7

No.	Control type
0	Type A (normal)
1	Type B (overshoot restraint)
2	Type C (Disturbance restraint)

Table 7 Setting of Type B mode: SET 4, Item 8

No.	Overshoot
0	Overshoot restraint - weak
1	Overshoot restraint - intermediate
2	Overshoot restraint - strong

Table 8 Setting of tuning type: SET 4, Item 12

No.	Type
1	Primary auto-tuning
2	Primary self-tuning
3	Secondary auto-tuning (Primary/Secondary PID)
4	Secondary self-tuning (Primary/Secondary PID)
5	Primary/secondary auto-tuning (Primary/Secondary PID)

Table 9 Setting of AT sensitivity: SET 4, Item 14
Setting of primary control sensitivity: SET4, Item 28
Setting of secondary control sensitivity: SET4, Item 40
Setting of SV tolerable width: SET14, 15 and 16, Item 3
PV display color switching range: SET 18, Item 6

Thermocouple/temperature measuring resistor	Current/voltage
0.0 to 999.9℃, 0 to 999℃	0 to 9999 (digits)

Table 10 Setting of primary (secondary) control OFF point position: SET 4, Items 29 and 41
Setting of dead band: Control setting mode item 43

Thermocouple/temperature measuring resistor	Current/voltage
-999.9 to 999.9℃ -999 to 999℃	-9999 to 9999 digits

Table 11 Setting of connection target: SET 5 to 11, Item 1

No.	Description
0	Primary output
1	Secondary output
2	Event output
3	RUN output
4	RDY output
5	Timer 1 output
6	Timer 1 on delay output
7	Timer 1 off delay output
8	Timer 1 on + off delay output
9	Timer 2 output
10	Timer 2 on delay output
11	Timer 2 off delay output
12	Timer 2 on + off delay output
13	Timer 3 output
14	Timer 3 on delay output
15	Timer 3 off delay output
16	Timer 3 on + off delay output
17	Transmission output (during analog output)

* In SET 7 to 11 there is no item "17"

Table 12 Setting of event function 1: SET 5 to 11, Item 2

No.	PV event function
∗∗0	None
∗∗1	Deviation upper/lower limit
∗∗2	Deviation upper limit
∗∗3	Deviation lower limit
∗∗4	Deviation range
∗∗5	Absolute value upper/lower limit
∗∗6	Absolute value upper limit
∗∗7	Absolute value lower limit
∗∗8	Absolute value range
No.	Added function
∗0∗	None
∗1∗	Hold
∗2∗	Standby
∗3∗	Delay
∗4∗	Hold + standby
∗5∗	Hold + delay
∗6∗	Standby + delay
∗7∗	Hold + standby + delay
No.	Control mode interlock function
0∗∗	All modes
1∗∗	RUN/MAN mode only
2∗∗	RUN mode only

Table 13 Setting of event upper limit/lower limit: SET 5 to 11, Item 3 and 4
Setting of transmission scaling upper/lower limit: SET 5 and 6, Item 12 and 13

Thermocouple/temperature measuring resistor	Current/voltage
-1999.9 to 2999.9℃ -1999 to 2999℃	-19999 to 29999 (digits)

Table 14 Setting of event sensitivity: SET 5 to 11, Item 5

Thermocouple/temperature measuring resistor	Current/voltage
0.0 to 999.9℃ 0 to 9999℃	0 to 9999 (digit)

Table 15 Setting of event function 2: SET 5 to 11, Item 7

No.	Function
∗∗0	None
∗∗1	Exists
No.	Added function
∗0∗	Disable
∗1∗	Hold
∗2∗	Delay
∗3∗	Hold + delay
No.	Control mode interlock function
0∗∗	All modes
1∗∗	RUN/MAN mode only
2∗∗	RUN mode only

Table 16 Setting of event function 3: SET 5 to 11, Item 8

No.	Function
∗∗0	None
∗∗1	CT1 fault
∗∗2	CT2 fault
∗∗3	CT1 fault + CT2 fault
No.	Added function
∗0∗	None
∗1∗	Hold
∗2∗	Delay
∗3∗	Hold + delay
No.	Control mode interlock function
0∗∗	All modes
1∗∗	RUN/MAN mode only
2∗∗	RUN mode only

Table 17 Setting of event function 4: SET 5 to 11, Item 9

No.	Function
∗∗0	None
∗∗1	Exists
No.	Added function
∗0∗	Disable
∗1∗	Hold

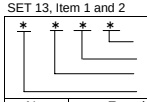
Table 18 Setting of transmission output function: SET 5 and 6, Item 11

