High Performance Single-phase Thyristor Unit

20 A/30 A/45 A 60 A/80 A/100 A

Quick Operation Manual

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Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of your new instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference.

This manual explains the basic procedures for operating the THV-A1. For detailed handling procedures and various function settings, please refer to separate THV-A1 Instruction Manual [Detailed version] (IMR02D04-EID).

The above manuals can be downloaded from the official RKC website: https://www.rkcinst.co.jp/english/download-center.

1. PARTS DESCRIPTION

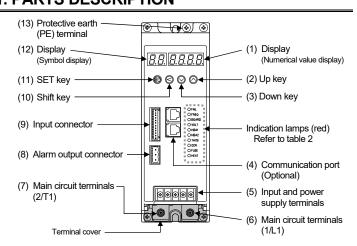


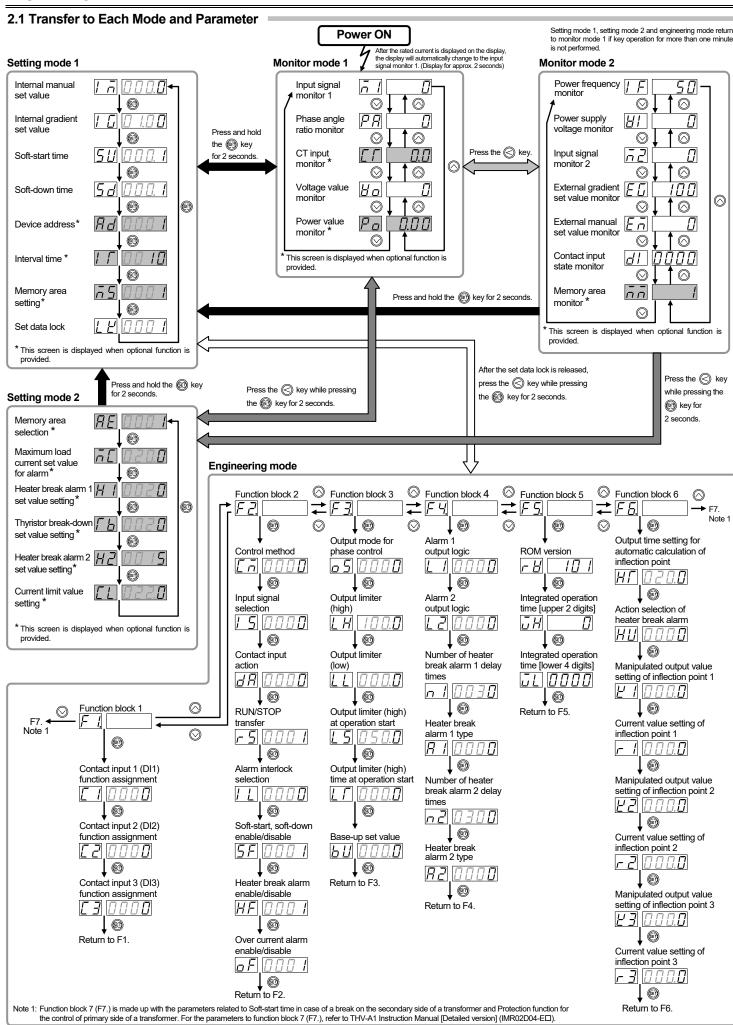
Table 1 Parts description [The name is the same as for each type (20 to 100 A).]

