

The right choice for ultimate yield!

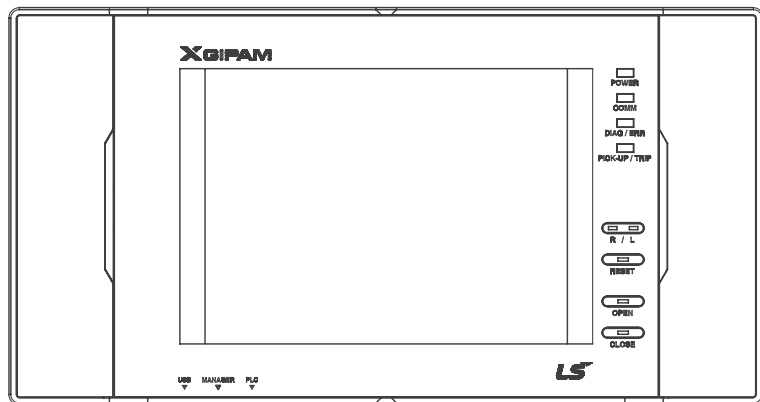
LS ELECTRIC strives to maximize your profits in gratitude for choosing us as your partner.

Next Generation Intelligent Device

XGIPAM

User's Manual

GIPAM Series



Safety Instructions

- Read this manual carefully before installing, wiring, operating, servicing or inspecting this equipment.
- Keep this manual within easy reach for quick reference.



LS ELECTRIC

The best choice for your benefit.

LS ELECTRIC makes an effort to give more benefit to user.

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Safety Caution

Please read carefully before putting the product into service for the proper operation of XGIPAM.

- Please keep the safety caution to prevent any accident happen by using the product incorrectly.
- Safety caution is classified with caution and danger and Indication of them as follows.



Caution

Not following the instruction may result in serious injury or even death



Danger

Not following the instruction may result in serious injury or property damage

Symbols, used in this manual, is indicated as follows.



This symbol is for warning the hazardousness under the specific condition.



This symbol is for warning the electric shocks or any accidents under the specific condition.

This instruction must be kept at a close place to XGIPAM.



Caution

- Please do not work with, test, or set up the equipment alone.
- Please do not wiring when applied with power or on the operation;
It may result in electric shock.
- Please do not all the wiring operation with the live bus bar;
It may result in electric shock or fire and property damage by charging voltage of current transformer.
- Please connect to the ground.
It may cause electric shock.
F.G socket must be grounded to the proof case of the switchboard.
- Please do not attempt to disassemble even when the power not applied;
It may result in electric shock by charging current remained in the product.
- Please do not short the secondary side of the PT.
It may result in fire.

- **Please do not short the secondary side of the CT.**
It may result in fire.
- **Please do not wire or operate with wet hands;**
It may result in electric shock.
- **Please do not use any damaged cable;**
It may result in electric shock.
- **Please use the ring terminal when wiring the cable;**
It may result in electric shock by bare wire



Danger

■ Safety caution for installation & terminal wiring

- **Apply the rated voltage to the power supply terminal of the product.**
It may result in damage of product or fire.
- **Please keep away product from screws, metals, water, or oil.**
It may result in fire.
- **Please keep the rated load and polarity of input & output contacts;**
It may result in product damage or fire.
- **While connecting to a port, check the number of the terminal before short.**
It may result in damage in the product or fire.
- **Assemble the cover of the terminal after disconnecting the terminal.**
- **Product must be installed and managed by a specialist.**
Otherwise, wrongly installed product may cause malfunction or accident.
- **Use circuit breaker input/output auxiliary relay only.**
If direct control is caused to a circuit breaker, inner RELAY flame may result.
- **Turn the power OFF when changing the communication card.**
All DO is reset when the power is turned OFF.

■ Checklist before supply of power

- Check the polarity and voltage in control power.
- Check if short exists in the input/output terminal.

■ Caution for storage and handling

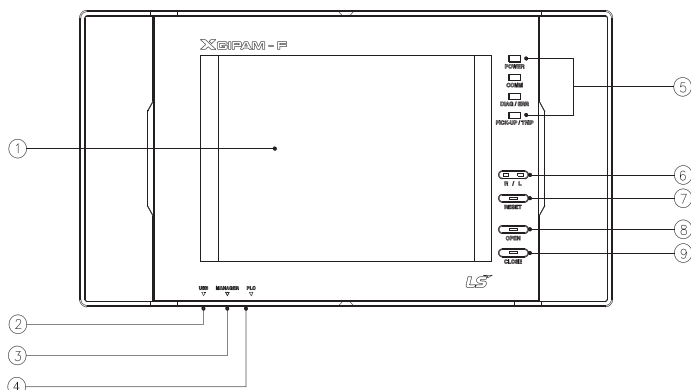
- Please store at a dry and clean place.
- Do not throw or put too much force on the product while handling.
- Do not load over 5 stories.

■ Caution for disposal

- Please dispose product according to the industrial waste regulation.

1. Outer Layout

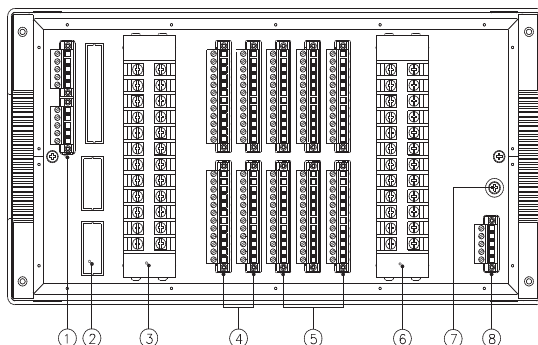
1.1 Front Layout



No.	Name	Primary function
1	TFT LCD Panel	Shows set up menu, measurement, information of product. It is also possible to change the menu and option on the screen by using the touch screen.
2	Memory Port	It is possible to download set up files by using the USB Memory.
3	Manager Port	Used with a PC manager program in order to connect the equipment to the PC.
4	PLC Port	Used with a GMWIN PLC manager program in order to connect the equipment to the PC. * Caution : Use GMWIN over version 4.17.
5	Status LED	Power LED(Green) : Lights when the power is ON Comm LED(Orange) : Lights when the distant communication works properly DIAG/ERR LED(Red) : Lights when malfunction is found in product PICK-UP/TRIP LED(Red) : Lights when relay element is PICK-UPed, Lights when TRIP happens
6	Remote/Local Key	Used when changing Remote/Local state Lights green light when it is Remote, and lights red light when it is Local
7	Reset Key	Used to reset the relay, It lights a red light only when Reset is needed
8	CB OPEN Key	Used to Open the circuit breaker, and lights a green light when circuit breaker is opened
9	CB CLOSE Key	Used to Close the circuit breaker, and lights a red light when circuit breaker is closed

1. Outer Layout

1.2 Backside Layout



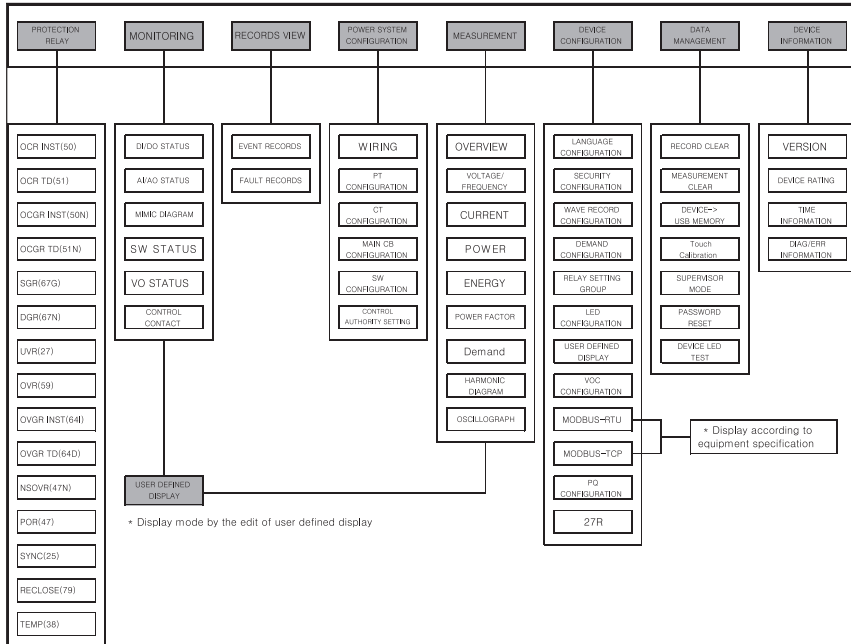
No.	Name	Primary Function
1	Main & Comm Board	Handles the main process, and conducts RS485 communication such as Modbus
2	Extension Board	Ethernet communication module is installed. (Option)
3	CT/PT Board	Receives systematic current/voltage input. (Basic)
4	Conn type DI/DO Board	Connector type DI/DO modules are installed. DI : 5 points, PO : 2 points, Normal DO : 1points
5	TB type DI/DO Slot	Terminal Block type DI/DO module is installed. (Basic) DI : 10 points, PO : 2 points, Normal DO : 6 points
6	FG Terminal	Frame Ground terminal (Outer earthing connecting terminal) F.G terminal must be earthed to the outer part of the switchboard panel. ※ F.G (Frame Ground) : This allows the leaking current and the electrical noise to be discharged through earthing in order to decrease the electrical impact on the equipment. This happens when electrical problems occur because of the earthing on metal such as the outer box of the equipment or the panel board.
7	Power Board	AC110V/DC 110V~125V rate control power module is installed. (Basic)

※ Battery for RTC storage in the MAIN board is consumable item and may need to be replaced.

※ The rear part of the product is a maintenance area, Please contact engineer if there is any change.

