Multifunctional digital power protection monitoring device with various protection and measurement elements

GIPAM3000

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Digital Integrated Protection & Monitoring Equipment

- With 34 types of protection elements in 2 models, the distribution system fully protected
- Enhanced analysis function through various saved event data (up to 1,000 events are saved)
- Trip logic and sequence with Programmable Logic Controller and 1,024 in/output port
- Extended power quality(PQ) monitoring
- Select Before Operating(SBO) and Check Before Operating(CBO)
- Vector diagram
- Trip Circuit Supervision(TCS) and Trip Relay Supervision(TRS)
- Sequence of Event(SOE)
- PT(VT) failure detection
- Circuit Breaker Failure(CBF)
- Cold Load Pickup(CLP)
- Root Mean Square(RMS) trend
- Disk emulation
- Various communication compatibility(MODBUS, DNP, IEC61850)
- Remote access using PC Manager
- Self-diagnosis and sequence monitoring
- HMI with enhanced visibility and convenience
- Convenient lever withdrawal structure
- Long-life and reliable parts applied
- Fully compatible with previous models (GIPAM2000/2200)

Contents

GIPAM3000

Digital Integrated Protection & Monitoring Equipment

GIPAM3000 series are multifunction microprocessor-based protection equipments suitable for all types of application such as distribution feeders.

It can be also be used for management backup protection of incomings, feeders, high tension motors, BUS, transformers and generators

Over current protection function includes protection elements such as over current, over current ground fault, selective ground fault current, directive ground fault current, negative sequence over current in each phase with regard to time delay or instantaneous elements.

Under voltage protection has a operation function independently of each other, and it also has a function of 5 Recloser.

In addition, PLC CPU is built inside, so it is easy to set up not only programmable logic input and output but also user-specific usage, and has extensive monitoring and measurement functions.

It has internal memory to store 1,000 recent events, 200 Faults, and each significant 64 cycles of Fault waveform data.

The convenience features include self-diagnosis while operationg, alarm output function in case of abnormalities, RS-485 and Ethernet port for communication with higher systems as well as separate USB 2.0 ports for computer connection, and support MODBUS, DNP3.0, and IEC61850 international standard protocols.

The high-resolution 6.5" color graphics LCD and touchscreen make it easy to see the power system with relays, as well as Fault and Event data and Fault waveforms, harmonic spectrum and Vector Diagram.

The program for PC interface supports a variety of functions, including setting, monitoring, and control of all relay elements.

B


LS
POWER
COMM.
DIAG ERR
PICK UP TRIP
PROTECTIVE RELAY
MONITORING
RECORDS VIEW
POWER SYSTEM CONFIGURAITON
MEASUREMENT
DEVICE CONFIGURATION
DATA MANAGEMENT
DEVICE INFORMATION
USER DEFINED DISPLAY
GIPAM 3000
F1
F2
R/L
ENTER
CANCEL
VECTOR DIAGRAM
MEASUREMENT CURRENT
MEASUREMENT HARMONIC DIAGRAM
상태감시 CB 상태
상태감시 DI/DO 상태
MONITORING MIMIC DIAGRAM

Features

With 34 types of protection elements in 2 models, the distribution system fully protected

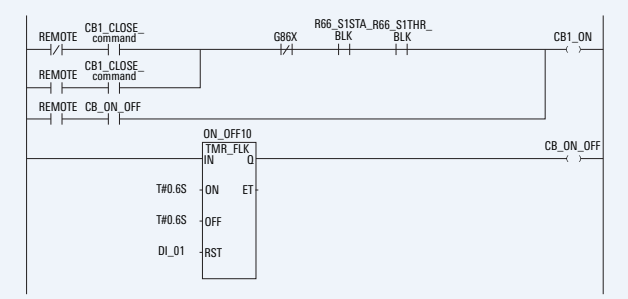
The GIPAM3000 is a total of 34 types of protection elements in two models, Feeder/Incoming, Motor, Distributed Power Source Protection FI Model and Transformer Protection T Model. Complete protection of various distribution systems.

Enhanced analysis function through various saved event data (up to 1,000 events are saved)

The GIPAM3000 records up to 1,000 events in the relay, including relay behavior, various settings, deletion of records, CB,DI,DO,VO,CC,GOOSE status changes, and all event records can be viewed by using FILTER functions by dividing them into relay settings, status changes, system settings changes, control commands, and device information.
The fault record function is the status of relay operation (Pick Up/ Operation/) among recorded events.
Reset) Only the information is extracted separately and stores a total of 200 accident records.
PQ recording is a feature that is supported only by FI type and stores a total of 200 PQ records by extracting only PQ activity records, such as PQ (Sag, Swell, Interruption), End, Duration, Phase Voltage Size and Phase, Peak Voltage, Control Authority, and Time of Occurrence among recorded events.
The fault waveform recording function stores the fault waveforms of voltage and current during relay operation for accurate fault analysis in the event of a systematic accident caused by relay operation, and can record up to 16 waveforms.
The RMS recording function can facilitate analysis of the system during motor start-up (CB ON).
The system's three-phase voltage and current can be recorded as RMS values for 60 seconds to record up to 10 waveforms.
The DEMAND recording function is only supported by FI type and is a feature that records Peak Demand and Over Demand according to user setting value and time.

Trip logic and sequence with Programmable Logic Controller and 1,024 in/output port

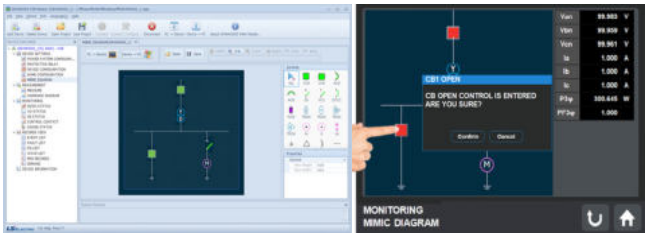
The GIPAM3000 has a built-in PLC logic function, so all I/O contacts and relay elements, including Trip Relay, can be operated by a user-generated Trip Logic. When the relay element is activated, the signal is passed to the input contacts of the PLC and operates according to the program. Sequence, such as interlocks between relay devices or switchboards, can also be easily implemented with PLC. A separate PLC operating program (XG5000) must be used to create logic



* You can download the latest version of the XG5000 for free from our website.
* XG5000 Supported OS Specifications is Windows XP, Vista, 7, 8 and 10

MIMIC diagram

MIMIC Diagram shows the open circuit diagram of the power system in which the product is used, along with voltage, current, power, and power factor measurements. It can be edited and entered through PC Manager, and can check and control the status of breakers, DIs, and CCs.



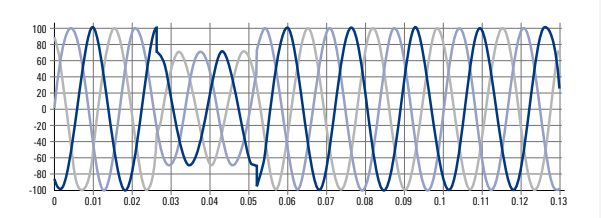
Extended power quality monitoring

The PQ measurement function is supported only for FI type and records PQ generation, shutdown, duration, phase voltage size and phase, peak voltage, control authority, and time of occurrence.

- Analysis and monitoring for Sag, Swell, Interruption
- Harmonics Analysis Spectrum up to 13th (2~13th harmonics and THD, TDD, k-factor)
- 0.5% precision for voltage, current
- 1.0% precision for power , energy

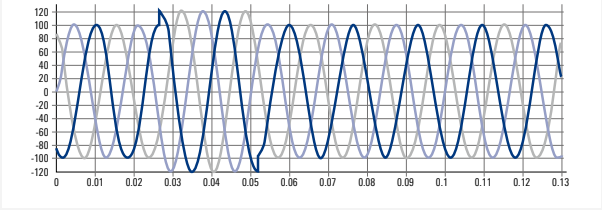
- **SAG** (VOLTAGE DROP)

  The RMS value of the voltage is called Instantaneous Sag when 0.5 to 30 cycles occur with 0.1 to 0.9pu of rated voltage, and the state when 30 cycles to 3 seconds is called Temporary Sag, and the state when it lasts for 3 seconds to 1 minute is called Temporary Sag.
  The Sag phenomenon cannot be prevented by battery backup, etc., and the transformer,Cables, switchgear, CT & PT, etc. are not affected by Sag.



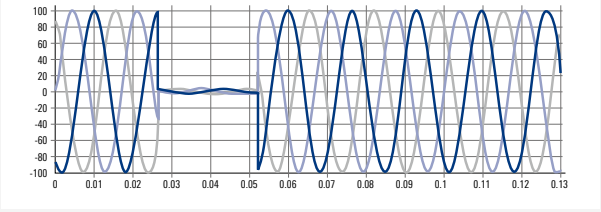
- **SWELL** (VOLTAGE RISE)

  The RMS value of the voltage is 1.1 to 1.8pu of the rated voltage, and the status of 0.5 to 30 cycles is called Instantaneous Swell, the state of 30 cycles to 3 seconds, and the state of 3 seconds to 1 minute is called Temporary Swell. In particular, frequency-sensitive equipment is heavily influenced by Swell.
  What's really affected by the Swell phenomenon is the equipment that requires the correct speed,
  Computer, electronic control equipment, etc. are affected by immediate failure.



- **Interruption**

When the effective value of the voltage is less than 0.1pu and occurs for 0.5 to 3 seconds,
the status is “Momentary Interruption”. the state when it lasts for 3 seconds to 1 minute is called Temporary Interruption. Interruptions can cause malfunctions such as electronic control, computer, or rotor control. It also reduces the induction of motor contact and can affect soft-starter equipment.

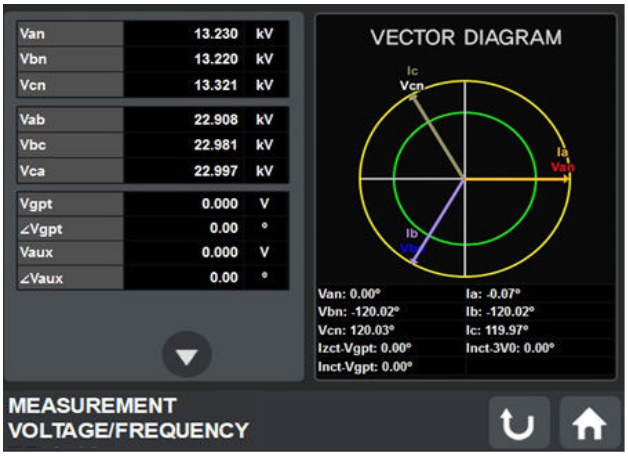


Select Before Operating(SBO) and Check Before Operating(CBO)

By choosing controlling Points first before sending out orders to where it is desired to control, control orders are executed only along with normal responses. This function enhances to control reliability and security. GIPAM3000 applies SBO/CBO functions at CB control’s power contact points. For selected
control point, it will wait for control orders for 5 seconds after its response. If the control order won’t be delivered within 5 seconds, it will be reset. The control functions will be executed only on the normal condition when orders were delivered within 5 seconds.

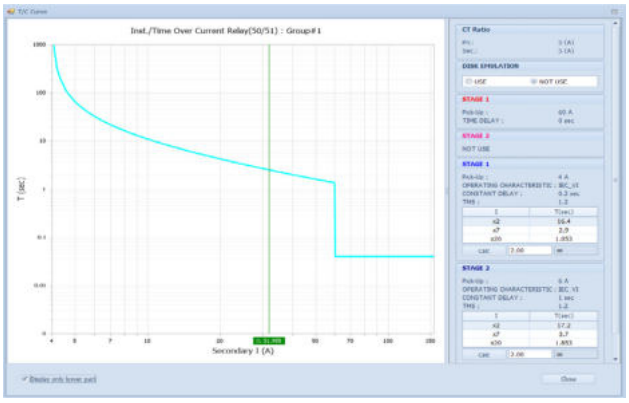
VECTOR DIAGRAM

GIPAM3000 displays Vector Diagram for the voltage, current, and phase of the system. This allows you to check the amount of electricity to easily identify the condition of the system.



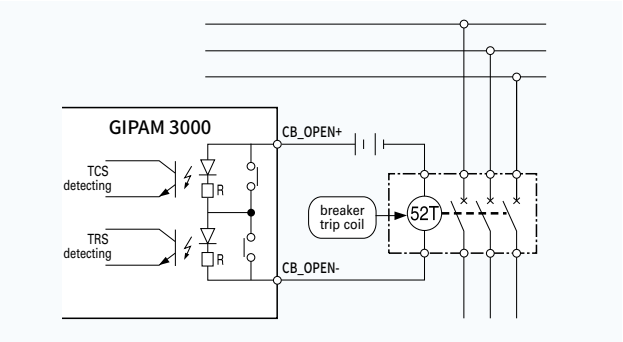
Precise protection is possible with various operating characteristic curves (IEC/IEEE/KEPCO)

For GIPAM3000, enter the settings for each relay element.
You can use the PC Manager to immediately view the Time Characteristic Curve for each setting. It calculates and displays operating hours for 200%, 700%, and 2,000% of the settings, making it easy to configure protection cooperation between protective devices.



Trip Circuit Supervision(TCS) and Trip Relay Supervision(TRS)

Trip Circuit Supervision (TCS) is a function that monitors the trip circuit of the breaker for faults.
It is supposed to be monitored at all times while the breaker is closed. Trip Relay Supervision (TRS) function monitors the relay for OPEN control inside the GIPAM3000 at a specified monitoring interval to indicate an abnormal condition.
(Monitoring interval: 1 to 365 days / 1 day) However, for CB2, the function selection must be set to CB, not PO, to perform the TCS, TRS functions.



* Terminal between the CB_OPEN contactors may always have a resistance of around 200 kΩ, which may not operate normally when used for any purpose other than TRIP.

Sequence of Event(SOE)

GIPAM300 supports the SOE function that makes easy for reviewing fault analysis and operation information by recording events in sequence at 1ms’ intervals regarding internal protection relay, breaker operation, or self-diagnosis abnormalities such as alarm contact output and others.
These events including the latest registered one can be stored as many as 1,000.
Each event can be verified in detail under the “EVENT RECORDS” section from the initial screen of “RECORDS VIEW”Menu. In addition, it is possible to save as files with GIPAM3000 Manager.

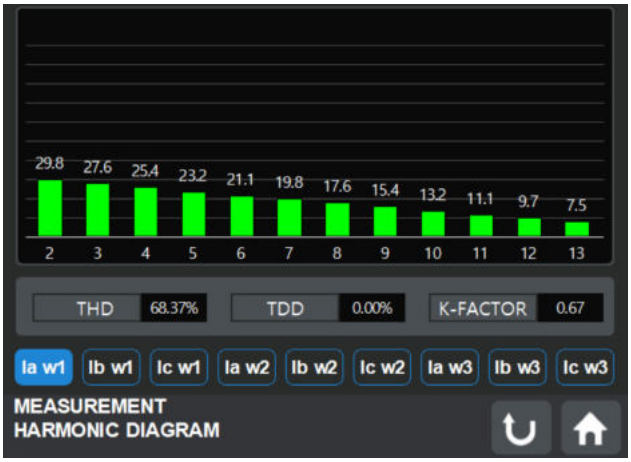
Features

PT(VT) failure detection

By detecting PT 2nd fuse melt-down in advance, it's possible to collect alarm message and logic prints which can be used to prevent unnecessary system cutoffs by protection relay operation of UVR and NSOVR. It does not activate under under-voltage or blackout situation, it compares with voltage current and on breaker conditions to decide PT fuse opening. Replacing PT fuse will reset it immediately.
By utilizing DO output, it not only generate alarm signal but also make Trip Block to disable trip function.

Harmonic spectrum monitoring

GIPAM3000 provides harmonics analysis SPECTRUM.
Display the 2nd to 13th harmonics for current and voltage.
It also displays Total Harmonic Distortion (THD), Total Demand Distortion (TDD) and k-factor.



Circuit Breaker Failure(CBF)

The 50BF is a function that can prevent further extension of accident by controlling upper circuit breaker to trip, when lower circuit breaker failed to act despite protection relay was activated and sent trip signal for problems in the circuit.
Even though the relay element is operated and the breaker OPEN command is issued, if a current above the set current value is still passed after a certain period of time, it will be determined to be a failure of the breaker and a CBF action signal will be generated by the PLC. Using this signal, the protective element then issues a command again or blocks the upper breaker through a separate output contact.

In/output port status monitoring

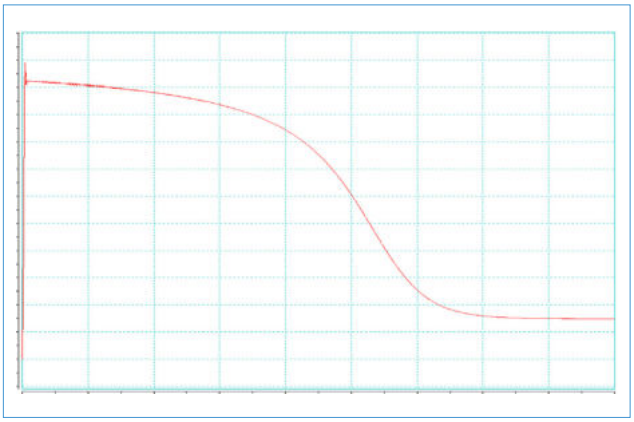
It has Virtual Output(VO) and Control Contact(CC) functions for monitoring the input/output status of the relay.
A total of 64 virtual outputs can be set, and VO function is designated as DO to check the incorrect connection of sequence wiring in the switchboard.
A total of 32 control contacts can be set, and CC function is used to verify the DO operation and wiring assigned to the relay element and to perform CB control check and communication test.

Cold Load Pickup(CLP)

This is a function that increases the OCR/OCGR setting value for a certain time after the breaker is turned on to prevent the OCR/OCGR from inadvertently operating due to the inrush current of the load when the breaker is turned on.
If the CLP holding time (1~60sec) and CLP set value (120~1,000%) are set before using the relay, the accident is judged by comparing with the CLP set value instead of the OCR/OCGR set value during the CLP hold time when the breaker is turned on. And it operates, and after the holding time, it operates with the original setting value. However, it is recommended to set the CLP setting value higher than the inrush current and lower than the expected short-circuit current.