No.	Name	Description	
(1)	Display (Numerical value display)	Display the input signal values and parameters.	
(2)	Up key	Used to select the monitor item and function block (F□). Increase numerals.	
(3)	Down key	 Used to select the monitor item and function block (F□). Decrease numerals. 	
(4)	Communication port (COM.PORT1, COM.PORT2)	Communication port for connecting a host computer or the THV-A1 in a multi-drop connection. (Optional)	
(5)	Input and power supply terminals	Used to connect input signal (controller) and power supply (instrument power supply voltage) wires.	
(6)	Main circuit terminals (1/L1)	Used to connect main circuit wires.	
(7)	Main circuit terminals (2/T1)		
(8)	Alarm output connector	Used to alarm output. (Number of output points: 2 points) The type of alarm to be output must be set.	
(9)	Input connector	Used to connect with a setter (potentiometer), external contact or controller. A function must be assigned to the contact input (DI).	
(10)	Shift key	Used to select the mode. Shift digits when settings are changed.	
(11)	SET key	Used for parameter calling up and set value registration.	
(12)	Display (Symbol display)	Display the parameter symbols.	
(13)	Protective earth (PE) terminal	Used to connect the grounding terminal.	

Table 2 Indication lamps [The name is the same as for each type (20 to 100 A).]

Symbol	Name	Description	
FAIL	FAIL	This lamp lights to indicate an error detected by the watchdog timer of the self-diagnosis function or the CPU power monitor.	
FREQ	Power frequency error	This lamp lights if power frequency is out of the allowable range (detecting range) when power is turned on or during operation. (Detection range: 45.0 to 64.9 Hz)	
BOARD	Board error	This lamp lights if a board error of this instrument is detected by the self-diagnosis function.	
VOLT	Power supply voltage error	This lamp lights if the power voltage exceeds 264 V when the power is turned on or during operation.	
HBA1	Heater break alarm 1	Lights when HBA1 output is turned on. This alarm function is available on the instrument with a constant current control or constant power control.	
HBA2	Heater break alarm 2	Lights when HBA2 output is turned on. This alarm function is available on the instrument with a constant current control or constant power control.	
THY.B	Thyristor break-down alarm	Lights when thyristor break-down alarm output is turned on. This alarm function is available on the instrument with a constant current control or constant power control.	
OCR	Over current	This lamp lights if the current of more than 1.2 times the rating of this instrument flows. This alarm function is available on the instrument with a constant current control or constant power control.	
FUSE	Fuse break	This lamp lights if the fast-blow fuse inside the instrument blows. This alam function is available on the instrument with a built-in fast-blow fuse.	
HEAT	Heat sink temperature abnormality	This lamp lights if the temperature of the semiconductor controlled rectifier (SCR) rises above 120 °C. This alarm function is available on the instrument with a heat sink temperature detection function.	

2. SETTING



2.2 Parameter List

Symbol	Name	Display range 0 to 100 % Select whether this shows the auto mode set value, the external manual set value, or the internal manual set value.	
⊼ / (M1)	Input signal monitor 1		
PR	Phase angle ratio	0 to 100 %	
(PA)	monitor	(0 to 180°: When the phase angle is 180°, display the 100 %.)	
EF (CT)	CT input monitor ¹	0.0 to 27.0 A (20 A type) 0.0 to 81.0 A (60 A type) 0.0 to 40.5 A (30 A type) 0.0 to 108.0 A (80 A type) 0.0 to 60.8 A (45 A type) 0.0 to 135.0 A (100 A type)	
Ha (Vo)	Voltage value monitor	0 to 280 V (90 to 264 V AC [Including power supply voltage variation] Rated value 100 to 240 V AC) Display the output voltage of THV-A1.	
Р _о (Po)	Power value monitor ²	0.00 to 7.56 kW (20 A type) 0.00 to 22.68 kW (60 A type) 0.00 to 11.34 kW (30 A type) 0.00 to 30.24 kW (80 A type) 0.00 to 17.01 kW (45 A type) 0.00 to 37.80 kW (100 A type)	

This screen is displayed on the instrument with a constant current control or constant power control. This screen is displayed on the instrument with a constant power control.