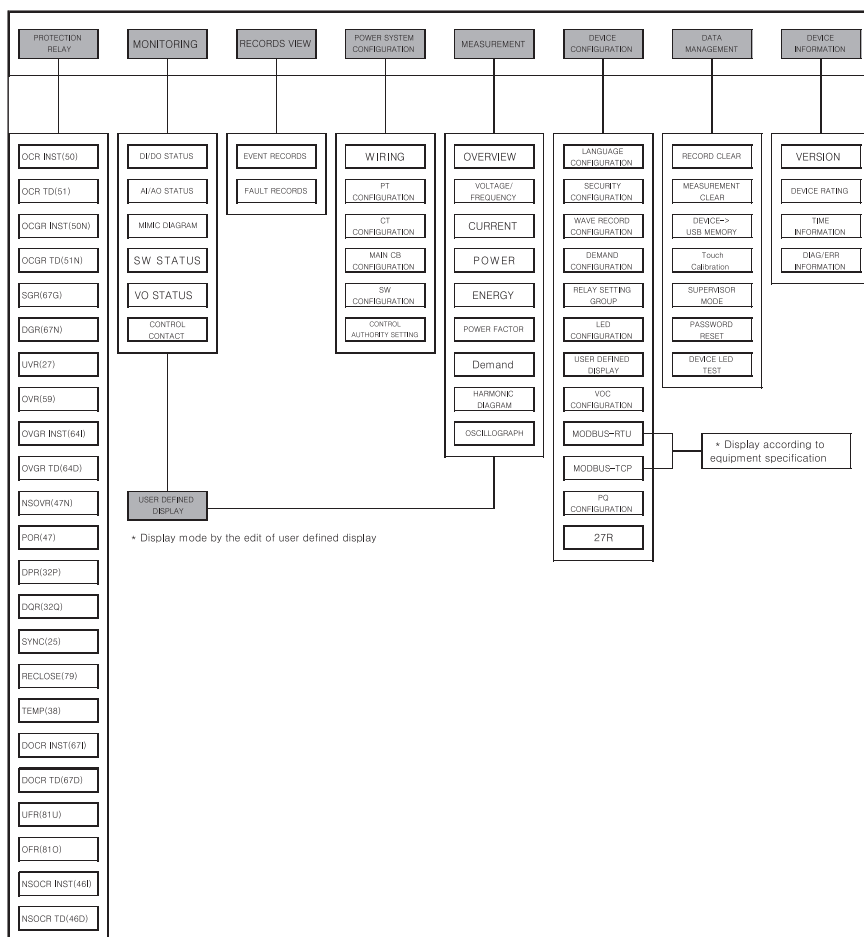
1. Outer Layout

1.3 Menu Layout – F Type



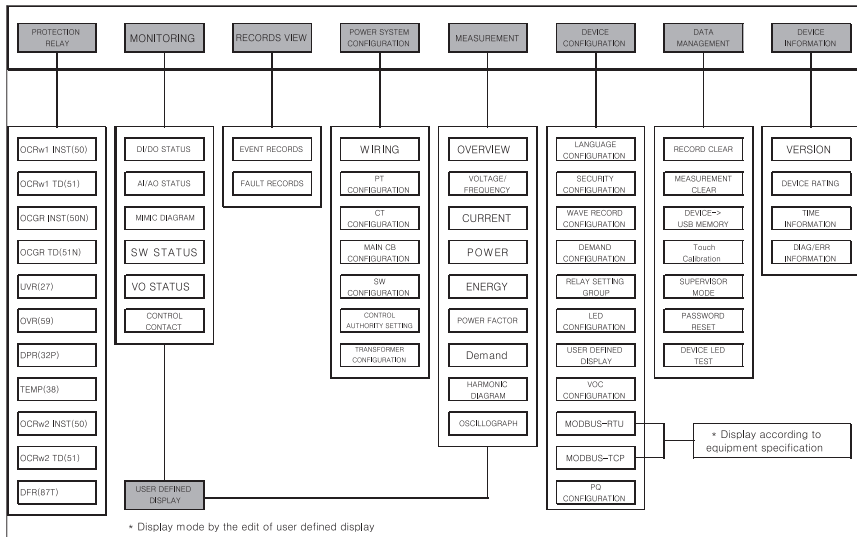
1. Outer Layout

1.4 Menu Layout – B Type



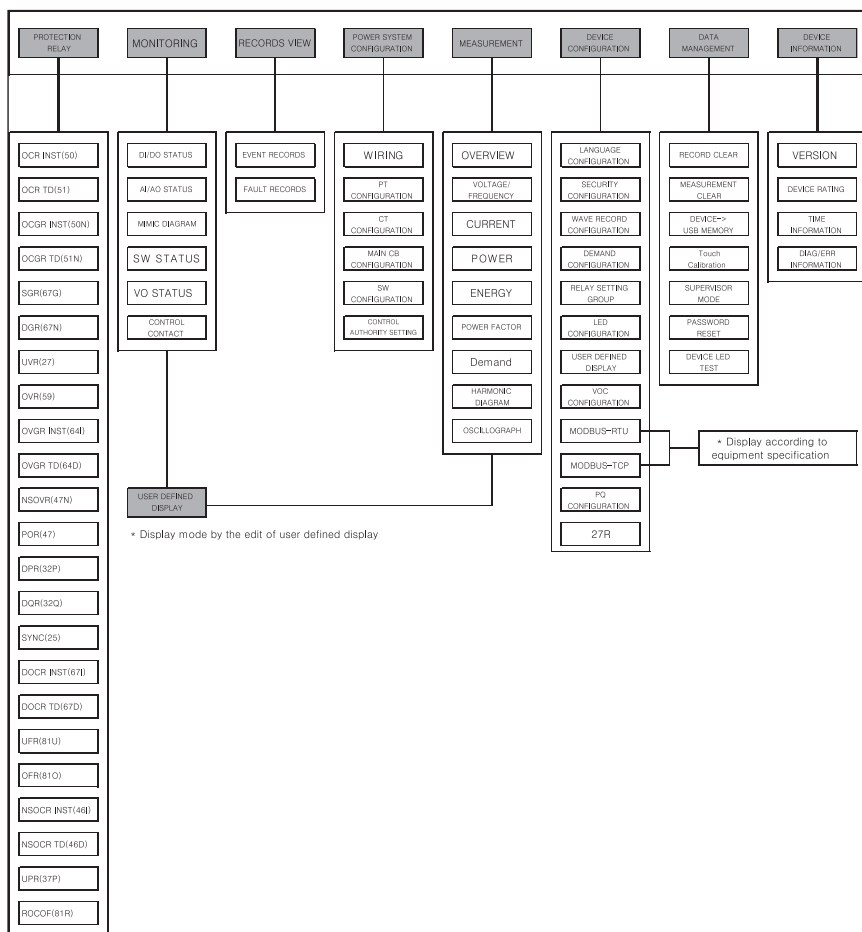
1. Outer Layout

1.5 Menu Layout – T Type



1. Outer Layout

1.6 Menu Layout – DG Type



2. Rated Values for the Product

2.1 Rated Values for the equipment

Contents		Specification
Cut off method		3P3W(2PT-D), 3P4W(3PT-Y)
Input point	Frequency	50Hz or 60Hz
	Voltage	PT: 100V, 110V, 120V, 190V (Phase/line input choice $1/\sqrt{3}$) * Maximum 120V
		GPT: 110~190V
	Current	CT: 1A
		ZCT: 1.5mA
	Control Power	AC: 110V, DC110~125V
	Usage Power	Normally Under 30W, Operation: Under 70W
	Input Burden	PT: 0.5VA (PT phase is the standard form)
CT: 1.0VA		
Input point		Digital Input: AC/DC 110V
Output point	TRIP use	AC 250V 10A / DC 30V 10A Resistive Load
		AC 2500VA, DC300W
	ALARM use	AC 250V 5A / DC 30V 5A Resistive Load
		AC 1250VA, DC150W
Usable Temperature Range		-10℃ ~ 55℃
Storage Temperature Range		-25℃ ~ 70℃
Usable Humidity Range		Daily average 30% ~ 80%
Altitudinous		Below the altitude 1000m
ETC		Area without vibration and impact

2. Rated Values for the Product

2.2 Measuring Specifications

Measuring contents	Indications		Note
	Unit	Range	
Voltage	V	0.0 ~ 999.999 k	±0.2% Phase Voltage, Line Voltage
Zero phase voltage	V	0.0 ~ 999.999 k	±2.0% Vo
Bus voltage	V	0.0 ~ 999.999 k	±0.2% VB
Voltage Unbalanced Factor	%	0.0 ~ 200.00	±2.0%
Reverse Phase Voltage	V	0.0 ~ 999.999 k	±1.0% V2
Current	A	0.0 ~ 999.999 k	±0.2% Phase Current
Zero phase current (CT4)	A	0.0 ~ 999.999 k	±2.0% In
Zero phase current (ZCT)	A	0.0 ~ 999.999	±1.0% Io
Reverse phase current	A	0.0 ~ 999.999 k	±1.0% I2
Phase	°	0.0 ~ 360.0	±5°
Active power	W	0.00 ~ 9999.999 M	±0.5% +Forward, -Reverse
Reactive power	VAR	0.00 ~ 9999.999 M	±0.5%
Apparent power	VA	0.00 ~ 9999.999 M	±1.0%
Active electric energy	WH	0.00 ~ 99999.999 M	±0.5% +Forward, -Reverse
Reactive electric energy	VARH	0.00 ~ 99999.999 M	±0.5%
Frequency(Va)	Hz	45 ~ 65	±0.005Hz
Frequency(VB)	Hz	45 ~ 65	±0.005Hz
Power Factor(PF)	-	-1.000 ~ 1.000	±1.0% Foward/Reverse
Fundamental Power Factor(DPF)	-	-1.000 ~ 1.000	±1.0% Foward/Reverse
Voltage Harmonics	%	0.00 ~ 100.00	±5.0% 2nd ~ 63 trillion Harmonics and THD,TDD,K-Factor
Current Harmonics	%	0.00 ~ 100.00	±5.0% 2nd ~ 63 trillion Harmonics and THD,TDD,K-Factor
Active power Demand	W	0.00 ~ 9999.999 M	Total Peak Demand
Reactive power Demand	VAR	0.00 ~ 9999.999 M	Total Peak Demand
Current Demand	A	0.3 ~ 999.999 k	Total Peak Demand and Peak Demand of each phase
Load Factor	%	0.0 ~ 100.000	±0.2% Load factor of each phase

3. Relay Element

XGIPAM RELAY SETTING

Protection relay	Operation type	Operation value setting / Variation, operation time	Note
OCR Inst (50)	Instant time Definite time	Setting : OFF, 0.10 ~ 32.00 / 0.01In Operation time : 0, 0.05 ~ 300.0 / 0.001s (Instant time, Definite time)	When set up to "0", (60Hz) It acts lower than 30ms. (50Hz) It acts lower than 40ms.
OCR TD (51)	Definite time Inverse time	Setting: OFF, 0.02 ~ 10.00 / 0.01In Operation time : 0.05 ~ 1.20 / 0.01 (Inverse time) 0.05 ~ 300.0 / 0.001s (Definite time) Operation delay time : 0 ~ 300.0 / 0.001s(Inverse time)	Temporary Curve IEC SI/VI/E/LI ANSI SI/VI/EI KEPCO SI/VI
OCGR Inst (50N)	Instant time Definite time	Setting : OFF, 0.1 ~ 32.00 / 0.01In Operation time : 0, 0.05 ~ 300.0 / 0.001s Motor Block time : 0.1 ~ 300.0 / 0.1s (Instant time, Definite time)	When set up to "0", (60Hz) It acts lower than 30ms. (50Hz) It acts lower than 40ms. Motor Block I > 0.1A
OCGR TD (51N)	Definite time Inverse time	Setting : OFF, 0.02 ~ 10.00 / 0.01In Operation time : 0.05 ~ 1.20 / 0.01 (Inverse time) 0.05 ~ 300.0 / 0.001s (Definite time) Operation delay time : 0 ~ 300.0 / 0.001s(Inverse time) Motor Block time : 0.1 ~ 300.0 / 0.1s	Temporary Curve IEC SI/VI/E/LI ANSI SI/VI/EI KEPCO SI/VI Motor Block I > 0.1A
SGR (67G)	Definite time	Zero phase current setting : 0.6 ~ 6.0 / 0.1mA Zero phase voltage setting : 0, 8.0 ~ 80.0 / 1V Phase-sensitivity standard angle : 0 ~ ±90 / 1° Operation time : 0.05 ~ 10.0 / 0.001s	If the zero phase voltage is set to 0, the zero phase current will act only.
DGR (67N)	Instant time Definite time Inverse time	Zero phase current Setting : 0.02 ~ 10.00 / 0.01In Zero phase voltage Setting : 8.0 ~ 80.0 / 1V Phase-sensitivity standard angle : 0 ~ ±90 / 1° Phase operation range : 60 ~ 87 / 1° Operation time : 0.05 ~ 1.20 / 0.01 (Inverse time) 0, 0.05 ~ 300.0 / 0.001s (Instant time, Definite time) Operation delay time : 0 ~ 300.0 / 0.001s(Inverse time) POWER FLOW DIRECTION : FORWARD / REVERSE	When set up to "0", (60Hz) It acts lower than 50ms. (50Hz) It acts lower than 55ms. Temporary Curve IEC SI/VI/E/LI ANSI SI/VI/EI KEPCO SI/VI
UVR (27)	Definite time	Setting : OFF, 0.10 ~ 1.10 / 0.01Vn Operation time : 0.05 ~ 300.0 / 0.001s (Definite time) Auto reset : Use / Not use Dead Voltage Block : Use / Not use	Dead Voltage Block: If the 3 phase voltage is lower than 0.05Vn, the UVR does not operate.

