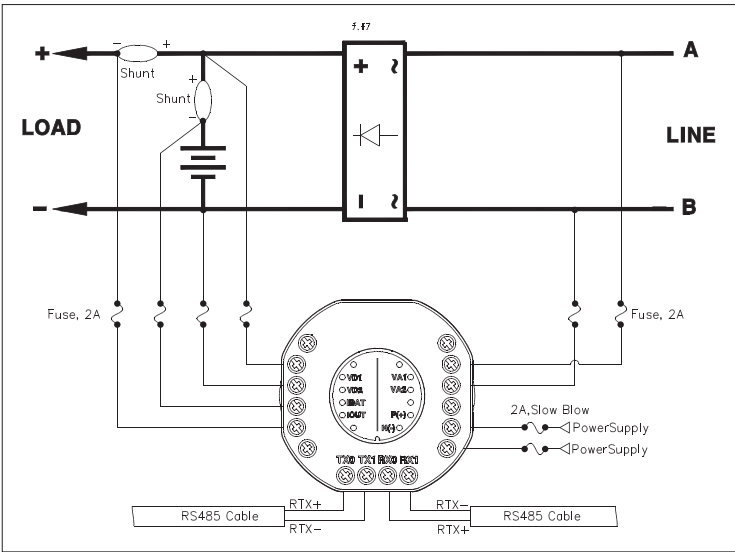


1. Simple installation



< Image 1 Terminal structure and connection >

- Cutting should be done in accordance with DIN 96 or ANSI 4 in place to attach. Refer to "3. Product external structure and specifications" for details.
- Connect the power cable.
Do not turn on the power before connecting every required cable.
Rated power is AC/DC 88~264V.
- Connect wires into DC/AC voltage and resistance board of shunt.
Refer to "5. How to connect the unit" for details.
AC voltage input range is 20~380V + 120% (AC 20~452V).
DC voltage input range is 20~220V + 120% (DC 20~264V).
Rated voltage of shunt resistance is 100~150mV while its input range is 3~180mV.
- Connect communication cable if your unit has a communication function.
Refer to "Image 12 RS-485 How to connect communication cable" for details.
- Turn on the power after inserting voltage input fuse.
- Set the unit according to your needs.
Refer to "How to set the unit" for details.
How to set quickly
- Press [UP] and [DOWN] keys at the same time to move to "Setting menu".
- Initial setting screen shows connection type 'Ao_S'.
- Move among setting items by pressing [UP] or [DOWN] key.
- Setting item flickers showing it can be changed when selecting it by pressing [ENTER] key.
- Change setting by pressing [UP] and [DOWN] keys then press [ENTER] key to save your setting.
- Press [UP] and [DOWN] keys at the same time to move back to measurement screen.

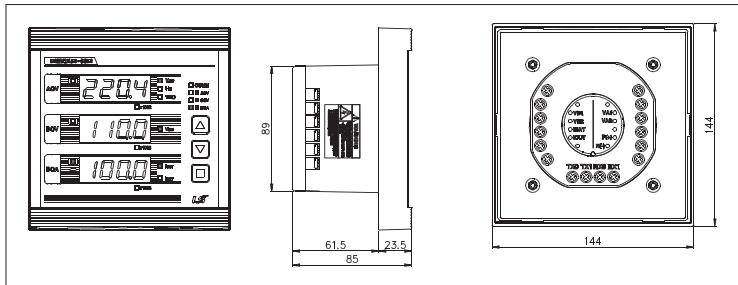
2. Overview

Digital DC meter (GIMAC-DC) is a specialized product based on rectification of incoming and distribution board. It is a multi-functional digital measuring instrument which measures/displays rectification-based input AC voltage, frequency, THD, output DC voltage, output current and battery charge/discharge current.

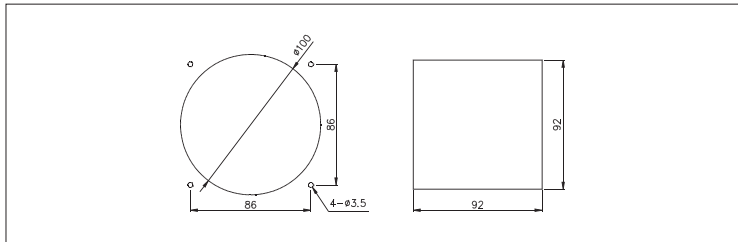
GIMAC-DC maximizes user convenience by offering the following features.