■ Monitor mode 2

Symbol	Name	Display range	
! F (IF)	Power frequency monitor	40 to 70 Hz	
(VI)	Power supply voltage monitor	0 to 280 V (90 to 264 V AC [Including power supply voltage variation] Rated value 100 to 240 V AC) Display the power supply voltage.	
-ī-2 (M2)	Input signal monitor 2	0 to 100 $\%$ Display the auto mode set value (value of input signal from controller).	
EG)	External gradient set value monitor	0 to 100 %	
Eñ (EM)	External manual set value monitor	0 to 100 %	
급 (dl)	Contact input state monitor	Contact input 1 (DI1) 0: Contact open 1: Contact closed Contact input 2 (DI2) 0: Contact open 1: Contact closed Contact input 3 (DI3) 0: Contact open 1: Contact closed	
лл (MM)	Memory area monitor *	1 to 4 The memory area number now used for alarm monitoring is displayed.	

■ Setting mode 1

Symbol	Name	Setting range	Factory set value
/	Internal manual set value	0.0 to 100.0 %	0.0
/ [] (IG)	Internal gradient set value 1	0.00 to 2.00 (0.00: Internal gradient 0 % 2.00: Internal gradient 200 %)	1.00
5U (SU)	Soft-start time ²	0.0 to 100.0 seconds (0.0: Soft-start function unused)	0.1
5d (Sd)	Soft-down time ²	0.0 to 100.0 seconds (0.0: Soft-down function unused)	0.1
Rd (Ad)	Device address ³	0 to 99	1
/ [(IT)	Interval time 3	0 to 250 ms	10
75 (MS)	Memory area setting ⁴	1 to 4 Set the memory area used for alarm monitoring.	1
(TK)	Set data lock	L L Setting mode 1, Setting mode 2 0: Lock 1: Unlock Engineering mode 0: Lock 1: Unlock Unused Unused	0001

his parameter becomes valid when the control method is the phase control or zero-cross control (continuous).

■ Setting mode 2

Setting mode 2 screen is displayed on the instrument with a constant current control or constant power control.

Symbol	Name	Setting range	Factory set value
RE (AE)	Memory area selection	1 to 4 Select the memory area used to store the set values.	1
лЕ (MC)	Maximum load current set value for alarm ★	0.0 to 22.0 A (20 A type) 0.0 to 33.0 A (30 A type) 0.0 to 50.0 A (45 A type) 0.0 to 66.0 A (60 A type) 0.0 to 88.0 A (80 A type)	20.0 30.0 45.0 60.0 80.0
H I (H1)	Heater break alarm 1 set value setting ★	0.0 to 110.0 A (100 A type) 0 to 100 % of maximum load current set value * (0: Heater break alarm 1 unused)	100.0 20

[★] Parameters which can be used in multi-memory area function

When the control method is Phase Control, RKC recommends:

Set the heater break alarm set value to approximately 20 % of the maximum load current value for heater break alarm Type 1 (constant resistance type, deviation alarm).

Set the heater break alarm set value to approximately 10 % of the maximum load current value for heater break alarm.

Type 2 (linearity resistor type, absolute value alarm). Do not set the heater break alarm set value to more than 15 %.

I ype 2 (linearity resistor type, a sosoulie value aiarm). Do not set the neater break aiarm set value to more train 15 %.

In the case of a heater break alarm that supports non-linear resistance, there is no recommended value because the load characteristics vary depending on the non-linear load type.

When the control method is Zero-cross Control, RKC recommends:

Set the heater break alarm set value to approximately 80 % of the reading of current transformer input.

Set the heater break alarm set value to a slightly smaller value to prevent a false alarm when power supply variation is large.

Set the heater break alarm set value to a slightly larger value to detect a failure of one heater when more than one heaters are connected in parallel. But the set value should be less than the maximum reading of current transformer input.

This parameter becomes valid when the control method is the phase control. This screen is displayed on the instrument with a communication function (RS-422A or RS-485).

This screen is displayed on the instrument with a constant current control or constant power control. When the memory This scheen is displayed on the insurinent with a constant certain to this or constant power control. When area setting (MS) is changed, the memory area selection (AE) changes to the same memory area number When a contact input (DI) is used, the contact input (DI) setting has priority.