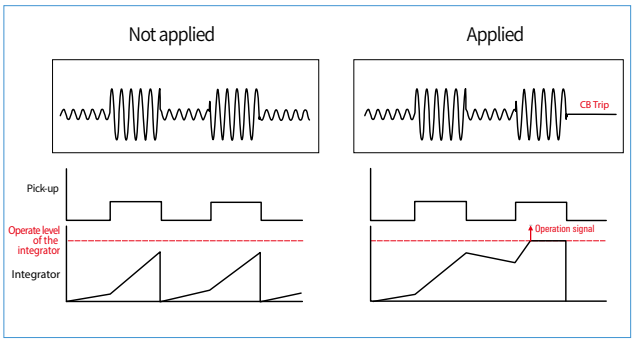
Root Mean Square(RMS) trend

The RMS Trend function records the RMS values of voltage and current for 60 seconds when the circuit breaker is turned on, and up to 10 can be recorded.
This enables analysis of the motor starting current, enabling precise protection relay settings. FI model can record 3 phase voltage, current, T model can record 1 winding current and 2 harmonic current respectively.



Disk emulation

If a ground fault/short circuit occurs due to insulation breakdown due to system aging, the signs of an intermittent accident are repeated several times, leading to a final accident.
The Disk Emulation function detects the signs of an initial accident and helps to block it safely before it spreads to a major accident.



Various communication compatibility (MODBUS, DNP, IEC61850)

The GIPAM 3000 includes media from RS-485, TCP/IP, Fiber Optic, and supports MODBUS, DNP3.0, IEC61850 Ed1/Ed2 protocol.
(The IEC61850 protocol does not support RS-485 communication.)
This variety of communication methods enables remote communication with PC managers for relay setup and management and other top software or heterogeneous communication. In addition, the user can connect directly to PC Manager via USB 2.0 port (Type B) on the front

Easy setup with PC Manager

The GIPAM3000 PAM-Master, available for setup of the GIPAM3000, makes it easy to set up and verify all the functions, including all the settings of the relay.
On-Line or Off-Line PC, enter each setting and connect to the front communication port (B Type, USB 2.0) of the GIPAM3000 series to download to complete the setup.

Remote access using PC Manager

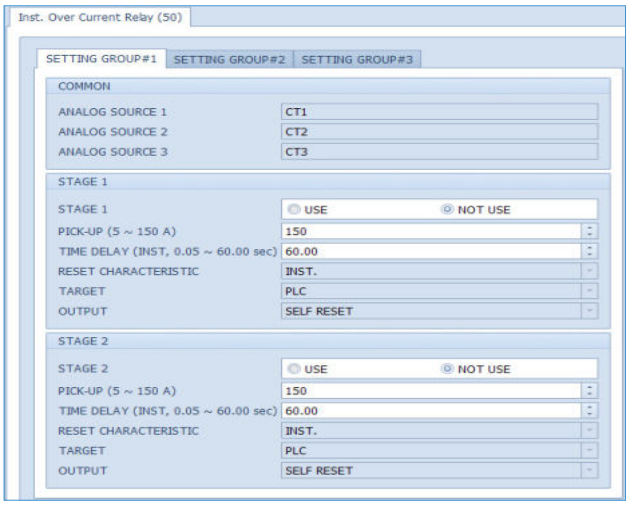
This is a function that enables event, fault, accident waveform analysis, etc. By connecting PC Manager from a remote area using Serial and Ethernet Port for remote communication on the back of the product.

Type		SCADA terminal	Manager terminal	Remark
Protocol	Media			
MODBUS, DNP	SERIAL(485)	TRX1+, TRX1+	TRX2+, TRX2+	A separate line is required.
MODBUS,DNP IEC61850	Ethernet	Ethernet com. port		Communication lines can be used in common.

Setting group function

It is a function that composes optimal protection coordination with digital input depending on the situation such as system changes and facility maintenance by correcting multiple correction values on one protection relay element. Up to three groups can be specified.

※ Path : GIPAM3000 PAM-Master - DEVICE SETTINGS - PROTECTIVE RELAY



Self-diagnosis and sequence monitoring

Self-diagnosis is performed by applying monitoring and redundancy circuits to the main circuits so that the equipment does not malfunction due to malfunction of internal components or circuits.

- Measurement and relay monitoring: ADC IC abnormality is monitored at all times and measured and compared with one analog input and two channels for abnormality monitoring.
- Communication monitoring: When a relay is booted, communication between the board and the board is monitored for abnormality of communication with the board.
- SMPS monitoring: Always monitor the internal SMPS power supply for abnormalities.
- CPU/DSP Watchdog: Always monitors for abnormalities with CPU and DSP Watchdog and performs H/W reset recovery when an error occurs.
- Memory redundancy: Performs error check for each memory data section, and double-backs up to a separate memory area to recover data from backup when an error occurs.

HMI with enhanced visibility and convenience

The GIPAM3000 is equipped with a 6.5” Color Touch Graphic LCD and a Key button, which enhances visibility and convenience by providing an intuitive GUI, convenient MMI function, and various information screens.

- Support full menus in ENG/KOR for global users.
- User convenience is enhanced by applying touch screen and key buttons.
- MIMIC displays the system disconnection diagram, measured values, and breaker control.
- Various measurement information is provided in various forms such as figures, graphs, and charts, so that intuitive information can be grasped.

User favorite screen setting

If you select and set up to three of the status monitoring, record viewing, and measurement screens that are frequently used by users, it provides a function to cycle through the registered screens every 5 seconds.

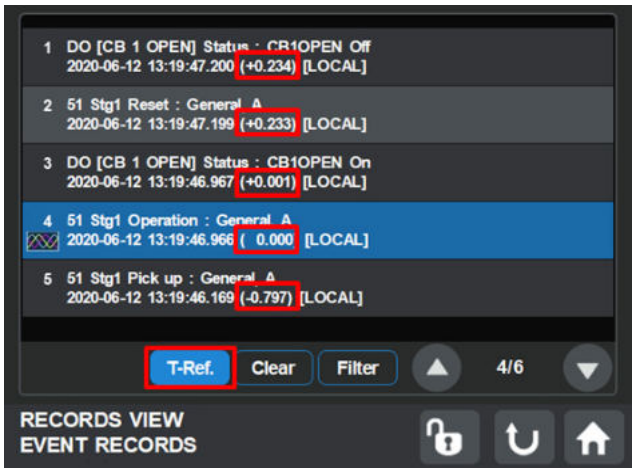
Features

Convenient Lever withdrawal structure applied

When the lever mounted at the bottom of the front of the relay is raised up, it can be pulled out and combined with only a small amount of force with the principle of lever.

Event time calculation display(T-Ref)

When displaying various event records on the relay HMI, this function additionally displays the time interval between the first selected event and the other events. This is a convenient function that eliminates the need for manual calculation of how much time lag occurs when an important event occurs one after another.



Long-life and reliable parts applied

The reliability of the product has been further improved by applying polymer capacitors, super capacitors, and MRAM memory, which are long-life parts.

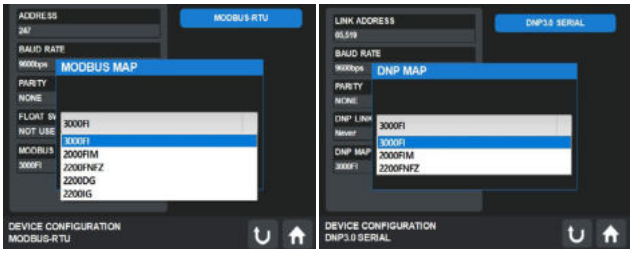
- Application of hybrid polymer capacitor: Minimize dry-up phenomenon of electrolytic capacitor applied to all electronic products.
- Super Capacitor application: For power backup of RTC operation in case of power failure, use Super Capacitor that can be used for a long time when charged instead of the primary battery.
- MRAM memory application: Among non-volatile memories used to store important relay settings, events and wave records, MRAM memory applied with the latest semiconductor technology is applied.
- Application of strong parts in high temperature and high humidity environment: Gold plated surface treatment and hole plug-in method are applied to prevent PCB surface corrosion.

Provide a wider range of use environments

Provides the use temperature (-25°C ~ 60°C) which is extended by more than 30% compared to the use temperature (-15°C ~ 55°C) of our other relays, and the storage temperature (-40°C ~70°C) which is expanded compared to the existing by providing also available in more severe environments.

Fully compatible with previous models (GIPAM2000/2200)

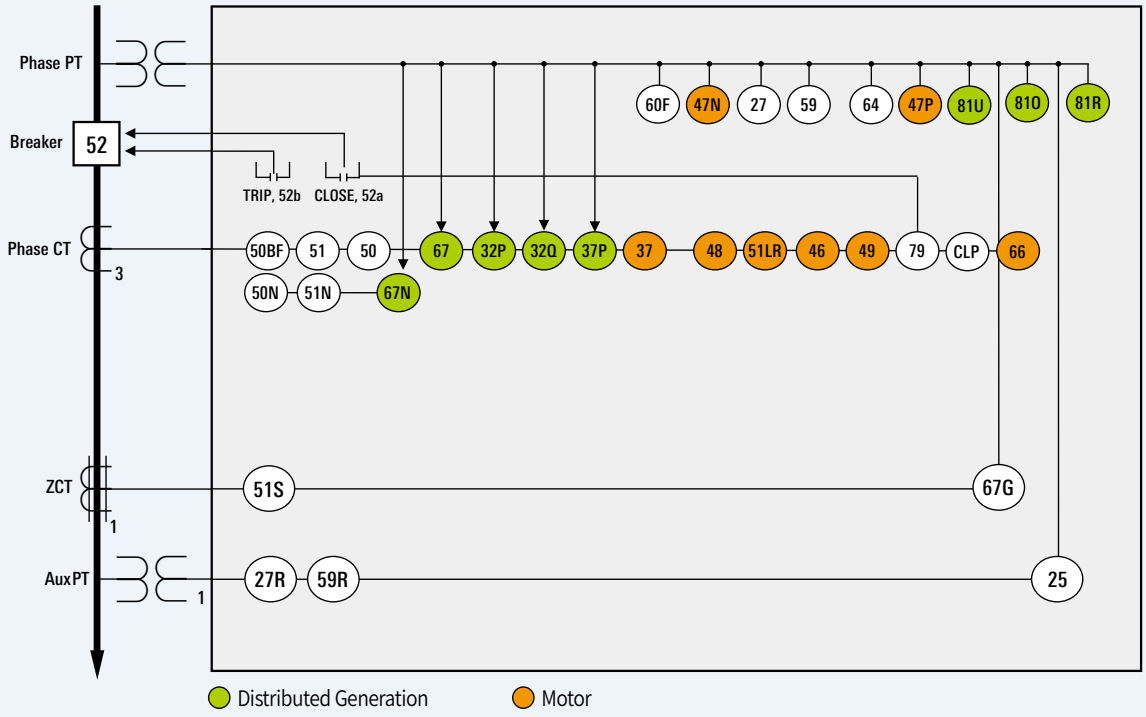
It is fully compatible with the cutting size, mounting hole and terminal block of GIPAM2000, its existing equivalent model, and the cutting size and mounting hole of another equivalent model, GIPAM2200.
MODBUS and DNP3.0 communication settings with GIPAM2000/2200 models installed through communication map settings are fully compatible.



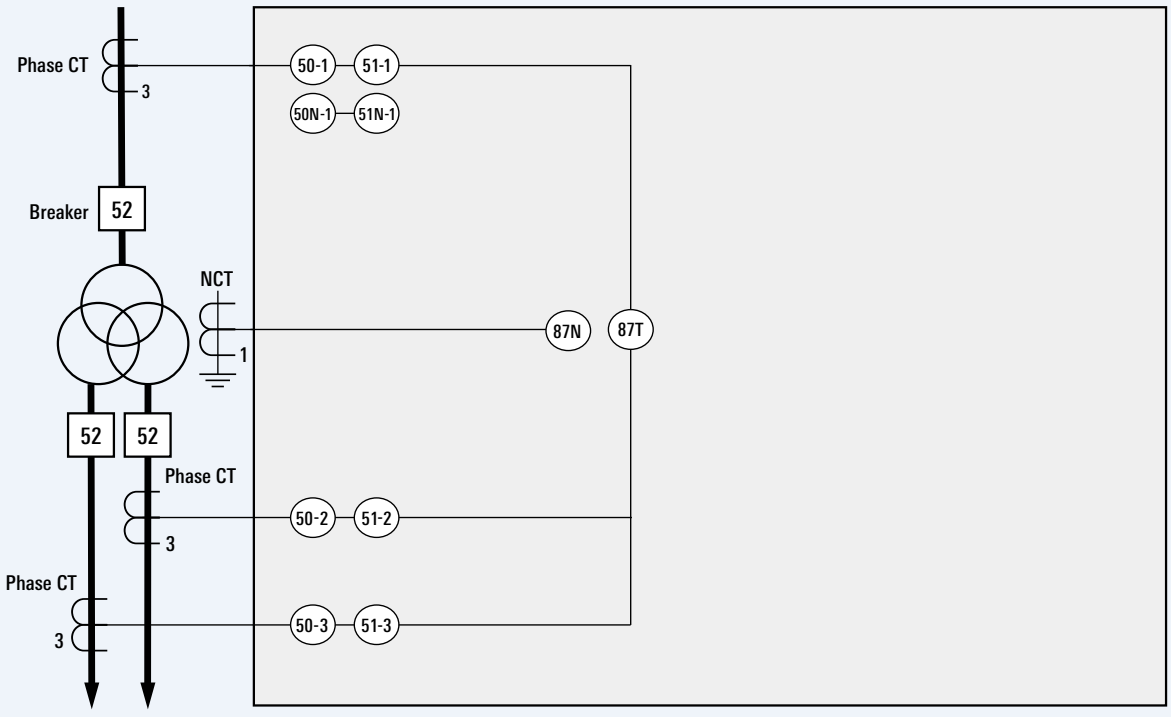
Functional Block Diagram

B

GIPAM3000 FI



GIPAM3000 T



Function & Rating

Protection

Type	Usage	Protection Elements		
GIPAM3000 FI	Feeder/Incoming Motor Distributed Generation	OCR (50/51) SEF (51S) Note 1) UVRR (27R) OVGR (64) Note 3) DPR (32P) UFR (81U) NSOCR (46) UPR (37P) RECLOSING (79) PTF (60F)	OCGR (50/51N) DOCGR (67NI/67ND) Note 2) OVR (59) NSOVR (47N) DQR (32Q) OFR (81O) THR (49) UCR (37) NCH (66) CLP	SGR (67G) UVR (27) OVRR (59R) POR (47P) DOCR (67I/67D) ROCOF(81R) STALL-LOCK (48/51LR) SYNC (25) CBF (50BF) LOCK--OUT (86) Note 4)
GIPAM3000 T	Transformer	OCR (50/51w1) OCGR (50/51N-1) DFRG (87N)	OCR (50/51w2) OCGR (50/51N-2) LOCK--OUT (86) Note 4)	OCR (50/51w3) DFR (87T) Note 5)

Note) 1. Sensitive Earth Fault (SEF) is a relay element that detects the earth current in the event of an earth accident in the non-ground
2. DOCGR is the same as DGR.
3. OVGR is ALRAM with no breaker TRIP In factory-shipped products.
4. Lock-out (86) can be configured with PLC Trip Logic.
5. The Inrush Detector (68) element is included in the DFR (87T) element.

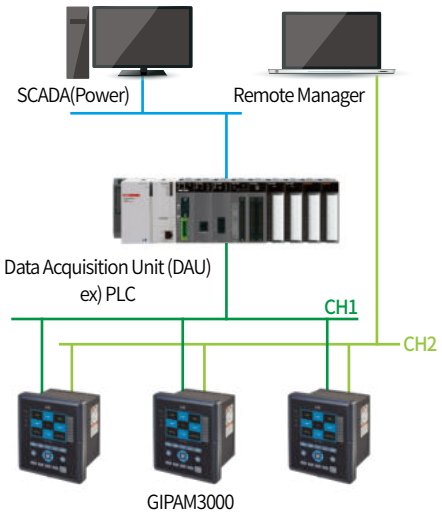
Measurement

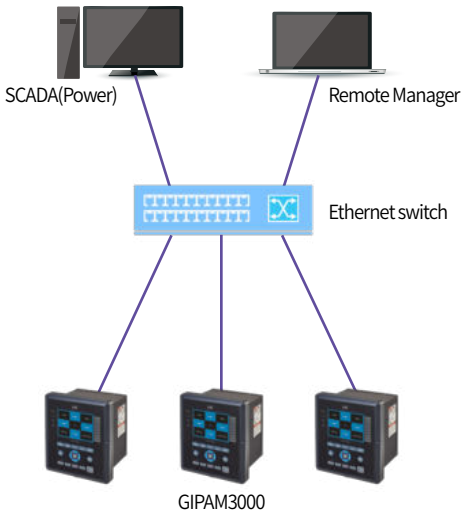
Measurement		Display range	Accuracy (%)	Remarks
Voltage	Voltage (V)	0.0V ~ 9999.999kV	±0.5%	Phase voltage, Line voltage
	Normal/reverse voltage (V_1/V_2)	0.0V ~ 9999.999kV	±5.0%	
	Zero phase voltage (V_{gpt})	0.0V ~ 9999.999V	±5.0%	
	Bus voltage (V_{aux})	0.0V ~ 9999.999kV	±5.0%	
	Voltage unbalance rate (%)	0.0% ~ 300.00%	±5.0%	
Current	Current (A)	0.0A ~ 999.999kA	±0.5%	Phase current (1A~6A)
	Normal/reverse current (I_1 / I_2)	0.0A ~ 999.999kA	±5.0%	
	Zero phase current (I_{nct})	0.0A ~ 999.999kA	±5.0%	I_{nct}
	Zero phase current (I_{zct})	0.0A ~ 999.999A	±5.0%	I_{zct}
Phase		-180.0°~180.0° (Phase display range)	±5°	
Power	Active power	0.00 ~ 9999.999 MW	±1.0%	+Forward, -Reverse (0.866 ≤ PF ≤ 1 , 1A ≤ Phase ≤ 6A)
	Reactive power	0.00 ~ 9999.999 MVar	±1.0%	+Forward, -Reverse (0 ≤ PF ≤ 0.5, 1A ≤ Phase ≤ 6A)
	Apparent power	0.00 ~ 9999.999 MVA	±5.0%	
Energy	Active energy	0.00 ~ 99999.999 MWh	±1.0%	+Forward, -Reverse (0.866 ≤ PF ≤ 1 , 1A ≤ Phase ≤ 6A)
	Reactive energy	0.00 ~ 99999.999 MVarh	±1.0%	+Forward, -Reverse (0 ≤PF ≤ 0.5, 1A ≤ Phase ≤ 6A)
	Apparent energy	0.00 ~ 99999.999 MVah	±5.0%	
Frequency	Frequency (V_a)	35 ~ 78Hz	±0.01Hz	Containing within 5% harmonics ±0.05Hz
	Frequency (V_{aux})	35 ~ 78Hz	±0.01Hz	Containing within 5% harmonics ±0.05Hz
Power factor	Power factor (PF)	-1.000 ~ 1.000	±0.02	Forward/Reverse (1A ≤Phase current ≤ 6A, 46V ≤Phase voltage ≤ 132V), Harmonic : 0%
	60hz power factor (DPF)	-1.000 ~ 1.000	±0.02	Forward/Reverse (1A ≤Phase current ≤ 6A, 46V ≤Phase voltage ≤ 132V), Harmonic : 0%
Harmonic	Voltage harmonic	0.00 ~ 100.00%	±5.0%	2^{nd} ~ 13^{th} Harmonic & THD, TDD, K-Factor (46V ≤ Harmonic & THD ≤ 220V)
	Current harmonic	0.00 ~ 100.00%	±5.0%	2^{nd} ~ 13^{th} Harmonic & THD, TDD, K-Factor (1A ≤Phase current ≤ 20A)
Demand	Active power demand	0.00 ~ 9999.999 MW	-	Total Peak Demand
	Reactive power demand	0.00 ~ 9999.999 MVar	-	Total Peak Demand
	Current demand	0.00 ~ 999.999 kA	-	Total Peak Demand

Note) Active power is an error in the rating when PF=1.