- Precision level
It satisfies AC/DC voltage 0.3%(Full scale) and DC current 0.5%(Full scale). In particular, it ensures a high reliability by maintaining its precision level at sites where frequency changes.
- Wide range of PT voltage input (AC380V)
It is economical requiring simple wiring because user can enter AC20~380V+120%(AC 20V~452V) directly without an additional primary PT.
- Various measurements
It can measure and display up to 11 items through 3 display windows.
- Compact unit and panel cutting size
Its dimension is 144(W) * 144(H) * 85(D) mm and its panel cutting size complies with DIN 96 and ANSI 4.
- RS485 MODBUS
It supports the general-purpose RTU MODBUS protocol of RS485 type.
- Control power of free voltage
It supports a variety of power voltages from AC/DC 88 to 264V.
- Automatic scroll
It automatically scrolls displayed item every 10 seconds if pressing [DOWN] and [ENTER] keys at the same time.

3. Unit external structure and dimension



< Image 2 Unit external structure and dimension >



< Image 3 Dimension of perforated panel of unit distribution board >

4. Standard and specification

4.1 Standard usage environment

The unit should be used under the following conditions unless specified otherwise.

- Temperature
- Normal usage temperature: -10C ~ 55C
- Storage temperature: -25C ~ 70C
- Humidity condition: Below 80% (However, should not be bedewed.)
- Place to use
- Altitude: Below 2,000m
- No particular vibration or impact
- No significant contamination of surrounding air

4.2 Input rating

<Table1 input rating>

Item	Application range	Remarks
Shunt resistance rating	DC 100 ~ 150 mV	
Range of shunt resistance measurement	DC 3~180 mV	
Range of DC voltage measurement	DC 20 ~ 264 V	
Range of AC voltage measurement	AC 20 ~ 452 V	
Range of frequency measurement	45 Hz ~ 65 Hz	
PT input burden	Below0.5 VA	
Control power	AC/DC 88~264V(Free Voltage)	
Consumed power	Below 10W at all times	

4.3 Internal environment specification

The unit satisfies the following environment specification <Table 2 internal environment specification>

Item	Specification	Applicable standard
Insulation resistance	Over 500 V, 10 MΩ	IEC60255 - 5
Power frequency withstand voltage	AC 2 kV (1.5 kV)	IEC60255 - 5
Lightning Impulse withstand voltage	5 kV(3 kV)	IEC60255 - 22 IEC61000 - 4
Oscillatory withstand voltage	2.5 ~ 3 kV	IEC60255 - 22 EN61000 - 4
Surge tolerance	Control power, transformer: 6kV	IEC60255 - 22 EN61000 - 4 - 5
Fast transient burst	Control power, transformer: 4kV	IEC60255 - 22 EN61000 - 4 - 4
Impulse noise tolerance	Control power, transformer: 2kV	-
Static electricity ESD	Air : 8 kV Contact : 6 kV	IEC60255 - 22 IEC61000 - 4 - 2
Radio-frequency radiating tolerance	10 V/m	IEC60255 - 22
Radio-frequency conducted tolerance	10 V	IEC60255 - 22
Electromagnetic conduction	0.15 ~ 0.5 MHz : 79(66) dBuV 0.5 ~ 30 MHz : 73(60) dBuV	IEC60255 - 22

4. Rating and specification

Item	Measured component	Detailed measured component	Precision level (%)	Remarks
AC voltage	AC voltage	Vac	0.30%	F/S
	Frequency	Hz	0.15Hz	
	THD	THD	-	
DC voltage	DC voltage	Vdc	0.30%	F/S
DC current	Output current	IoUT	0.50%	F/S
	Battery current	lBAT	0.50%	F/S
MAX	AC voltage	MAX VAc	-	
	THD	MAX THD	-	
	DC voltage	MAX Vdc	-	
	Output current	MAX IoUT	-	
	Battery current	MAX lBAT	-	

