

GIPAM10 Series

INSTRUCTION MANUAL

LS Digital Protection Relay

1. Notices for user

⚠ Warnings

- Do not operate, examine, or install by yourself.
- Wire work is not allowed during operation or when power is input.
 - May cause electric shock.
- Avoid all wire working when live wire.
 - May cause damage or fire due to electric shock and charging voltage of converter.
- Put to earth,
 - May cause electric shock.
- Do not disassemble even the power is not input.
 - May cause electric shock due to charging current inside the product.
- Do not short-circuit the Conventional PT.
 - May cause fire.
- Do not disconnect the Conventional CT.
- Do not install and operate with wet hands.
 - May cause electric shock
- Do not use if the cable sheath is peeled off.
 - May cause electric shock.
- Do terminal work when connecting the cable.
 - May cause electric shock due to spiral part of the cable.

⚠ Cautions

- Cautions when installing or disconnecting the terminal.
- Approve the proper power rating on the power plug of the product.
 - May damage the product or cause fire.
- Keep the screw, metal material, water or oil out of the product.
 - May cause fire
- Keep the rated load and polarity of the input and output contact.
 - May damage the product or cause fire.
- Check the terminal number before connecting to the port.
 - May damage the product or cause fire.
- Assemble the terminal cover after connecting the terminal.
- Let installation and maintenance done by experts.
 - There may be accident or malfunction due to installation error.
- Please use the auxiliary relay for input/opening of the circuit breaker.
 - If controlling the circuit breaker directly, interior of relay may be damaged.
- Check lists before power up.
- Check the voltage and polarity of control power.
- Check the connection of input/output terminal.
- Cautions for storage and handling
- Keep it in place without humidity and dust.
- Do not throw it or put too much power when carrying
- Do not load it on the product.
- Cautions for discarding
- Treat it as industrial waste when discarding.

2. Product classification and composition of terminal block

■ Product classification

Number	Classification and type	Protections	Rated control power
1	GIPAM10 CU	50/51, 50N/51N, 46	AC/DC 110/220V frequency 50/60Hz
2	GIPAM10 CR	50/51, 50N/51N, 46, 79	
3	GIPAM10 VO	27, 59, 47P, 64	
4	GIPAM10 NZ	67N, 67G, 64	

■ Composition of terminal block

POWER-	17	1	POWER+	POWER-	17	1	POWER+	POWER-	17	1	POWER+
DO 01-	18	2	DO 01+	DO 01-	18	2	DO 01+	DO 01-	18	2	DO 01+
DO 02-	19	3	DO 02+	DO 02-	19	3	DO 02+	DO 02-	19	3	DO 02+
DO 03-	20	4	DO 03+	DO 03-	20	4	DO 03+	DO 03-	20	4	DO 03+
DO 04-	21	5	DO 04+	DO 04-	21	5	DO 04+	DO 04-	21	5	DO 04+
DI 01-	22	6	DI 01+	DI 01-	22	6	DI 01+	DI 01-	22	6	DI 01+
DI 02-	23	7	DI 02+	DI 02-	23	7	DI 02+	DI 02-	23	7	DI 02+
DI 03-	24	8	DI 03+	DI 03-	24	8	DI 03+	DI 03-	24	8	DI 03+
DI 04-	25	9	DI 04+	DI 04-	25	9	DI 04+	DI 04-	25	9	DI 04+
DI 05-	26	10	DI 05+	DI 05-	26	10	DI 05+	DI 05-	26	10	DI 05+
Ia-	27	11	Ia+	Va-	27	11	Va+	IN-	27	11	IN+
Ib-	28	12	Ib+	Vb-	28	12	Vb+	VO-	28	12	VO+
Ic-	29	13	Ic+	Vc-	29	13	Vc+	IO-	29	13	IO+
IN-	30	14	IN+	VO-	30	14	VO+	NC	30	14	NC
NC	31	15	NC	NC	31	15	NC	NC	31	15	NC
TRX-	32	16	TRX+	TRX-	32	16	TRX+	TRX-	32	16	TRX+

GIPAM10 CU/CR

GIPAM10 VO

GIPAM10 NZ

1. Terminal block of GIPAM10 is composed of above 3 types according to its model.

* POWER (+/-): It is the power input terminal of the product.
Rated power is AC/DC 110/220V.

