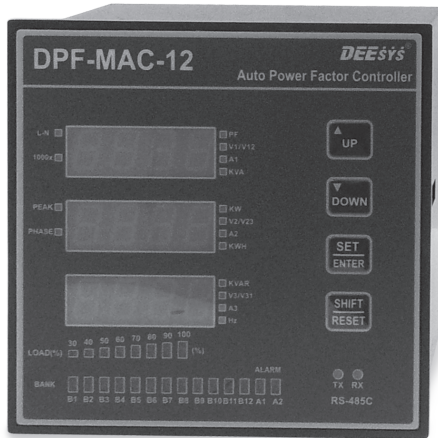


MULTI POWER FACTOR AUTOMATIC CONTROLLER & DIGITAL METER [DPF-MAC]

Introduction



DPF-MAC increases usage efficiency by controlling the power factor. It controls condenser input/cut-off by measuring the power factor or practical effective value of reactive power of Banks on the condenser panel connected to the load by adopting the high efficiency DSP and MCU on a real time basis. It can measure 28 electrical measurement items while controlling 12 Banks on the condenser. Remote monitoring is also available with 2 alarm output and communication functions.

Specifications

General Specifications

Power Supply	110~250Vac (45~65Hz) / 110Vdc
Power Consumption	5VA
Power Input	UP to 470Vac (LINE to LINE) input share 0.02VA
Current Input	Rated current 5A (Max 10A) input share 0.15VA
Insulation Type	Galvanic Isolation & EMI Filter
Temperature Range	-20°C ~ 60°C
Humidity Range	0~90% (NONE CONDENSING)

Control Function

Bank Set-up	Number of BANKS	0~12 (Contact point)
	Number of ALARMS	2 (Contact point)
Capacitor Capacity set-up	1 ~ 9,999 KVar (AUTO / MANUAL set-up)	
Delay Time	3 ~ 3,000sec	Time accounting for electricity charge & discharge
Dead Time	3 ~ 3,000sec	
Max Power Factor Set-up	0.95 ~ 1 ~ -0.96	(- Lead)
Min Power Factor Set-up	0.50 ~ 0.95	
Reactive Power set-up(Optional)	-999 ~ 1 ~ 999kVA	Target reactive power set-up
Power factor control method	Auto (Optional)	Auto Set-up and Control
	Manual	Sequence Control
		Circulation Control
No-Reaction zone	When less than 10% of PT/ CT input PEAK power	

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Measurement Function

Measurement Items	Unit	Scope of measure	Accuracy	Remarks
Voltage (3 Phases)	V	0 ~ 9,999kV	0,3% F.S	
Current (3 Phases)	A	0 ~ 9,999kA	0,3% F.S	
Frequency	Hz	45,0 ~ 65,0	0,3% F.S	
Power Factor	%	-1,00 ~ 1,00	0,5% F.S	
Power factor for each phase	%	-1,00 ~ 1,00	0,5% F.S	Communication DATA
Active Power	KW	0 ~ 9,999 KW	0,5% F.S	
Active power for each phase	KW	0 ~ 9,999 KW	0,5% F.S	Communication DATA
Reactive Power	Kvar	0 ~ 9,999 Kvar	0,5% F.S	
Reactive power for each phase	Kvar	0 ~ 9,999 Kvar	0,5% F.S	Communication DATA
Apparent Power	KVA	0 ~ 9,999 KVA	0,5% F.S	
Apparent Power for each power	KVA	0 ~ 9,999 KVA	0,5% F.S	Communication DATA
Active Energy	KWh	0 ~ 9,999,999KWh	1% F.S	
Active Power PEAK	KW	0 ~ 9,999 KW	0,5% F.S	
Voltage Phase Angle	°			For the case of 3 Phase 4 line system

※ Communication data in the remarks column is data that can be verified within communications only.