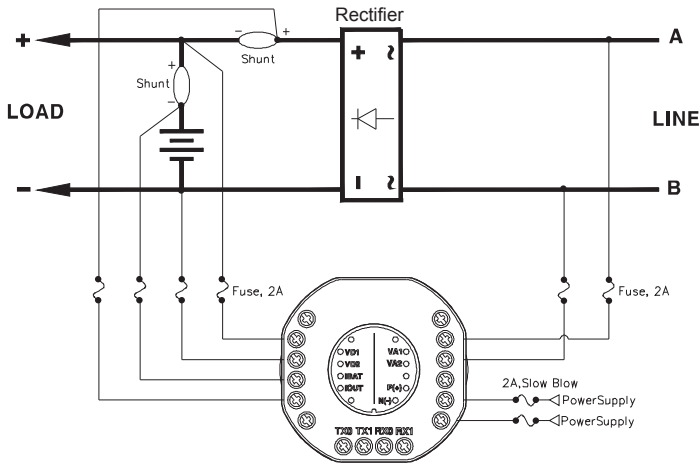
5. How to connect the unit

5.1 How to connect based on rectification

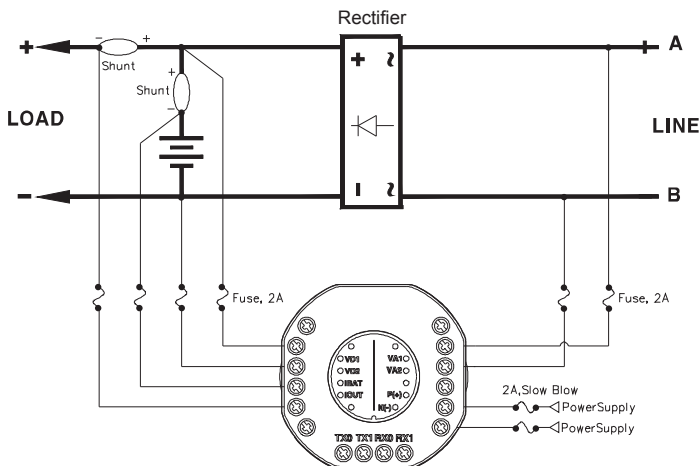


- Perform the connecting process after turning off the unit.
- Recommended width of cable is from AWG 14 ~ AWG 12(2.1~3.3mm²).
- Terminal bolt tightening torque (kgf-cm) is below 10.

5.1.1. Correct connection



< Image 4 Correct connection 1 >



< Image 5 Correct connection 2 >

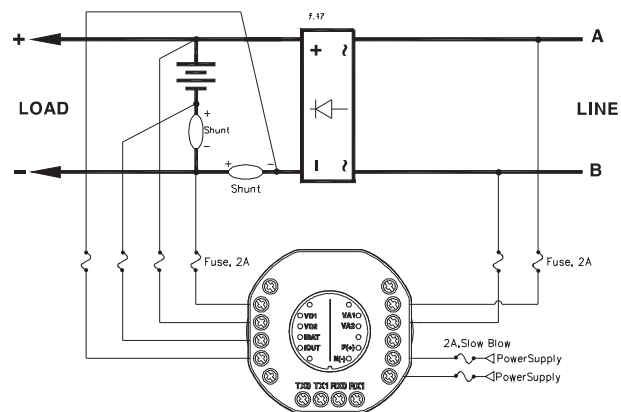
GIMAC-DC USER MANUAL

Warning

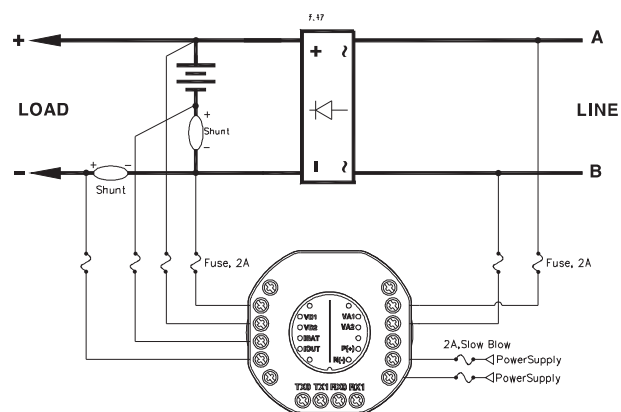
- Do not work, inspect or install the unit alone.
- Do not work on any electrical wiring when the unit is turned on or it is in operation as you might get an electric shock.
- Do not work on any electrical wiring if there is any live-line. Otherwise, the unit might be damaged or the fire might be caused due to an electric shock and charging voltage of current transformer.
- Do not disassemble the unit even when the power is off as it might cause an electric shock due to charging voltage in the unit.
- Do not short-circuit its secondary circuit as it might cause the fire.
- Do not touch the unit with wet hands as it might cause an electric shock.
- Do not use the unit if any cable sheath is damaged as it might cause an electric shock.
- Terminal works are required when connecting cables as twisted cable might cause an electric shock.
- Wear proper protective clothing prior to working with the unit.
- Attach a warning sign prior to working with the unit.
- Remove every wire from the unit when conducting insulation internal pressure test or measuring insulation resistance in distributing board on which it is installed.