* DO1~04 : It is Digital Output Terminal. It outputs the Trip/Alarm signal when fault occurs,
and all DO01~DO04 can be set by the user.

* Ia, Ib, Ic : It is current input terminal. Connect it to CT.

* Va, Vb, Vc : It is voltage input terminal. Connect it to PT.

* IN, VO, IO : It is the input terminal of zero phase current(NCT), zero phase voltage(GPT),
zero phase current(ZCT).

* TRX: It is communication connecting terminal. The type of communication is RS-485/MODBUS.
Refer to "4. Connection method" for details.

Note), Input the power on the product when all connection is completed.

3. Service environment and product rating

■ Input rating

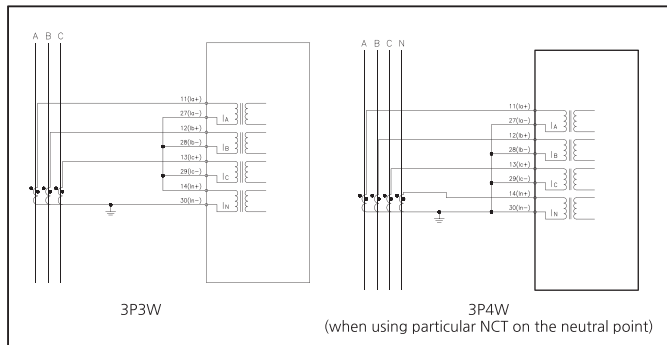
Classification	Rating
Rated frequency	50[Hz] or 60[Hz]
Rated voltage	Phase voltage: 110 [V] (10VO model) Zero phase voltage: 110 [V] (10VO/10NZ model)
Rated current	Current: 1[A] or 5[A] (10CU/10CR/10NZ model) (CT input terminal H/W of 1A and 5A are different) Zero phase current: NCT=1[A] or 5[A], ZCT=1.5[mA]
Rated power input	AC/DC 110/220V 50Hz/60Hz
Power consumption of control power	Always 20[W] below, 25[W] below when operation
Burden	Phase CT: 1.0 VA/Phase below Zero phase CT: 1.0VA below PT: 0.5 VA/Phase below
Operation temperature	-25°C ~ +55°C (-13°F ~ 131°F)
Storage temperature	-30°C ~ +70°C (-22°F ~ 158°F)
Humidity	Average 30% ~ 80%
Altitude	1000m and below
Other	Non-impact place, Non air pollution place
Standard	KEMC1120, IEC60255

■ Output rating

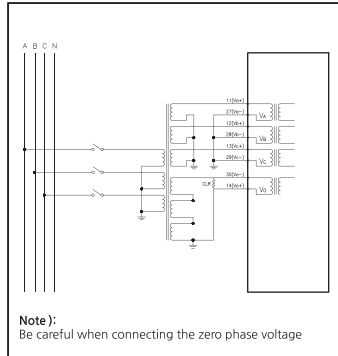
Classification		Application range	Notes
Relay for Trip	Rated load	AC250V 16A / DC30V 16A	Resistive load
	Max. switching voltage / current	380VAC, 125VDC / 16A	
Relay for Signal	Rated load	AC240V 3A / DC30V 3A	Resistive load
	Max. switching voltage / current	240VAC, 30VDC / 5A	