Communication

Type	RS-485	Ethernet
Protocol	DNP3.0 SERIAL MODBUS-RTU	DNP3.0 TCP MODBUS-TCP IEC61850 Ed.1/Ed.2
Specification	• Distance : Max. 1.2km • Speed : 9600, 19200, 38400bps • Cable : RS485 standard cable, 22AWG twisted shield pair cable • Mode : Differential • Method : Half-Duplex • Max input/output voltage : -7V ~ +12V	[10/100Base-TX] • Distance : Max. 100m per segment • Speed : Max 100Mbps • Cable : UTP(CAT.5), STP(Level 3) • Topology : Star type [100Base-FX] • Distance : Max. 2km per segment • Speed : 100Mbps Full-Duplex • Cable - . Wavelength : 1300nm - . Multi-Mode fiber - . Fiber Size : 62.5/125, 50/125um - . Optic Connector : LC type • Topology : Star type
Wiring	• Comm. terminal - CH 1 (8th terminal) : SCADA only - CH 2 (9th terminal) : Manager only, the REMOTE MANAGER setting should be set to 'USE'	• Comm. terminal : Don't care if the IP address is correct, communication is possible

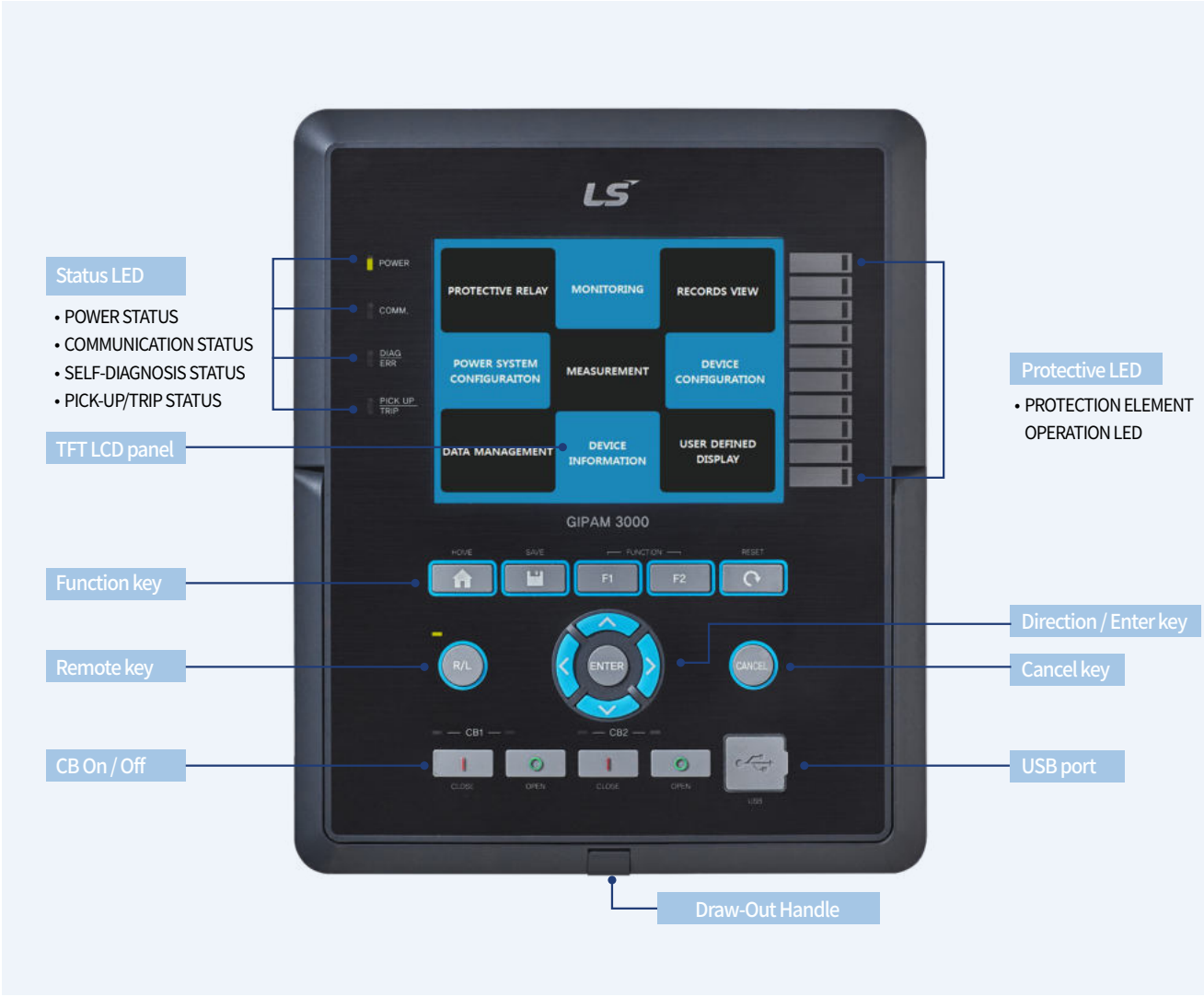




Function & Rating

Rating

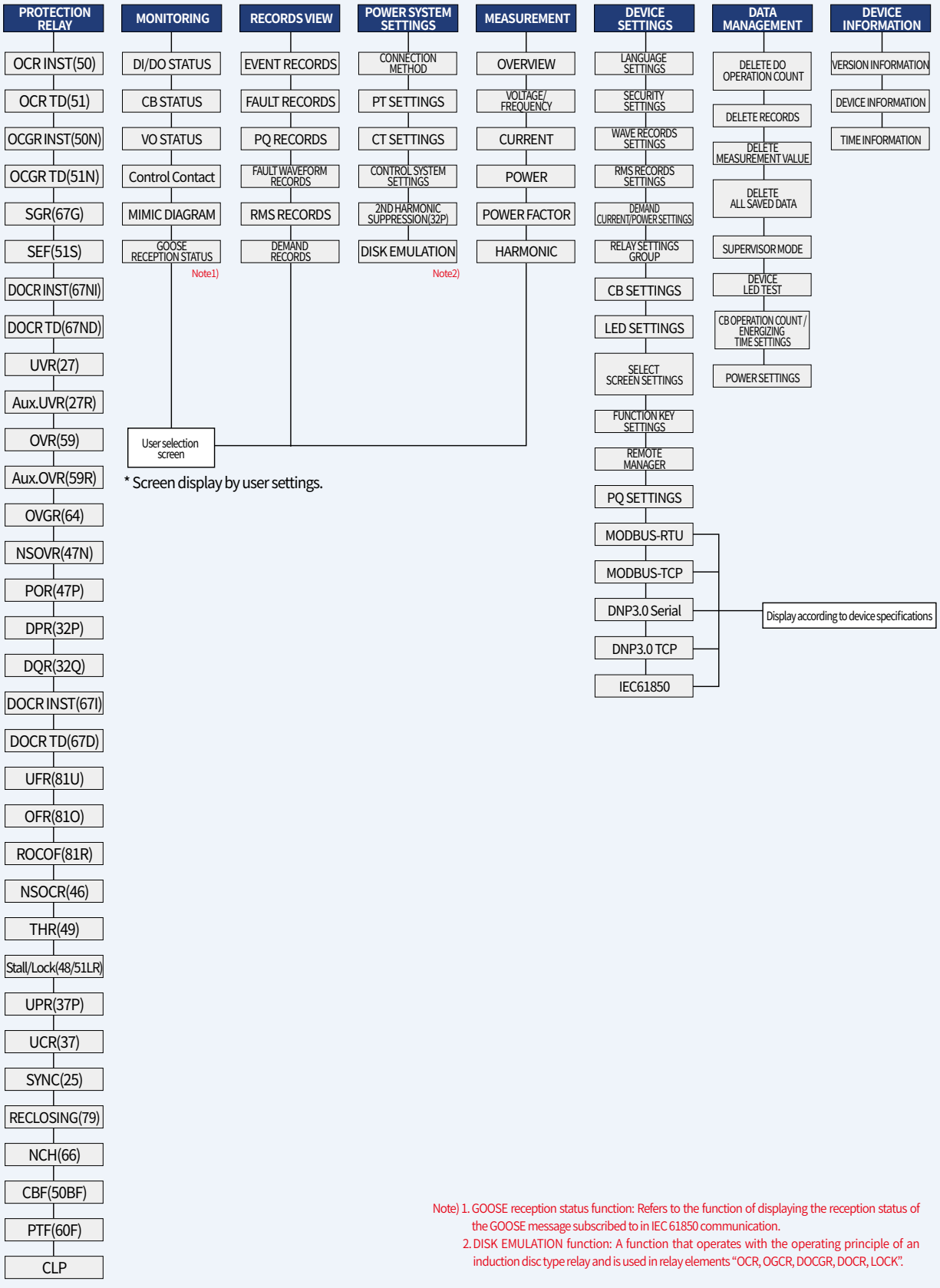
Type			Specification
Wiring			3P3W(2PT-D), 3P4W(3PT-Y)
Rating	Frequancy		60Hz, 50Hz
	Voltage	PT	110V (55~125V)
		GPT	Vn*√3 Vn : PT secondary rating voltage
	Current	CT	5A
		ZCT	1.5mA
	Power		AC/DC110V, DC125V
	Power consumption		30W or less : Stanby / 50W or less : Operation
	Burden		0.5VA or less : PT 1.0VA or less : CT
Input contact	for general		Digital Input AC/DC 110V, DC125V
Output contact	for trip		AC 250V 16A/DC 30V 16A, Resistive Load : Rated Capacity AC 4000VA, DC 480W : Opening Capacity
	for alarm		AC 250V 5A/DC 30V 5A, Resistive Load : Closed Capacity AC 1250VA, DC 150W : Opening Capacity
Tolerance	Operation Value		±5%
	Operation Time		±5% or ±35ms
Insulation Resistance			DC 500V 100MΩ or more
Insulation Voltage			AC 2kV(1kV)/1min
Lightning impulse voltage			AC 5kV(3kV) or more, 1.2x50μs standard waveform supplied
Overload withstand	Current circuit		Withstand 1.2 times of rated current continuously Withstand 2 times of rated current for 3 hours. Withstand 20 times of rated current for 2 seconds. Withstand 40 times of rated current for 1 second.
	Voltage circuit		Withstand 1.15 times of rated voltage for 3 hours.
Fast Transient Disturbance			4kV : power input 2kV : other input
Electrostatic Discharge(ESD)			8kV : Air, 6kV : Contact
Temperature	Operation		-25°C ~ 60°C
	Storage		-40°C ~ 70°C
Humidity			RH 80% or less (non-condensing)
Altitude			2,000m or less
Environment			A place not subject to abnormal vibration and shock.
Applied Standards			KEMC 1120 IEC 60255-26 IEC 61850-6, 7-1, 7-2, 7-3, 7-4, and 8-1
Dimension(mm)			209(W)x185.8(D)x260(H) : Cutting Size
Weignt			10.3kg
Communication			RS485 : Modbus, DNP3.0 Ethernet TE : Modbus, DNP3.0, IEC61850 Ethernet FE : Modbus, DNP3.0, IEC61850



Menu	Function
	Back to the main menu
	Save the setting value
	Go directly to a preset menu (Setting Menu : DEVICE SETTINGS – FUNCTION KEY SETTINGS)
	Reset the relay status
	Switch the Remote and Local LED : Green (Remote) / Red (Local)
	Enter : Select item and confirm setting Cancel : cancels the selected item, changes or cancels the setting value.

Operation & Setting

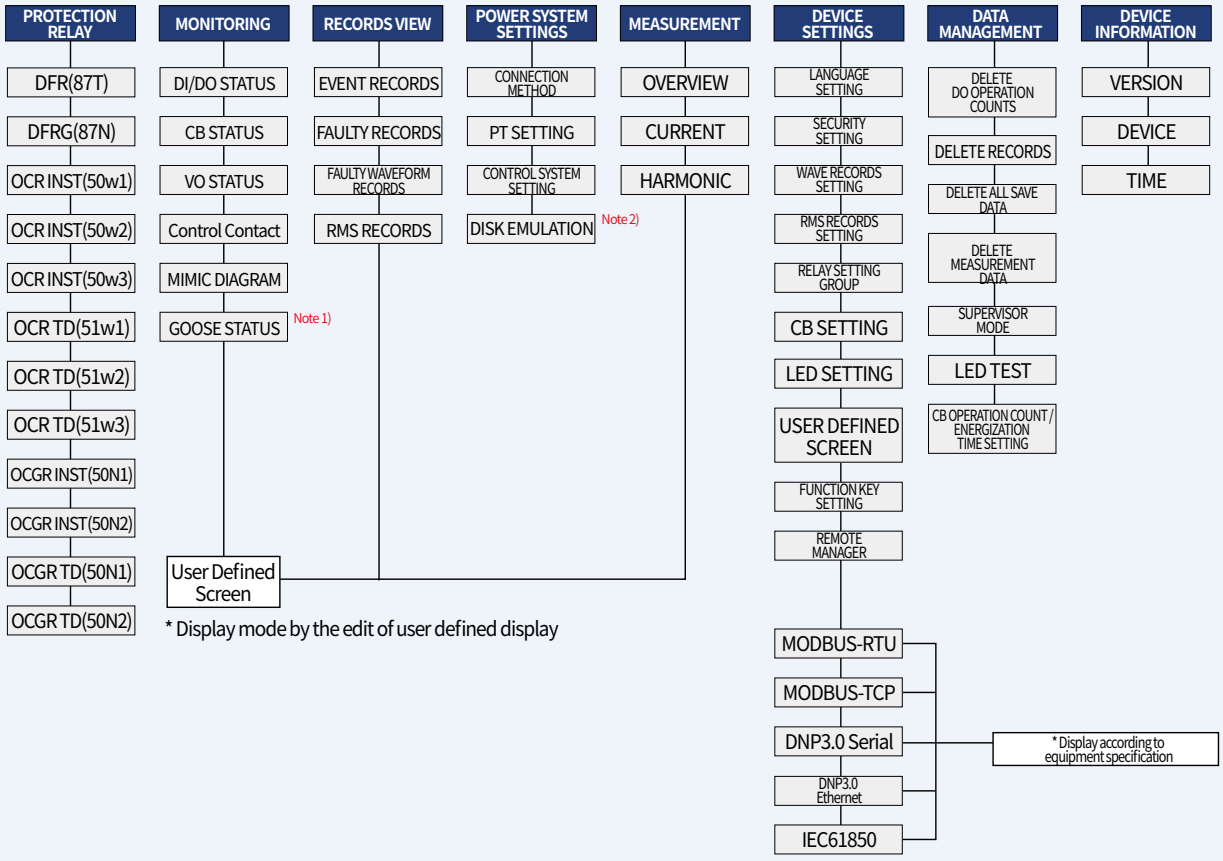
GIPAM3000 FI



Note) 1. GOOSE reception status function: Refers to the function of displaying the reception status of the GOOSE message subscribed to in IEC 61850 communication.
2. DISK EMULATION function: A function that operates with the operating principle of an induction disc type relay and is used in relay elements "OCR, OGCR, DOCGR, DOCR, LOCK".

B

GIPAM3000 T



Note) 1. GOOSE reception status function: Refers to the function of displaying the reception status of the GOOSE message subscribed to in IEC 61850 communication.
2. DISK EMULATION function: A function that operates with the operating principle of an induction disc type relay and is used in relay elements "OCR, OGCR, DOCGR, DOCR, LOCK".