Caution

- Matters requiring attention when installing or connecting terminal**
 - Apply rated power voltage for the unit. Otherwise, the unit might be damaged or the fire might be caused.
 - Be careful not to let any substances such as bolt, metal, water or oil in the unit as it might cause the fire.
 - Apply rated input standards and polarity. Otherwise, the unit might be damaged or the fire might be caused.
 - Make sure to check terminal number before connecting into any terminal block. Otherwise, the unit might be damaged or the fire might be caused.
 - Assemble terminal cover after connecting the terminal.
 - Only authorized expert may install or repair the unit as incorrect installation might cause malfunctioning or accident.
- Considerations before turning on the unit**
 - Check voltage and polarity of control power.
 - Check connection of input terminal.
 - Check items requiring attention when storing and handling the unit.
 - Store the unit in moisture/dust-free area.
 - Do not throw or put excessive pressure on the unit as it might cause malfunctioning or failure.
 - Only up to 10 units can be piled one on top of the other when loading.
 - Process the unit as industrial wastes when discarding it.

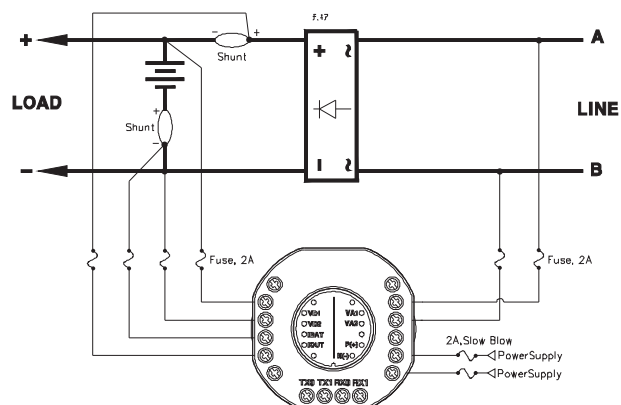


< Image 6 Correct connection 3 >

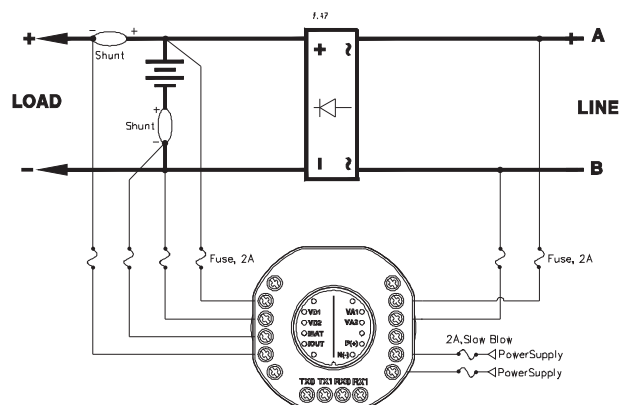


< Image 7 Correct connection 4 >

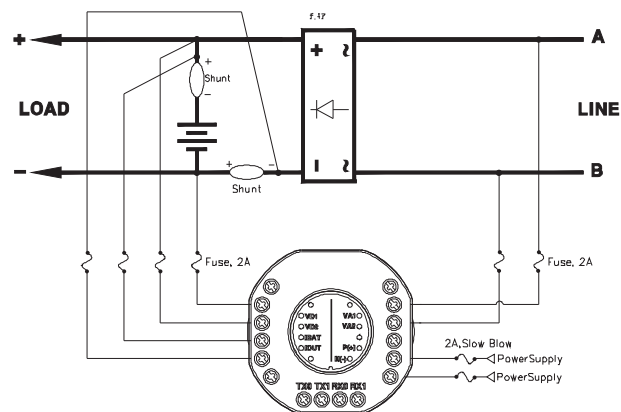
5.1.2 Incorrect connection



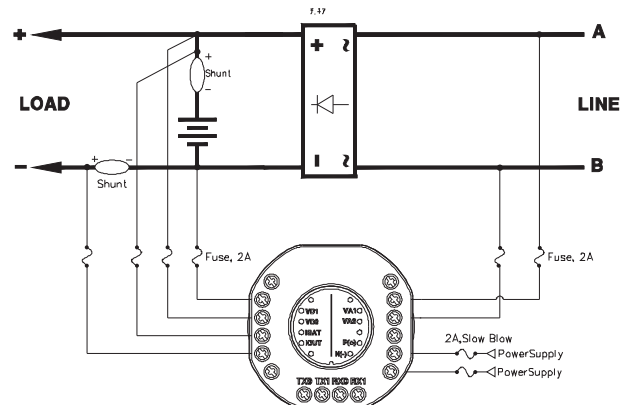
< Image 8 Incorrect connection 1 >



< Image 9 Incorrect connection 2 >



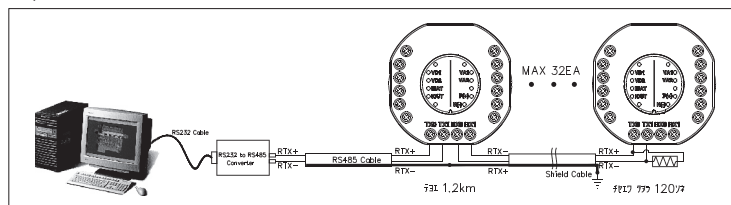
< Image 10 Incorrect connection 3 >



< Image 11 Incorrect connection 4 >

5.2 How to connect communication cable

- 1) Specification of communication cable: AWG 22, Twisted shield pair cable
- 2) RS-485 communication cable connection



< Image 12 How to connect RS-485 communication cable >

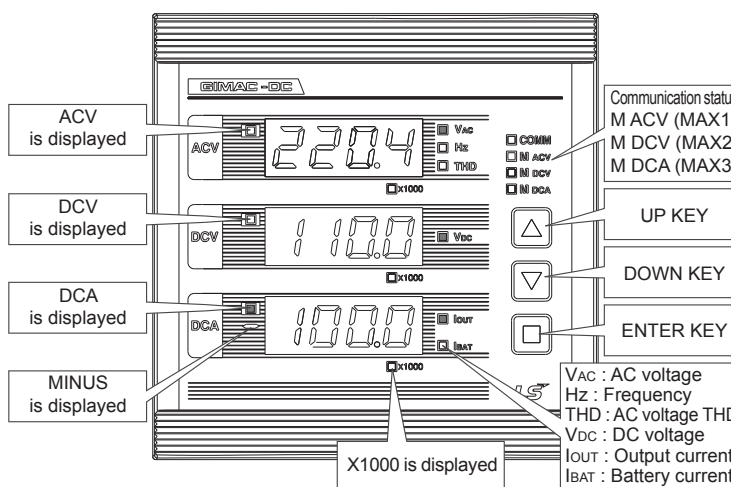
- Shields of communication cables need to be connected with one another and earthed.
- Attach the 1/4W, 120 Ohm resistor between (+) and (-) terminal at the edge.
- User can connect up to 32 units.
- Maximum communication distance is 1.2km.
- COMM LED flickers when responding to communication.

6. Control and setting

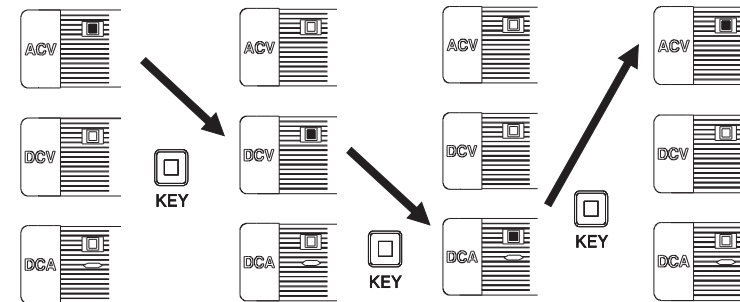
GIMAC-DC has 2 modes, namely, display mode and setting mode.