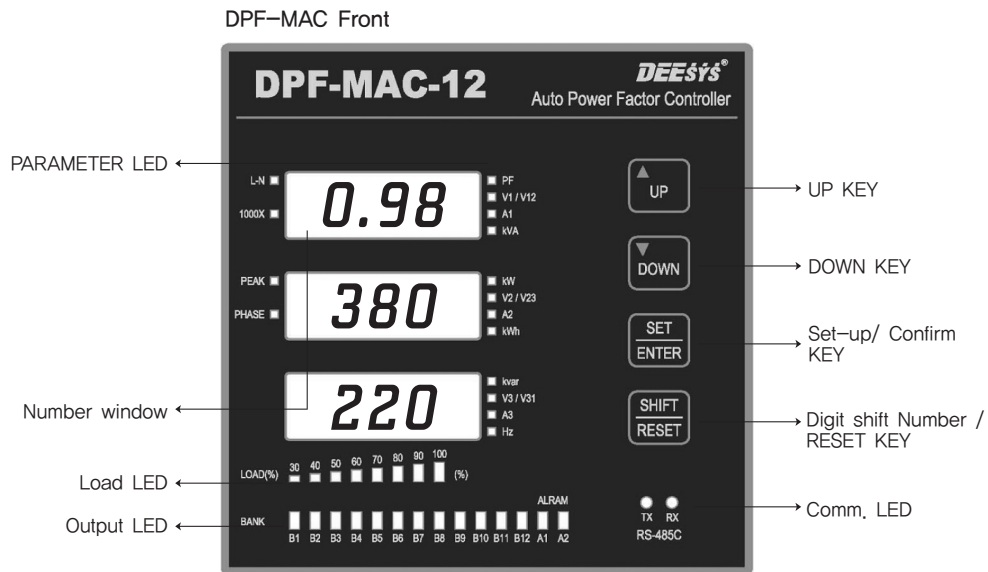
Communication specifications

Communication Port	RS-485 1 Port or RS-232C 1 Port (Optional)
Protocol	Modbus RTU
Communication Method	RS-485 Half Duplex 2Wire
Communication Speed	4800, 9600, 19200, 38400 bps
Available number of connections	99
Cable Length	Maximum 1,2km

※ Please connect terminating resistance if there are many connections or if the communication cable length is too long. Terminating resistance should be 110Ω.

DISPLAY

Part names and functions



Various electrical components are indicated with 3 FND

LEDs on each side show the electrical component and peak value, 1000 magnification, voltage phase angle, etc.

The lower front shows load factors with easily noticeable LED bars.

The LEDs on the bottom line show the power contact point for the control unit and contact points when there is an alarm.

DPF-MAC supports MODBUS and RS-232C communications as an option. Communication status can be checked from the front panel.

There are 4 buttons on right side which can be used when converting screens or initial set-up.

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Set-Up Menu

Go to the set-up screen by pushing the SELECT Key.
PASS and 9990 will appear on the screen.
Set the numbers to 9999 and push the select key.

Set-up type

SEt Basic set-up

- Set-up communications address
- Set-up communications speed
- Input CT ratio – Input 1st connected CT value
- Input PT ratio – When direct connection is 1, for PT connection, on the 1st and 2nd side
- Connection method set-up
- Set-up the scroll function for the displayed screen

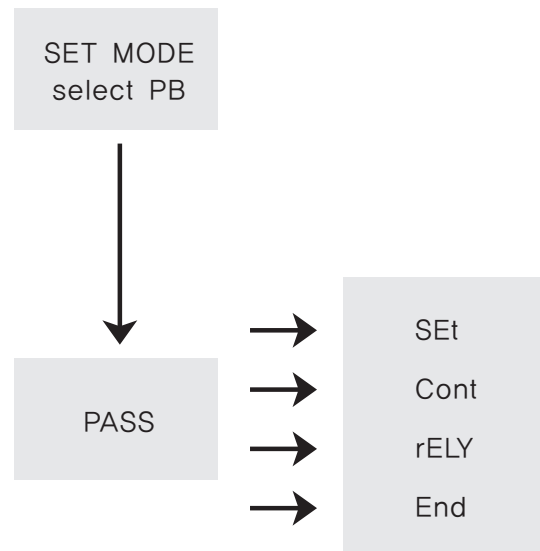
Cont control method set-up

- Set-up the driving standard value – power factor PF / Reactive power rACT
- Input the set-up value for the power factor – Input max and min values
- Input the set-up value for the reactive power – Input max and min values
- Driving set-up – 1: OFF, 2: sequential, 3: Circulation, 4: Automatic