Operation Characteristics

GIPAM3000 FI

Protection	Operating part	Pick-up range (Not USE, range/unit)	Operating characteristics	Operating time range	Delay time range	Remark
OCR (50)	Stage1	NOT USE, 5.0A ~ 150.0A/0.1A	Instantaneous	Operating within 40msec	-	-
	Stage2		Definite	0.05s ~ 60.00s/0.01s		
OCR (51)	Stage1	NOT USE, 0.50A ~ 20.00A/0.01A	Definite	0.05s ~ 60.00s/0.01s	-	IEC-SI, VI, EI, LI, IEEE-VI, EI, MI, KEPCO-SI, VI, Disk Emulation
	Stage2		Inverse	0.05 ~ 1.20/0.01 (IEC) 0.05 ~ 15.00/0.01 (IEEE)	0~10.00s/0.01s	
OCGR (50N)	Stage1	NOT USE, 0.5A ~ 40.0A/0.1A	Instantaneous	Operating within 40msec	-	-
	Stage2		Definite	0.05s ~ 60.00s/0.01s		
OCGR (51N)	Stage1	NOT USE, 0.10A ~ 10.00A/0.01A	Definite	0.05s ~ 60.00s/0.01s	-	IEC-SI, VI, EI, LI, IEEE-VI, EI, MI, KEPCO-SI, VI, Disk Emulation
	Stage2		Inverse	0.05 ~ 1.20/0.01 (IEC) 0.05 ~ 15.00/0.01 (IEEE)	0~10.00s/0.01s	
SGR (67G)	Stage1	NOT USE, 1.0~20.0mA/0.1mA(I_{zct}), 8~80V/1V, 0~359°/1° (Direction reference angle)	Definite	0.05s ~ 60.00s/0.01s	-	-
SEF (51S)	Stage1	NOT USE, 1.0~20.0mA/0.1mA(I_{zct})	Definite	0.05s ~ 60.00s/0.01s	-	-
DOCGR (67NI)	Stage1	NOT USE,0.5A ~ 40.0A/0.1A(I_{zct}), 0~359°/1°(Direction reference angle)	Instantaneous	Operating within 50msec	-	-
			Definite	0.05s ~ 60.00s/0.01s		
DOCGR (67ND)	Stage1	NOT USE, 0.10A~10.00A/0.01A(I_{nct}), 0~359°/1°(Direction reference angle)	Definite	0.05s ~ 60.00s/0.01s	-	IEC-SI, VI, EI, LI, IEEE-VI, EI, MI, KEPCO-SI, VI, Disk Emulation
			Inverse	0.05 ~ 1.20/0.01 (IEC) 0.05 ~ 15.00/0.01 (IEEE)	0~10.00s/0.01s	
UVR (27)	Stage1	NOT USE, 10.0V~110.0V/0.1V, NOT USE/USE(Auto return), NOT USE/USE(Dead voltage block), NOT USE/USE(No display), PLC, DO04(output)	Definite	0.05s ~ 60.00s/0.01s	-	Dead voltage block: 6V fixed ✓ Please Set the stage2 to use 32Q
	Stage2					
UVRR (27R)	Stage1	NOT USE, 10.0V~110.0V/0.1V, NOT USE/USE(Auto return), NOT USE/USE(Dead voltage block), NOT USE/USE(No display)	Definite	0.05s ~ 60.00s/0.01s	-	Dead voltage block: 6V fixed ✓ Under voltage Relay for other BUS with PT5
OVR (59)	Stage1	NOT USE, 40.0V~180.0V/0.1V	Definite	0.05s ~ 60.00s/0.01s	-	-
	Stage2					
OVRR (59R)	Stage1	NOT USE, 40.0V~180.0V/0.1V(V_{aux})	Definite	0.05s ~ 60.00s/0.01s	-	-
OVGR (64)	Stage1	NOT USE, 5.0V ~ 80.0V/0.1V	Definite	0.05s ~ 60.00s/0.01s	-	-
	Stage2					
NSOVR (47N)	Stage1	NOT USE, 11V ~ 110V/1V	Definite	0.05s ~ 60.00s/0.01s	-	-
	Stage2					
POR (47P)	Stage1	NOT USE, 5%~100%/1%	Definite	0.05s ~ 60.00s/0.01s	-	-
	Stage2					
DPR (32P)	Stage1	NOT USE, 15.0W~500.0W/0.1W, FORWARD/REVERSE	Definite	0.10s ~ 60.00s/0.01s	-	Operates with 3-phase active power ✓ When 32P operates , only DO08 OUTPUT activates and CB OFF output is not available. Please modify the LOGIC if necessary.
	Stage2					
DQR (32Q)	Stage1	NOT USE, 11.0VAr~500.0VAr/0.1VAr, FORWARD/REVERSE	Definite	0.10s~ 60.00s/0.01s	-	Operates with individual reactive power. (Q_a, Q_b, Q_c) $Q_a = I_a * (V_b - V_c)$ ✓ Please Set the 27 of stage2 to use 32Q
	Stage2					

Note) GIPAM2000 sets the rated unit (Vn=110V, In=5A), and GIPAM3000 sets the size unit (voltage value, current value)
Ex) When operating value 110V, 5A is set, GIPAM2000: 1Vn, 1In, GIPAM3000: 110V, 5A

Protection	Operating part	Pick-up range (Not USE, range/unit)	Operating characteristics	Operating time range	Delay time range	Remark
DOCR (67I)	Stage1	NOT USE, 5.0A~150.0A/0.1A, 0~359°/1° (Direction reference angle)	Instantaneous	Operating within 50msec	-	Operating range angle: ±87°
	Stage2		Definite	0.05s ~ 60.00s/0.01s		
DOCR (67D)	Stage1	NOT USE, 0.50A~20.00A/0.01A, 0~359°/1° (Direction reference angle)	Definite	0.05s ~ 60.00s/0.01s	-	IEC-SI, VI, EI, LI, IEEE-VI, EI, MI, KEPCO-SI, VI, Disk Emulation Operating range angle: ±87°
	Stage2		Inverse	0.05 ~ 1.20/0.01 (IEC) 0.05 ~ 15.00/0.01 (IEEE)	0~10.00s/0.01s	
UFR (81U)	Stage1	NOT USE, 50.00Hz~60.00Hz/0.01Hz	Definite	0.10s~ 60.00s/0.01s	-	Low voltage block: 40V
	Stage2					
	Stage3					
	Stage4					
OFR (81O)	Stage1	NOT USE, 60.00Hz~70.00Hz/0.01Hz	Definite	0.10s ~ 60.00s/0.01s	-	Low voltage block: 40V
	Stage2					
	Stage3					
	Stage4					
ROCOF (81R)	Stage1	NOT USE, 0.10Hz/s~2.00Hz/s/0.01Hz/s	Definite	0.20s~ 1.00s/0.01s	-	Low voltage block: 40V
	Stage2					
	Stage3					
	Stage4					
NSOCR (46)	Stage1	NOT USE, 0.50A~5.00A/0.01A	Definite	0.10s ~ 60.00s/0.01s	-	-
	Stage2					
THR (49)	Stage1	NOT USE, 1.00A~10.00A/0.01A, Alarm : USE/NOT USE, 70% ~ 90%/1%	Inverse	2.0min~32.0min/0.5min, 0.8 ~ 1.2/0.01	-	-
STALL/LOCK (48/51LR)	Stage1	1.00A~50.00A/0.01A,	Definite	0.05s ~ 60.00s/0.01s	-	IEC-VI, EI, Disk Emunlation
			Inverse	0.05 ~ 1.00/0.01 (IEC)		
UPR (37P)	Stage1	NOT USE, 15W~500W/1W, FORWARD/REVERSE	Definite	0.10s ~ 60.00s/0.01s	-	Dead power block: 15W
	Stage2					
UCR (37)	Stage1	NOT USE, 0.5A ~ 4.5A/0.1A	Definite	0.10s~ 60.00s/0.01s	-	Dead current block: 0.1A
	Stage2					
SYNC (25)	Stage1	NOT USE, 2V~50V/1V(V_{diff}), 5°~45°/1°(Phase diff), 0.01Hz~0.50Hz/0.01Hz(F diff), 10V~30V/1V(Dead Voltage)	Definite		-	Synchronous voltage: 40V ~ 132V
Reclose (79)	Stage1	NOT USE, 1~5time/1time NOT USE/USE (Limiting operation during the second input)	Definite	1.0s~180.0s/0.1s(Preparation time) 0.2s~60.0s//0.1s(Dead voltage time1) 0.2s~60.0s//0.1s(Dead voltage time 2) 0.2s~60.0s//0.1s(Dead voltage time 3) 0.2s~60.0s//0.1s(Dead voltage time 4) 0.2s~60.0s//0.1s(Dead voltage time 5) 1.0s~180.0s/0.1s(Return time)	-	- Operation protection: OCR/OCGR/DOCR/DOCG - Protection description: It is a function to block instantaneous operation after one operation of reclosed.
NCH (66)	Stage1	NOT USE, 1~5time/1time, 10 ~ 80%/1%	Definite	1 ~ 60min/1min	-	-
CBF (50BF)	Stage1	NOT USE, 1.0A~5.0A/0.5A	Definite	0.10s ~ 1.00s/0.01s	-	Operation condition : breaker closed status
PTF (60F)	Stage1	NOT USE, 10V ~ 70V/1V	Definite	Operating within 40msec	-	Operation condition : breaker closed status , 0.1A<Phase current<5A, I_{ub}(%) : 20%or less , Operation time : 40ms or less, NEMA : $I_{ub} = (Max(I_{line} - I_{avg}))/I_{avg}$

Note) GIPAM2000 sets the rated unit (Vn=110V, In=5A), and GIPAM3000 sets the size unit (voltage value, current value)
Ex) When operating value 110V, 5A is set, GIPAM2000: 1Vn, 1In, GIPAM3000: 110V, 5A

Operation Characteristics

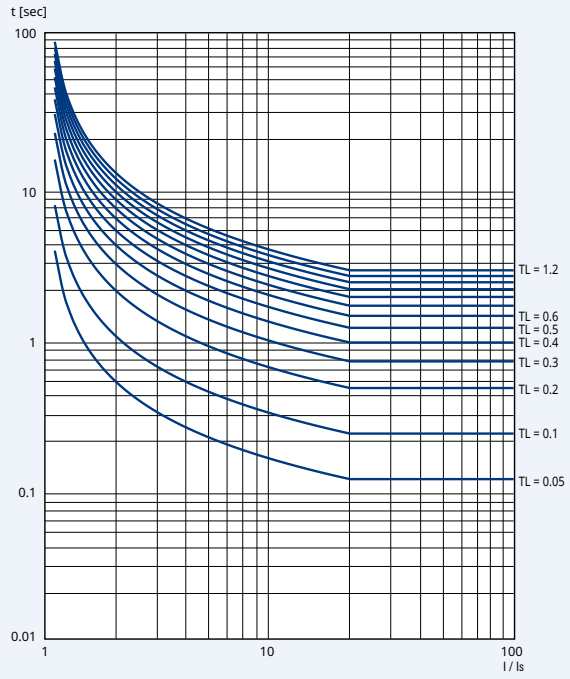
GIPAM3000 T

Protection	Operating part	Pick up range (Not USE, range/unit)	Operating characteristics	Operating time range	Delay time range	Remark
CLP	Stage1	NOT USE, 120%~1,000%/5%	Definite	1.0s~60.0s/0.1s	-	Operation protection: 50/51/50N/51N Restart time: 10 sec
OCR (50 w1)	Stage1	NOT USE, 5.0A ~ 150.0A/0.1A	Instantaneous	Operating within 40msec	-	-
	Stage2		Definite	0.05s ~ 60.00s/0.01s		
OCR (50 w2)	Stage1	NOT USE, 5.0A ~ 150.0A/0.1A	Instantaneous	Operating within 40msec	-	-
	Stage2		Definite	0.05s ~ 60.00s/0.01s		
OCR (50 w3)	Stage1	NOT USE, 5.0A ~ 150.0A/0.1A	Instantaneous	Operating within 40msec	-	-
	Stage2		Definite	0.05s ~ 60.00s/0.01s		
OCR (51 w1)	Stage1	NOT USE, 0.50A ~ 20.00A/0.01A	Definite	0.05s ~ 60.00s/0.01s	-	IEC-SI, VI, EI, LI, IEEE-VI, EI, MI, KEPCO-SI, VI, Disk Emulation
	Stage2		Inverse	0.05 ~ 1.20/0.01(IEC) 0.05 ~ 15.00/0.01(IEEE)	0~10.00s/0.01s	
OCR (51 w2)	Stage1	NOT USE, 0.50A ~ 20.00A/0.01A	Definite	0.05s ~ 60.00s/0.01s	-	IEC-SI, VI, EI, LI, IEEE-VI, EI, MI, KEPCO-SI, VI, Disk Emulation
	Stage2		Inverse	0.05 ~ 1.20/0.01(IEC) 0.05 ~ 15.00/0.01(IEEE)	0~10.00s/0.01s	
OCR (51 w3)	Stage1	NOT USE, 0.50A ~ 20.00A/0.01A	Definite	0.05s ~ 60.00s/0.01s	-	IEC-SI, VI, EI, LI, IEEE-VI, EI, MI, KEPCO-SI, VI, Disk Emulation
	Stage2		Inverse	0.05 ~ 1.20/0.01(IEC) 0.05 ~ 15.00/0.01(IEEE)	0~10.00s/0.01s	
OCGR (50N_1)	Stage1	NOT USE, 0.5A ~ 40.0A/0.1A	Instantaneous	Operating within 40msec	-	-
	Stage2		Definite	0.05s ~ 60.00s/0.01s		
OCGR (50N_2)	Stage1	NOT USE, 0.5A ~ 40.0A/0.1A	Instantaneous	Operating within 40msec	-	-
	Stage2		Definite	0.05s ~ 60.00s/0.01s		
OCGR (51N_1)	Stage1	NOT USE, 0.10A ~ 10.00A/0.01A	Definite	0.05s ~ 60.00s/0.01s	-	IEC-SI, VI, EI, LI, IEEE-VI, EI, MI, KEPCO-SI, VI, Disk Emulation
	Stage2		Inverse	0.05 ~ 1.20/0.01(IEC) 0.05 ~15.00/0.01(IEEE)	0~10.00s/0.01s	
OCGR (51N_2)	Stage1	NOT USE, 0.10A ~ 10.00A/0.01A	Definite	0.05s ~ 60.00s/0.01s	-	IEC-SI, VI, EI, LI, IEEE-VI, EI, MI, KEPCO-SI, VI, Disk Emulation
	Stage2		Inverse	0.05 ~ 1.20/0.01(IEC) 0.05 ~ 15.00/0.01(IEEE)	0~10.00s/0.01s	
DFR (87T)	High set	NOT USE, 5.0A ~ 100.0A/0.1A	Instantaneous	Operating within 50msec	-	-
			Definite	0.05s ~ 10.00s/0.01s		
	Low set	NOT USE, 1.00A~5.00A/0.01A, 15%~80%/1%(Slope#1), 15%~80%/1%(Slope#2), 5.0A~100.0A/0.1A(Critical point), NOT USE/USE (Zero current removal), NOT USE/USE (Harmonic removal), NOT USE, 5%~50%/1% (Harmonic ratio)	Definite	0.05s ~ 10.00s/0.01s	-	-
DFRG (87N)	Stage1	NOT USE, 0.25A~5.00A/0.01A, Slope : 15% ~ 80%/1%	Definite	0.05s ~ 10.00s/0.01s	-	-

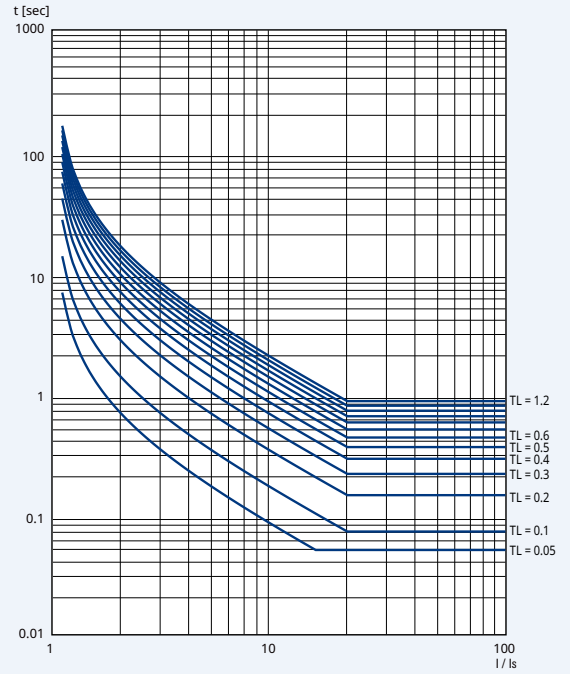
Note) GIPAM2000 sets the rated unit (Vn=110V, In=5A), and GIPAM3000 sets the size unit (voltage value, current value)
Ex) When operating value 110V, 5A is set, GIPAM2000: 1Vn, 1In, GIPAM3000: 110V, 5A