6.1 Measurement display mode and how to control

6.1.1 Measurement display mode



6.1.2 Selecting an item to measure using ENTER key



< Image 14 Selecting an item to measure >

6.1.3 Selecting an item to display using UP/DOWN key

Select an item to display using UP/DOWN key after selecting an item to measure.

Item to measure	LED	Item to display
ACV	VAC	AC voltage
	Hz	AC voltage frequency
	THD	AC voltage total harmonic distortion
	MACV(MAX1)+VAC	MAX AC voltage
	MACV(MAX1)+THD	MAX AC voltage THD
Item to measure	LED	Item to display
DCV	VDC	DC voltage
	MDCV(MAX2)+VDC	MAX DC voltage
Item to measure	LED	Item to display
DCA	IOUT	DC output current
	IBAT	Battery charge/discharge current
	MDCA(MAX3)+IOUT	MAX DC output current
	MDCA(MAX3)+IBAT	MAX battery charge/discharge current

6.1.4 X 1000 LED

X 1000 LED shows that 1,000 (When lighted) or 1,000,000 (When flickering) is multiplied to displayed number to display the actual value meaning that actual value is 1,000 times and 1,000,000 times of displayed value when *1000 LED is lighted and *1000 LED flickers, respectively.

6.2 How to set the unit

- User can enter/exit setting mode by pressing [UP] and [DOWN] keys at the same time.
- User can move/search for an item by pressing [UP] or [DOWN] key.
- Setting item flickers showing it can be changed when selecting it by pressing [ENTER] key in setting display mode.
- Change setting by pressing [UP] and [DOWN] keys then press [ENTER] key to save your setting. Then saved item will be lighted.
- Press [UP] and [DOWN] keys at the same time to move back to initial screen in display mode.
- Sequence and items used in setting mode are as the following.

< Table 4 Setting menu >

Sequence	Setting menu	Displayed item	Setting value	Initial value	Remarks
1	Output current, shunt resistance, rating current	'Ao_S'	1~9999 A	100	STEP 1
2	Output current, shunt resistance, rating voltage	'Vo_S'	100~150 mV	100	STEP 10
3	Battery charge/discharge current, shunt resistance, rating current	'Ab_S'	1~9999 A	100	STEP 1
4	Battery charge/discharge current, shunt resistance, rating voltage	'Vb_S'	100~150 mV	100	STEP 10
5	Communication address	'Addr'	1~247	1	
6	Communication speed	'bPS'	1 : 9600 bps 2 : 19200 bps 3 : 38400 bps	3	
	Float variable Swap Yes/No	'S'	On : Yes Of : No	On	
7	Tx delay time	'tX. t'	10~200 msec	20	
8	Data reset	'rSt.'	0 : all Data Reset 1 : Max VAC Reset 2 : Max THD Reset 3 : MAX VDC Reset 4 : MAX IOUT Reset 5 : MAX IBAT Reset	-	
9	Display version	'vEr.'	X.XXX	-	Not to be Set by user

6.3 Self-diagnosis

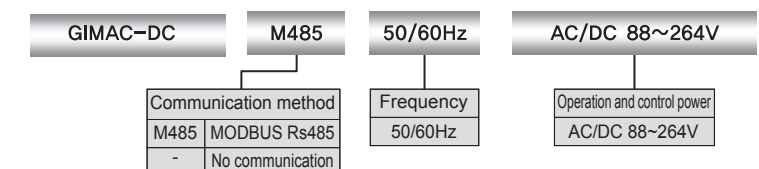
- 1) Self-diagnosis
- GIMAC-DC displays the following self-diagnosis functions as necessary.

- ERROR 1 : MEMORY ERROR
- ERROR 2 : POWER FAIL
- ERROR 3 : OPTION ERROR
- ERROR 4 : SET DATA ERROR
- ERROR 5 : CALIBRATION DATA ERROR

Please contact nearby service center or store for thorough inspection of the unit if any error other than error 2 occurs.

You can reach our customer center at 1544-2080.

7. Model naming system



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