No.	Transmission content
∗1	PV (measured value) output
∗2	SV (set value) output
∗3	MV1 (primary operation amount) output
∗4	MV2 (secondary operation amount) output
No.	Normal/reverse motion
0∗	Normal motion
1∗	Reverse motion

Table 19 Setting of CT connection target: SET 12, Item 1 and 4

No.	Connection target
1	Connected to OUT 1
2	Connected to OUT 2
3	Connected to OUT 3 (Option)
4	Connected to OUT 4 (Option)
5	Connected to OUT 5 (Option)
6	Connected to OUT 6 (Option)
7	Connected to OUT 7 (Option)

Table 20 Setting of DI function and polarity: SET 13, Item 1 and 2



No.	Function selection	
	Active	
0	None	None
1	Bank switching	Bank switching
2	MD	READY
3	AUTO	MANUAL
4	Reverse motion	Normal motion
5	AT stop	AT startup
6	Timer stop	Timer start
No.	Polarity selection	
0	Close active	
1	Open active	

*DI function is an option

Table 21 Setting of functions of timers 1, 2 and 3: SET 14, 15 and 16, Item 1

No.	Description
1	Auto start
2	Manual start
3	SV start
4	DI1 start
5	DI2 start
6	DI3 start
7	DI4 start
8	Event 1 start
9	Event 2 start
10	Event 3 start
11	Event 4 start
12	Event 5 start
13	Event 6 start
14	Event 7 start

Table 22 Setting of ON/OFF delay timer: SET 14, 15 and 16, Item 4 and 5
Remained time monitor: SET 14, 15 and 16, Item 7

0:00 to 99:59	Hours: minutes or minutes: seconds

Table 23 Setting of communication parameters: SET 17, Item 2

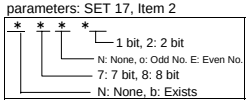


Table 24 Setting of communication speed: SET 17, Item 3

Numerical No.	Description
2.4	2400bps
4.8	4800bps
9.6	9600bps
19.2	19200bps
38.4	38400bps

Table 25 Setting of communication switching: SET 17, Item 6

No.	Description
0	Write prohibited
1	Write allowed
2	Simultaneous temperature increase
3	Simultaneous temperature increase

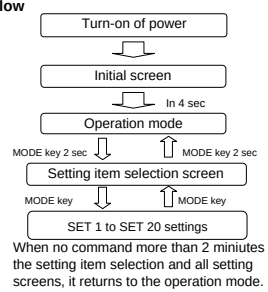
Bank selection table according to DI status

DI1	
0	Bank0
1	Bank1

DI2	DI1	
0	0	Bank0
0	1	Bank1
1	0	Bank2
1	1	Bank2

DI3	DI2	DI1	
0	0	0	Bank0
0	0	1	Bank1
0	1	0	Bank2
0	1	1	Bank3
1	0	0	Bank4
1	0	1	Bank5
1	1	0	Bank6
1	1	1	Bank7

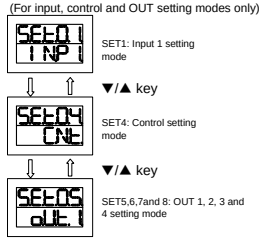
Basic flow



When no command more than 2 miniutes in the setting item selection and all setting screens, it returns to the operation mode.

Setting items selection screen flow

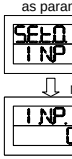
(For input, control and OUT setting modes only)



The operation flow below uses SET1, SET4, and SET5, 6, 7 and 8 as primary parameters

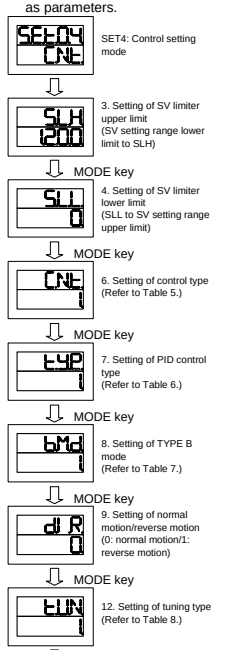
SET 1: Input 1 setting mode

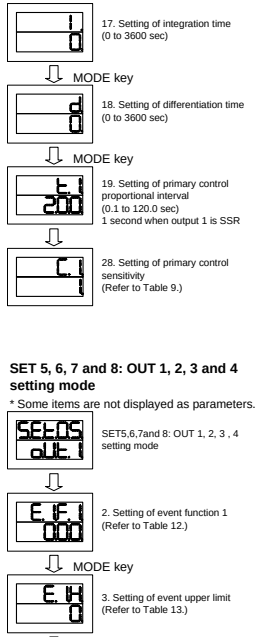
* Some items are not displayed as parameters.