Characteristic Curves

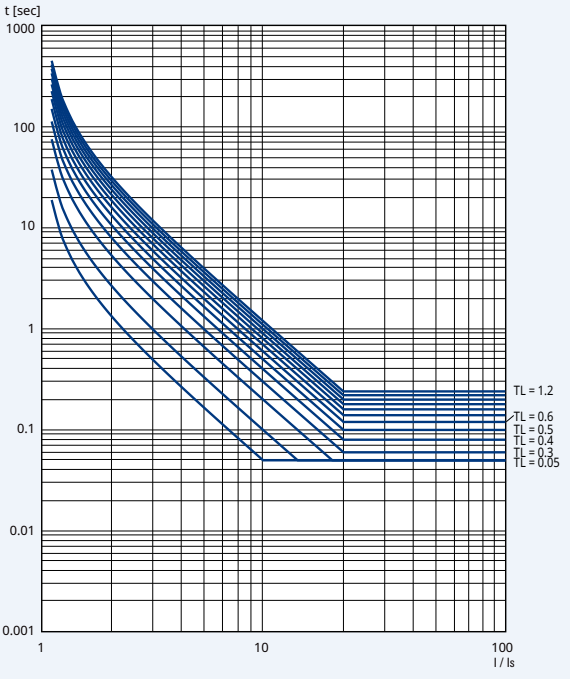
IEC-SI:Standard Inverse Time



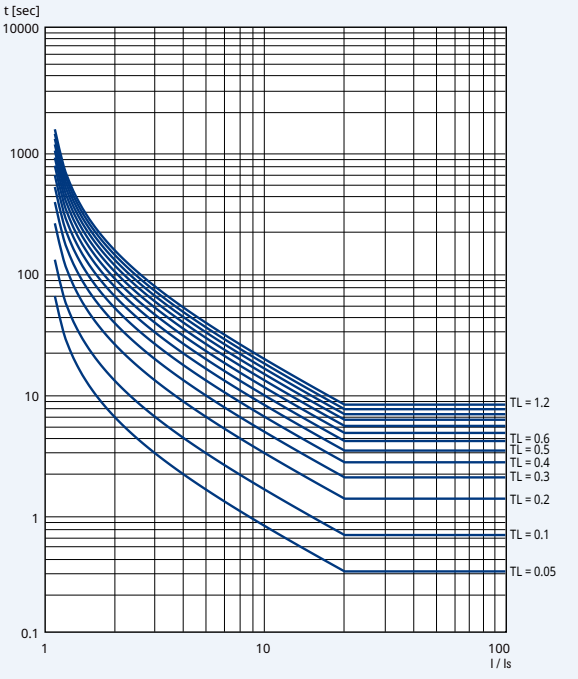
IEC-VI:Very Inverse Time



IEC-EI:Extremely Inverse Time



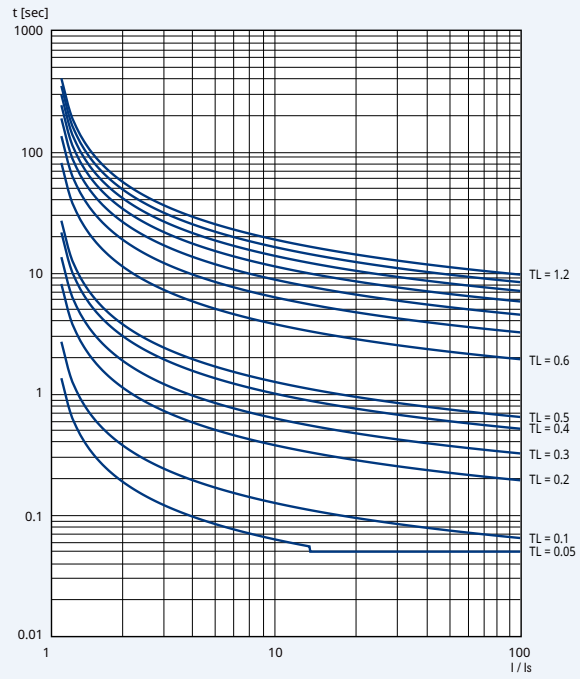
IEC-LI:Longtime Inverse Time



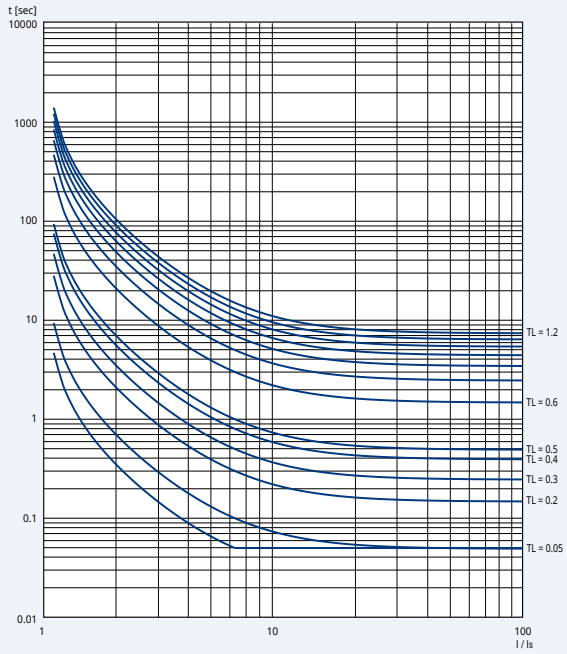
Note) If the operation time of the time-limited characteristic curve is shorter than the instantaneous operation, it is based on the instantaneous operation time.

Characteristic Curves

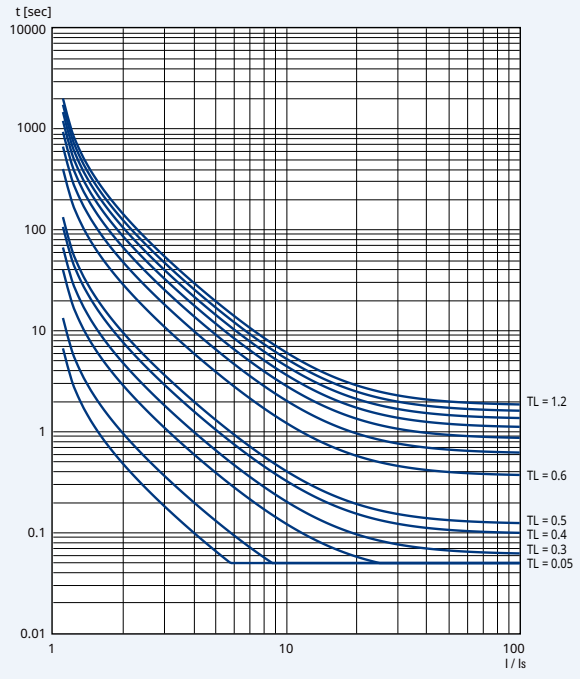
IEEE-MI : Moderately Inverse Time)



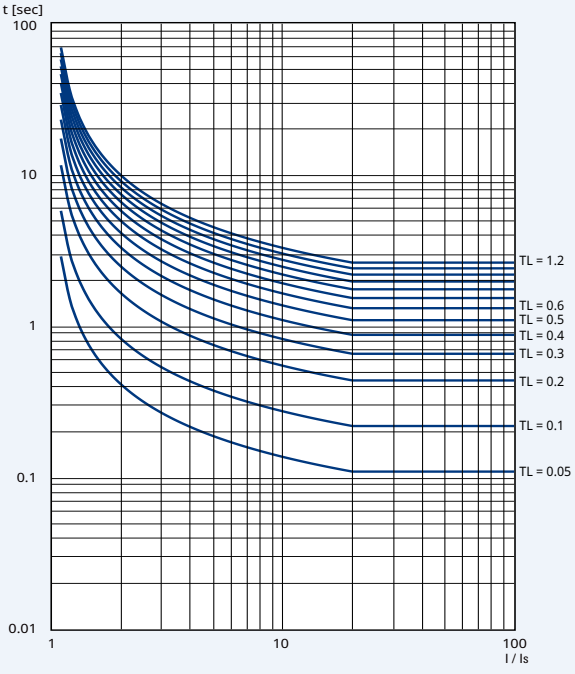
IEEE-VI:Very Inverse Time)



IEEE-EI:Extreme Inverse Time)

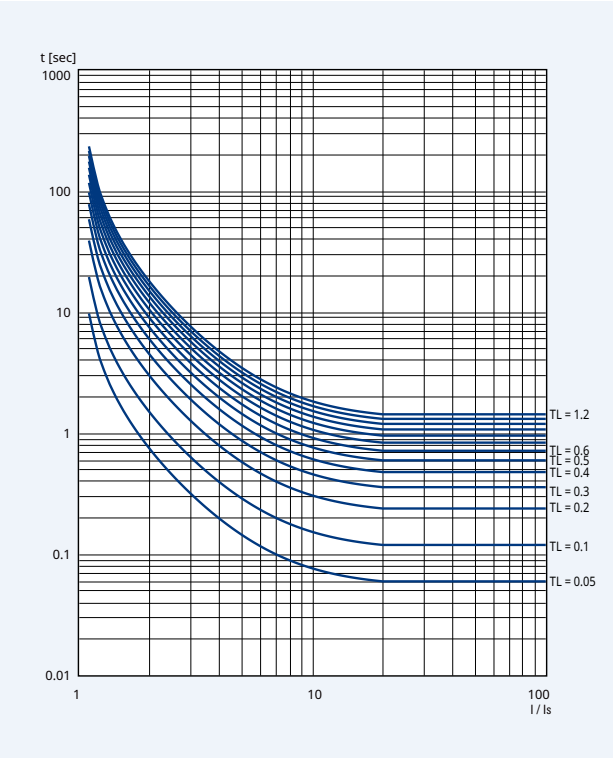


KEPCO-SI



B

KEPCO-VI



Inverse time curve characteristic value

Operating time formula

$$t(s) = TMS \times \left(\frac{k}{\left(\frac{G}{G_S} \right)^{\alpha} - 1} + C \right) + CD \qquad t_r(s) = TMS \times \left(\frac{t_r}{1 - \left(\frac{G}{G_S} \right)^{\beta}} \right)$$

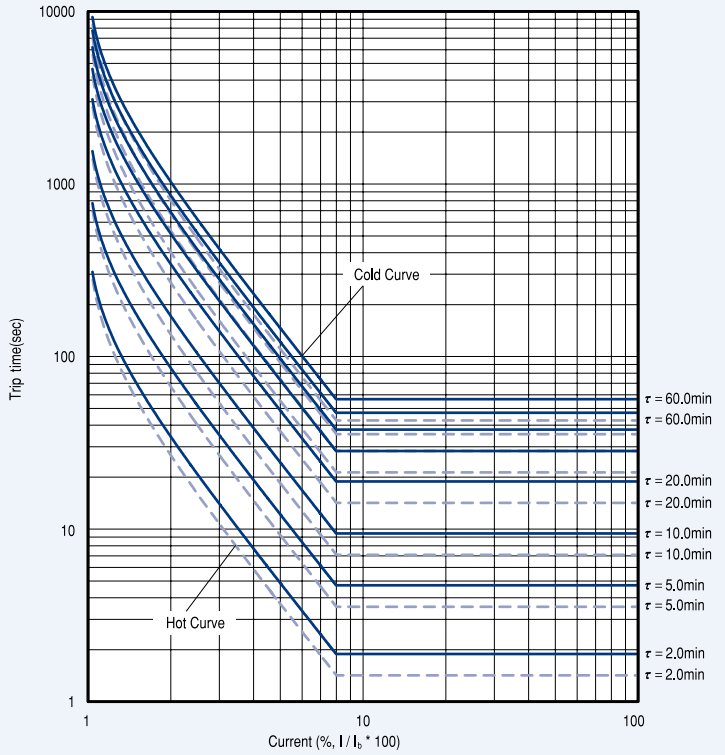
TMS(Time Multiplier Setting): Inverse time characteristic value, GS: Setting current, G: fault current
k, α, c: Factor for each curve, CD: Constant Delay

Curve model	TYPE	TMS range	TMS Step	k	c	α	tr	β
IEC	SI	0.05 ~ 1.20	0.01	0.14	0	0.02	9.7	2
	VI			13.5	0	1	43.2	2
	EI			80	0	2	58.2	2
	LI			120	0	1	80	2
IEEE	MI	0.05 ~ 15.0	0.01	0.0515	0.114	0.02	4.85	2
	VI			19.61	0.491	2	21.6	2
	EI			28.2	0.1217	2	29.1	2
KEPCO	SI	0.05 ~ 1.20	0.01	0.11	0.42	0.02	-	-
	VI			39.85	1.084	1.95	-	-

Note) OCR, OCGR, DOCR, DOCGR apply IEC(4), IEEE(3), KEPCO(2) curves.
LOCK apply IEC VI, EI only.

Characteristic Curves

Thermal Curve



• **Apply : THR(49)**

· HOT : $t = \tau h \cdot I_n \frac{I^2 - I_P^2}{I^2 - (k \cdot I_B)^2}$

$\tau h = 2.0 \sim 60.0 min$

· COLD : $t = \tau c \cdot I_n \frac{I^2}{I^2 - (k \cdot I_B)^2}$

$\tau c = 2.0 \sim 60.0 min$

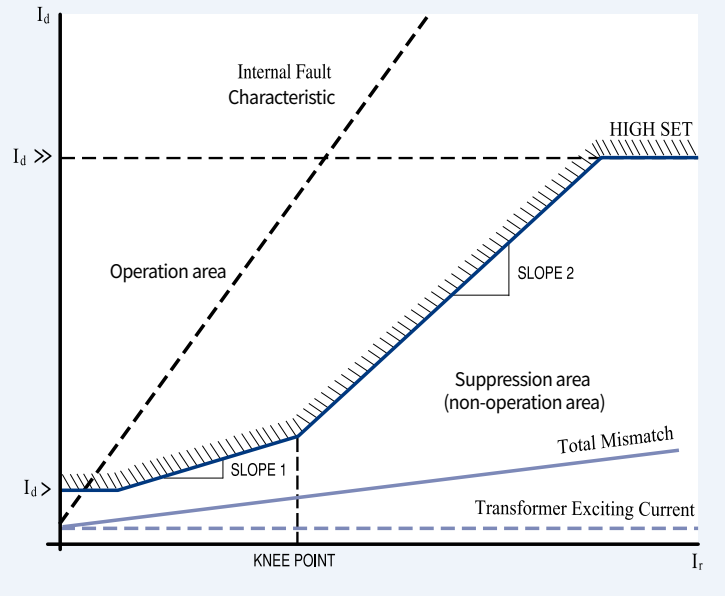
$\begin{pmatrix} I_P = 0.5 \\ k = 1 \\ I_B = 1 \end{pmatrix}$

· k = SF

I_P : Failure load current
I_B : Rated load current
k : Overload constant
I : Fault current
τh (τheating) : Thermal time constant during operation
τc (τcooling) : Thermal time constant during cooling

· Cold state is $I_P = 0$
· SF : Service Fator

Ratio Differential Curve



• **Apply : DFR(87T-P)**

$I_d = I_{differential} = |\bar{I}_1 - \bar{I}_2|$ (Vector sum.)

$Ir = I_{restraint} = |I_1| + |I_2|$ (Scalar sum.)

$SLOPE = [\frac{I_d}{I_r}]$

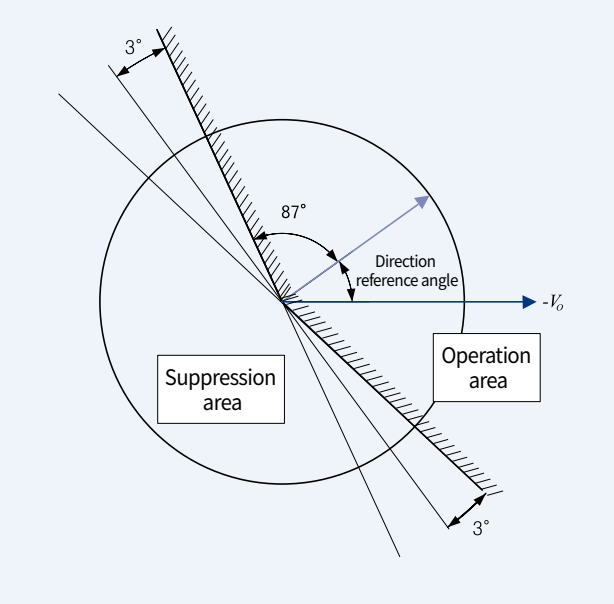
Fault Characteristic: Fault Characteristic
($I_{1st} = If$, $I_{2nd} = 0$)

I_d : Differential current
I_r : Suppression current
$I_d>$: Time difference current (Low set : 1~5A)
$I_d>>$: Instantaneous differential current
(High set : 5~100A)
KNEE POINT : Inflection point
SLOPE 1 : Characteristic slope 1
SLOPE 2 : Characteristic slope 2

B

Directional element operation characteristics

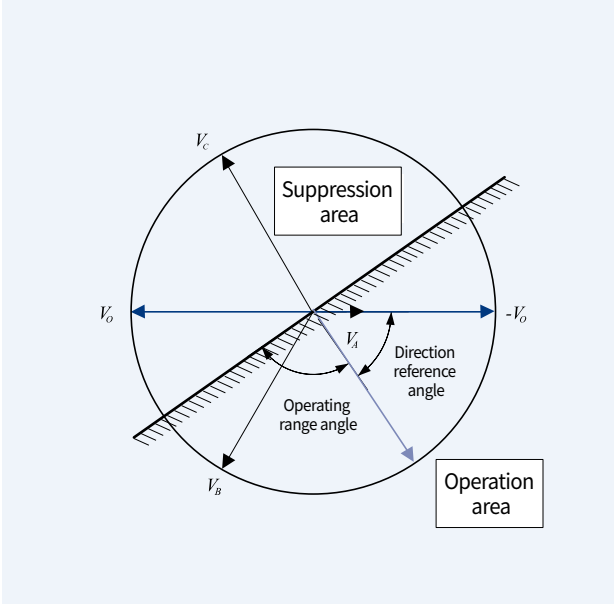
SGR



• **SGR Relay operating area**

Reference sensitivity phase angle – 87° ≤ ($\angle I_o - \angle V_o$) ≤ Reference sensitivity phase angle + 87°

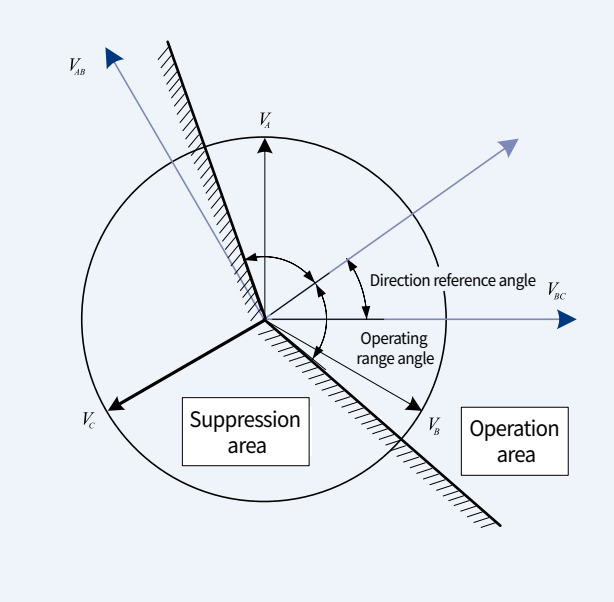
DGR, DOCGR



• **DGR, DOCGR Relay operating area**

Reference sensitivity phase angle – Operating range angle ≤ ($\angle I_o - \angle V_o$) ≤ Reference sensitivity phase angle + Operating range angle