Although the following values are recommended, the alarm set value varies depending on the load type and the number of connection. Set the value suited to your system.

Settina mode 2

Symbol	Name	Setting range	Factory set value
ГЬ	Thyristor break-down	0 to 100 % of maximum load current set value 1	20
(Tb)	set value setting ★	(0: Thyristor break-down alarm unused)	
H2	Heater break alarm 2	0 to 100 % of maximum load current set value 2	15
(H2)	set value setting ★	(0: Heater break alarm 2 unused)	
ΕL	Current limit value	0.0 to 22.0 A (20 A type) 3	22.0
(CL)	setting ★	0.0 to 33.0 A (30 A type) 3	33.0
		0.0 to 50.0 A (45 A type) 3	50.0
		0.0 to 66.0 A (60 A type) 3	66.0
		0.0 to 88.0 A (80 A type) ³	88.0
		0.0 to 110.0 A (100 A type) 3	110.0

- ★ Parameters which can be used in multi-memory area function
- ¹ Although the following values are recommended, the alarm set value varies depending on the load type and the number of connection. Set the value suited to your system.
- When the control method is Phase Control, RKC recon
- Set the thyristor break-down set value to approximately 20 % of the maximum load current value for heater break alarm
- Set the thyristor break-down set value to approximately 10 % of the maximum load current value for heater break alarm Type 2 (linearity resistor type, absolute value alarm), Do not set the thyristor break-down set value to more than 15 %
- In the case of a non-linear resistance heater break alarm, there is no recommended value because the load characteristics vary depending on the non-linear load type.
- When the control method is Zero-cross Control, RKC recommends:

Set the thyristor break-down set value to approximately 80 % of the maximum load current value.

- ² Although the following values are recommended, the alarm set value varies depending on the load type and the number of connection. Set the value suited to your system.
- When the control method is Phase Control and heater break alarm Type 1 (constant resistance type, deviation rm) is selected RKC recomme
- Set the value must be equal or less than the heater break alarm 1 set value When the control method is Phase Control and heater break alarm Type 2 (linearity resistor type, absolute value
- For the type 2, this item is not available. Set the "0: Heater break alarm 2 unused."
- The heater break alarm 2 set value cannot be used as the non-linear resistance heater break alarm.
- The heater break alarm 2 set value is activated as the standard heater break alarm.
- When the control method is Zero-cross Control, RKC recommends:
- If the alarm needs to be output before a heater break occurs, set the set value of heater break alarm 2 to any value
- slightly larger than that of heater break alarm 1.

 If the alarm needs to be output before thyristor break-down occurs, set the set value of heater break alarm 2 to any value slightly smaller than that of heater break alarm 1.
- ³ If a current limit value is set to its maximum value, the current limit function is deactivated. When set to 0.0, the output of the THV-A1 turns off. In addition, the current limiter function is not available when the zero-cross control is selected

- Engineering mede

■ Engi	■ Engineering mode			
Symbol	Name	Setting range	Factory set value	
F <i>l.</i> (F1.)	Function block 1	This is first parameter symbol of function block 1 (F1.).		
E 1 (C1)	Contact input 1 (DI1) function assignment	No function Auto mode/Manual mode transfer 1 RUN/STOP transfer 2	0	
[2 (C2)	Contact input 2 (DI2) function assignment	3: Alarm interlock release ² 4: Heater break alarm enable/disable ^{2,3} 5: Soft-start, soft-down enable/disable ^{2,4}	0	
(C3)	Contact input 3 (DI3) function assignment	6: Set data lock/unlock ^{2,5} 7: Over current alarm enable/disable ^{2,3} 8: Memory area transfer ^{3,6,7}	0	