4. Connecting method

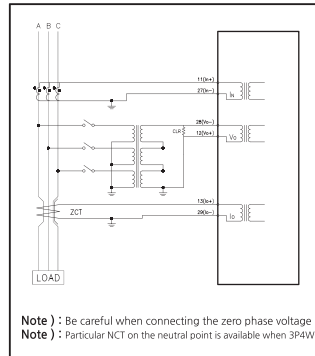
■ Connecting method of GIPAM10 CU/CR



■ Connecting method of GIPAM10 VO

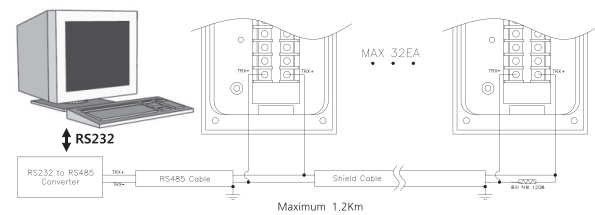


■ Connecting method of GIPAM10 NZ

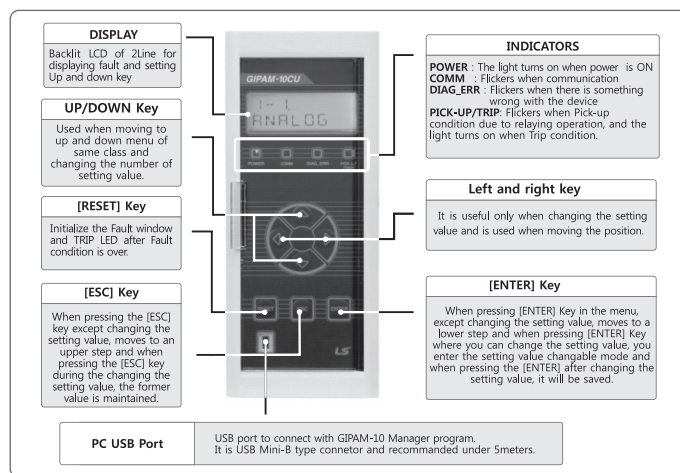


5. Communication connection and exterior of the product

- Specification of communication cable: AWG 22, Twisted Shield Pair Cable
- RS-485 communication connection

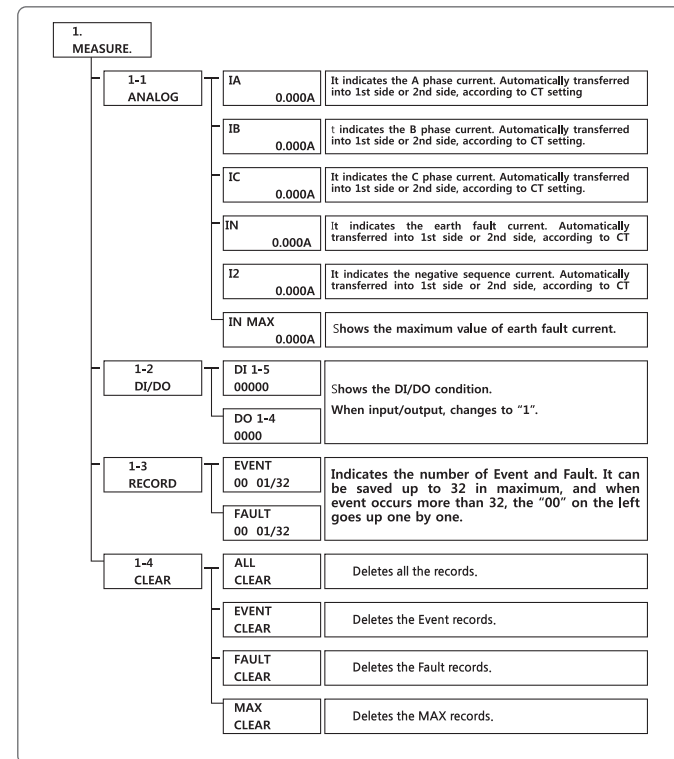


- The shield of communication line should be connected to each other and put to earth.
- Attach the 1/4W, 120 ohm resistance between the end of +, - terminal.
- The maximum number of connection is 32.
- Please use the designated communication cable, (LJREV-AMESB 22AWG Pair Cable)
- The maximum distance of communication is 1.2km.
- COMM LED flickers when responding to communication.