3. Relay Element

XGIPAM RELAY SETTING

Protection relay	Operation type	Operation value setting / Variation, operation time	Note
OVR (59)	Definite time Inverse time	Setting : OFF, 0.80 ~ 1.60 / 0.01Vn Operation time : 0.01 ~ 1.20 / 0.01 (Inverse time) 0.05 ~ 300.0 / 0.001s (Definite time) Operation delay time : 0 ~ 300.0 / 0.001s(Inverse time)	Temporary Curve IEC SI/M/EI/LI ANSI SI/M/EI KEPCO SI/M
OVGR Inst (64)	Instant time Definite time	Setting : OFF, 5 ~ 80 / 1V Operation time : 0, 0.05 ~ 300.0 / 0.001s (Instant time, Definite time)	When set up to "0", (60Hz) It acts lower than 30ms. (50Hz) It acts lower than 40ms.
OVGR TD (64D)	Definite time Inverse time	Setting : OFF, 5 ~ 80 / 1V Operation time : 0.05 ~ 1.20 / 0.01 (Inverse time) 0.05 ~ 300.0 / 0.001s (Definite time) Operation delay time : 0 ~ 300.0 / 0.001s(Inverse time)	Temporary Curve IEC SI/M/EI/LI ANSI SI/M/EI KEPCO SI/M
NSOVR (47N)	Definite time	Setting : OFF, 11 ~ 120 / 1V Operation time : 0.05 ~ 300.0 / 0.001s	Definite time All 3 phase voltages must be over 5V.
POR (47)	Definite time	Setting : OFF, 2.0 ~ 100.0 / 1% Operation time : 0.05 ~ 300.0 / 0.001s $Vub(Unbalanced\ Factor) = \frac{Max(V_{phase}-V_{avg})}{V_{avg}} \times 100\%$	Definite time
SYNC (25)	Definite time	V Diff : OFF, 2 ~ 50 / 1V Phase Diff : OFF, 5 ~ 45 / 1° Freq Diff : 0.01 ~ 0.50 / 0.01Hz Dead Voltage : 0.2 ~ 0.4 / 0.01Vn	After the synchronous conditions are satisfied, it operates within 1sec.
Reclosing (79)	-	Reclosed circuit number : 1 ~ 5 / 1 time Prepare Time : 0.02 ~ 60.00 / 0.001s Dead Time : 0.06 ~ 300.0 / 0.001s CB Operation time : 0.05 ~ 0.500 / 0.001s Reclaim Time : 1.00 ~ 300.0 / 0.001s Scheme : Not use, L-L, L-D, D-L, D-D *CB operation time: It is setup as Switch Fault time delay equipment setup-SW setup menu.	Not use, Live Bus – Live Line Live Bus – Dead Line, Dead Bus – Live Line Dead Bus – Dead Line
TEMP (38)	Definite time	Setting : Off, 20 ~ 180 / 1°C Operation time : 0, 0.05 ~ 300.0 / 0.001s	The range is needed to be setup as AI mode when equipment is setup as a relay.

3. Relay Element

XGIPAM RELAY SETTING

Protection relay	Operation type	Operation value setting / Variation, operation time	Note
UFR (81U)	Definite time	60Hz Setting : OFF, 50 ~ 60 / 0.05Hz 50Hz Setting : OFF, 40 ~ 50 / 0.05Hz Operation time : 0.10 ~ 300.0 / 0.001s UV Block : 0.5 ~ 0.9 / 0.01Vn	Select PT#1 or PT#5
OFR (81O)	Definite time	60Hz Setting : OFF, 60 ~ 70 / 0.05Hz 50Hz Setting : OFF, 50 ~ 60 / 0.05Hz Operation time : 0.10 ~ 300.0 / 0.001s UV Block : 0.5 ~ 0.9 / 0.01Vn	Select PT#1 or PT#5
DPR (32P)	Definite time	Setting : OFF, 0.01 ~ 1.50 / 0.01Pn Operation time : 0.10 ~ 300.0 / 0.001s (Definite time) Direct : Forward / Reverse	-
DQR (32Q) (Bay Type use only)	At definite time	Setup : OFF, 0.02 ~ 1.50 / 0.01Qn Action time : 0.10 ~ 300.0 / 0.001s (Definite time) Direct : Forward / Reverse	-
DOCR Inst (67I)	Instant time Definite time	Setting : OFF, 0.1 ~ 32.0 / 0.01In Phase-sensitivity standard angle : 0 ~ $\pm 90 / 1^\circ$ Phase operation range: 60 ~ 87 / 1° Direct : Forward / Reverse Operation time : 0, 0.05 ~ 300.0 / 0.001s (Instant time, Definite time)	When set up to "0", (60Hz) It acts lower than 50ms. (50Hz) It acts lower than 55ms.
DOCR TD (67D)	Definite time Inverse time	Setting : OFF, 0.02 ~ 10.00 / 0.01In Phase-sensitivity standard angle : 0 ~ $\pm 90 / 1^\circ$ Phase operation range: 60 ~ 87 / 1° Direct : Forward / Reverse Operation time : 0.05 ~ 1.20 / 0.01 (Inverse time) 0.05 ~ 300.0 / 0.001s (Definite time) Operation delay time : 0 ~ 300.0 / 0.001s(Inverse time)	Temporary Curve IEC SI/VI/EI/LI ANSI SI/VI/EI KEPCO SI/VI
NSOCR Inst (46I)	Instant time Definite time	Setting : OFF, 0.1 ~ 2.00 / 0.01In Operation time : 0, 0.05 ~ 300.0 / 0.001s (Instant time, Definite time)	When set up to "0", (60Hz) It acts lower than 50ms. (50Hz) It acts lower than 55ms.
NSOCR TD (46D)	Definite time Inverse time	Setting : OFF, 0.05 ~ 2.00 / 0.01In Operation time : 0.05 ~ 1.20 / 0.01 (Inverse time) 0.05 ~ 300.0 / 0.001s (Definite time) Operation delay time : 0 ~ 300.0 / 0.001s(Inverse time)	Temporary Curve IEC SI/VI/EI/LI ANSI SI/VI/EI KEPCO SI/VI

3. Relay Element

XGIPAM RELAY SETTING

Protection relay	Operation type	Operation value setting / Variation, operation time	Note
Current Differential Relay (87T)	Instant time Definite time	Id(Low pick up) : OFF, 0.2 ~ 1.0 / 0.01In Slope1 : 15 ~ 100 / 1 % Slope2 : 15 ~ 100 / 1 % Knee point : 1.0 ~ 20.0 / 0.1In Inrush inhibit : OFF, 5 ~ 50 / 1 % Io elimination : on, off Id (High pick up) : OFF, 2.0 ~ 32.0 / 0.01In Operation time : 0, 0.05 ~ 300.0 / 0.001s (Instant time, Definite time)	When set up to "0", (60Hz) It acts lower than 50ms. (50Hz) It acts lower than 60ms.
ROCOF (81R)	Definite time	Setting : OFF, 0.1 ~ 2.0 / 0.1Hz/s Operation time : 0.20 ~ 60.0 / 0.001s UV Block : 50 ~ 100 / 1V	—
DQR (32Q) (DG Type use only)	Definite time	Setting : OFF, 0.01 ~ 1.50 / 0.01Qn Operation time : 0.10 ~ 300.0 / 0.001s (Definite time) Direct : Forward / Reverse Q Calc. Method : $Qa=IaV_{sin}(\theta_{\theta})$, $Qa=Ia(Vb-Vc)$	—
UPR (37P)	Definite time	Setting : OFF, 0.02 ~ 0.80/0.01Pn Operation time : 0.10 ~ 300.0/0.001s (Definite time) Direct : Forward / Reverse	—

※ Precautions when using UVR(27) Auto reset

— . When using UVR(27) Auto reset, default PLC Logic is not linked.

4. Additional Functions

XGIPAM Additional Functions

4.1 DI/DO Monitoring

X-GIPAM provides 2 kinds of digital input/output modules.

The digital IO module basically has three(In the case of Bay and DG Types, there are 4,) installed, and at maximum there can be 4 installed.

1) Terminal Block type is composed DI 10 points, PO 2 points, DO 8 points

a) DI Composition: DI01, DI02, DI03, DI04, DI05, DI COM0 / DI06, DI07, DI08, DI09, DI10, DI COM1

Note) DI01/DI02 is the point that receives the state indication of SW and CB (DI01: ON Status, DI02: OFF status)

b) DO Composition

– PO Relay: CB OPEN+(DO02+), CB OPEN-(DO02-) / CB CLOSE+(DO01+), CB CLOSE-(DO01-)

– Alarm Relay: DO03, DO04, DO05, COM0 / DO06, DO07, DO08, COM1

2) Connector type is composed DI 5 points, PO 2 points, DO 1 points

a) DI Composition: DI01, DI02, DI03, DI04, DI05, DI COM0

Note) DI01/DI02 is the point that receives the state indication of SW and CB (DI01: ON Status, DI02: OFF status)

b) DO Composition

– PO Relay: CB OPEN+(DO02+), CB OPEN-(DO02-) / CB CLOSE+(DO01+), CB CLOSE-(DO01-)

– Alarm Relay: DO03, COM0

4.2 Event Record Function

Input and output of the product in action and all the state changes with the time information recorded in the order in which the data refers to the place. Because the event records the operation state of the relay, accident record analysis or failure analysis can be performed with this function. Additionally the accident information is recorded every 1msec.

4. Additional Functions

XGIPAM Additional Functions

1) Event Record Reading

As soon as the X-GIPAM realizes that an Event happened, the Event and the additional information about the cause of the event is recorded and the content of the record and the type of information are like the follows.

a) Change setting Event

- Values before and after the change

b) Relay operation (Pick Up/Operation/Drop out Event)

- The quantity of the electricity that causes the relay operation
- In the case of Operation, Wave information is basically recorded.

c) The change of state of DI/DO/VO/SW

- Values before and after the state and the user name of DI/DO/VO

※ If the initial power is permitted during the change of state of DI/DO, the state change event does not recorded. However, VO makes the Event recorded.

d) Control (SW, DO, CC, Fault Reset, Auto-Reclosing, Count/Value Clear etc.)

- The control Event does not have additional information.

e) VOC/Demand Event

- The quantity of electricity that causes VOC/Demand operation

f) When TCS Status, TRS Status, SWF STATUS, I2t STATUS EVENT occurs, the SW NAME is not recorded, and only when the SW STATUS EVENT occurs the SW NAME is recorded.

2) Event Storage Capacity

If up to 1000 events of the past can be saved, when there are more than 1000 events the oldest Events are deleted and the newest data are filled in(Roll-over function).

4.3 Fault Record Function

Fault Record function is the record that is the recorded that extracted the information about the accident in the system.

1) Event recorded in the Fault

- Pick Up Event / Operation Event / Drop Out Event

2) Relay element common record event Values

a) Common VALUES of an event

- The name of the relay element and the relevant Stage / Operation state(Pickup, Operate, Dropout etc) / Time information / Main Control [REMOTE / LOCAL]

b) Fault Values

- Fundamental wave Va, Vb, Vc, Vo, VB / fundamental wave Ia, Ib, Ic, In(Io)
- According to some relay elements, set to display the quantity of electricity

4. Additional Functions

XGIPAM Additional Functions

4.4 Power System Configuration Function

1) Wiring Information Setup

This configuration is an important setup about the protection function like the PT/CT setup, and this must be compatible with the installation environment in order to prevent malfunction.

X-GIPAM allows both the WYE wiring and the DELTA wiring in the wiring between PT and the relay.

The wiring information setup means the setup on how the PT of the relay is wired. In other words, if DELTA wiring is used, 2PT-D mode be selected and if WYE wiring is used, 3PT-Y mode be selected.

2) Voltage Transformer (PT) Setup

a) Phase Voltage Transformer

i) PRIMARY : The setup of the phase PT primary ratio

– Input Range : 100 ~ 999999V

ii) SECONDARY : The setup of the phase PT secondary ratio

– Input Range : 100, 110, 120, 190

iii) PRL/SEC. FACTOR : The setup of the input voltage in the phase/line (According to the standard of the installed PT)

– Input Range : 1 = The installation of the PT for input in line voltage, $1/\sqrt{3}$ = The installation of the PT for input in phase voltage

b) Ground Voltage Transformer(GPT)

i) PRIMARY : The setup of the phase PT primary ratio. There can be no modification in the monitor GPT setup window, the setup value in the setup of the phase PT is used at it is.

ii) TERTIARY : The setup of the Three winding PT. GPT tertiary voltage

– Input Range : 110 ~ 190

c) Zero phase Voltage Input

i) Vo SOURCE : The Source of the zero phase voltage

–SLOT#01 PT4 : The direct input of Slot#1 through PT4

–SLOT#01 VECTOR SUM : Cognizes the Vo value as a vector sum of the PT1/2/3 input of Slot#1.

d) Voltage Transformer Breakdown Monitoring (PTF)

A function that alarms when the X-GIPAM Fuse and PT is disconnected (PT Fail)

– If in the CB close state the current unbalanced factor(I_2/I_1) is below 20%, the relevant current of the phase is below 0.02~1A, and the relevant voltage is below 10%, continued long than 50msec, it is judged to be a PT Failure.