Selection of the setting type may be necessary using the contact input action (dA) of function block 2

ontact input (DI) state			
Name	Items selected depending on DI state		
Name	Open	Closed	
Auto mode/Manual mode transfer	Auto mode	External manual mode or Internal manual mode	
RUN/STOP transfer	STOP	RUN	
Alarm interlock release		Alarm interlock release	
Heater break alarm enable/disable	Enable	Disable	
Soft-start, soft-down enable/disable	Enable	Disable	
Set data lock/unlock	Lock Unlock		
Over a prost clarm enable/diachle	Fnoble	Diaghla	

- This setting becomes valid on the instrument with a constant current control or constant power control
- ⁴ This setting becomes valid when the control method is the phase control
- ⁵ The mode locked by the contact input (DI) accords with the set data lock (LK) setting in setting mode 1
- ⁶ If the non-linear resistance heater break alarm is used, memory area transfer cannot be used
- Memory area transfer uses two contact input (DI) points.

Assign memory area transfer to contact input 1 (DI1). When assigned to contact input 1 (DI1), memory area transfer is also automatically assigned to contact input 2 (DI2).

Memory area transfer cannot be assigned to contact input 2 (DI2) and contact input 3 (DI3).

[DI No.		Memory areas selected depending on DI state		
	DI NO.	Memory area 1	Memory area 2	Memory area 3	Memory area 4
	DI1	Open	Closed	Open	Closed
	DI2	Open	Open	Closed	Closed
•					

Symbol	Name	Setting range	Factory set value
F2. (F2.)	Function block 2	This is first parameter symbol of function block 2 (F2.).	
(CM)	Control method	Phase control Zero-cross control (continuous) ¹ Zero-cross control (input synchronous type) ¹	0
1 5 (IS)	Input signal selection	0: 0 to 20 mA DC, 0 to 5 V DC, 0 to 10 V DC ² , 0/12 V DC, 0/24 V DC 1: 4 to 20 mA DC, 1 to 5 V DC, 0/12 V DC, 0/24 V DC	Factory set value varies depending on the instrument specification.
dR (dA)	Contact input action	O: External manual mode ↔ Auto mode ³ 1: Internal manual mode ↔ Auto mode ³ 2: Internal manual mode (fixed) ³ 3: External manual mode (fixed) ³	0

- 1 When the zero-cross control is selected, the output mode for phase control becomes invalid.
- $^{2}\,$ If 0 to 10 V DC is specified at the time of ordering, this cannot be changed to an input signal other than voltage pulse
- input (0/12 V DC, 0/24 V DC).

Settings that become effective based on the contact input (DI) setting:					
Contact input action (dA) setting	Settings that become effective based on the DI setting				
Contact input action (dA) setting	Closed	Open			
0: External manual mode ↔ Auto mode	External manual mode	Auto mode			
1: Internal manual mode ↔ Auto mode	Internal manual mode	Auto mode			
2: Internal manual mode (fixed)	Internal manual mode				
3: External manual mode (fixed)	External manual mode				

Function block 2 (F2.)

Symbol	Name	Setting range	Factory set value
r5	RUN/STOP transfer ¹	0: STOP	1
(rS)		1: RUN	
1 L	Alarm interlock ²	0: Unused	0
(IL)		1: Use	
SF	Soft-start, soft-down	0: Soft-start, soft-down disable	1
(SF)	enable/disable 1,3	1: Soft-start, soft-down enable	
HF	Heater break alarm	0: Heater break alarm disable	1
(HF)	enable/disable 1,4	1: Heater break alarm enable	
aF	Over current alarm	0: Over current alarm disable	1
(oF)	enable/disable 1,4	1: Over current alarm enable	

- When a contact input (DI) is used, the contact input (DI) setting has priority.
- ² To use the alarm interlock release function in a contact input (DI), set to "1: Use." When in the alarm interlock release (contact closed) state, the alarm interlock function will not operate. The contact input (DI) setting has priority.
- This parameter becomes valid when the control method is the phase control.
- ⁴ This parameter becomes valid on the instrument with a constant current control or constant power control.