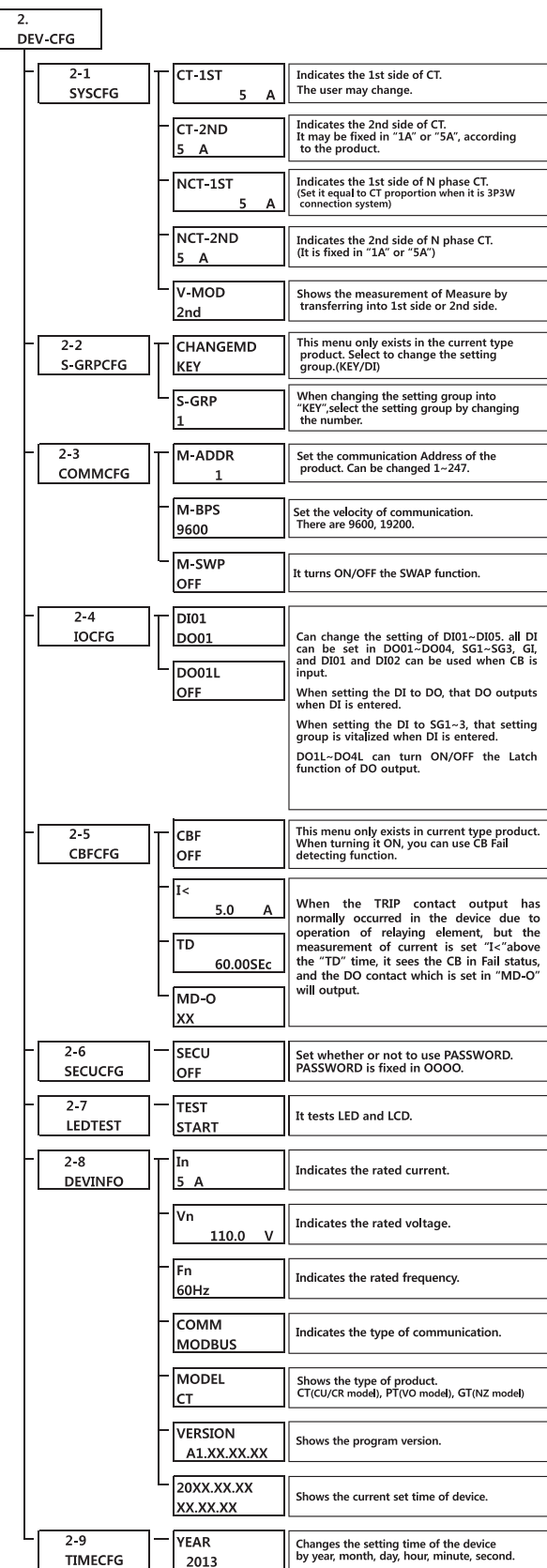
6. Handling and setting method(1. MEASURE)

There is a little difference in menu for each product but the basic structure is the same. On this instruction manual, we would like to explain it according to the current type product. When the power is boot up after the connection and installation, "1. MEASURE" menu will show up. It indicates the current measurement and DI/DO condition, and the number of EVENT, etc.



7. Handling and setting method(2. DEV-CFG)

If you press "DOWN" key in the "1. MEASURE" menu, you may move to "2. DEV CFG" menu. This menu indicates a lot of information of the device and can change the setting.



Moving the menu

Moving the menu to left and right: ENTER KEY
Moving the menu to up and down: UP/DOWN KEY

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8. Setting range of relaying element (3.Relay Setting)

3, RY-S1 or 3, RY-CFG is the relaying element menu.

Refer to following table for detail explanation and setting of the menu.

■ instantaneous over current relay (OCR – 50)

	Item	Rating	Contents	Notes
Setting	Setting range of operating value	5A 1A	5~100A/1A 1~20A/1A	—
	Setting range of operating time	—	0.04~60.00s/0.01s	—
	Trip/Alarm contact	—	None, Select one among DO01~DO04	0.04s : Instantaneous 0.05~60.00s : Definite-time
Error	Tolerance of operating value	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of returning value	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of operating time	—	±5% of nominal time or ±35ms	—
			Instantaneous operates when it is under 40ms	—
	Tolerance of returning time	—	Returns when it is below 100ms.	—

■ timing over current relay (OCR – 51)

	Item	Rating	Contents	Notes
Setting	Setting range of operating value	5A 1A	1.0~12.0A/0.1A 0.2~2.4A/0.1A	—
	TC(Time characteristic)	-	DT,SL,VL,ELLI	—
	TD(Time Delay)	-	0.10~60.00/0.01	Applied when selecting DT
	TL(Time Lever)	-	0.05~1.20/0.01	Applied when selecting SL, VL, EL, U
	RTC(Returning time characteristic)	-	DT,SL,VL,ELLI	Can only set characteristic which is same with TC
Error	Trip/Alarm contact	-	None, Select one among DO01~DO04	—
	Tolerance of operating time	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of returning time	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of operating time	-	±5% of nominal time or ±35ms	—
	Tolerance of returning time	-	Returns when it is below 100ms.	—

■ instantaneous over current relay (OCCR – 50N)