4. Additional Functions

XGIPAM Additional Functions

3) Current Transformer (CT) Setup

If the CT ratio is changed, the accumulated Energy is cleared.

F,B,DG Type	T Type
a) Phase Current Transformer i) PRIMARY: Setup of the primary ratio of the phase CT (Input Range : 5 ~ 9999A) ii) SECONDARY: Setup of the secondary ratio of the phase CT (Input Range : It is fixed at 5A, so there can be no change.)	a) Primary Winding Phase Current Transformer i) PRIMARY: Setup of the primary ratio of the phase CT (Input Range : 5 ~ 9999A) ii) SECONDARY: Setup of the secondary ratio of the phase CT (Input Range : It is fixed at 5A, so there can be no change.)
b) Ground Current Transformer i) PRIMARY: The input range of the primary side of the zero phase current (Input Range : 5 ~ 9999A) ii) SECONDARY: The input range of the secondary side of the zero phase current (Fixed at 5A)	b) Secondary Winding Phase Current Transformer i) PRIMARY: Setup of the primary ratio of the phase CT (Input Range : 5 ~ 9999A) ii) SECONDARY: Setup of the secondary ratio of the phase CT (Input Range : It is fixed at 5A, so there can be no change.)
c) Zero phase Current Transformer i) PRIMARY: The primary ratio of the Non-Earthed zero phase current (Fixed at 200mA) ii) SECONDARY: The secondary ratio of the non-earthed zero phase current (Fixed at 1.5mA)	c) Zero phase Current Transformer i) Connection: Choice between Pri. and Sec. windings ii) PRIMARY: The input range of the primary side of the zero phase current (Input Range : 5 ~ 9999A) iii) SECONDARY: The input range of the secondary side of the zero phase current (Fixed at 5A)
d) The input of the zero phase current i) SLOT#01 CT4 : The zero phase current input using CT4 (Read Only)	d) The input of the zero phase current i) SLOT#01 CT7 : The zero phase current input using CT7 (Read Only)

4) The setup of the main circuit breaker / SW / control system

X-GIPAM can compose up to 4 SW objects. The user can set up the main control circuit breaker of the relay. Using the OPEN/CLOSE key which is on the front side, the main control switch, direct control order can be issued and quick control motion is possible. This switch lets the function that predicts the life expectancy operate, and only one main control circuit breaker can be set up.

※ Caution : SW composing and the main circuit breaker selection function needs to setup identical to the ladder of PLC, and if not(when the PLC is not fixed and setup only in the menu) the function cannot be performed correctly.

a) The setup of the main circuit breaker

i) MAIN CB

Select the SW that will be used as a main circuit breaker. The SW that will be setup must be set up as SW in the menu of the SW CONFIGURATION, and has to select only the one that is setup as SW.

ii) I2t LIMIT USE

This decides whether to use the circuit breaker life span limit function. When set up as the main circuit breaker, the cutoff current that occurs because of the opening of the main circuit breaker is calculated in the inner algorithm and if the result exceeds the limited figure, an Event occurs.

iii) I2t LIMIT

Setup Range : 10,000(MIN) ~ 1,000,000,000(MAX)

4. Additional Functions

XGIPAM Additional Functions

b) SW Setup

- i) FUNCTION : It can select the use of PO to be a SWITCH or a signal DO.
- ii) TCS USAGE : It selects whether or not to use the TCS function
 - USE : Uses the TCS function – NOT USE : Does not use the TCS function
 - ※ When the Function is set as normal signal DO(PO), it is fixed at NOT USE
- iii) TRS USAGE : It decides whether to use the TRS function
 - USE : Uses the TRS function – NOT USE : Does not use the TRS function
 - ※ When the Function is set as normal signal DO(PO), it is fixed at NOT USE
- iv) TRS SCHEDULE : This sets up the operation frequency of the TRS checking function
 - Setup Range : 1 ~ 365 day
- v) SW FAULT USAGE : This selects whether to use the function that checks the failure of the switch that is set as the main circuit breaker.
 - USE : Uses the function. –NOT USE : Does not use the function
- vi) SW FAULT TIME DELAY (SW fault check operation time) : After the relay element operation changed the circuit breaker to OPEN, the operation time of the switch operation Fail check function that is used to judge the normal operation needs to be set up with an interval of 50 ~ 500 ms / 1 ms.
- vii) SOURCE

This shows the location of the DO(PO) that can be set as a SWITCH. Senses the IO module that is installed in the product, and displays the information. So the information cannot be changed by user.

viii) 3PSW EARTH DI SOURCE

In the case of a 3 pole control SWITCH, the third condition input is set up with this function. This needs to be set as NOT USE when normal circuit breaker is being set up.

c) Control Relay Setup

- R/L CHANGE SOURCE : This decides if the REMOTE/LOCAL will be controlled with a key or a DI.
- [LOCAL] SETTING STATUS : This decides which state(OPEN/CLOSE) will be chosen as the LOCAL state when the REMOTE/LOCAL main agent is set as DI.
- ※ CONTROL AUTHORITY reflects the current REMOTE/LOCAL state.

5) Transformer Setup(Displays the menu only at the T Type)

The T Type which is the relay for the protection of the transformer, lets the rating and wiring method of the primary and secondary side of the transformer.

- a) The rating of the primary side of the transformer (1 ~ 999,999V)
- b) The rating of the secondary side of the transformer (1 ~ 999,999V)
- c) The setup of the wiring method of primary and secondary side of the transformer: Select and use a total of 24 connection (Ex: DY11)

5. Equipment Setup

XGIPAM Equipment Setup

5.1 Language selection

- ENGLISH: Displays the menu and the message in English
- KOREAN: Displays the menu and the message in Korean

5.2 Security setup

X-GIPAM uses a password for the security. Also the password can be used or not, and the use of the password on each menu/function group can be chosen by the user. The password is composed of four numbers, and is input with the use of the keypad on the HMI which uses the touch screen function. If the password is confirmed, the security is cleared for ten minutes

If there is no input(Touch, Mouse etc) for the next ten minutes, the security is closed again and the password needs to be confirmed again.

(※ Initial Password : "0000")

- Usage: Chooses whether to use the Password.
- Change of Password: Uses the existing Password
- Controls whether to use the password of each menu/function group

5.3 Wave form record setup

X-GIPAM saves the Wave regardless of the setup of the user when the safety relay function shows Pickup and Operation function.

On top of that it saves the Wave when the equipment performs the Capture order in the Oscilloscope function. Also X-GIPAM saves whenever the user chooses to save the wave. The user can choose one wave trigger source, and if the trigger source that is chosen by the user is input the wave is saved. The Wave is saved with 64 Samples per 1 cycle and 128 Cycles are saved with the number of samples

The change of cycle is impossible. But, in the saving before/after the trigger timing, the cycle setup is possible.

- RECORD CYCLE : Wave Cycle to be saved - 128 cycle (Fix)
- SAMPLE RATE : The number of Wave samples to be saved - 64 Sample (Fix)
- PRE TRIGGER CYCLE : The wave cycle before the Wave save Event happens, 0 ~ 128 CYCLE
- TRIGGER SOURCE : Wave save input Source that is selected by the user - DI, VO choice
- TRIGGER SOURCE STATUS : The state of Trip Source - CLOSE (Fixed)

5.4 Demand current/power setup

1) Load Record

- Average time : The demand time limit for the Load Profile record

5. Equipment Setup

XGIPAM Equipment Setup

2) Demand Current

- I3φ/1a/1b/1c USAGE : 3phase/A phase/B phase/C phase current Demand usage
USE : Uses the function, NOT USE : Does not use the function
- I3φ/1a/1b/1c VALUE : 3 phase/A phase/B phase/C phase Over Demand setup value
1 ~ 999999 A
- DEMAND TIME (Current demand time limit): Current Demand time limit
1 ~ 3600 sec

3) Demand Power

- This means the accumulated forward/backward P3 valid quantity of electricity during the demand time, Forward/backward Q3 invalid quantity of electricity
- Demand Time limit : 5~60 min/5 min

5.5 Relay setup group

Setting Group alteration Event can be selected with the combination of the change of the input/output of certain DIs, the user change of the PC/HMI or the setup alteration to the long distance communication. One to four automatic alteration Setting group can be set up and also it can be not used. Without using automatic Setting group, the change of the setting group through manual or long distance operation is always possible.

1) Environment Setup

a) Vitality Group

This shows the presently applied Setting group and through the touch LCD, PC manager, and long distance setup can be changed to 1~4.

b) Re-setup Suppression Time

If the Setting group is changed once, during the time that is setup with the SWITCH BLOCK TIME, the change to another setting group through manual or automatic methods and the change of the setting group automatic alteration relation setup(USE/NOT USE, SOURCE, SOURCE STATUS, Block Time) is blocked.

- Setup Range : 1 ~ 600 sec / 1 sec

2) GROUP1 ~GROUP4

a) Automatic vitality Usage

The automatic change of each Setting group can be set to be used or not.

b) Input Choice

Setting group is set to automatic change event source. It can be chosen from all the DI, VO.

c) Input State

Setting group is set up to the automatic alteration event source state. Since the ACTIVE SOURCE is DI, VO, the ACTIVE SOURCE STATUS is CLOSE.

5. Equipment Setup

XGIPAM Equipment Setup

5.6 LED Setup

There are 8 virtual LEDs on the left side of the HMI monitor, and the Source for the lighting of the LED can be changed by the user.

If the source condition that is set up by the user satisfies the trigger condition, the light lights up in a red or yellow band.

LED 01 ~ LED 08 Setup

– Usage : USE or NOT USE

– Input Choice : Relay element (Stage1, Stage2), DI/DO, VO

– Input State : If it is a relay element, PICK-UP or OPERATION

[25 Protection Content] Sync, Sync permission v.

[79 Protection Content] Ready, Process, Fail/Lock-out, Cancel

If it is DI/DO/VO : Fixed to CLOSE

5.7 User Defined Display Setup

If there is no input by the user for 10 minutes, the monitor is changed to the screen that is selected. If there is more than one selected screen, each screen is maintained for five seconds and the next screens is displayed on the screen. The user can choose 3 screens maximum.

The elements that can be set up have the same DISPLAY 1/2/3 composition.

– Usage : The usage of certain screens, USE or NOT USE

– Screen selection : The screen that can be chose by the user

Measurement: Overview, Voltage/Freq, Current, Power, Energy, Power Factor, Demand, Harmonic, Oscillograph

Monitoring: DI/DO, AI/AO, MIMIC, VO, SW

5.8 VOC Setup

VOC (Value of Change) is the analog event function that generates an event when the measurement of the relay deviates the value set up by the user.

1) Usage : USE or NOT USE

2) Input Choice: Va, Vb, Vc, Vo, VB, Ia, Ib, Ic, IN, Io, Pa, Pb, Pc, Qa, Qb, Qc, AIO #1 ~ AIO #2, AI01 ~ AI06

* The setup is only possible on the modules that have slots installed.

* In the case of power, there is no difference in the setup of forward and reverse, and on the relevant quantity of electricity the VOC operates only with the absolute value of the input power. However, if the VOC operates with the reverse power source “-” signal is recorded on the event.