Symbol	Name	Setting range	Factory set value
F3.	Function block 3	This is first parameter symbol of function block 3	
(F3.)		(F3.).	
aS	Output mode for	0: Proportional phase angle to input	Factory set value
(oS)	phase control 1	1: Proportional voltage to input	varies depending
		2: Proportional square voltage (electric power)	on the instrument
		to input 3: Constant current control ²	specification.
		4: Constant voltage control	
		5: Constant power control ³	
		6: Square voltage feedback	
LH	Output limiter (high) 4	0.0 to 100.0 %	100.0
(LH)		[Output limiter (low) ≤ Output limiter (high)]	
LL	Output limiter (low) 4	0.0 to 100.0 %	0.0
(LL)		[Output limiter (low) ≤ Output limiter (high)]	
L5	Output limiter (high) at	0.0 to 100.0 %	50.0
(LS)	operation start 5	[Output limiter (high) at operation start ≤ Output limiter (high)]	
LΓ	Output limiter (high)	0.0 to 600.0 seconds	0.0
(LT)	time at operation start 5	(0.0: Output limiter function at operation start disable)	
Ӹ	Base-up set value 4,6	-10.0 to +100.0 %	0.0
(bU)		[Base-up set value ≤ Output limiter (high)]	

- 2 This setting becomes valid on the instrument with a constant current control or constant power control
- The setting becomes valid on the instrument with a constant power control.
- 4 This parameter becomes valid when the control method is the phase control or zero-cross control (continuous).
- ⁵ This function is activated when the control method is the phase control.
- ⁶ The base-up set value is effective only when the output limiter (low) is set to 0.0.

Symbol	Name	Setting range	Factory set value
F4. (F4.)	Function block 4	This is first parameter symbol of function block 4 (F4.).	
L / (L1)	Alarm 1 output logic 1	No output Power frequency error (energized) Board error (energized) Board error (energized) Power supply voltage error (energized) Heater break alarm 1 (energized) ² Heater break alarm 2 (energized) ² Thyristor break-down alarm (energized) ² Over current (energized) ² Fuse break (energized) Heat sink temperature abnormality (energized) ³ Fall. (de-energized)	0
L2 (L2)	Alarm 2 output logic ¹	To set the alarm output to "de-energized," set the thousands digit to "1." (However, excluding FAIL.) For example, to set the alarm output of "2. Board error (energized)" as "de-energized," set "1002." To output the alarm output by logical OR, set the sum of the set values. For example, to generate the alarm output of "board error (energized)" and "over current error (energized) by logical OR, set to "66." To set it as "de-energized," set to "1066." Mixed output of energized and de-energized is not possible. In addition, logical OR output of FAIL (de-energized) is not possible, and thus this must be set independently.	0
л / (n1)	Number of heater break alarm 1 delay times ²	1 to 100 times	30
# I (A1)	Heater break alarm 1 type 2,4	Type 1 (constant resistance type, deviation alarm) Type 2 (linearity resistor type, absolute value alarm)	0
n2)	Number of heater break alarm 2 delay times ²	1 to 1000 times	300
R2 (A2)	Heater break alarm 2 type ^{2,4}	Type 1 (constant resistance type, deviation alarm) Type 2 (linearity resistor type, absolute value alarm)	0

- Alarm output is outputted on the instrument with an alarm output 2 points.
- $^{2}\,$ This setting becomes valid on the instrument with a constant current control or constant power control
- ³ The setting becomes valid on the instrument with a heat sink temperature detection function.
- ⁴ This parameter becomes valid when the control method is the phase control.

	Symbol	Name	Setting range
	F <u>S.</u> (F5.)	Function block 5	This is first parameter symbol of function block 5 (F5.).
	(tV) 	ROM version	Display the version of loading software.
- · ·	Integrated operation time [upper 2 digits]	0 to 99 (Resolution of display: 10, 000 hours) Up to 999,999 from 0 including the upper and lower digits can be displayed.	
	تاًد (WL)	Integrated operation time [lower 4 digits]	0 to 9999 (Resolution of display: 1 hours) If the total integrated operating time exceeds 9,999 hours, these digits move to the integrated operating time display [upper 2 digits].