	Item	Rating	Contents	Notes
Setting	Motor Block Time	—	0.1~60.0s/0.1s	Standard current : 20% of rating
	Setting range of operating value	5A 1A	2.5~40.0A/0.1A 0.5~8.0A/0.1A	—
	Setting range of operating time	—	0.04~60.00s/0.01s	—
	Trip/Alarm contact	—	None, Select one among DO01~DO04	0.04s : Instantaneous 0.05~60.00s : Definite-time
Error	Tolerance of operating value	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of returning value	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of operating time	—	±5% of nominal time or ±35ms	—
			Instantaneous operates when it is under 40ms	—
	Tolerance of returning time	—	Returns when it is below 100ms.	—

8. Setting range of relaying element (3.Relay Setting)

■ timing over current relay (OCGR – 51N)

	Item	Rating	Contents	Notes
Setting	Motor Block Time	-	0.1~60.0s/0.1s	Standard curren : 20% of rating
	Setting range of operating value	5A 1A	0.5~5.0A/0.1A 0.1~1.0A/0.1A	—
	TC(Time characteristic)	-	DT,SL,VL,ELLI	—
	TD(Time Delay)	-	0.10~60.00/0.01	Applied when selecting DT
	TL(Time Lever)	-	0.05~1.20/0.01	Applied when selecting SL, VL, EL, LI
	RTC(Returning time characteristic)	-	DT,SL,VL,ELLI	Can only set characteristic which is same with TC
Error	Trip/Alarm contact	-	None, Select one among DO01~DO04	—
	Tolerance of operating value	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of returning value	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of operating time	-	±5% of nominal time or ±35ms	—
	Tolerance of returning time	-	Returns when it is below 100ms.	—

■ negative sequence over current relay (NSOCR – 46)

	Item	Rating	Contents	Notes
Setting	Setting range of operating value	5A 1A	0.5~5.0A/0.1A 0.1~1.0A/0.1A	—
	Setting range of operating time	-	0.10~60.00s/0.01s	Definite-time
	Trip/Alarm contact	-	None, Select one among DO01~DO04	—
Error	Tolerance of operating value	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of returning value	5A 1A	±5% of setting value or ±0.05A ±5% of setting value or ±0.01A	—
	Tolerance of operating time	-	±5% of nominal time or ±35ms	—
	Tolerance of returning time	-	Returns when it is below 100ms.	—

■ auto reclosing (Autoreclose– 79)

	Item	Rating	Contents	Notes
Setting	The number of reclosing	—	1~4 time(s)	—
	warm up time	—	0.10 ~ 200.00sec/0.01sec	—
	Reclaim Time	—	0.10 ~ 200.00sec/0.01sec	—
	Prepare Time	—	0.10 ~ 200.00sec/0.01sec	—
	1st Shot Delay	—	0.10 ~ 200.00sec/0.01sec	—
	2nd Shot Delay	—	0.10 ~ 200.00sec/0.01sec	—
	3rd Shot Delay	—	0.10 ~ 200.00sec/0.01sec	—
	4th Shot Delay	—	0.10 ~ 200.00sec/0.01sec	—
Error	Tolerance of operating time	—	±5% of nominal time or ±60ms	—

8. Setting range of relaying element (3.Relay Setting)

■ selective ground relay (SGR–67G)

	Item	Rating	Contents	Notes
Setting	Zero phase current (Io)	-	0.9 ~ 6.0mA/0.1mA	—
	Zero phase voltage (Vo)	-	10 ~ 80V/1V	—
	Operating characteristic angle (Ang)	-	0 ~ 90degree(s) /1degree(s)	—
	TD(Time Delay)	-	0.10~60.00/0.01	Definite-time
Error	Trip/Alarm contact	-	None, Select one among DO01~DO04	—
	Tolerance of operating value	5A 1A	±5% of setting value or ±0.05A, ±1V ±5% of setting value or ±0.01A, ±1V	—
	Tolerance of returning value	5A 1A	±5% of setting value or ±0.05A, ±1V ±5% of setting value or ±0.01A, ±1V	—
	Tolerance of operating tim	-	±5% of nominal time or ±35ms, ±1V	—
	Tolerance of returning time	-	Returns when it is below 100ms.	—
	Tolerance of operating angle	-	within ±5° of nominal operating angle	nominal operating angle =operating characteristic angle ±90°
	Tolerance of returning angle	-	withing ±5° of operating angle	—