3) Range: 10 ~ 50% / 1%

4) Operation delay time: 1 ~ 300 sec / 1 sec

5) Range re-selection time: 1 ~ 300 sec / 1 sec

5. Equipment Setup

XGIPAM Equipment Setup

5.9 Communication Setup : Long distance function uses the Protocol like the following.

1) MODBUS RTU

- a) Usage : USE or Not USE
- b) Address setup : 1~247
- c) BaudRate setup : 9600, 19200, 38400 bps
- d) Float Data SWAP function setup : SWAP ON, SWAP OFF
 - ※ RS485 communications (DNP 3.0 , MODBUS RTU)
 - 1) Operation mode : Differential
 - 2) Communication Range : Maximum 1.2Km
 - 3) Communication Line : General-purpose RS-485, Shield twisted 2-Pair Cable
 - 4) Maximum Input/Output Voltage : $\pm 6V$

2) MODBUS-TCP

- a) Usage : USE or Not USE
- b) SWAP function setup : SWAP ON, SWAP OFF
- c) Client Max Idle Time setup : 10~60 sec
 - If the fixed time is passes, the TCP connection is disconnected because of the Timeout, and is put to cleared state
- d) 100-FX Duplex setup : Full Duplex, Half Duplex
- e) IP Address setup : 0.0.0.0 ~ 255.255.255.255
 - ※ When setting the IP Address of Channel A and B, the third address[Class3] should be configured differently.
 - Ex) When the IP Address of Channel A is "192.168.1.1", Channel B can be "192.168.10.1" which has different address of Class3.
- f) Subnet mask setup : 0.0.0.0 ~ 255.255.255.255
- g) MAC Address setup : 00-0B-29-yy-yy-yy (y : 0 ~ F) (※ Mac Address has already been set, so it is not allowed to be set by user.)

5. Equipment Setup

XGIPAM Equipment Setup

※ 10BASE-T Ethernet (MODBUS-TCP)

- 1) Maximum baud rate : 10 Mbps
- 2) Topology : Star
- 3) Transmission medium : UTP(CAT.3, CAT.5)
- 4) Access control method : CSMA/CD
- 5) Transmission code : Manchester
- 6) Maximum transmission distance : Up to 100m between HUB and Terminal

※ 100BASE-TX Ethernet (MODBUS-TCP)

- 1) Maximum baud rate : 100 Mbps
- 2) Topology : Star
- 3) Transmission media : UTP(CAT.5), STP(Level 3)
- 4) Access control method : CSMA/CD
- 5) Transmission code : 4B/5B + MLT-3
- 6) Maximum transmission distance : Up to 100m between HUB and Terminal

※ 100BASE-FX (MODBUS-TCP)

- 1) Maximum baud rate: 100 Mbps
- 2) Topology : Star
- 3) Transmission media
 - Wavelength: 1300nm
 - Multi-Mode fiber
 - Fiber Size: 62.5/125, 50/125um
 - Optic Connector: SC type
- 4) Access control method : CSMA/CD, Transmission code : 4B/5B + NRZI
- 5) Maximum transmission distance : Up to 2km per segment

XGIPAM Equipment Setup

5.10 PQ Setup

The function which is power quality(PQ) measurement function like Sag, Interruption, Swell can be configured its availability.

PQ function record Start/End Event when the voltage keep its level more than one half(1/2) cycle(8.4msec).

When PQ function works, the result will output as Event/PLC Logic.

- 1) Sag: The operating range can be configured as 0.4PU ~ 0.9PU/0.1PU. It also records its quantity/min or max/duration time of electricity for each phase at the time of detection.
- 2) Swell: The operating range can be configured as 1.1PU ~ 1.6PU/0.1PU. It also records its quantity/min or max/duration time of electricity for each phase at the time of detection.
- 3) Interruption: When the system voltage drops under 0.1Vn, it records its quantity/min or max/duration time of electricity for each phase at the time of detection and Event.

5.11 Monitoring element of the bus bar under voltage(27R)

27R is for monitoring the under voltage of bus and it is not relay protection element but additional elements. It operates through VB applied source.

- 1) Operating range : 0.1Vn ~ 1.1 Vn / 0.01Vn
- 2) Operating time range : 0.05~300 / 0.001s (Definite-time)
- 3) Remarks
 - a) When 27R works, there's no other message such as screen or LED displayed like relay element, but the events are recorded only.
 - b) When 27R works, Pick up, Operation, Drop-out events are recorded like the relay element.However, waveform is not recorded.

6. User Interface Specifications

6.1 XGIPAM TERMINAL Composition

1. Composition of the XGIPAM F terminal board

Comm	Extended Comm	CT/PT	Slot#2	Slot#3	Slot#4	Slot#5	Slot#6	Slot#7	
54 COM A	64 FX Rx/A		201 A01+	301 A01+	401 D01	501 D01	601 D01		
55 Tx/D0 A	65 FX Tx/A	42 BLK BLK	202 A01-	302 A01-	402 D02	502 D02	602 D02	18 DI01 DI02	06
56 Tx/D1 A	66 FX Rx/B	43 Va+ Va-	203 A02+	303 A02+	403 D02	503 D02	603 D02		
57 Rx/D0 A	67 FX Tx/B	44 Vb+ Vb-	204 A02-	304 A02-	404 D03	504 D03	604 D03	19 DI03 DI04	07
58 Rx/D1 A		45 Vc+ Vc-	205 A03+	305 A03+	405 D03	505 D03	605 D03		
		46 Vo+ Vo-	206 A03-	306 A03-	406 D04	506 D04	606 D04	20 DI05 COM0	08
59 COM B		47 VB(27R)+ VB(27R)-	207 A04+	307 A04+	407 D04	507 D04	607 D04		
60 Tx/D0 B			208 A04-	308 A04-	408 D05	508 D05	608 D05	21 DI06 DI07	09
61 Tx/D1 B			209 A05+	309 A05+	409 D05	509 D05	609 D05		
62 Rx/D0 B			210 A05-	310 A05-	410 COM0	510 COM0	610 COM0	22 DI08 DI09	10
63 Rx/D1 B			211 A06+	311 A06+	411 COM0	511 COM0	611 COM0		
			212 A06-	312 A06-	412	512	612	23 DI10 COM1	11
68 LAN A			213 A00+	313 A00+	413 DO02+(PO)	513 DO02+(PO)	613 DO02+(PO)	24 CB OFF+ (DO02+) CB OFF- (DO02-)	12
69 LAN B			214 A00-	314 A00-	414	514	614	25 CB ON+ (DO01+) CB ON- (DO01-)	13
			215 A00+	315 A00+	415 DO02-(PO)	515 DO02-(PO)	615 DO02-(PO)	26 DO03 DO04	14
			216 A00-	316 A00-	416	516	616		
			217 A00+	317 A00+	417 DO01+(PO)	517 DO01+(PO)	617 DO01+(PO)	27 DO05 COM0	15
			218 A00-	318 A00-	418	518	618		
			219 A00+	319 A00+	419 DO01-(PO)	519 DO01-(PO)	619 DO01-(PO)	28 DO06 DO07	16
			220 A00-	320 A00-	420	520	620	29 DO08 COM1	17
			221 -	321 -	421 DO03	521 DO03	621 DO03		01 L1/+
			222 -	322 -	422	522	622		02
			223 -	323 -	423 COM0	523 COM0	623 COM0		03 L2/-
			224 -	324 -	424	524	624		04
MAIN	Extension Comm (Option)	CT/PT	A/AO (Option)	A/AO (Option)	DI/DO	DI/DO	DI/DO (Option)	DI/DO	POWER

2. Composition of the XGIPAM B, DG terminal board

Comm	Extended Comm	CT/PT	Slot#2	Slot#3	Slot#4	Slot#5	Slot#6	Slot#7	
54 COM A	64 FX Rx/A		201 A01+	301 A01+	401 D01	501 D01	601 D01		
55 Tx/D0 A	65 FX Tx/A	42 BLK BLK	202 A01-	302 A01-	402 D02	502 D02	602 D02	18 DI01 DI02	06
56 Tx/D1 A	66 FX Rx/B	43 Va+ Va-	203 A02+	303 A02+	403 D02	503 D02	603 D02		
57 Rx/D0 A	67 FX Tx/B	44 Vb+ Vb-	204 A02-	304 A02-	404 D03	504 D03	604 D03	19 DI03 DI04	07
58 Rx/D1 A		45 Vc+ Vc-	205 A03+	305 A03+	405 D03	505 D03	605 D03		
		46 Vo+ Vo-	206 A03-	306 A03-	406 D04	506 D04	606 D04	20 DI05 COM0	08
59 COM B		47 VB(27R)+ VB(27R)-	207 A04+	307 A04+	407 D04	507 D04	607 D04		
60 Tx/D0 B			208 A04-	308 A04-	408 D05	508 D05	608 D05	21 DI06 DI07	09
61 Tx/D1 B			209 A05+	309 A05+	409 D05	509 D05	609 D05		
62 Rx/D0 B			210 A05-	310 A05-	410 COM0	510 COM0	610 COM0	22 DI08 DI09	10
63 Rx/D1 B			211 A06+	311 A06+	411 COM0	511 COM0	611 COM0		
			212 A06-	312 A06-	412	512	612	23 DI10 COM1	11
68 LAN A			213 A00+	313 A00+	413 DO02+(PO)	513 DO02+(PO)	613 DO02+(PO)	24 CB OFF+ (DO02+) CB OFF- (DO02-)	12
69 LAN B			214 A00-	314 A00-	414	514	614	25 CB ON+ (DO01+) CB ON- (DO01-)	13
			215 A00+	315 A00+	415 DO02-(PO)	515 DO02-(PO)	615 DO02-(PO)	26 DO03 DO04	14
			216 A00-	316 A00-	416	516	616		
			217 A00+	317 A00+	417 DO01+(PO)	517 DO01+(PO)	617 DO01+(PO)	27 DO05 COM0	15
			218 A00-	318 A00-	418	518	618		
			219 A00+	319 A00+	419 DO01-(PO)	519 DO01-(PO)	619 DO01-(PO)	28 DO06 DO07	16
			220 A00-	320 A00-	420	520	620	29 DO08 COM1	17
			221 -	321 -	421 DO03	521 DO03	621 DO03		01 L1/+
			222 -	322 -	422	522	622		02
			223 -	323 -	423 COM0	523 COM0	623 COM0		03 L2/-
			224 -	324 -	424	524	624		04
MAIN	Extension Comm (Option)	CT/PT	A/AO (Option)	A/AO (Option)	DI/DO	DI/DO	DI/DO (Option)	DI/DO	POWER

6. User Interface Specifications

6.1 XGIPAM TERMINAL Composition

3. Composition of the XGIPAM T terminal board

Comm	Extended Comm	CT/PT		Slot#2	Slot#3	Slot#4	Slot#5	Slot#6	Slot#7					
54 COM A	64 FX RxA	42	BLK	BLK	30	201 AD1+	301 AD1+	401 DI01	501 DI01	601 DI01	18	DI01	DI02	06
55 TxDO A	65 FX TxA					202 AD1-	302 AD1-	402	502	602				
56 TxDI A	66 FX RxA					203 AD2+	303 AD2+	403 DI02	503 DI02	603 DI02				
57 RxDO A	67 FX RxB	43	Va+	Va-	31	204 AD2-	304 AD2-	404	504	604	19	DI03	DI04	07
58 RxDI A	67 FX TxB					205 AD3+	305 AD3+	405 DI03	505 DI03	605 DI03				
						206 AD3-	306 AD3-	406	506	606				
59 COM B		44	Vb+	Vb-	32	207 AD4+	307 AD4+	407 DI04	507 DI04	607 DI04	20	DI05	COM0	08
60 TxDO B						208 AD4-	308 AD4-	408	508	608				
61 TxDI B		45	Vc+	Vc-	33	209 AD5+	309 AD5+	409 DI05	509 DI05	609 DI05	21	DI06	DI07	09
62 RxDO B						210 AD5-	310 AD5-	410	510	610				
63 RxDI B		46	Ia1+	Ia1-	34	211 AD6+	311 AD6+	411 COM0	511 COM0	611 COM0	22	DI08	DI09	10
						212 AD6-	312 AD6-	412	512	612				
68 LAN A		47	Ib1+	Ib1-	35						23	DI10	COM1	11
69 LAN B														
		48	Ic1+	Ic1-	36	213 AO0+	313 AO0+	413 DO02+(PO)	513 DO02+(PO)	613 DO02+(PO)	24	CB OFF+ (DO02+)	CB OFF- (DO02-)	12
						214 AO0-	314 AO0-	414	514	614				
		49	Ia2+	Ia2-	37	215 AO0+	315 AO0+	415 DO02-(PO)	515 DO02-(PO)	615 DO02-(PO)	25	CB ON+ (DO01+)	CB ON- (DO01-)	13
						216 AO0-	316 AO0-	416	516	616				
		50	Ib2+	Ib2-	38	217 AO0+	317 AO0+	417 DO01+(PO)	517 DO01+(PO)	617 DO01+(PO)	26	DO03	DO04	14
						218 AO0-	318 AO0-	418	518	618				
		51	Ic2+	Ic2-	39	219 AO0+	319 AO0+	419 DO01-(PO)	519 DO01-(PO)	619 DO01-(PO)	27	DO05	COM0	15
						220 AO0-	320 AO0-	420	520	620				
		52	In+	In-	40	221 -	321 -	421 DO03	521 DO03	621 DO03	28	DO06	DO07	16
						222 -	322 -	422	522	622				
		53	BLK	BLK	41	223 -	323 -	423 COM0	523 COM0	623 COM0	29	DO08	COM1	17
						224 -	324 -	424	524	624				
MAIN	Extension Core (Option)	CT/PT		A/AO (Option)	A/AO (Option)	DI/DO	DI/DO	DI/DO (Option)	DI/DO		DI/DO		POWER	

* CB OPN+ can use PO02+, CB OPN-can use PO02-, CB CLS+ can use PO01+, and CB CLS-can use PO01-

* The terminal number abbreviation of DI/DO which are installed at Slot 4, 5, 6 is indicated as the slot number in front of the terminal number.