SET 4: Control setting mode

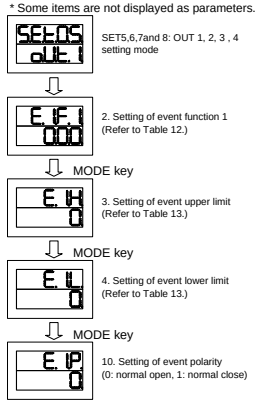
* Some items are not displayed as parameters.





SET 5, 6, 7 and 8: OUT 1, 2, 3 and 4 setting mode

* Some items are not displayed as parameters.



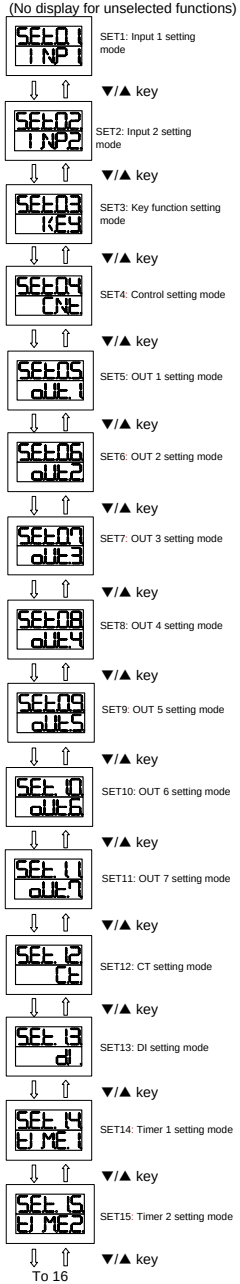
Character

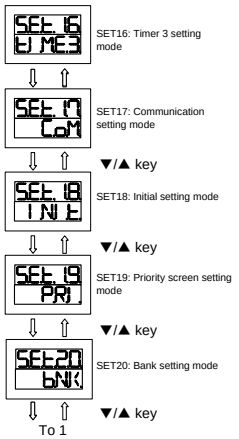
0	1	2
0	1	2
3	4	5
3	4	5
6	7	8
6	7	8
9	Minus	Period
9	-	.
Slash		
/		
A	B	C
A	b	C
D	E	F
d	E	F
G	H	I
G	H	I
K	L	M
K	L	M
N	O	P
N	o	P
R	S	T(t)
R	S	t
U	V	W
U	V	W
Y		
Y		

Operation flow diagram

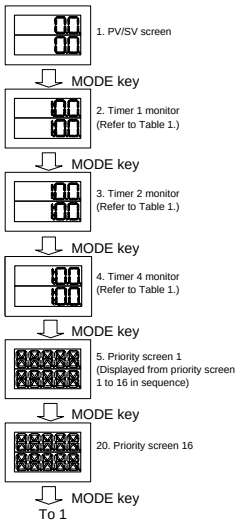
Setting item selection screen

(No display for unselected functions)