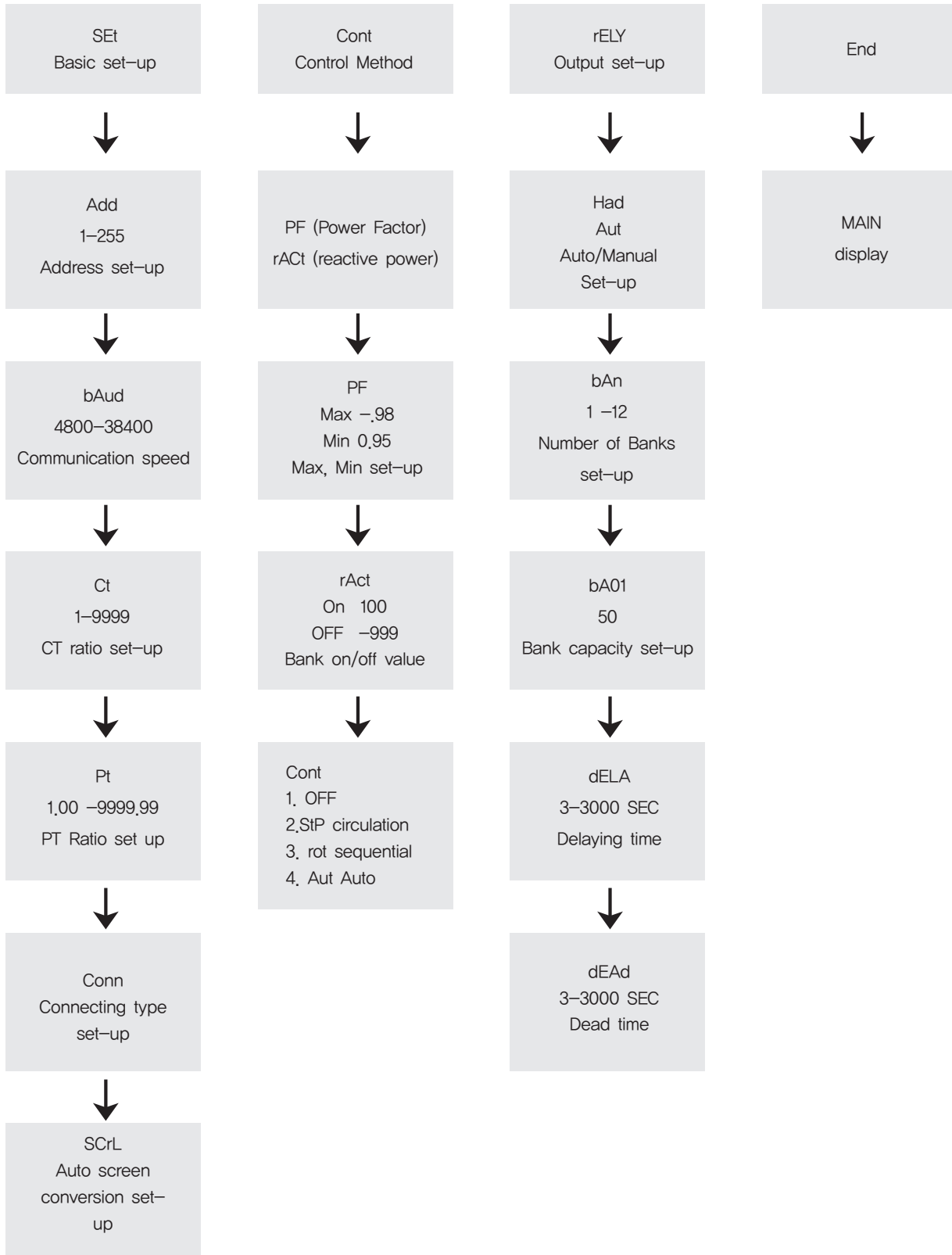
rELY Set-up

- Auto, manual Set-up – manual Had / Auto Aut
- Number of BANKs Set-up (For manual operation) 1~12
- BANK capacity set-up (For manual operation)
- DELAY TIME Set-up – 3~3000sec
- DEAD TIME Set-up – 3~3000sec