Symbol	Name	Setting range	Factory set value
F <u>6.</u> (F6.)	Function block 6	This is first parameter symbol of function block 6 (F6.).	
HF (HT)	Output time setting for automatic calculation of inflection point ¹	0.0 to 100.0 seconds (0.0: Inflection point calculation function unused)	20.0
HU (HU)	Action selection of heater break alarm ¹	Standard heater break alarm Non-linear resistance heater break alarm Start inflection point calculation ²	0
(K1)	Manipulated output value setting of inflection point 1 ¹	0.0 to 100.0 %	0.0
r / (r1)	Current value setting of inflection point 1 ¹	0.0 to 22.0 A (20 A type) 0.0 to 66.0 A (60 A type) 0.0 to 33.0 A (30 A type) 0.0 to 88.0 A (80 A type) 0.0 to 50.0 A (45 A type) 0.0 to 110.0 A (100 A type)	0.0
(K2)	Manipulated output value setting of inflection point 2 ¹	0.0 to 100.0 %	0.0
r2)	Current value setting of inflection point 2 ¹	0.0 to 22.0 A (20 A type) 0.0 to 66.0 A (60 A type) 0.0 to 33.0 A (30 A type) 0.0 to 88.0 A (80 A type) 0.0 to 50.0 A (45 A type) 0.0 to 110.0 A (100 A type)	0.0
(K3) F3	Manipulated output value setting of inflection point 3 ¹	0.0 to 100.0 %	0.0
(r3)	Current value setting of inflection point 3 ¹	0.0 to 22.0 A (20 A type) 0.0 to 66.0 A (60 A type) 0.0 to 33.0 A (30 A type) 0.0 to 88.0 A (80 A type) 0.0 to 50.0 A (45 A type) 0.0 to 110.0 A (100 A type)	0.0

- ² When the calculation of the inflection point is finished, the set value returns to "1."
- It may not be possible to use the non-linear resistance heater break alarm function with some heater
 - Use this function in a system with a current capacity of 10 A or more.
 As the measuring accuracy of the current transformer (CT) is within ±2 % of the THV-A1 rated current,
 - no heater break alarm may normally operate if used at a smaller load current valu

Symbol	Name	Setting range	Factory set value
F7. (F7.)	Function block 7 *	This is first parameter symbol of function block 7 (F7.), For the parameters to function block 7 (F7.), refer to THV-A1 Instruction Manual [Detailed MR02004_F[7])	

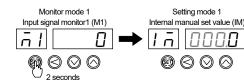
When the zero-cross control is used, the non-linear resistance heater break alarm function cannot be used.

* Functions in function block 7 (F7.) are available on the instrument with a constant current control or constant power

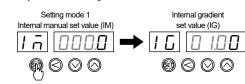
2.3 Changing Parameter Settings

Example: When set the internal gradient set value to "0.50"

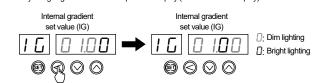
1. Press and hold the SET key for 2 seconds at Monitor mode 1 until Setting mode 1 is displayed.



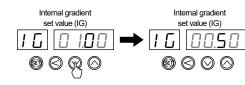
2. Press the SET key to enter the Internal gradient set value.



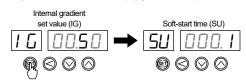
3. Press the shift key to high-light the one decimal place on display (numerical value display).