DOCR



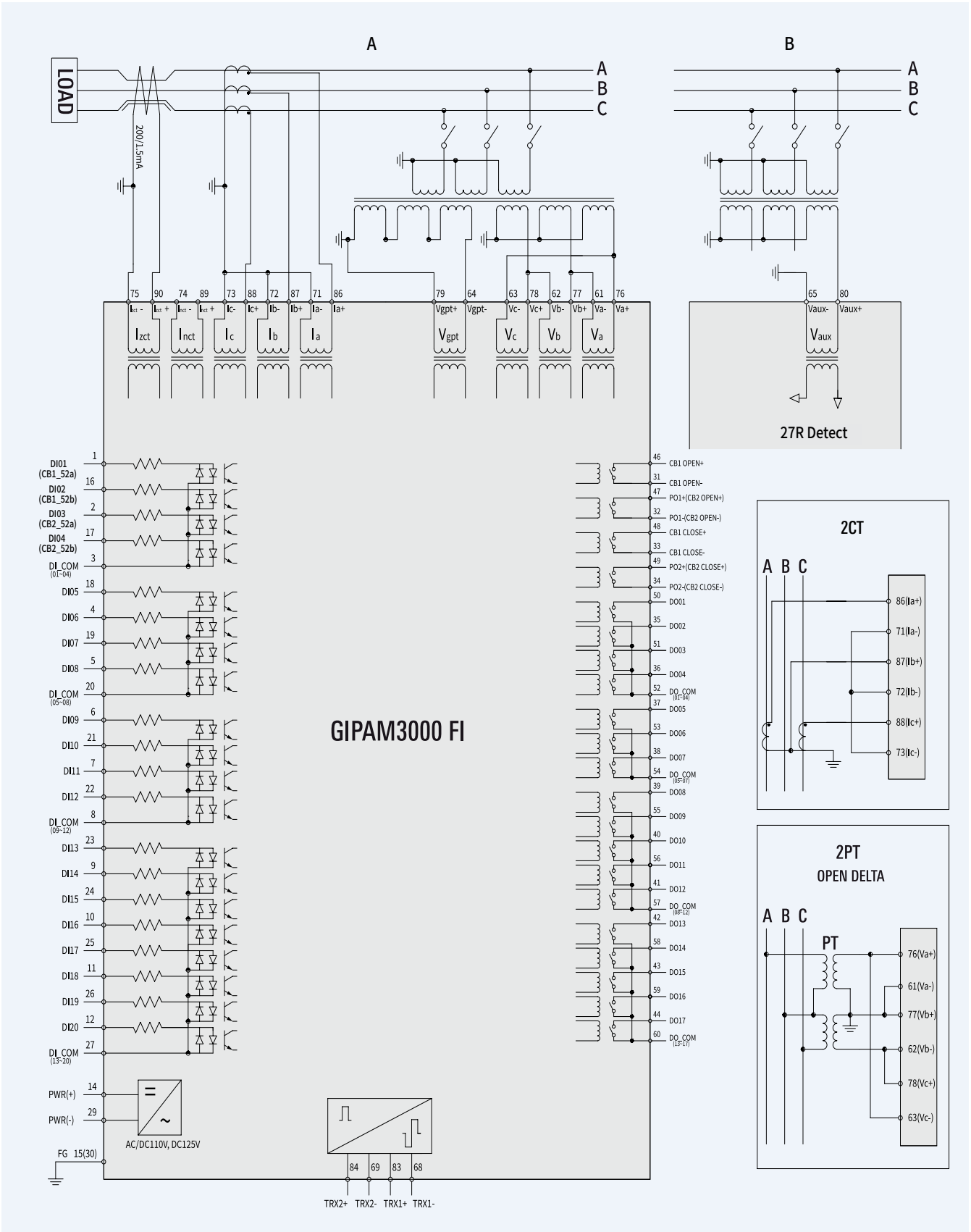
• **DOCR Relay operating area**

Reference sensitivity phase angle – Operating range angle ≤ (∠Operating current - ∠Reference voltage) ≤ Reference sensitivity phase angle + Operating range angle

Phase	Operating current	Polarity voltage(Vpol)
A	I_a	$V_{bc} = V_b - V_c$
B	I_b	$V_{ca} = V_c - V_a$
C	I_c	$V_{ab} = V_a - V_b$

Wiring

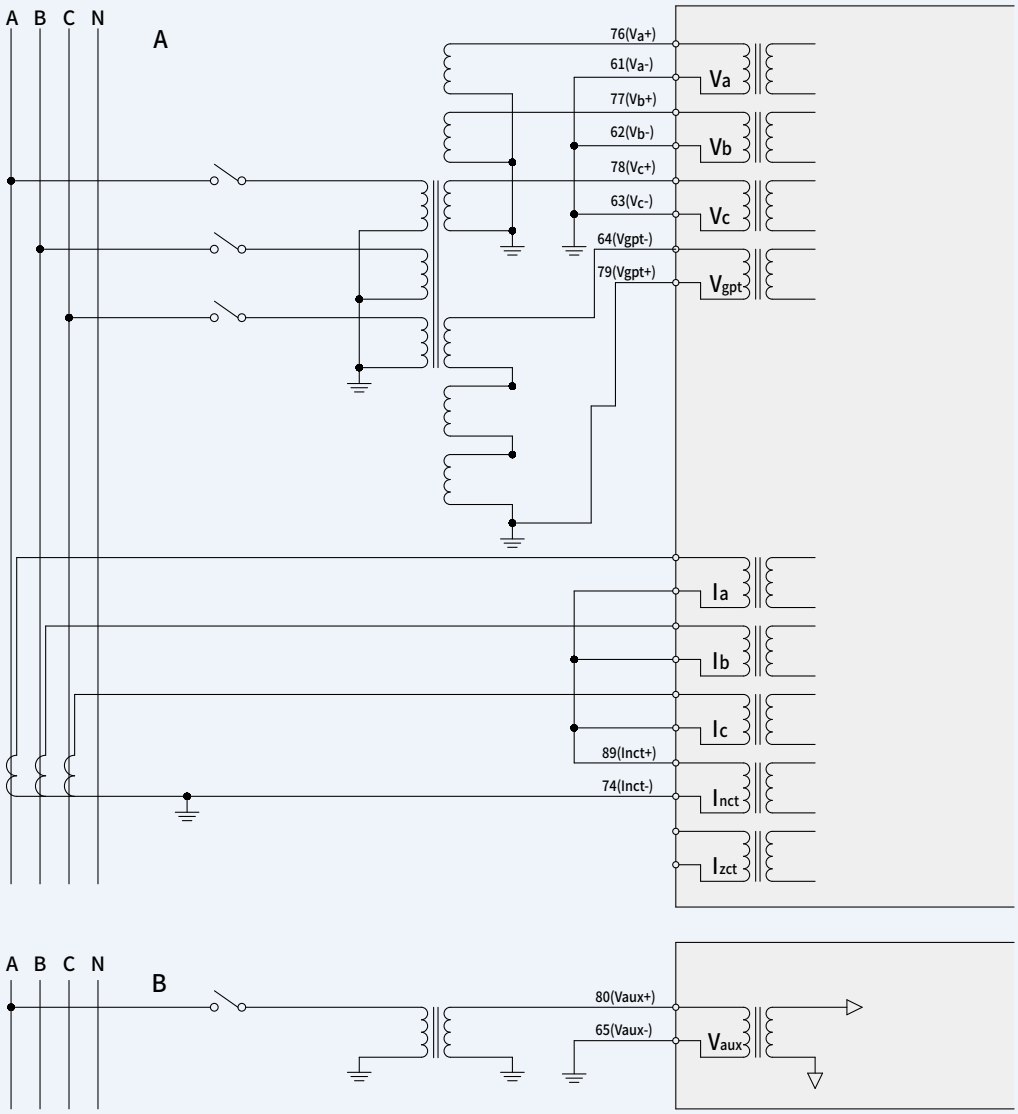
GIPAM3000 FI Wiring (3P3W)



Note) GIPAM3000 recommends 3PT Y connection for optimal system protection.

B

GIPAM3000 FI Wiring (3P4W)

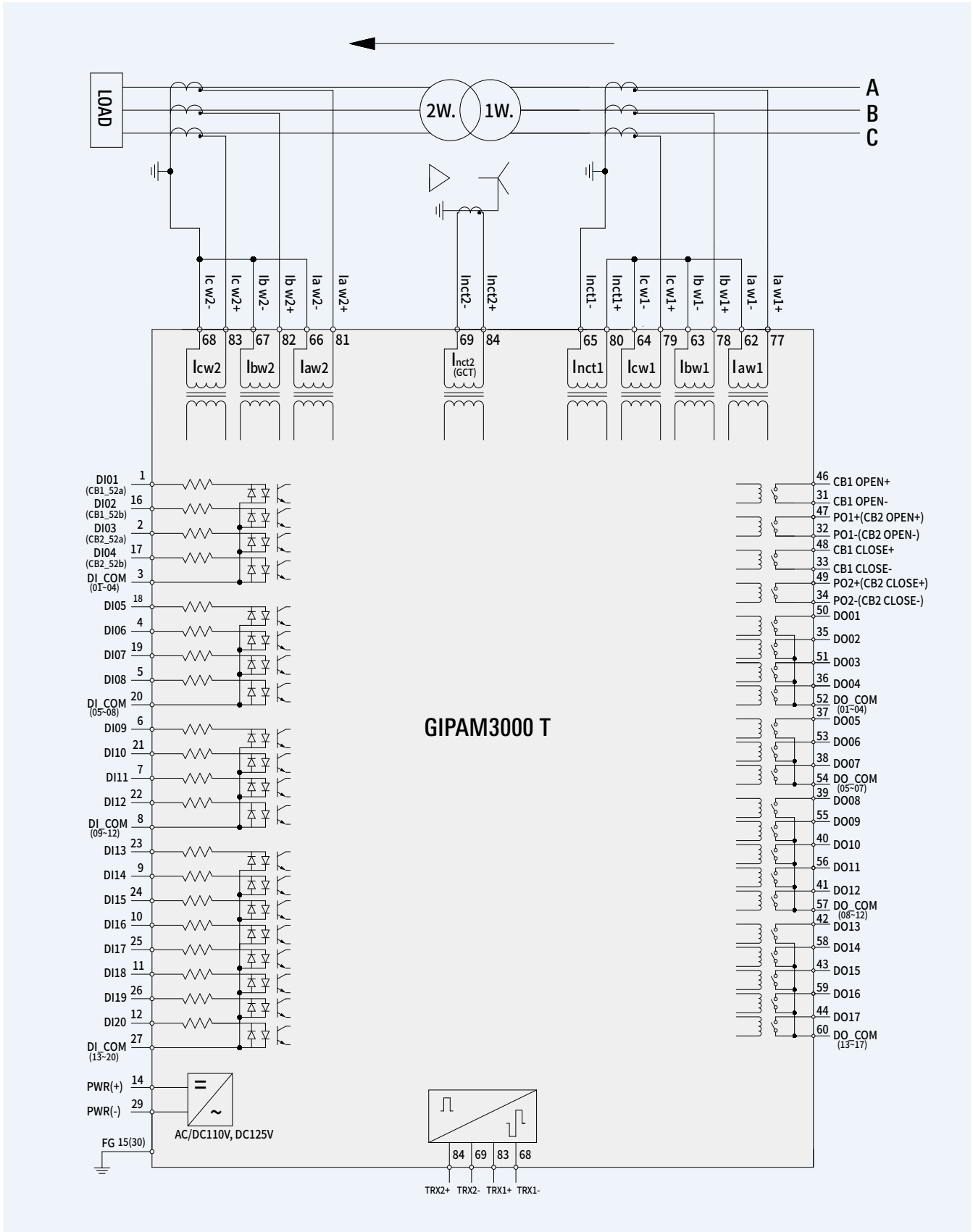


*In case of using three winding CT as 3CT Y winding in the 3-phase 3-wire resistance grounding system

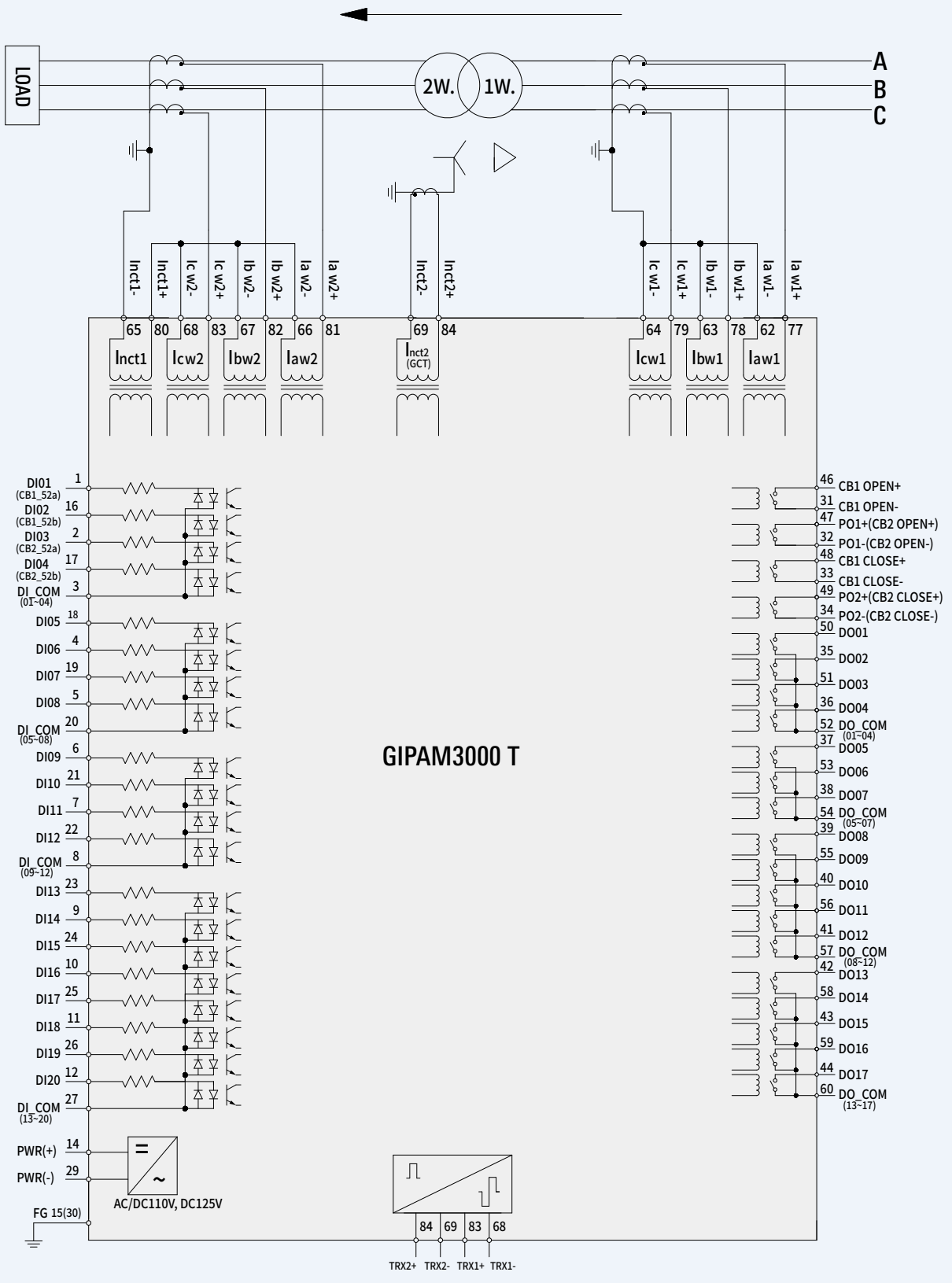
*Ground fault detection in case of using ground CT in the 3-phase 3-wire resistance grounding system

Wiring

GIPAM3000 T Wiring (2wire)