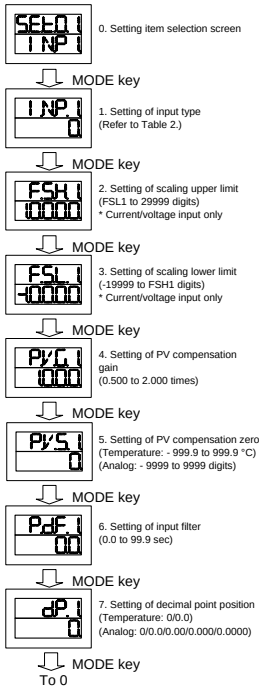




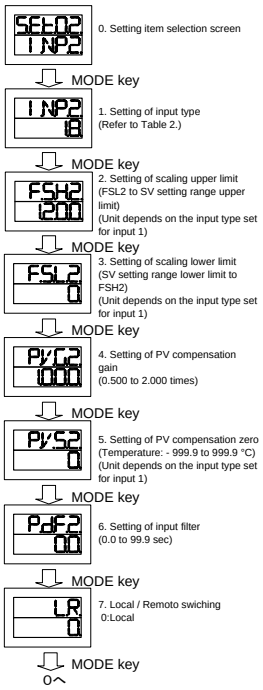
Run mode



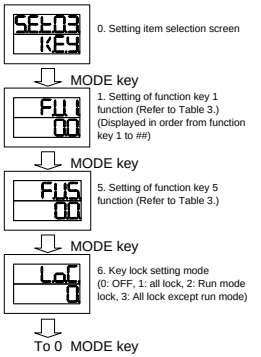
SET 1: Input 1 setting mode



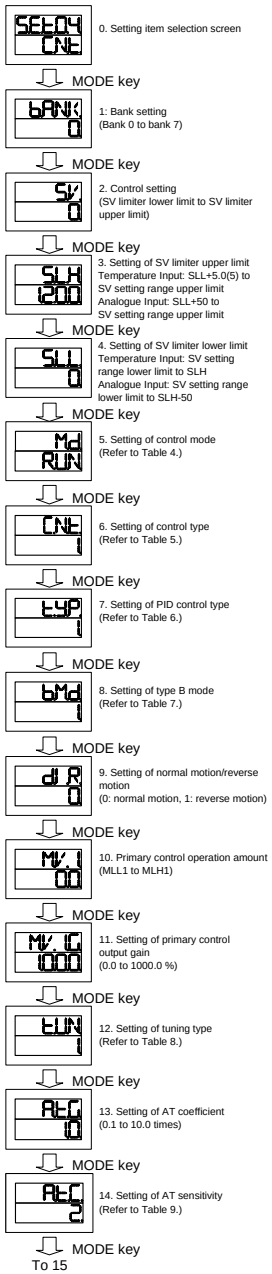
SET 2: Input 2 setting mode

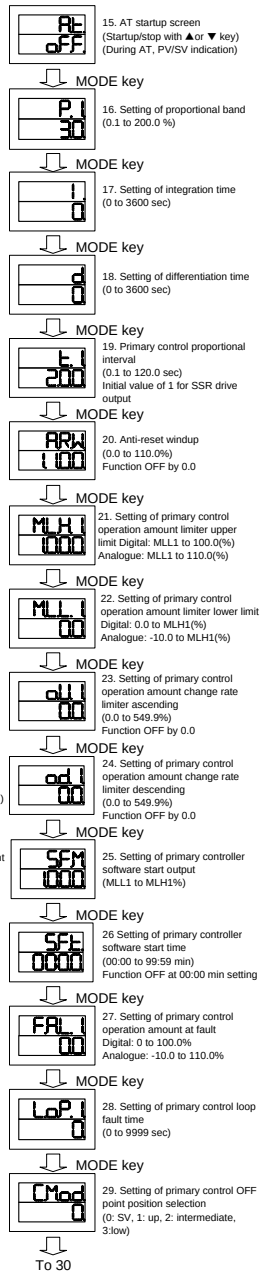


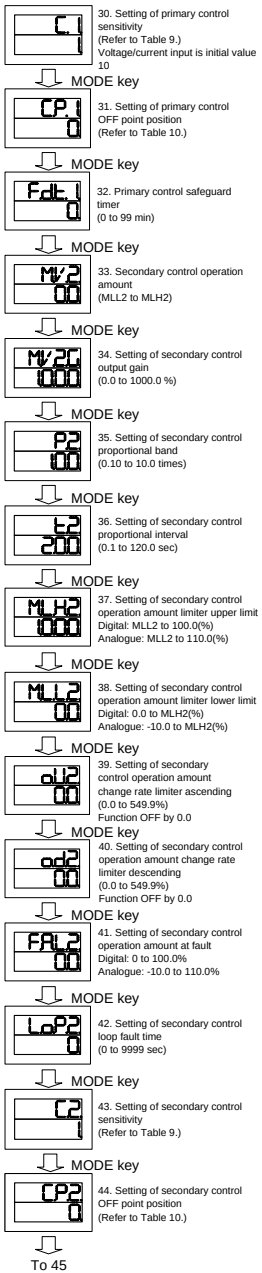
SET 3: Key function setting mode

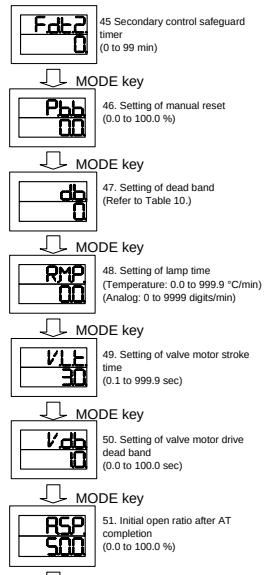


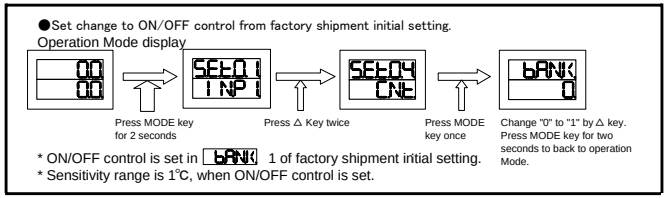
SET 4: Control setting mode











SET 5

SEt05 — 0. Setting item selection screen

MODE key

oUt1 / 0 — 1. Setting of connection target. (Refer to Table 11.)