End End of set-up



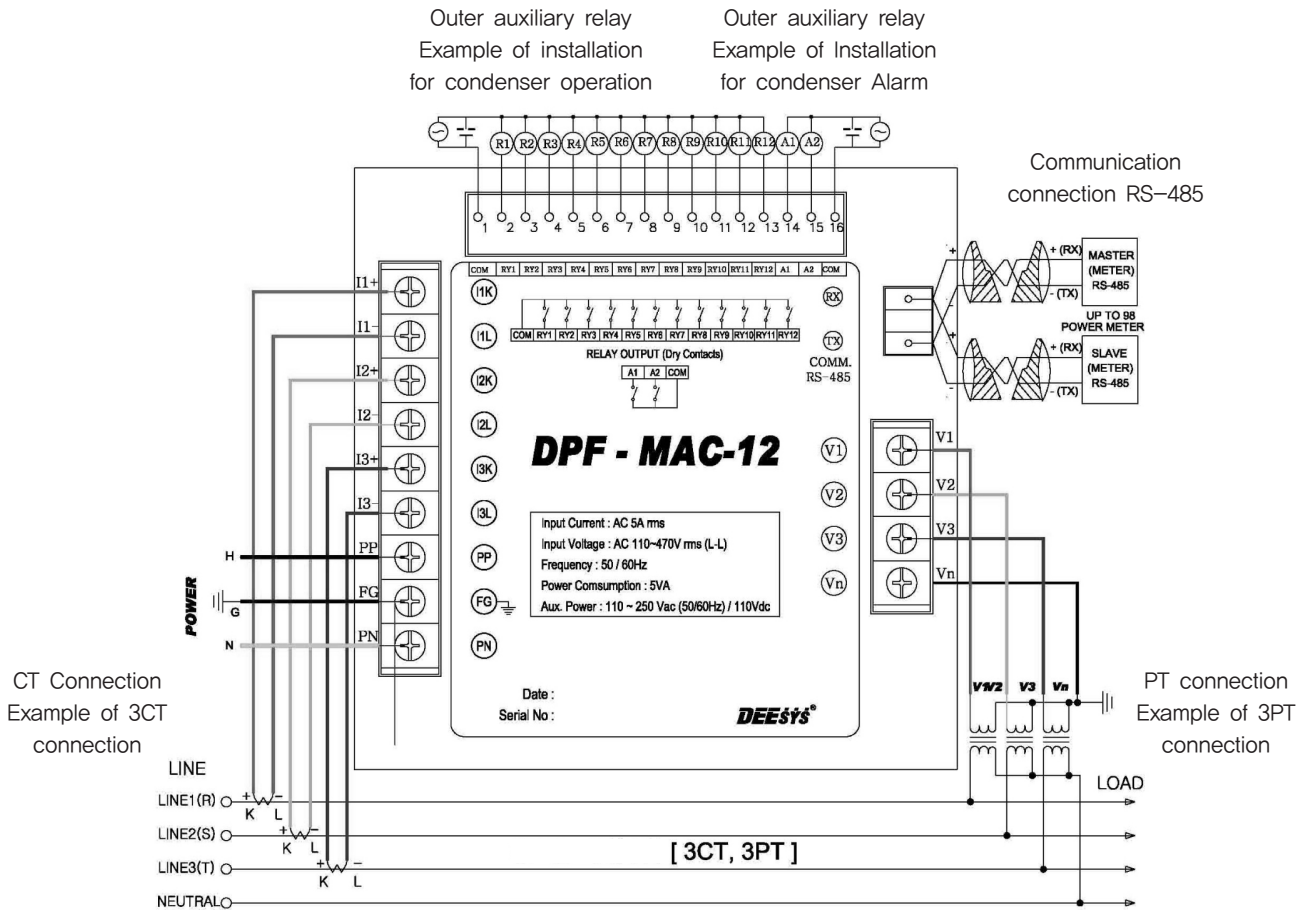
Detailed set-up



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Installation and items requiring attention

Line connection diagram



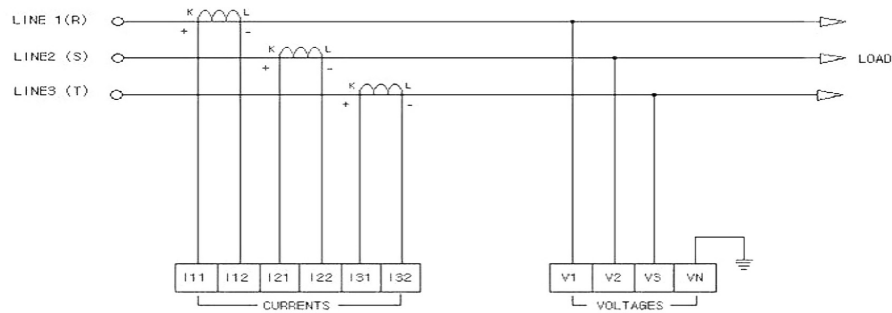
Items requiring attention

items requiring attention when installing the product

- Check the user' s manual when installing the DPF.
- Check if there is any mechanical damage to the DPF.
- Do not turn on the voltage, current or power during DPF installation.
- Turn the voltage off or open during voltage connection.
- If the CT 1st side is approved when connecting the current, cut off the CT 2nd side.
- Connect to the rear terminal of DPF correctly after checking the manual.
- Input the correct set-up value and voltage and current ratios after verification.
- Input after checking the power system connection type.