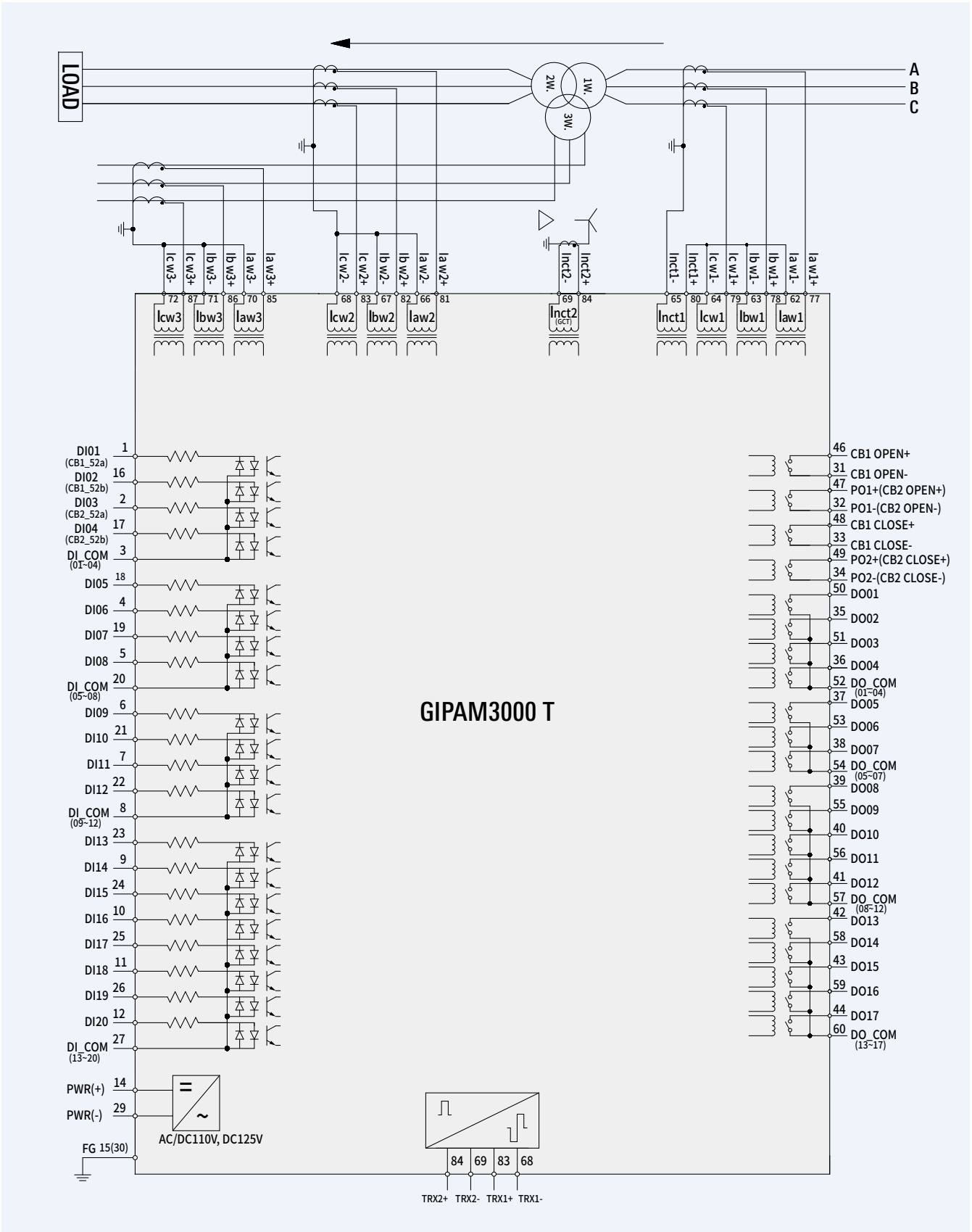


B

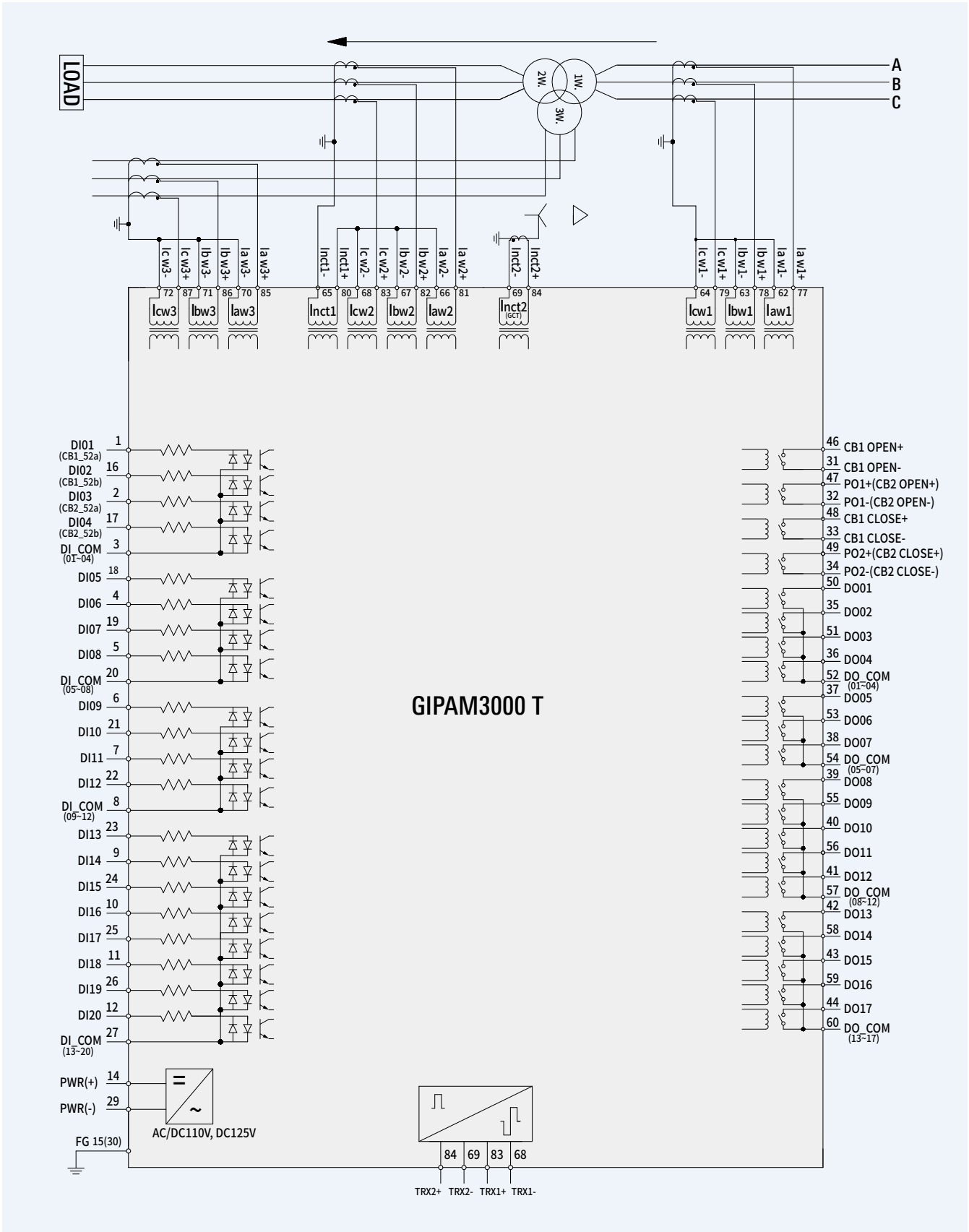

LOAD
2W.
1W.
A
B
C
Inct1-
Inct1+
Ic w2-
Ic w2+
Ib w2-
Ib w2+
Ia w2-
Ia w2+
Inct2-
Inct2+
Ic w1-
Ic w1+
Ib w1-
Ib w1+
Ia w1-
Ia w1+
65 80 68 83 67 82 66 81
69 84
64 79 63 78 62 77
Inct1
Icw2
Ibw2
Iaw2
Inct2 (GCT)
Icw1
Ibw1
Iaw1
GIPAM3000 T
DI01 (CB1_52a) 1
DI02 (CB1_52b) 16
DI03 (CB2_52a) 2
DI04 (CB2_52b) 17
DI_COM (01~04) 3
DI05 18
DI06 4
DI07 19
DI08 5
DI_COM (05~08) 20
DI09 6
DI10 21
DI11 7
DI12 22
DI_COM (09~12) 8
DI13 23
DI14 9
DI15 24
DI16 10
DI17 25
DI18 11
DI19 26
DI20 12
DI_COM (13~20) 27
PWR(+) 14
PWR(-) 29
FG 15(30)
AC/DC110V, DC125V
84 69 83 68
TRX2+ TRX2- TRX1+ TRX1-
46 CB1 OPEN+
31 CB1 OPEN-
47 PO1+(CB2 OPEN+)
32 PO1-(CB2 OPEN-)
48 CB1 CLOSE+
33 CB1 CLOSE-
49 PO2+(CB2 CLOSE+)
34 PO2-(CB2 CLOSE-)
50 DO01
35 DO02
51 DO03
36 DO04
52 DO_COM (01~04)
37 DO05
53 DO06
38 DO07
54 DO_COM (05~07)
39 DO08
55 DO09
40 DO10
56 DO11
41 DO12
57 DO_COM (08~12)
42 DO13
58 DO14
43 DO15
59 DO16
44 DO17
60 DO_COM (13~17)

Wiring

GIPAM3000 T Wiring (3wire)



B


LOAD
A
B
C
2W.
1W.
3W.
Icw3-
Icw3+
Ibw3-
Ibw3+
Iaw3-
Iaw3+
Inct1-
Inct1+
Icw2-
Icw2+
Ibw2-
Ibw2+
Iaw2-
Iaw2+
Inct2-
Inct2+
Icw1-
Icw1+
Ibw1-
Ibw1+
Iaw1-
Iaw1+
72 87 71 86 70 85
65 80 68 83 67 82 66 81
69 84
64 79 63 78 62 77
Icw3
Ibw3
Iaw3
Inct1
Icw2
Ibw2
Iaw2
Inct2
(GCT)
Icw1
Ibw1
Iaw1
DI01 (CB1_52a) 1
DI02 (CB1_52b) 16
DI03 (CB2_52a) 2
DI04 (CB2_52b) 17
DI_COM (01~04) 3
DI05 18
DI06 4
DI07 19
DI08 5
DI_COM (05~08) 20
DI09 6
DI10 21
DI11 7
DI12 22
DI_COM (09~12) 8
DI13 23
DI14 9
DI15 24
DI16 10
DI17 25
DI18 11
DI19 26
DI20 12
DI_COM (13~20) 27
PWR(+) 14
PWR(-) 29
FG 15(30)
AC/DC110V, DC125V
GIPAM3000 T
84 69 83 68
TRX2+ TRX2- TRX1+ TRX1-
46 CB1 OPEN+
31 CB1 OPEN-
47 PO1+(CB2 OPEN+)
32 PO1-(CB2 OPEN-)
48 CB1 CLOSE+
33 CB1 CLOSE-
49 PO2+(CB2 CLOSE+)
34 PO2-(CB2 CLOSE-)
50 DO01
35 DO02
51 DO03
36 DO04
52 DO_COM (01~04)
37 DO05
53 DO06
38 DO07
54 DO_COM (05~07)
39 DO08
55 DO09
40 DO10
56 DO11
41 DO12
57 DO_COM (08~12)
42 DO13
58 DO14
43 DO15
59 DO16
44 DO17
60 DO_COM (13~17)

Contact Configuration

GIPAM3000 FI

CT/PT

76	V_a+	V_a-	61
77	V_b+	V_b-	62
78	V_c+	V_c-	63
79	Vgpt+	Vgpt-	64
80	Vaux+	Vaux-	65
81	BLANK	BLANK	66
82	BLANK	BLANK	67
83	TRX1+	TRX1-	68
84	TRX2+	TRX2-	69
85	BLANK	BLANK	70
86	I_a+	I_a-	71
87	I_b+	I_b-	72
88	I_c+	I_c-	73
89	Inct+	Inct-	74
90	Izct+	Izct-	75

※ CB2 OFF, CB2 ON can be set to PO.

DO

46	CB1 OPEN+	CB1 OPEN-	31
47	PO1+	PO1-	32
48	CB1 CLOSE+	CB1 CLOSE-	33
49	PO2+	PO2-	34
50	DO01	DO02	35
51	DO03	DO04	36
52	DO_COM (01~04)	DO05	37
53	DO06	DO07	38
54	DO_COM (05~07)	DO08	39
55	DO09	DO10	40
56	DO11	DO12	41
57	DO_COM (08~12)	DO13	42
58	DO14	DO15	43
59	DO16	DO17	44
60	DO_COM (13~17)	BLANK	45

COMM

FE1	RX
FE2	RX
RJ45 PORT	
TE1	
TE2	

DI & POWER

16	DI02	DI01	1
17	DI04	DI03	2
18	DI05	DI_COM (01~04)	3
19	DI07	DI06	4
20	DI_COM (05~08)	DI08	5
21	DI10	DI09	6
22	DI12	DI11	7
23	DI13	DI_COM (09~12)	8
24	DI15	DI14	9
25	DI17	DI16	10
26	DI19	DI18	11
27	DI_COM (13~20)	DI20	12
28	BLANK	BLANK	13
29	PWR(-)	PWR(+)	14
30	FG	FG	15

FI Model I/O contact composition

Contact name	Number(COM)	Basic usage	Optional usage	CC number	Remark
DI01	1(3)	CB1 Status input(52a)	Cannot be changed	-	
DI02	16(3)	CB1 Status input(52b)	Cannot be changed	-	
DI03	2(3)	CB2 Status input(52a)	General DI	-	
DI04	17(3)	CB2 Status input(52b)	General DI	-	
DI05	18(20)	General DI	General DI	-	
DI06	4(20)	General DI	General DI	-	
DI07	19(20)	General DI	General DI	-	
DI08	5(20)	General DI	General DI	-	
DI09	6(8)	General DI	General DI	-	
DI10	21(8)	General DI	General DI	-	
DI11	7(8)	General DI	General DI	-	
DI12	22(8)	General DI	General DI	-	
DI13	23(27)	General DI	General DI	-	
DI14	9(27)	General DI	General DI	-	
DI15	24(27)	General DI	General DI	-	
DI16	10(27)	General DI	General DI	-	
DI17	25(27)	General DI	General DI	-	
DI18	11(27)	General DI	General DI	-	
DI19	26(27)	Buzzer Stop	General DI	-	When the Push Button is attached to the PNL, connect to the corresponding DI. (A contact is used)
DI20	12(27)	Panel Reset	General DI	-	
CB1 OPEN	31, 46	CB1 OPEN output	Cannot be changed	-	
CB1 CLOSE	33, 48	CB1 CLOSE output	Cannot be changed	-	
PO1	32, 47	POWER OUT1 output	General DO	-	When selecting PO, it is used as General DO, When selecting CB, it is used as output for CB2 control
PO2	34, 49	POWER OUT1 output	General DO	-	
DO01	50(52)	50/51/67I/67D	General DO	CC01	
DO02	35(52)	50/51N(OCGR)	General DO	CC02	
DO03	51(52)	67G/51S/67NI/67ND	General DO	CC03	
DO04	36(52)	UVR Latch(Self maintenance)	Cannot be changed	CC04	Output can be changed to NORMAL in UVR setting
DO05	37(54)	POWER FAIL	Cannot be changed	-	Operates by direct control and is used for alarming power failure
DO06	53(54)	81U/81O/81R	General DO	CC06	
DO07	38(54)	46/37P/59R	General DO	CC07	
DO08	39(57)	27R/32P/32Q	General DO	CC08	When 32P operates , only DO08 OUTPUT activates and CB OFF output is not available, Please modify the LOGIC if necessary.
DO09	55(57)	47P/47N	General DO	CC09	
DO10	40(57)	25(SYNC-OP)	General DO	CC10	
DO11	56(57)	CB_ON_LAMP	General DO	CC11	When attaching breaker's status lamp to PNL, connect it to the appropriate DO terminal.
DO12	41(57)	CB_OFF_LAMP	General DO	CC12	
DO13	42(60)	59/49	General DO	CC13	
DO14	58(60)	64,48/51R	General DO	CC14	
DO15	43(60)	27(UVR-OP),37/66	General DO	CC15	UVR(OP) is NORMAL output.
DO16	59(60)	86X(Lock-out)	General DO	CC16	
DO17	44(60)	BUZZER	General DO	CC17	

Note) 1. OVGR(64) element is set as the default alarm
2. UVR(27) can be used as Latch contact (DO04) and Normal contact (DO15) without changing PLC
3. CC: Switch for relay output contact test to check operation on the device without a tester

GIPAM3000 T

CT/PT

76	BLANK	BLANK	61
77	I_a w1+	I_a w1-	62
78	I_b w1+	I_b w1-	63
79	I_c w1+	I_c w1-	64
80	Inct1+	Inct1-	65
81	I_a w2+	I_a w2-	66
82	I_b w2+	I_b w2-	67
83	I_c w2+	I_c w2-	68
84	Inct2+	Inct2-	69
85	I_a w3+	I_a w3-	70
86	I_bw3+	I_b w3-	71
87	I_c w3+	I_c w3-	72
88	BLANK	BLANK	73
89	TRX1+	TRX1-	74
90	TRX2+	TRX2-	75

※ CB2 OFF, CB2 ON can be set to PO.

DO

46	CB1 OPEN+	CB1 OPEN-	31
47	PO1+	PO1-	32
48	CB1 CLOSE+	CB1 CLOSE-	33
49	PO2+	PO2-	34
50	DO01	DO02	35
51	DO03	DO04	36
52	DO_COM (01~04)	DO05	37
53	DO06	DO07	38
54	DO_COM (05~07)	DO08	39
55	DO09	DO10	40
56	DO11	DO12	41
57	DO_COM (08~12)	DO13	42
58	DO14	DO15	43
59	DO16	DO17	44
60	DO_COM (13~17)	BLANK	45

COMM

FE1	RX
FE2	RX
RJ45 PORT	
TE1	
TE2	

DI & POWER

16	DI02	DI01	1
17	DI04	DI03	2
18	DI05	DI_COM (01~04)	3
19	DI07	DI06	4
20	DI_COM (05~08)	DI08	5
21	DI10	DI09	6
22	DI12	DI11	7
23	DI13	DI_COM (09~12)	8
24	DI15	DI14	9
25	DI17	DI16	10
26	DI19	DI18	11
27	DI_COM (13~20)	DI20	12
28	BLANK	BLANK	13
29	PWR(-)	PWR(+)	14
30	FG	FG	15