Ex) DI01 of Slot6 -> 601

* RS-485 Communication wiring

- Communication cable specification: AWG 22, Twisted Shield Pair Cable

- The Shield of communication line must be connected to each other, and both ends of the line must be grounded.

6. User Interface Specifications

6.1 XGIPAM TERMINAL Composition

4. Default Logic composition of the XGIPAM F Terminal Board

F Type basic DIO (slot4,5,6,7)						F Type DIO 1ea Expansion (slot4,5,6,7)					
Slot 7	DI 01	SW1_A	DO 01	SW1_Close	•	DI 01	SW1_A	DO 01	SW1_Close	•	
	DI 02	SW1_B	DO 02	SW1_Open	•	DI 02	SW1_B	DO 02	SW1_Open	•	
	DI 03	•	DO 03	POR / NSOVR	CC06	DI 03	•	DO 03	POR / NSOVR	CC06	
	DI 04	•	DO 04	SYNC. Check	CC07	DI 04	•	DO 04	SYNC. Check	CC07	
	DI 05	•	DO 05	TPRI.38)	CC08	DI 05	•	DO 05	TPRI.38)	CC08	
	DI 06	•	DO 06	UVR/Pulse	CC03	DI 06	•	DO 06	UVR/Pulse	CC03	
	DI 07	•	DO 07	88K	•	DI 07	•	DO 07	88K	•	
	DI 08	•	DO 08	Buzzer	CC10	DI 08	•	DO 08	Buzzer	CC10	
	DI 09	•				DI 09	•				
	DI 10	•				DI 10	•				
Slot 6	<div>OPTION</div>					DI 01	SW1_A	DO 01	SW1_Close	•	
						DI 02	SW1_B	DO 02	SW1_Open	•	
						DI 03	•	DO 03	•	•	
						DI 04	•				
						DI 05	•				
Slot 5	DI 01	•	DO 01	OVR	CC04	DI 01	•	DO 01	OVR	CC04	
	DI 02	•	DO 02	OVGR	CC05	DI 02	•	DO 02	OVGR	CC05	
	DI 03	•	DO 03	Power Fail	•	DI 03	•	DO 03	Power Fail	•	
	DI 04	•				DI 04	•				
	DI 05	•				DI 05	•				
Slot 4	DI 01	•	DO 01	OCR	CC01	DI 01	•	DO 01	OCR	CC01	
	DI 02	•	DO 02	OCGR/SGR/DGR	CC02	DI 02	•	DO 02	OCGR/SGR/DGR	CC02	
	DI 03	•	DO 03	UVR	CC03	DI 03	•	DO 03	UVR	CC03	
	DI 04	•				DI 04	•				
	DI 05	•				DI 05	•				

5. Default Logic Composition of the XGIPAM T/B/DG terminal Board

Basic DIO (slot4,5,6,7) : T Type					DIO 1ea Expansion (slot4,5,6,7) : T Type					Basic DIO (slot4,5,6,7) : Bay Type					Basic DIO (slot4,5,6,7) : DG Type										
Slot 7	DI 01	SW1_A	DO 01	SW1_Close	•	DI 01	SW1_A	DO 01	SW1_Close	•	DI 01	SW1_A	DO 01	SW1_Close	•	DI 01	SW1_A	DO 01	SW1_Close	•					
	DI 02	SW1_B	DO 02	SW1_Open	•	DI 02	SW1_B	DO 02	SW1_Open	•	DI 02	SW1_B	DO 02	SW1_Open	•	DI 02	SW1_B	DO 02	SW1_Open	•					
	DI 03	•	DO 03	DPR	CC06	DI 03	•	DO 03	DPR	CC06	DI 03	•	DO 03	POR / NSOVR	CC06	DI 03	•	DO 03	POR / NSOVR	CC06					
	DI 04	•	DO 04	OCR (Secondary)	CC07	DI 04	•	DO 04	OCR (Secondary)	CC07	DI 04	•	DO 04	NSOVR	CC06	DI 04	•	DO 04	NSOVR	CC06					
	DI 05	•	DO 05	TPRI.38)	CC08	DI 05	•	DO 05	TPRI.38)	CC08	DI 05	•	DO 05	TPRI.38)	•	DI 05	•	DO 05	Extra Fault	•					
	DI 06	•	DO 06	Extra Fault	CC09	DI 06	•	DO 06	Extra Fault	CC09	DI 06	•	DO 06	UVR/Pulse	CC03	DI 06	•	DO 06	UVR/Pulse	CC03					
	DI 07	•	DO 07	88K	•	DI 07	•	DO 07	88K	•	DI 07	•	DO 07	88K	•	DI 07	•	DO 07	88K	•					
	DI 08	•	DO 08	Buzzer	CC10	DI 08	•	DO 08	Buzzer	CC10	DI 08	•	DO 08	Buzzer	CC10	DI 08	•	DO 08	Buzzer	CC10					
	DI 09	•				DI 09	•				DI 09	•				DI 09	•								
	DI 10	•				DI 10	•				DI 10	•				DI 10	•								
Slot 6	OPTION										DI 01	SW1_A	DO 01	SW1_Close	•	DI 01	•	DO 01	DPR/DGR	CC06	DI 01	•	DO 01	DPR/DGR	CC06
											DI 02	SW1_B	DO 02	SW1_Open	•	DI 02	•	DO 02	UVR OFF	CC07	DI 02	•	DO 02	UVR OFF/DOOR	CC07
											DI 03	•	DO 03	SW1_Close	•	DI 03	•	DO 03	SYNC. Check	CC08	DI 03	•	DO 03	SYNC. Check	CC08
											DI 04	•				DI 04	•				DI 04	•			
											DI 05	•				DI 05	•				DI 05	•			
Slot 5	DI 01	•	DO 01	OVR	CC04	DI 01	•	DO 01	OVR	CC04	DI 01	•	DO 01	OVR	CC04	DI 01	•	DO 01	OVR	CC04	DI 01	•	DO 01	OVR	CC04
	DI 02	•	DO 02	PRI	CC05	DI 02	•	DO 02	PRI	CC05	DI 02	•	DO 02	OVR	CC04	DI 02	•	DO 02	UVR	CC03	DI 02	•	DO 02	UVR	CC03
	DI 03	•	DO 03	Power Fail	•	DI 03	•	DO 03	Power Fail	•	DI 03	•	DO 03	Power Fail	•	DI 03	•	DO 03	Power Fail	•	DI 03	•	DO 03	Power Fail	•
	DI 04	•				DI 04	•				DI 04	•				DI 04	•				DI 04	•			
	DI 05	•				DI 05	•				DI 05	•				DI 05	•				DI 05	•			
Slot 4	DI 01	•	DO 01	OCR (Primary)	CC01	DI 01	•	DO 01	OCR (Primary)	CC01	DI 01	•	DO 01	OCR / DOOR	CC01	DI 01	•	DO 01	OCR / DOOR	CC01	DI 01	•	DO 01	OCR / DOOR	CC01
	DI 02	•	DO 02	OCGR/SGR/DGR	CC02	DI 02	•	DO 02	OCGR/SGR/DGR	CC02	DI 02	•	DO 02	OCGR/SGR/DGR	CC02	DI 02	•	DO 02	OCGR / DPR	CC02	DI 02	•	DO 02	OCGR / DPR	CC02
	DI 03	•	DO 03	UVR	CC03	DI 03	•	DO 03	UVR	CC03	DI 03	•	DO 03	UVR	CC03	DI 03	•	DO 03	UVR	CC03	DI 03	•	DO 03	UVR	CC03
	DI 04	•				DI 04	•				DI 04	•				DI 04	•				DI 04	•			
	DI 05	•				DI 05	•				DI 05	•				DI 05	•				DI 05	•			

* PQ(Sag, Swell, Interruption), PTF, CBF, I2t, TCS/TRS uses the EXTRA FAULT point to provide output.

* Bay Type 27 Relay Protection Element : stage 1 is composed of 3 phase ORs, stage 2 is made of 32Q and each phase AND

* DG Type 27 Relay Protection Element : stage 1 is composed of 3 phase ANDs (3phase short backup protection use) ,
stage 2 is made of 32Q and each phase ANDs.

* CC : Switch for the relay output point Test. Can check operation in the equipment without tester

* If slot4(or slot 5,6) is used for circuit breaker control, please contact the engineer since it is necessary to modify PLC.

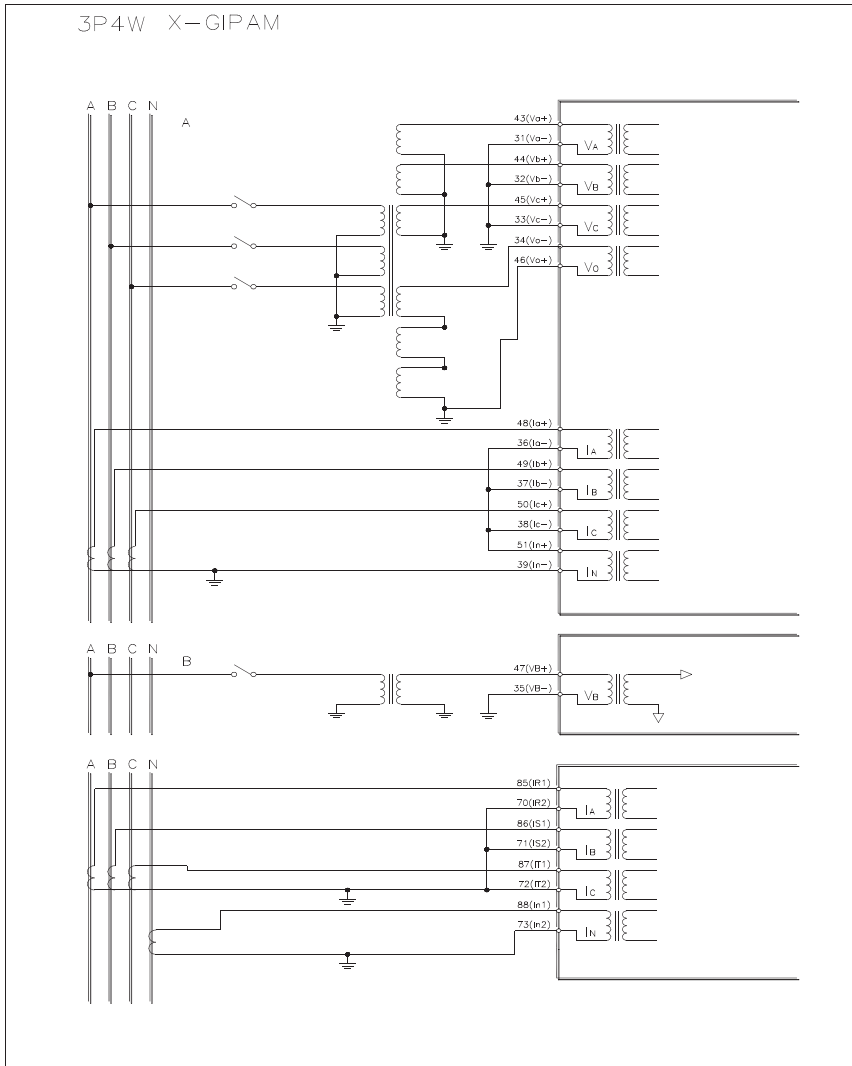
* If you use BAY / DG / TYPE products, please contact the engineer with PLC.