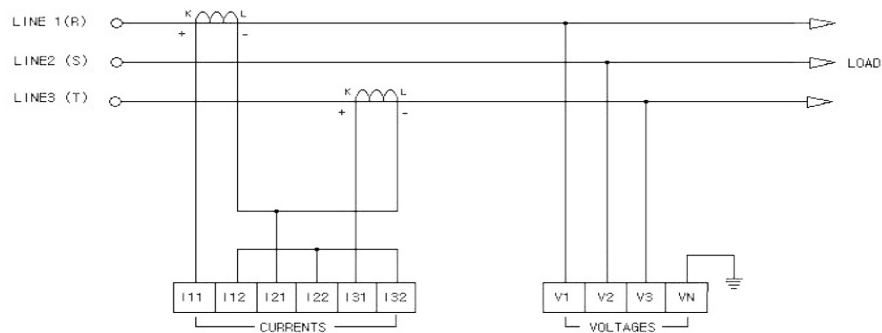
Wiring diagram

① 3-phase 3-line direct wiring (3CT) – Wiring mode 3Dir



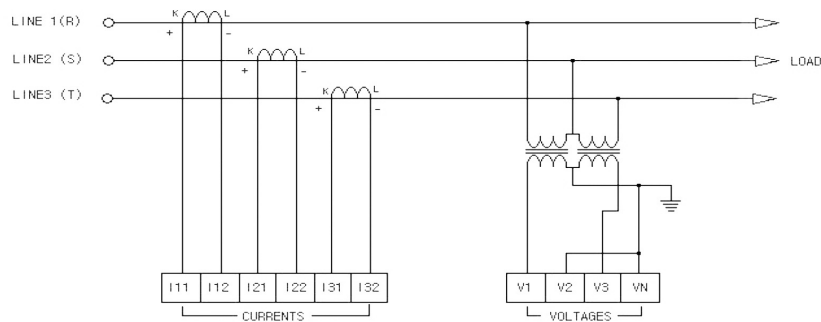
The above shows 3-phase 3-line wiring diagram in which CT of current input is used for each phase and voltage input is directly wired. At this time, the line voltage should be 470V or less.

② 3-phase 3-line direct wiring (2CT) – Wiring mode 3dir



The above shows 3-phase 3-line wiring diagram in which current input of CT is used for R and T, and the voltage input is directly wired.

③ 3-phase 3-line Delta (3CT, 2PT) wiring – 30P

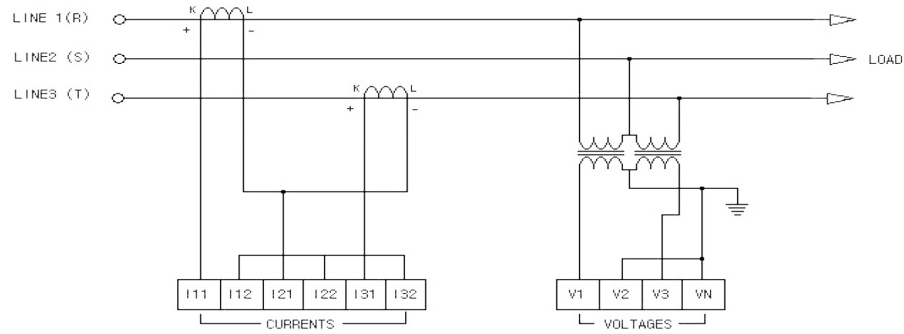


The above shows 3-phase 3-line wiring diagram in which current input of CT is used for each phase and for voltage input, PT is used.

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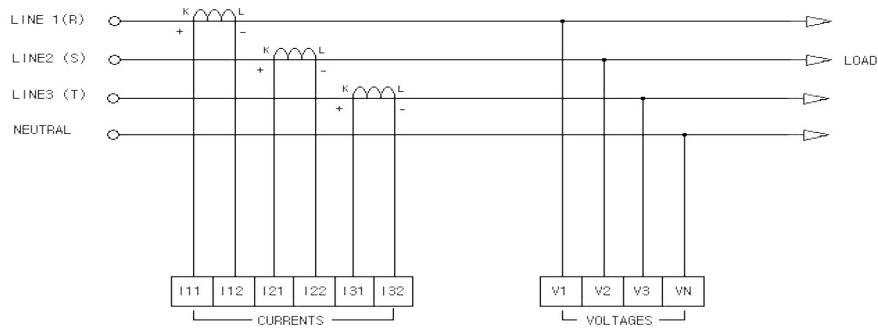
Wiring diagram

④ 3-phase 3-line Delta (2CT, 2PT) wiring – 3OP



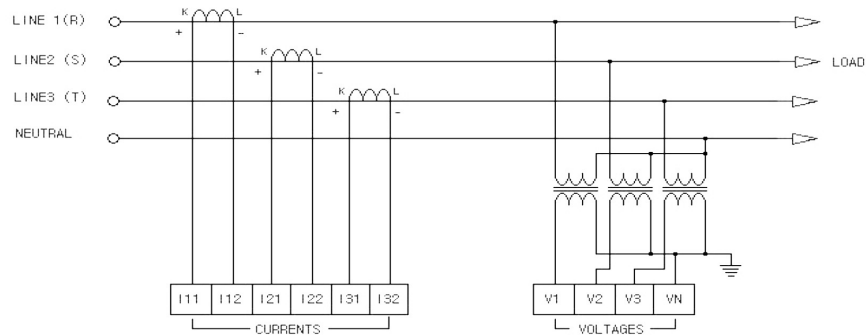
Current input of CT is used for R and T, and for voltage input, PT is used.

⑤ 3-phase 4-line direct wiring – 3P4L



The above shows 3-phase 4-line wiring diagram in which current input of CT is used for each phase and voltage input is directly wired. At this time, phase voltage should be 270V or less.