■ directional ground relay (DGR–67N)

	Item	Rating	Contents	Notes
Setting	Zero phase current(IN)	5A 1A	0.5 ~ 5.0A/0.1A 0.1 ~ 1.0A/0.1A	—
	Zero phase voltage (Vo)	-	10 ~ 80V/1V	—
	Operating characteristic angle(Ang)	-	0 ~ 90degree(s)/1degree(s)	—
	TD(Time Delay)	-	0.10~60.00/0.01	Definite-time
Error	Trip/Alarm contact	-	None, Select one among DO01~DO04	—
	Tolerance of operating value	5A 1A	±5% of setting value or ±0.05A, ±1V ±5% of setting value or ±0.01A, ±1V	—
	Tolerance of returning value	5A 1A	±5% of setting value or ±0.05A, ±1V ±5% of setting value or ±0.01A, ±1V	—
	Tolerance of operating time	-	±5% of nominal time or ±35ms, ±1V	—
	Tolerance of returning time	-	Returns when it is below 100ms.	—
	Tolerance of operating angle	-	within ±5° of nominal operating angle	nominal operating*angle =operating characteristic angle ±90°
	Tolerance of returning angle	-	withing ±5° of operating angle	—

■ ground over voltage relay (OVGR–64)

	Item	Rating	Contents	Notes
Setting	Setting range of operating value	-	10 ~ 110V/1V	—
	TD(Time Delay)	-	0.10~60.00s/0.01s	Definite-time
	Trip/Alarm contact	-	None, Select one among DO01~DO04	—
Error	Tolerance of operating value	5A 1A	±5% of setting value or ±1V ±5% of setting value or ±1V	—
	Tolerance of returning value	5A 1A	±5% of setting value or ±1V ±5% of setting value or ±1V	—
	Tolerance of operating time	-	±5% of nominal time or ±35ms	When allowing 120% of operation setting value
	Tolerance of returning time	-	Returns when it is below 100ms.	-

8. Setting range of relaying element (3.Relay Setting)

■ under voltage relay (UVR–27)

	Item	Rating	Contents	Notes
Setting	Setting range of operating value	-	10 ~ 110V/1V	—
	TD(Time Delay)	-	0.10~60.00s/0.01s	Definite-time
	UVR Block	-	ON/OFF selectable	Standard voltage : 6V
	Trip/Alarm contact	-	None, Select one among DO01~DO04	—
Error	Tolerance of operating value	5A 1A	±5% of setting value or ±1V ±5% of setting value or ±1V	—
	Tolerance of returning value	5A 1A	±5% of setting value or ±1V ±5% of setting value or ±1V	—
	Tolerance of operating time	-	±5% of nominal time or ±35ms	When allowing 80% of operation setting value
	Tolerance of returning time	-	Returns when it is below 100ms	-

■ over voltage relay (OVR–59)

	Item	Rating	Contents	Notes
Setting	Setting range of operating value	-	60 ~ 160V/1V	—
	TD(Time Delay)	-	0.10~60.00s/0.01s	Definite-time
	Trip/Alarm contact	-	None, DO01~DO04 중 택1	—
Error	Tolerance of operating value	5A 1A	±5% of setting value or ±1V ±5% of setting value or ±1V	—
	Tolerance of returning value	5A 1A	±5% of setting value or ±1V ±5% of setting value or ±1V	—
	Tolerance of operating time	-	±5% of nominal time or ±35ms	—
	Tolerance of returning time	-	Returns when it is below 100ms	When allowing 120% of operation setting value

■ open phase protection relay (POR–47P)

	Item	Contents	Notes
Setting	Setting range of operating value	5~100%/1%	$\frac{\text{MAX} \{ (V_{\text{max}} - V_{\text{min}}) \}}{V_{\text{nom}}} \times 100 \text{ [\%]}$
	TD(Time Delay)	0.10~60.00s/0.01s	Definite-time
	Trip/Alarm contact	None, Select one among DO01~DO04	—
Error	Tolerance of operating value	±5% of setting value or ±2.5%(constant)	—
	Tolerance of returning value	±5% of setting value or ±2.5%(constant)	—
	Tolerance of operating time	±5% of nominal time or ±35ms	When 150% unbalanced condition of operation setting value
	Tolerance of operating time	Returns when it is below 100ms	—

※ Operating characteristic of instantaneous relay(50,50N) when include Harmonics & Decaying DC.