* SLOT#4 DIO5 is composed of 8 contact for buzzer stop

* For DG Type only, DPR(32P) element is set as basic alarm

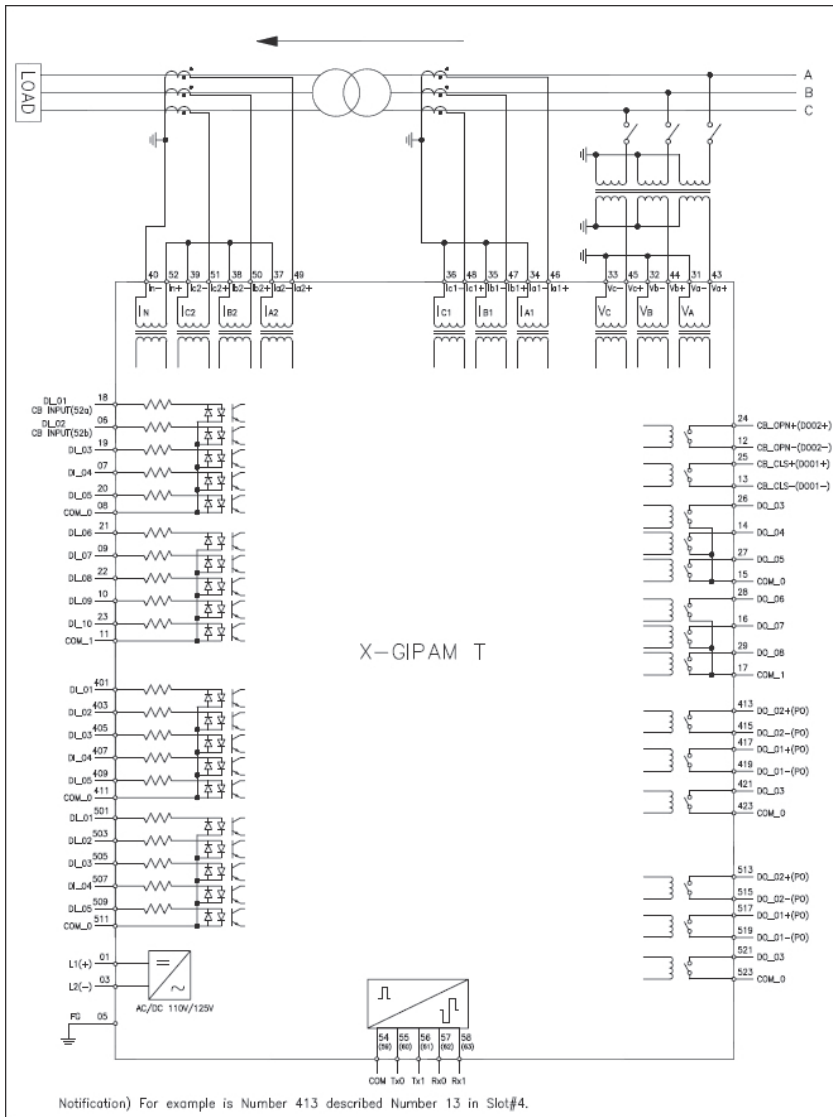
6. User Interface Specifications

6.2 XGIPAM F/B/DG Connective Diagram



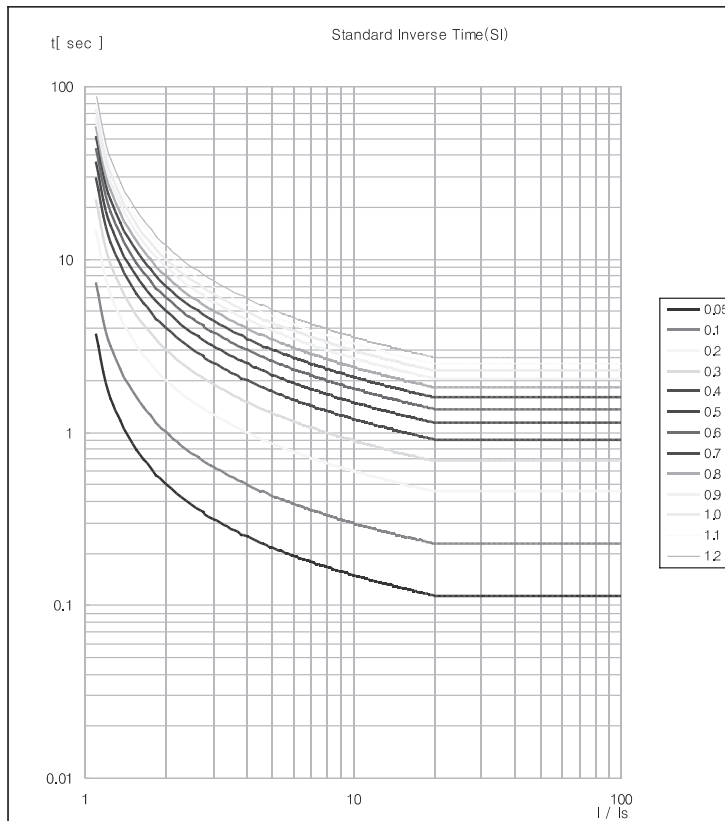
6. User Interface Specifications

6.2 XGIPAM T Connective Diagram



7. Characteristic Curve

IEC – SI(Standard Inverse) Characteristic Curve

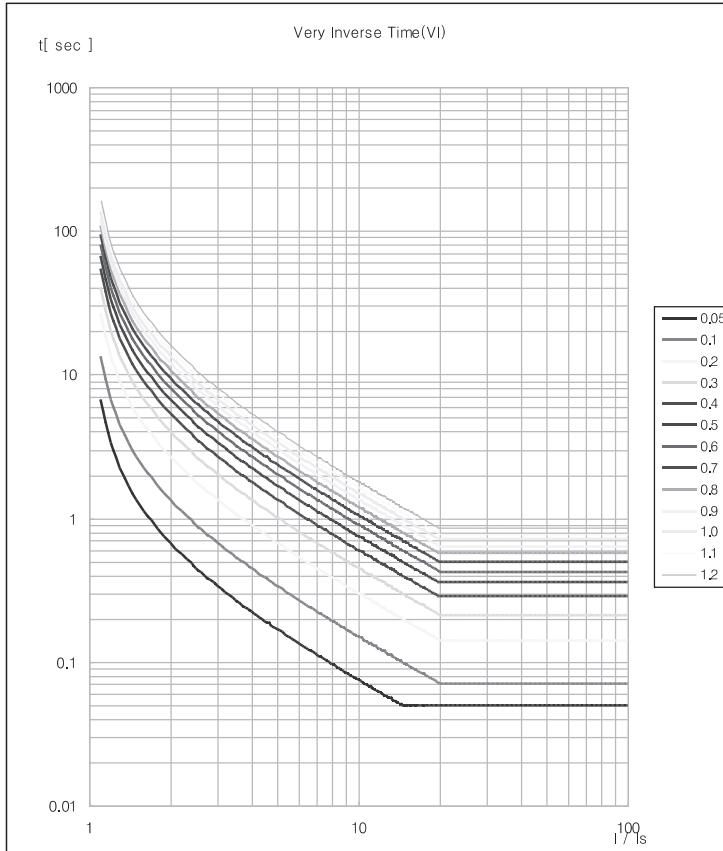


$$\text{TRIP TIME} = \left(\frac{0.14}{\left(\frac{I_F}{I_S} \right)^{0.02} - 1} \right) \times \text{TL} + \text{TD}$$

I_F = Fault Value
 I_S = Setting Value
 TL = TIME LEVER
 TD = TIME Delay(sec)

7. Characteristic Curve

IEC – VI(Very Inverse) Characteristic Curve

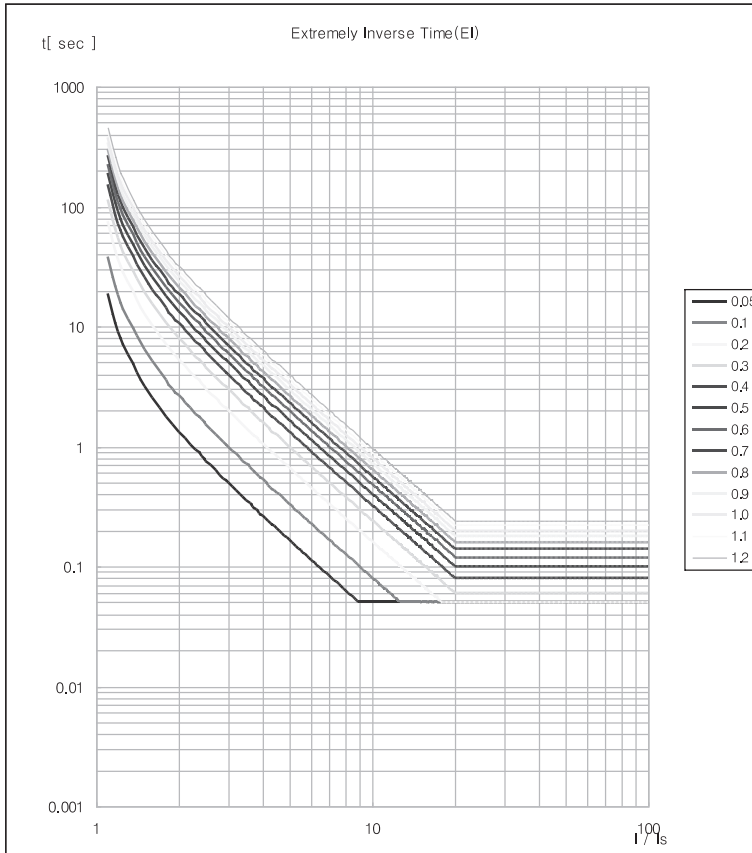


$$\text{TRIP TIME} = \left(\frac{13.5}{\left(\frac{I_F}{I_S} \right)^1 - 1} \right) \times \text{TL} + \text{TD}$$

I_F = Fault Value
 I_S = Setting Value
 TL = TIME LEVER
 TD = TIME Delay(sec)

7. Characteristic Curve

IEC – EI(Extremely Inverse) Characteristic Curve

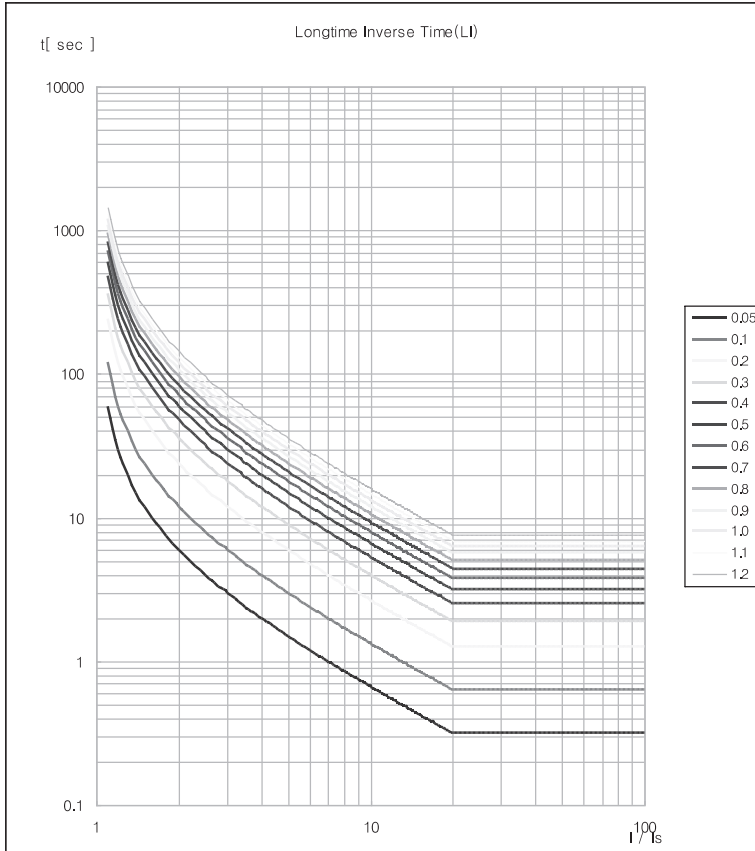


$$\text{TRIP TIME} = \left(\frac{80}{\left(\frac{I_F}{I_S} \right)^2 - 1} \right) \times \text{TL} + \text{TD}$$