⑥ 3-phase 4-line 3CT, 3PT wiring – 3P4L

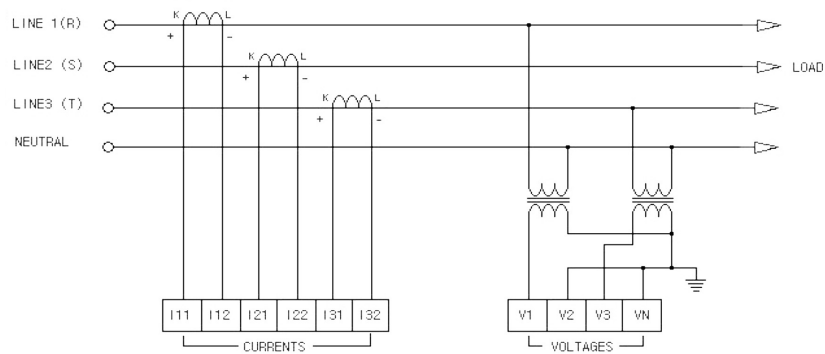


The above shows 3-phase 4-line wiring diagram in which current voltage of CT is used for each phase and for voltage input, PT is used for each phase. At this time, phase voltage should be 270V or less.

Wiring diagram

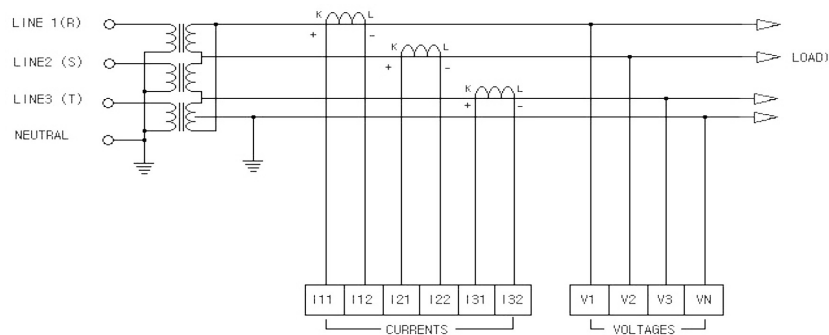
⑦ 3-phase 4-line 3CT, 2PT wiring – 3P4B

The below wiring diagram is about 4-line wiring in which 2 PT's are used for wiring when the voltage is balanced.



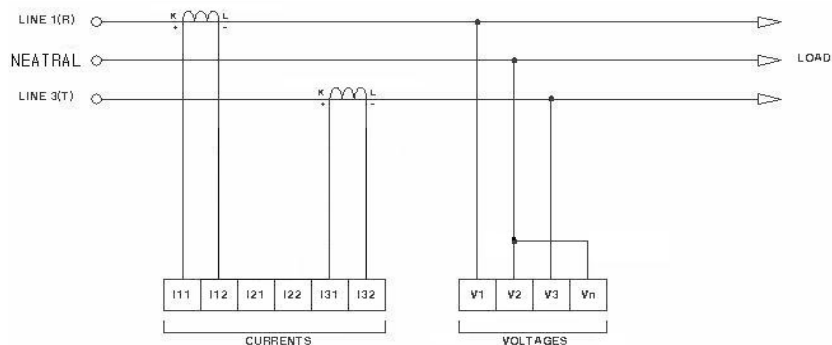
⑧ 3-phase 4-line (Delta) 3CT,3PT wiring – 3P4D

The below shows 3-phase Delta 4-line wiring.



⑨ Single-phase 3-line 2CT, 2PT wiring

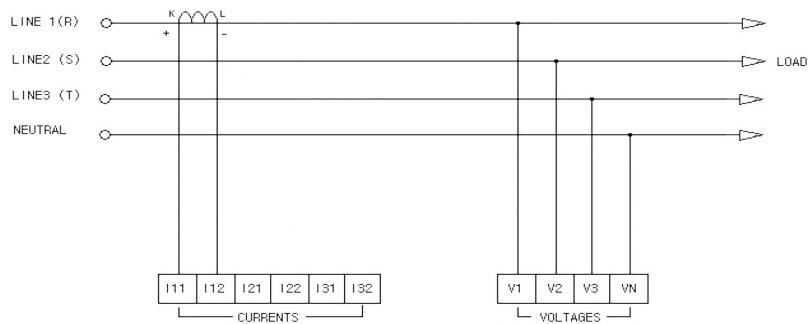
The below shows single-phase 3-line wiring.