MODE key

E1F1 / 000 — 2. Setting of event function 1 (Refer to Table 12.)

MODE key

E1H / 0 — 3. Setting of event upper limit (Refer to Table 13.)

MODE key

E1L / 0 — 4. Setting of event lower limit (Refer to Table 13.)

MODE key

E1C / 0 — 5. Setting of event sensitivity (Refer to Table 14.)

MODE key

E1t / 0 — 6. Setting of event delay timer (0 to 9999 sec)

MODE key

E1F2 / 000 — 7. Setting of event function 2 (PV fault) (Refer to Table 15.)

MODE key

E1F3 / 000 — 8. Setting of event function 3 (CT fault) (Refer to Table 16.)

MODE key

E1F4 / 00 — 9. Setting of event function 4 (Loop fault) (Refer to Table 17.)

MODE key

E1P / 0 — 10. Setting of event polarity (0: Normal open, 1: Normal close)

MODE key

tRN1 / 00 — 11. Setting of transmission output function (Refer to Table 18.)

MODE key

tRH1 / 1200 — 12. Setting of transmission scaling upper limit (Refer to Table 13.)

MODE key

tRL1 / 0 — 13. Setting of transmission scaling lower limit (Refer to Table 13.)

MODE key

To 0

* Setting mode for OUT2 is SEt05

SET 7 to

SEt07 — 0. Setting item selection screen

MODE key

oUt3 / 2 — 1. Setting of connection target. (Refer to Table 11.)

MODE key

E3F1 / 000 — 2. Setting of event function 1 (Refer to Table 12.)

MODE key

E3H / 0 — 3. Setting of event upper limit (Refer to Table 13.)

MODE key

E3L / 0 — 4. Setting of event lower limit (Refer to Table 13.)

MODE key

E3C / 0 — 5. Setting of event sensitivity (Refer to Table 14.)

MODE key

E3t / 0 — 6. Setting of event delay timer (0 to 9999 sec)

MODE key

E3F2 / 000 — 7. Setting of event function 2 (PV fault) (Refer to Table 15.)

MODE key

E3F3 / 000 — 8. Setting of event function 3 (CT fault) (Refer to Table 16.)

MODE key

E3F4 / 00 — 9. Setting of event function 4 (Loop fault) (Refer to Table 17.)

MODE key

E3P / 0 — 10. Setting of event polarity (0: Normal open, 1: Normal close)

MODE key

To 0

SET 12: CT setting mode

SEt12 / Ct — 0. Setting item selection screen

MODE key

Ct1 / 1 — 1. Setting of CT1 connection target (Refer to Table 19.)

MODE key

CM1 / 00 — 2. CT1 current value monitor (0.0 to 50.0 A)

MODE key

Ct1 / 00 — 3. Setting of CT1 fault current value (0.0 to 30.0 A)

MODE key

Ct2 / 1 — 4. Setting of CT2 connection target (Refer to Table 19.)

MODE key

CM2 / 00 — 5. CT2 current value monitor (0.0 to 50.0 A)

MODE key

Ct2 / 00 — 6. Setting of CT2 fault current value (0.0 to 30.0 A)

MODE key

To 0

SET 13: DI setting mode

SEt13 / dI — 0. Setting item selection screen

MODE key

dIF / 0000 — 1. Setting of function (Refer to Table 21.)

MODE key

dIP / 0000 — 2. Setting of polarity (Refer to Table 21.)

MODE key

To 0

* Setting mode for OUT4,5,6 and 7 are SEt08 SEt09 SEt10 SEt11

SET 14,

SEt14 / tIME1 — 0. Setting item selection screen

MODE key

tMF1 / 1 — 1. Setting of function (Refer to Table 21)

MODE key

H/M / 1 — 2. Setting of units (1: hours/minutes, 2: minutes/seconds)

MODE key

tSV1 / 00 — 3. Setting of SV tolerance width (Refer to Table 9.)