4. Press the DOWN key to change the number to "0.5."



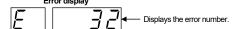
 $\textbf{5.} \ \ \text{Press the SET key to store the new value. The display goes to the next parameter. }$



- When the value is changed, it will be automatically stored after two seconds without any key
- Setting mode 1 return to monitor mode 1 if key operation for more than one minute is not
- Other parameters can be set in the same way as the example above

3. ERROR DISPLAYS

When the error occurs, the display changes to the error display. When two or more errors occur simultaneously, the error code numbers are totaled and displayed as one number



Error No.	Description	Action	Solution	
1	Calibration data error	THV-A1 output OFF	Turn off the power at once.	
2	Back-up error	THV-A1 output OFF	If an error occurs after the power is turned on again, please contact RKC	
4	A/D conversion error	THV-A1 output OFF	sales office or the agent.	
32	Power frequency error	THV-A1 output OFF	Check the value of power supply frequency, and turn off the power at once. If an error occurs after the power is turned on again, please contact RKC sales office or the agent.	
64	Power supply voltage error	THV-A1 output OFF	Turn off the power at once. If an error occurs after the power is	
128	Watchdog timer error	THV-A1 operation stops*	turned on again, please contact RK sales office or the agent.	

*When the operation of THV-A1 stopped, the output of THV-A1 turns OFF.

4. MODEL CODE

Check whether the delivered product is as specified by referring to the following model code list. If the product is not identical to the specifications, please contact RKC sales office or the agent.

THV-A1 PZ -- * - - - - (- -)* (1) (2) (3) (4) (5)(6)(7)(8)(9) (10)

* The code for accessory will be more than one if the product has more than one accessory.

(1) Power supply

1: Single-phase 100 to 240 V AC

(2) Control method PZ: Phase control/zero-cross control (configurable)

(3) Rated current 020: 20 A AC 045: 45 A AC 080: 80 A AC

(4) Input signal

4: Voltage input 0 to 5 V DC 6: Voltage input 1 to 5 V DC 5: Voltage input 0 to 10 V DC 7: Current input 0 to 20 mA DC

(5) Output mode

- 6: Standard 1 and Constant voltage control 2
- E: Standard¹, Constant voltage control² and Constant current control³ W: Standard¹, Constant voltage control² and Constant power control^{3,4}
- ¹Output mode of standard: Proportional phase angle to input, Proportional voltage to input and Proportional square voltage (electric power) to input
- ²With square voltage feedback
- ³ With Heater break alarm, Thyristor break-down alarm, Memory area, Current limiter, Over current alarm and Protection function for control of primary side of a transformer

8: Current input 4 to 20 mA DC

- ⁴ With constant current control

To control the primary side of the transformer, it is recommended to purchase a THV-A1 with a protection function for control of primary side of a transformer.

(6) Fast-blow fuse

N: No fast-blow fuse F: Built-in fast-blow fuse

(7) Alarm output

N: No alarm A: Alarm output 2 points

(8) Heat sink temperature detection function/Non-linear resistance heater break alarm (ARC-HBA) N: No function

- A: Heat sink temperature detection function
- C: Heat sink temperature detection function and Non-linear resistance heater break alarm * * When the output mode is specified to E or W code, this alarm can be selected.

(9) Communication function

4: RS-422A 5: RS-485

- Setter for open loop control (potentiometer, knob and scale plate) [1 set] and Input connector (plug) Setter for open loop control (potentiometer, knob and scale plate) [2 sets] and Input connector (plug)
- B: Alarm output connector (plug)
- Accessories (Order Separately)

Code	Accessories
THV1P-S01	Setter for open loop control (potentiometer, knob and scale plate)
THWP-C01	Input connector (plug)
THVAP-C01	Alarm output connector (plug)
THVAP-F20	Fast-blow fuse for 20 A
THVAP-F30	Fast-blow fuse for 30 A
THVAP-F45	Fast-blow fuse for 45 A
THVAP-F60	Fast-blow fuse for 60 A
THVAP-F45 ¹	Fast-blow fuse for 80 A
THVAP-F60 ²	Fast-blow fuse for 100 A

The 80 A type uses two 45 A fast-blow fuses (THVAP-F45).

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²The 100 A type uses two 60 A fast-blow fuses (THVAP-F60)

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