- Over 200% of setting value & include under 10% of harmonics : Under 40ms

- Over 200% of setting value & include 10~50% of harmonics : Under 100ms

- 200% of setting value & include Decaying DC : Decaying DC time + normal operating time

9. Additional function and accuracy of measurement

■ Self-examination

1) Power Fail

It shows the "Power Fail" on the LCD through observation port when the voltage drops under certain degree and DIAG_ERR LED flickers.

2) CT/PT Calibration performance

Monitors if performed CT/PT Calibration, and if the data is not effective or not have performed calibration, the DIAG_ERR LED flickers.

3) Watch Dog

Decides if DSP works properly, and if not, the outer monitor IC forcibly resets the DSP and neighboring devices, in same order with initial power boot up. At this time, it is not particularly indicated.

4) Monitoring memory and correction value disorder

Monitors the disorder of exterior memory. When the exterior memory is not operating properly, "FRAM ERROR" ,and when it is operating properly, "CRC ERROR" is indicated in the LCD, and DIAG_ERR LED flickers.

■ Recording function

Fault Event : 32EA

Trigger	Pickup, Operation
Time Tag	Event occurrence time
Main information	Voltage or current when fault
additional information	DI/DO Status

System Event : 32EA

Trigger	When Power ON, changing the setting, DI/DO status changes
Time Tag	Event Occurrence time

Wave : 4EA

Trigger	Operation
Sample/Cycle	32
Saving cycle	30 Cycle (50/60Hz in common)
Time Tag	Operation 발생 시각

* The Record menu of "measurement" indicates the total number of Record and when trip has occurred, it indicates the Operation Event type which occurred lastly, on the HML.

* Wave can be only seen through PC manager.

■ Measuring function

– Current type model : Phase current, zero phase current, negative sequence current

– Voltage type model : Phase voltage, line voltage, unbalance voltage, zero phase voltage

– Ground type model : Zero phase current for ground, Zero phase current for non grounding, zero phase voltage, phase angle

Measuring item	Display range (in standard of equipment indicating value)	Error (in standard of input rating of equipment)
Phase voltage (V)	0.000V ~ 999.999kV (Cuts off when 5V below)	±0.5 [%] at Vn ±5[%] or ±1[V] at Other Voltage range
Line voltage (V)	0.000V ~ 999.999kV (Cuts off when phase voltage is 5V below)	±5 [%] or ±1 [V]
Zero phase voltage (Vo)	0.000V ~ 999.999V (Cuts off when 5V below)	±5 [%] or ±1 [V]
Phase current (A)	0.000A ~ 999.999kA (Cuts off when under 2% of rating)	±0.5 [%] at In , ±5 [%] or ±0.05 [A](5A rating), ±0.01A(1A rating) at Other Current range
Zero phase current (IN)	0.000A ~ 999.999A (Cuts off when under 2% of rating)	±5 [%] or ±0.05 [A](5A rating), ±0.01A(1A rating)
Zero phase current for non grounding (IO)	0.000mA ~ 99.999mA (Cuts off when under 0.1mA of rating)	±5 [%]
Negative sequence current (I2)	0.000A ~ 999.999kA (Cuts off when under 2% of rating)	±5 [%] or ±0.05 [A](5A rating), ±0.01A(1A rating)
unbalance voltage	0.00~200.00 % (Indicates when even one of 3phase voltage is above cutting level)	±5 [%] or ±2.5 [%](constant)
Phase angle	Indicates only when it is over the cutting level of zero phase voltage and zero phase current	±5 *

■ DO Default Setting

제품	항목	설정
GIPAM10 CU/CR	DO 01	TRIP(OCR, OCGR, NSOCR)
	DO 02	OCR ALARM
	DO 03	OCGR ALARM
	DO 04	NSOCR ALARM
GIPAM10 VO	DO 01	TRIP(OVR, POR)
	DO 02	OVR ALARM
	DO 03	UVR, POR ALARM
	DO 04	TRIP(SGR, DGR)
GIPAM10 NZ	DO 01	SGR ALARM
	DO 02	DGR ALARM
	DO 03	DGR ALARM
	DO 04	OVGR ALARM

* In case of GIPAM10 CR type, output of redosing signal is DO02.