I_F = Fault Value
 I_S = Setting Value
 TL = TIME LEVER
 TD = TIME Delay(sec)

7. Characteristic Curve

IEC – LI(Longtime Inverse) Characteristic Curve

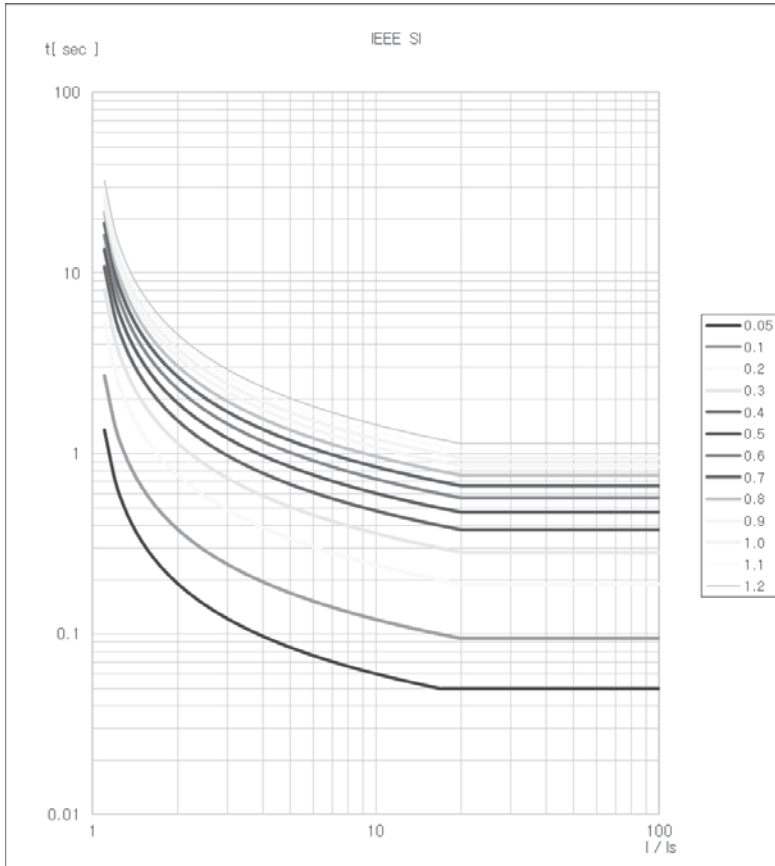


$$\text{TRIP TIME} = \left(\frac{120}{\left(\frac{I_F}{I_S} \right)^1 - 1} \right) \times \text{TL} + \text{TD}$$

I_F = Fault Value
 I_S = Setting Value
 TL = TIME LEVER
 TD = TIME Delay(sec)

7. Characteristic Curve

IEEE(ANSI) – SI(Standard Inverse) Characteristic Curve



$$\text{TRIP TIME} = \left(\frac{0.0515}{\left(\frac{I_f}{I_s} \right)^{0.02} - 1} + 0.114 \right) \times \text{TL} + \text{TD}$$

I_f = Fault Value

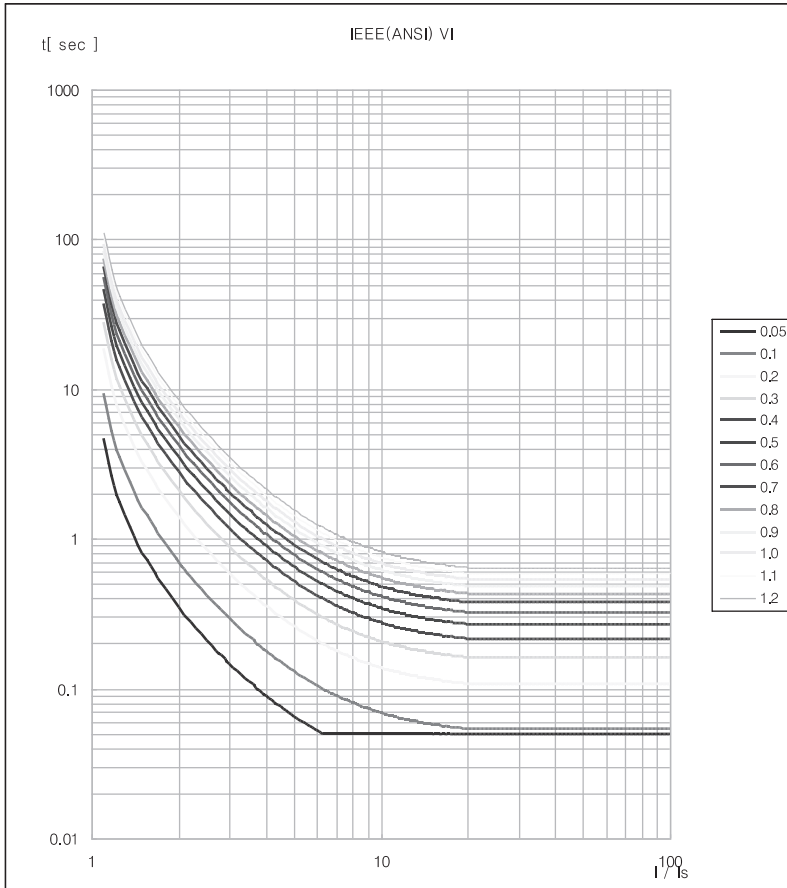
I_s = Setting Value

TL = TIME LEVER

TD = TIME Delay(sec)

7. Characteristic Curve

IEEE(ANSI)– VI(Very Inverse) Characteristic Curve



$$\text{TRIP TIME} = \left(\frac{19.61}{\left(\frac{I_F}{I_S} \right)^2 - 1} + 0.491 \right) \times \text{TL} + \text{TD}$$

I_F = Fault Value

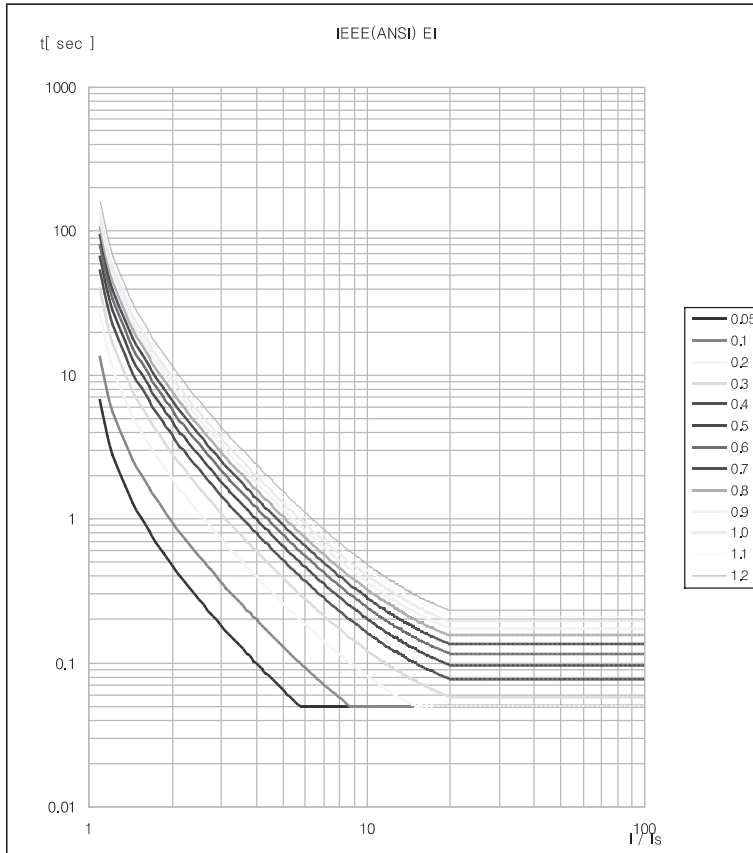
I_S = Setting Value

TL = TIME LEVER

TD = TIME Delay(sec)

7. Characteristic Curve

IEEE(ANSI) – EI(Extremely Inverse) Characteristic Curve

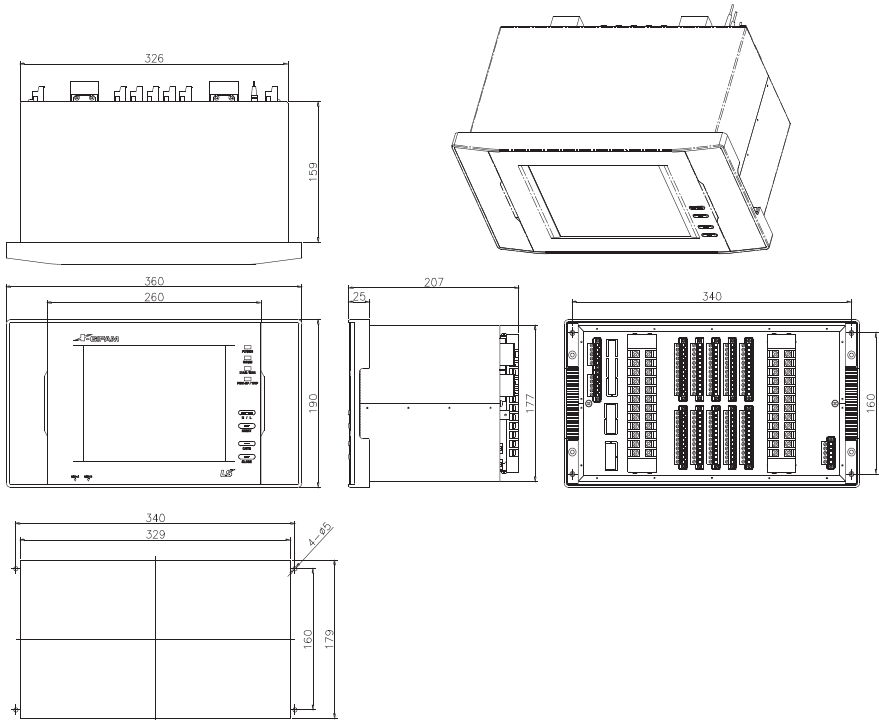


$$\text{TRIP TIME} = \left(\frac{28.2}{\left(\frac{I_F}{I_S} \right)^2 - 1} + 0.1217 \right) \times \text{TL} + \text{TD}$$

I_F = Fault Value
 I_S = Setting Value
 TL = TIME LEVER
 TD = TIME Delay(sec)

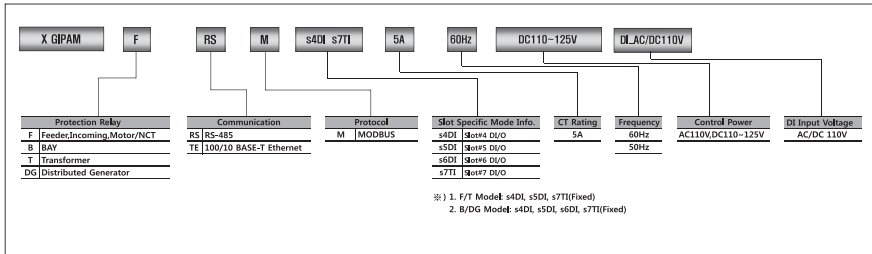
8. External Dimensions

Outer layout and Cut Size (mm)



9. Ordering Information

XGIPAM Equipment Naming System





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Specifications in this instruction manual are subject to change without notice due to continuous products development and improvement.

XGIPAM / 2020.09