MODE key

oNt1 / 0000 — 4. Setting of ON display timer (Refer to Table 22.)

MODE key

oFt1 / 0000 — 5. Setting of OFF delay timer (Refer to Table 22.)

MODE key

RUN1 / 1 — 6. Setting of repeating numbers (0 to 99) * "0" for unlimited number of times

MODE key

tIM1 / 0000 — 7. Remained time monitor (Refer to Table 22.) (Timer startup/stop with ▲/▼ key)

MODE key

To 0

* Setting Mode for Timer 2 & 3 are SEt15 SEt16

SET 17:

SEt17 / CoM — 0. Setting item selection screen

MODE key

PRt / 0 — 1. Setting of communication protocol (0: TOHO, 1: MODBUS(RTU), 2: MODBUS(ASCII)

MODE key

CoM / bAN2 — 2. Setting of communication parameters (Refer to Table 23.)

MODE key

bPS / 96 — 3. Setting of communication speed (Refer to Table 24)

MODE key

AdR / 1 — 4. Setting of communication address (TOHO: 1 to 99) (MODBUS: 1 to 247)

MODE key

AWt / 0 — 5. Setting of response delay time (0 to 250 ms)

MODE key

Mod / 1 — 6. Setting of communication (Refer to Table 25.)

MODE key

To 0

SET 18: Initial setting mode

SEt18 / INIt — 0. Setting item selection screen

MODE key

PASS / 0000 — 1. Password release (To release, change 4-digit numerical numbers and press MODE key.) (0000 to 9999)

MODE key

NdSP / 0 — 2. PV normal indication color (0: green, 1: red, 2: orange, 3:Auto)

MODE key

AdS1 / 1 — 3. PV color auto display: Low (0: green, 1: red, 2: orange)

MODE key

AdSM / 0 — 4. PV color auto display: Mid (0: green, 1: red, 2: orange)

MODE key

AdSH / 2 — 5. PV color auto display: High (0: green, 1: red, 2: orange)

MODE key

PVC / 1 — 6. PV color auto display: Switching range (Refer to Table 9.)

MODE key

E1dSP / 2 — 7. Indication color at PV event output (0: green, 1: red, 2: orange)

MODE key

E2dSP / 1 — 8. Indication color at PV fault (0: green, 1: red, 2: orange)

MODE key

E3dSP / 1 — 9. Indication color at CT fault (0: green, 1: red, 2: orange)

MODE key

E4dSP / 1 — 10. Indication color at loop fault (0: green, 1: red, 2: orange)

MODE key

bLd / 1 — 11. Setting of blind temporary call (0: to blind) (1: to call blind screen)

MODE key

bKUP — 12. Set value backup (To back up, press/hold FUNC key for 2 seconds)

MODE key

RESEt / 0 — 13. Initialization of values (0: Setting at factory shipment 1: Setting for backup) (To initialize, press/hold FUNC key for 2 seconds)

MODE key

PASS / 0000 — 14. Setting of password (To set/release, change 4-digit numerical numbers, and press/hold FUNC key for 2 seconds.) (0000 to 9999)

MODE key

0へ

SET 19:

SEt19 / PRJ — 0. Setting item selection screen

MODE key

PRJ01 / oFF — 1. Setting of priority screen 1

MODE key

PRJ16 / oFF — 16. Setting of priority screen 16

MODE key

0へ

screens 1

SET 20: Bank setting mode

SEt20 / bNK — 0. Setting item selection screen

MODE key

bNK01 / CNt — 1. Setting of bank selection 1

MODE key

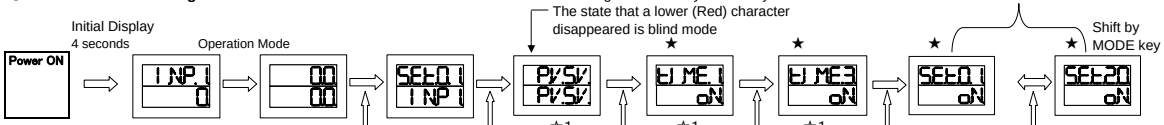
bNK16 / oFF — 16. Setting of bank screen 16

MODE key

To 0

selections

●BLIND Function Setting



Content of the left

1)In BLIND MODE, either「ON」& 「OFF」is displayed on under each characters (SV display).
「ON」is displayed.「OFF」is not displayed (BLIND).

2)To change characters in BLIND MODE by pressing「FUNC」key.
How to