MULTI POWER FACTOR AUTOMATIC CONTROLLER & DIGITAL METER [DPF-MAC]

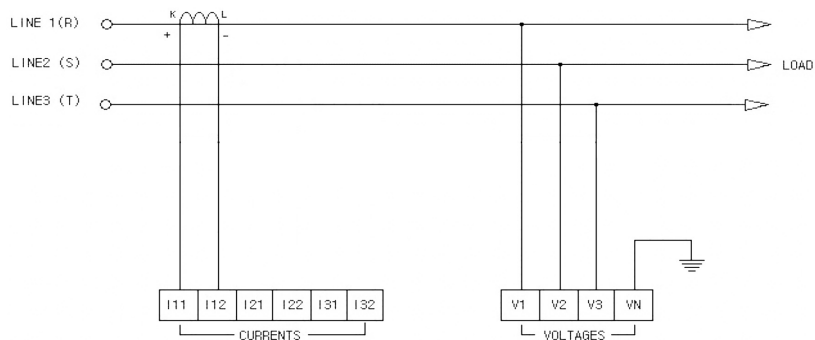
Wiring diagram

⑩ 3-phase 4-line 1CT wiring – 4L-1



The above shows 3-phase 4-line wiring diagram in which current input of CT is used for 1-phase and voltage input is directly wired. At this time, phase voltage should be 270V or less.

⑪ 3-phase 3-line (direct or Delta) wiring – 3L-1



The above shows 3-phase 3-line wiring diagram in which CT of current input is used for 1-phase and voltage input is directly wired. At this time, the line voltage should be 470V or less

※ Using 1CT

- Input voltage should be direct or using potential transformer connection.
- Input current has nothing to do with voltage phase.

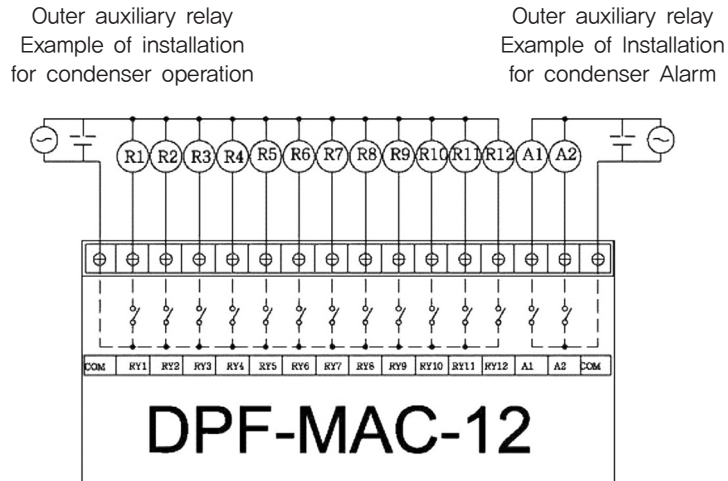
※ Only

- If input voltage will connect with R-phase, input current should be connected R-phase.
- If input voltage will connect with S-phase, input current should be connected S-phase.
- If input voltage will connect with T-phase, input current should be connected T-phase.

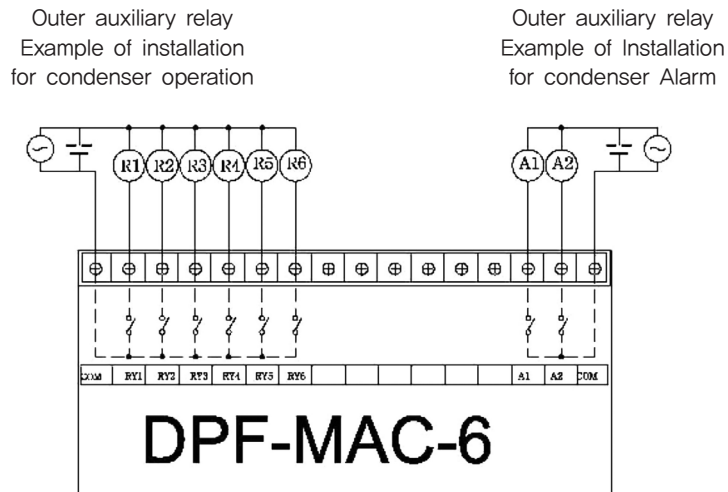
Relay input wiring

The above is about wiring of relay for control in the DPF.