So you must change the DO setting same as below.

GIPAM10 CR	DO 01	TRIP(OCR, OCGR, NSOCR)
	DO 02	XX(NONE)
	DO 03	OCR, OCGR ALARM
	DO 04	NSOCR ALARM

10. Characteristic curve

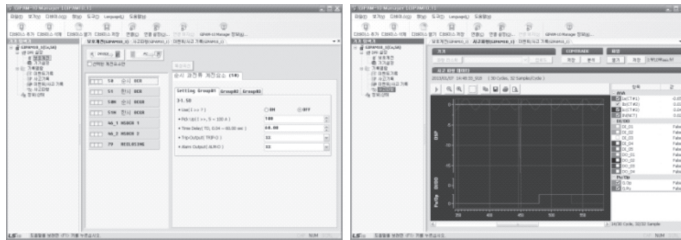
Item	IEC
Operating characteristic Curve (IEC 60255-3)	IEC INVERSE (SI) $t = \frac{0.14}{(I/I_b)^2 - 1} \cdot T_L$
	IEC VERY INVERSE (VI) $t = \frac{13.5}{(I/I_b)^2 - 1} \cdot T_L$
	EXTREMELY INVERSE (EI) $t = \frac{80}{(I/I_b)^2 - 1} \cdot T_L$
	IEC LONG INVERSE (LI) $t = \frac{120}{(I/I_b)^2 - 1} \cdot T_L$

Item	IEC
Returning characteristic Curve (IEC 60255-3)	IEC INVERSE (SI) $t = \frac{9.7}{1 - (I/I_b)^2} \cdot T_L$
	IEC VERY INVERSE (VI) $t = \frac{43.2}{1 - (I/I_b)^2} \cdot T_L$
	IEC EXTREMELY INVERSE (EI) $t = \frac{58.2}{1 - (I/I_b)^2} \cdot T_L$
	IEC LONG INVERSE (LI) $t = \frac{80}{1 - (I/I_b)^2} \cdot T_L$

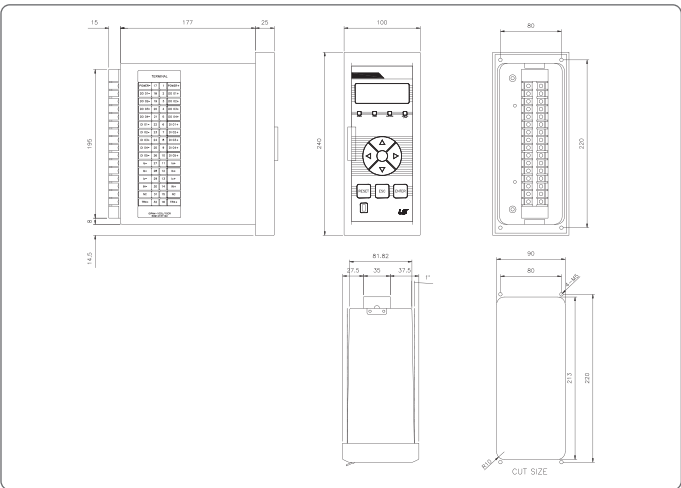
11. GIPAM10 MANAGER and outside view of the product

■ GIPAM10 MANAGER

You can easily set and confirm all the functions that GIPAM10 supports by using GIPAM10 MANAGER program. You can also easily analyze the event and fault record, fault wave form etc. Refer to homepage for details of GIPAM10 MANAGER.

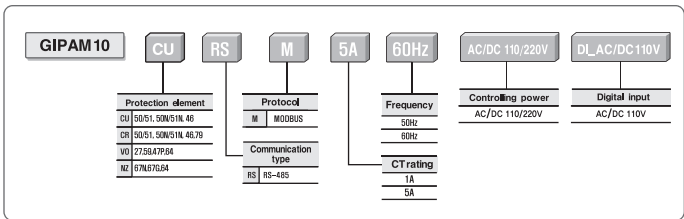


■ Outside view of GIPAM10



12. Form explanation [Ordering method]

■ Form explanation [ordering method]



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