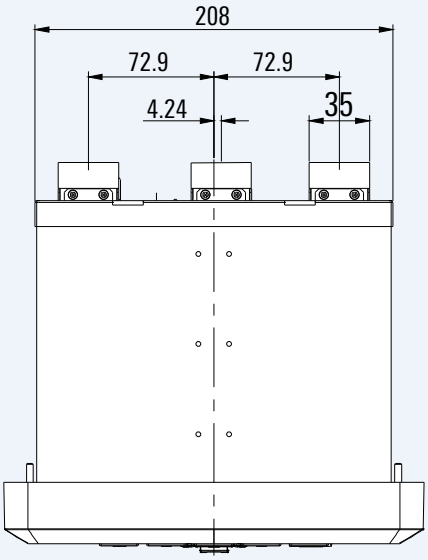
T Model I/O contact composition

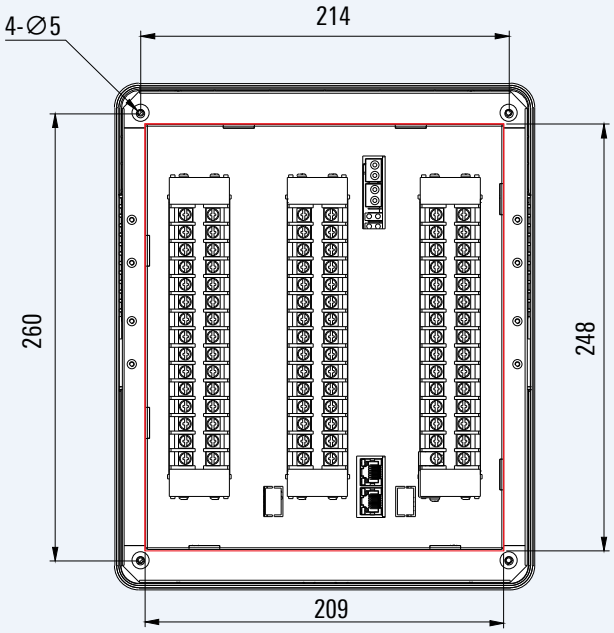
Contact name	Number(COM)	Basic usage	Optional usage	CC number	Remark
DI01	1(3)	CB1 Status input(52a)	Cannot be changed	-	
DI02	16(3)	CB1 Status input(52b)	Cannot be changed	-	
DI03	2(3)	CB2 Status input(52a)	General DI	-	
DI04	17(3)	CB2 Status input(52b)	General DI	-	
DI05	18(20)	General DI	General DI	-	
DI06	4(20)	General DI	General DI	-	
DI07	19(20)	General DI	General DI	-	
DI08	5(20)	General DI	General DI	-	
DI09	6(8)	General DI	General DI	-	
DI10	21(8)	General DI	General DI	-	
DI11	7(8)	General DI	General DI	-	
DI12	22(8)	General DI	General DI	-	
DI13	23(27)	General DI	General DI	-	
DI14	9(27)	General DI	General DI	-	
DI15	24(27)	General DI	General DI	-	
DI16	10(27)	General DI	General DI	-	
DI17	25(27)	General DI	General DI	-	
DI18	11(27)	General DI	General DI	-	
DI19	26(27)	Buzzer Stop	General DI	-	When the Push Button is attached to the PNL, connect to the corresponding DI. (A contact is used)
DI20	12(27)	Panel Reset	General DI	-	
CB1 OPEN	31, 46	CB1 OPEN output	Cannot be changed	-	
CB1 CLOSE	33, 48	CB1 CLOSE output	Cannot be changed	-	
PO1	32, 47	CB2 OPEN output	General DO	-	When selecting PO, it is used as General DO, When selecting CB, it is used as output for CB2 control
PO2	34, 49	CB2 CLOSE output	General DO	-	
DO01	50(52)	50/51(OCR 1wire)	General DO	CC01	
DO02	35(52)	50/51(OCR 2wire)	General DO	CC02	
DO03	51(52)	50/51(OCR 3wire)	General DO	CC03	
DO04	36(52)	87T(DFR)	General DO	CC04	
DO05	37(54)	POWER FAIL	Cannot be changed	-	Operates by direct control and is used for alarming power failure
DO06	53(54)	87N(DFRG)	General DO	CC06	
DO07	38(54)	General DO	General DO	CC07	
DO08	39(57)	50/51N(OCGR 1차)	General DO	CC08	
DO09	55(57)	50/51N(OCGR 2차)	General DO	CC09	
DO10	40(57)	General DO	General DO	CC10	
DO11	56(57)	CB_ON_LAMP	General DO	CC11	When attaching breaker's status lamp to PNL, connect it to the appropriate DO terminal.
DO12	41(57)	CB_OFF_LAMP	General DO	CC12	
DO13	42(60)	General DO	General DO	CC13	
DO14	58(60)	General DO	General DO	CC14	
DO15	43(60)	General DO	General DO	CC15	
DO16	59(60)	86X(Lock-out)	General DO	CC16	
DO17	44(60)	BUZZER	General DO	CC17	

Note) 1. CC: Switch for relay output contact test to check operation on the device without a tester

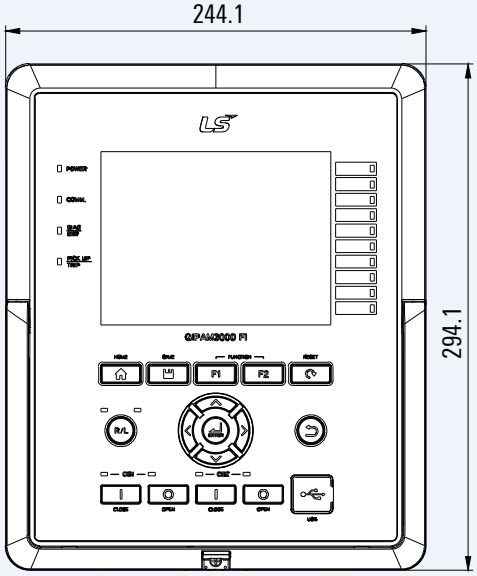
Dimensions & Ordering

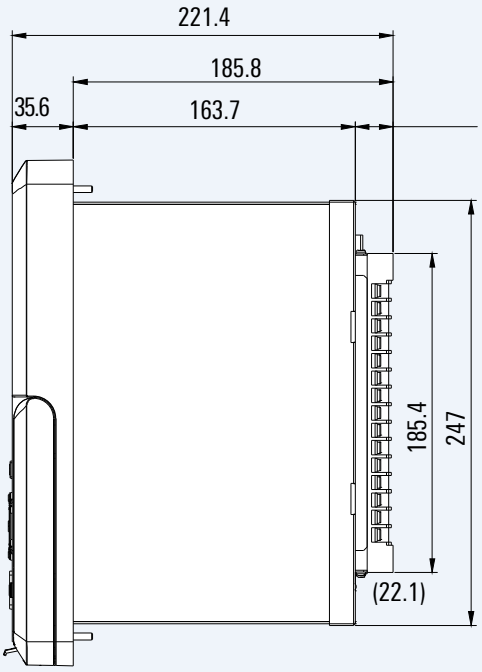
Dimensions





[Panel Cutting Size]





B

Ordering

GIPAM3000

FI

Protection	
FI	Feeder, Incoming, Motor, Distributed Generation
T	Transformer

RS

Communication	
RS	RS-485
TE	100/10 BASE-T Ethernet
FE	100 BASE-FX Ethernet

Note) IEC61850 communication protocol does not support RS-485 method.

M

Protocol	
M	MODBUS
D	DNP 3.0
C	IEC61850

5A

CT type
5A

60Hz

Frequency
50Hz
60Hz

AC/DC110V, DC125V

Control power
AC/DC110V, DC125V

DI Control Power

DI Input power
AC/DC110V, DC125V

GIPAM3000 - PAM MASTERR (Manager S/W)

Note) Manager Software can be downloaded from the website, and please purchase a universal USB A to B cable.

Certifications

KERI

UCA International Users Group

IEC 61850 Certificate Level A[1]

Ref. No: 2018TS01615

Issued to:
LSIS Co., Ltd.
LS Tower, 127 LS-RO, DONGAN-GU, ANYANG-SI,
GYEONGGI-DO, Republic of Korea

For the server product:
GIPAM3000
Multifunctional Protection Relay
Firmware version 1.00

Issued by:
Korea Electrotechnology Research Institute
111, Hanggaul-ro, Sangnok-gu, Ansan-si, Gyeonggi-do, 15588, Republic of Korea

The server product has not been shown to be non-conforming to:

IEC 61850 First Edition Parts 6, 7-1, 7-2, 7-3, 7-4 and 8-1

Communication networks and systems in substations.

The conformance test has been performed according to IEC 61850-10, UCA International Users Group Device Test Procedures version 3.1, the product's protocol, model and technical issue implementation conformance statements: "Protocol Implementation Conformance Statement for the IEC 61850 interface in GIPAM3000, v1.00", "Model Implementation Conformance Statement for the IEC 61850 interface in GIPAM3000, v1.00", "TISSUES Implementation Conformance Statement for the IEC 61850 interface in GIPAM3000, v1.00" and product's extra information for testing "Protocol Implementation eXtra Information for Testing (PIXIT) for the IEC 61850 interface in GIPAM3000, v1.00".

The following IEC 61850 conformance blocks are tested with a positive result (number of relevant and executed test cases / total number of test cases) :

1	Basic Exchange (23/24)	9a	GOOSE Publish (10/12)
2	Data Sets (3/6)	9b	GOOSE Subscribe (11/11)
2+	Data Set Definition (24/24)	12a	Direct Control (6/11)
4	Setting Group Selection (3/3)	12b	SBO Control (9/14)
5	Unbuffered Reporting (18/18)	12c	Enhanced Direct Control (7/13)
6	Buffered Reporting (25/27)	12d	Enhanced SBO Control (12/19)
		13	Time Synchronization (4/5)
		14	File Transfer (4/7)

This Certificate includes a summary of the test results as carried out at KERI in Republic of Korea with UniCA 61850 Client simulator version 4.29.03 with test suite version 3.29.05(TP 3.1) and UniCA 61850 analyzer version 5.31.00. This document has been issued for information purposes only, and the original paper copy of the KERI report: 2018TS01615 will prevail.

The test has been carried out on one single specimen of the product as referred above and submitted to KERI by LSIS Co., Ltd. The manufacturer's production process has not been assessed. This Certificate does not imply that KERI has approved any product other than the specimen tested.

Republic of Korea, August 9, 2018

Park Soung jae

S. J. Park
Executive Director
Power Apparatus Testing and Evaluation Division

S. P. Ahn
Technical Manager

1 Level A – Independent Tester with certified ISO 17025 Quality System

KERI

UCA International Users Group

Applicable Test Procedures from the UCA International Users Group Device Test Procedures version 3.1

Conformance Block	Mandatory	Conditional
1: Basic Exchange	Ass1, Ass2, Ass3, AssN2, AssN4, AssN5 Srv1, Srv2, Srv3, Srv4, Srv5, SrvN1abcd, SrvN4	AssN3 Srv6, Srv7, Srv8, Srv9, Srv10, SrvN1e, SrvN1f, SrvN2, SrvN3
2: Data Sets	Dset1, Dset10a, DsetN1ae	
2+: Data Sets Definition	Dset2, Dset3, Dset4, Dset5, Dset6, Dset7, Dset8, Dset9 DsetN1cd, DsetN2, DsetN3, DsetN4, DsetN5, DsetN6, DsetN7, DsetN8, DsetN9, DsetN10, DsetN11, DsetN12, DsetN13, DsetN14	DsetN15a, DsetN15b
4: Setting Group Selection	Sg1, SgN1a, Sg3	
5: Unbuffered Reporting	Rp1, Rp2, Rp3, Rp4, Rp9, RpN1, RpN2, RpN3, RpN4, RpN8	Rp5, Rp6, Rp7, Rp8, Rp10, Rp11, Rp12, RpN5
6: Buffered Reporting	Br1, Br2, Br3, Br4, Br9, Br20, Br21, Br22, Br25, Br26, Br27, Br28 BrN1, BrN2, BrN3, BrN4, BrN5, BrN8	Br5, Br6, Br7, Br8, Br10, Br11, Br12
9a: GOOSE publish	Gop2, Gop3, Gop4, Gop9, Gop10a	Gop1, Gop6, Gop7, Gop10b, GopN1
9b: GOOSE subscribe	Gos1a, Gos2, Gos3, GosN1, GosN2, GosN3, GosN4, GosN5, GosN6	Gos1b, Gos4
12a: Direct control	CtlN3 DOns1	Ctl2, Ctl7, CtlN11 DOns3
12b: SBO control	CtlN1, CtlN2, CtlN3, CtlN4, SBOns2	Ctl2, Ctl3, Ctl7, CtlN11
12c: Enhanced Direct control	CtlN3 DOes2, DOes5	Ctl2, Ctl7, CtlN8, CtlN11
12d: Enhanced SBO control	CtlN1, CtlN2, CtlN3, CtlN4, CtlN9 SBOes1, SBOes2, SBOes3	Ctl2, Ctl3, Ctl7, CtlN11
13: Time sync	Tm1, Tm2	TmN1, TmN2
14: File transfer	Ft1, Ft2ab, Ft4, FtN1ab	

All configuration file and data model tests have been successfully performed for the product variants using the same communication hardware and software version:

- GIPAM3000-F Feeder, Motor and Dispersed Generation Protection and Control Relay
- GIPAM3000-T Transformer Protection and Control Relay

KERI 111, Hanggaul-ro, Sangnok-gu, Ansan, Gyeonggi-do
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Certifications

KERI

UCA International Users Group

IEC 61850 Certificate Level A[1]

Ref. No: 2018TS01647

Issued to:
LSIS Co., Ltd.
LS Tower, 127 LS-RO, DONGAN-GU, ANYANG-SI,
GYEONGGI-DO, Republic of Korea

For the server product:
GIPAM3000
Multifunctional Protection Relay
Firmware version 1.00

Issued by:
Korea Electrotechnology Research Institute
111, Hanggaul-ro, Sangnok-gu, Ansan-si, Gyeonggi-do, 15588, Republic of Korea

The server product has not been shown to be non-conforming to:

IEC 61850 Edition 2 Parts 6, 7-1, 7-2, 7-3, 7-4 and 8-1

Communication networks and systems for power utility automation.

The conformance test has been performed according to IEC 61850-10 Edition 2, the UCA International Users Group Edition 2 Server Test Procedures version 1.0 with TPCL[2] version 1.2.6 with product's protocol, model and technical issue implementation conformance statements: "Protocol Implementation Conformance Statement for the IEC 61850 interface in GIPAM3000, v1.00", "Model Implementation Conformance Statement for the IEC 61850 interface in GIPAM3000, v1.00", "TISSUES Implementation Conformance Statement for the IEC 61850 interface in GIPAM3000, v1.00" and product's extra information for testing: "Protocol Implementation eXtra Information for Testing (PIXIT) for the IEC 61850 interface in GIPAM3000, v1.00".

The following IEC 61850 conformance blocks are tested with a positive result (number of relevant and executed test cases / total number of test cases) :

1	Basic Exchange (23/26)	9a	GOOSE Publish (10/13)
2	Data Sets (4/7)	9b	GOOSE Subscribe (13/14)
2+	Data Set Definition (24/24)	12a	Direct Control (9/18)
4	Setting Group Selection (4/4)	12b	SBO Control (16/27)
5	Unbuffered Reports (21/21)	12c	Enhanced Direct Control (11/20)
6	Buffered Reports (28/30)	12d	Enhanced SBO Control (17/28)
		13	Time Synchronization (4/7)
		14	File Transfer (5/8)

This Certificate includes a summary of the test results as carried out at KERI in Republic of Korea with UniCA 61850 Client simulator version 4.29.03 with test suite Ed2 3.28.05(TPCL 1.2.6) and UniCA 61850 analyzer version 5.31.00. This document has been issued for information purposes only, and the original paper copy of the KERI report: 2018TS01647 will prevail.

The test has been carried out on one single specimen of the product as referred above and submitted to KERI by LSIS Co., Ltd. The manufacturer's production process has not been assessed. This Certificate does not imply that KERI has approved any product other than the specimen tested

Republic of Korea, August 10, 2018

Park Seungjae

S. J. Park
Executive Director
Power Apparatus Testing and Evaluation Division

S. P. Ahn
Technical Manager

[1] Level A – Independent Tester with certified ISO 17025 Quality System
[2] TPCL – Test procedures change list

KERI

UCA International Users Group

Applicable Test Procedures from the UCA International Users Group Edition 2 Server Test Procedures version 1.0 with TPCL version 1.2.6

Conformance Block	Mandatory	Conditional
1: Basic Exchange	sAss1, sAss2, sAss3, sAssN2, sAssN3, sAssN4, sAssN5, sSrv1, sSrv2, sSrv3, sSrv4, sSrv5, sSrvN1abcd, sSrvN4	sSrv6, sSrv8, sSrv9, sSrv10, sSrv12 sSrvN1e, sSrvN1f, sSrvN2, sSrvN3
2: Data Sets	sDs1, sDs10a, sDsN1ae	sDs15
2+: Data Sets Definition	sDs2, sDs3, sDs4, sDs5, sDs6, sDs7, sDs8, sDs9, sDs11, sDs13, sDs14, sDsN1cd, sDsN2, sDsN3, sDsN4, sDsN5, sDsN6, sDsN7, sDsN8, sDsN9, sDsN10	sDs12, sDsN11, sDsN12
4: Setting Group Selection	sSg1, sSg3, sSgN1	sSg11
5: Unbuffered Reporting	sRp1, sRp2, sRp3, sRp4, sRp5, sRp9, sRp14, sRp15, sRpN1, sRpN2, sRpN3, sRpN4, sRpN8	sRp6, sRp7, sRp8, sRp10, sRp11, sRp12, sRp13, sRpN5
6: Buffered Reporting	sBr1, sBr2, sBr3, sBr4, sBr5, sBr9, sBr14, sBr15, sBr20 sBr21, sBr22, sBr25. sBr26, sBr27, sBr28, sBrN1, sBrN2, sBrN3, sBrN4, sBrN5, sBrN8	sBr6, sBr7, sBr8, sBr10, sBr11, sBr12, sBr13
9a: GOOSE publish	sGop2a, sGop3, sGop4, sGop9, sGop10, sGop11	sGop1, sGop6, sGop7 sGopN1
9b: GOOSE subscribe	sGos1, sGos2, sGos3, sGop5, sGop6a, sGop7, sGosN1, sGosN2, sGosN3, sGosN4, sGosN5, sGosN6	sGos4
12a: Direct control	sCtl5, sCtl10, sDOns1, sDOns2	sCtl2, sCtl7, sCtl13, sCtl15, sCtl16
12b: SBO control	sCtl5, sCtl8, sCtl9, sCtl10, sCtl11, sCtl25, sSBOns1, sSBOns2, sSBOns6	sCtl2, sCtl4, sCtl6, sCtl7, sCtl15, sCtl16, sCtl27
12c: Enhanced Direct control	sCtl5, sCtl10, sDOes1, sDOes2	sCtl2, sCtl7, sCtl13, sCtl14, sCtl15, sCtl16, sCtl26
12d: Enhanced SBO control	sCtl5, sCtl8, sCtl9, sCtl10, sCtl11, sCtl25, sSBOes1, sSBOes2, sSBOes6, sSBOes8	sCtl2, sCtl4, sCtl6, sCtl7, sCtl15, sCtl16, sCtl26
13: Time sync	sTm1, sTm2, sTmN1	sTmN2
14: File transfer	sFt1, sFt2ab, sFt4, sFt5, sFtN1ab	

All configuration file and data model tests have been successfully performed for the product variants using the same communication hardware and software version:

- GIPAM3000-F Feeder, Motor and Dispersed Generation Protection and Control Relay
- GIPAM3000-T Transformer Protection and Control Relay

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