• DPF-MAC-12 Wiring Example

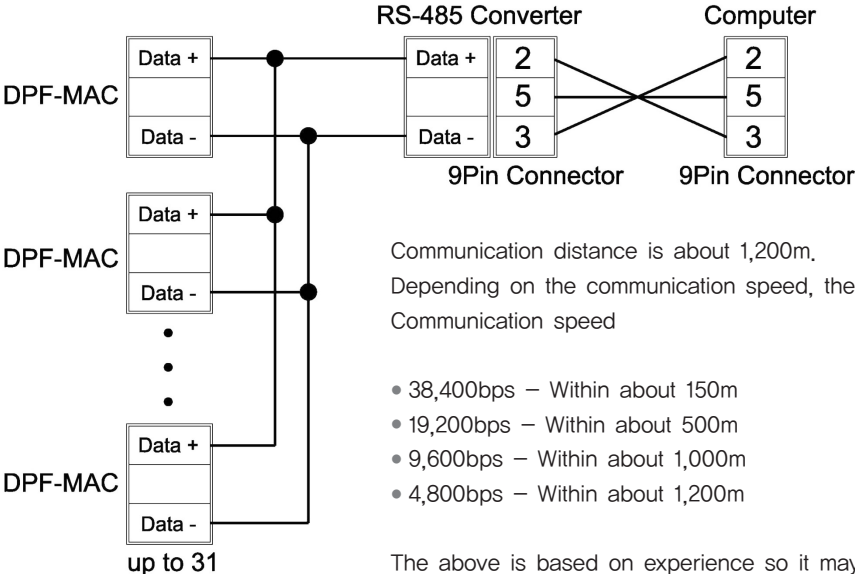


• DPF-MAC-6 Wiring Example



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Diagram of communications

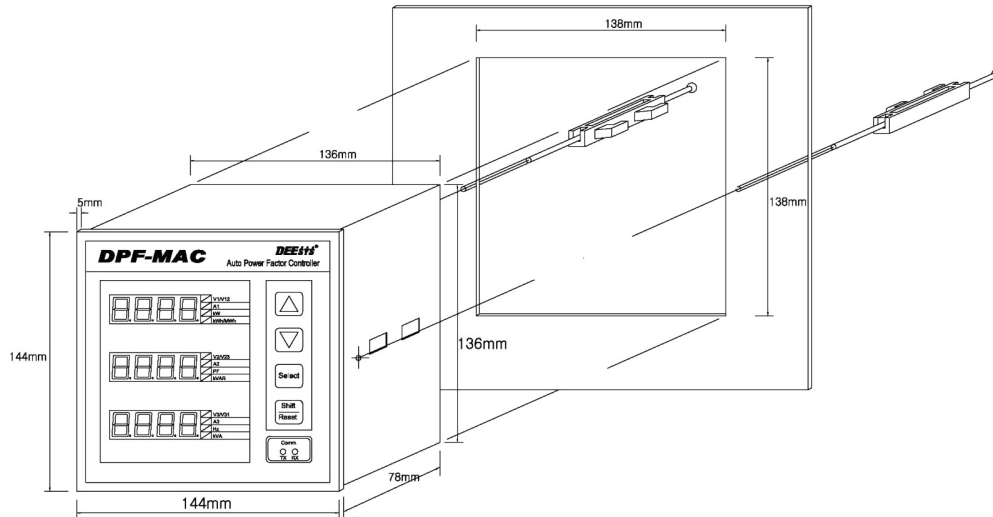


Communication distance is about 1,200m.
 Depending on the communication speed, the distance can have restriction.
 Communication speed

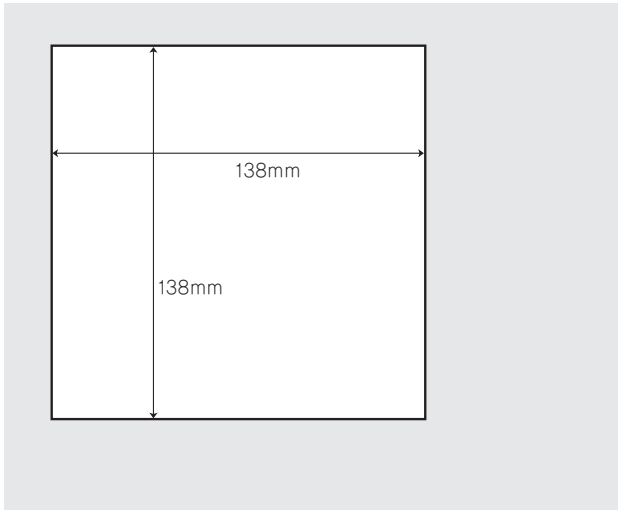
- 38,400bps – Within about 150m
- 19,200bps – Within about 500m
- 9,600bps – Within about 1,000m
- 4,800bps – Within about 1,200m

The above is based on experience so it may have some difference.
 For long distance, 120ohm terminal should be connected between RX and TX.

PANEL installation



Panel Cutting Size (w138 X h138)



Items requiring attention

Items requiring attention when installing the product

- Check the user' s manual when installing the DPF.
- Check if there is any mechanical damage to the DPF.
- Do not turn on the voltage, current or power during DPF installation.
- Turn the voltage off or open during voltage connection.
- If the CT 1st side is approved when connecting the current, cut off the CT 2nd side.
- Connect to the rear terminal of DPF correctly after checking the manual.
- Input the correct set-up value and voltage and current ratios after verification.
- Input after checking the power system connection type.