



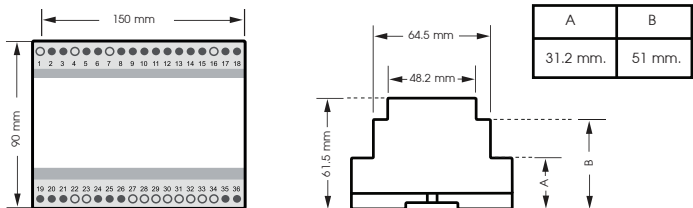
KM-22-1-DI



TECHNICAL SPECIFICATION

Power Supply		110-240 VAC 50-60 Hz
Power Consumption		3.5VA
Display		7-Segment, Size 0.39 Inch, 4 Digit 2 Row, 8 Digit 1 Row
Input	Volt	1 Phase
	Volt Range	10-400 VAC
	Accuracy Volt	±0.5% FS.
	Current	Connection 1 CT, Direct
	Current Transformer Ratio	1-2000
	Primary	9999 AMP
	Secondary	0.01-5A
	Accuracy Current	±0.5% FS.
	kWh	Class 1
	Counter Input	Dry Contact Max 1k Hz
Output	Relay Output	SPDT 5A 250VAC / 5A 30VDC
	Protocol	MODBUS RTU
Communication	Baud Rate	2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
	Parity	None, Even, Odd
	Stop Bits	1, 2
	Data Bits	8 Bits
	Support Device Node	255
Ambient Operation	Temperature	-10 °C to 60 °C
	Humidity	85 % RH Non-Condensing
Ambient Storage	Temperature	-20 °C to 80 °C
	Humidity	85 % RH Non-Condensing
Protection Degree		IP30
Installation		DIN-RAIL
Material		ABS-V0
Size		90 x 150 x 61.5 mm.
Weigth		280 g.

DIMENSION



DESCRIPTION

- Voltage range in 1 phase maximum 400 VAC
- Current measure range 0.01-5A show maximum 9999 A by C.T. Ratio Range 1-2000 (10000/5A)
- kw, kWh, Hour Counter, Counter Display with Relay Output
- Under and Over Voltage and Current Protection Relay
- Peak Hold for Maximum voltage, current and kW
- Fault Display with Memory
- RS-485 Modbus RTU
- LED shows measured value of Phase, Output and Peak
- Manual / Auto Display current and voltage of that phase.

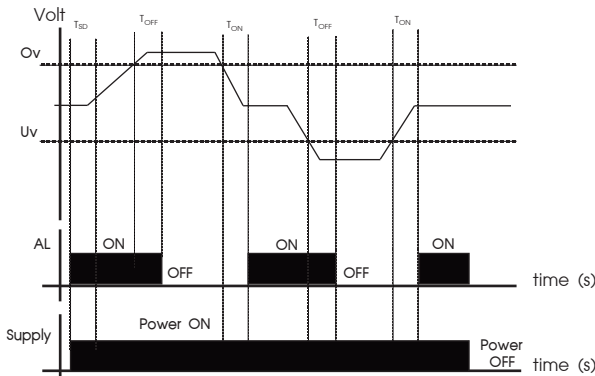
OPERATION

KM-22 is a measurement and display device for both voltage and current values in 3 phases. It also displays the values of kW, kWh, Hour and Counter. Hour values are the measurement of the working hours of the electrical system or machines to schedule maintenance. Counter is the number of products produced. To compare with the electrical energy (kWh) used to measure energy efficiency In addition, the peak value of voltage (V), current (A), and power (kW), can be remembered that can happen To analyze the feasibility of the electrical system

Voltage Protection Relay can set the voltage to fall or exceed between 50 to 500 VAC by setting the delay before starting from 1-3600 seconds (ON Delay Time), but if the phase sequence is incorrect, the Relay will not work and do not delay. When starting to work, it will capture the possibility of voltage if the voltage is lower or higher than the set value. Or the unbalance phase exceeds the set value or the missing phase. Relay will order OFF within 0-3600 seconds, which can be set to cut fast or slow as needed and display the reason Display. When the voltage level returns to the set voltage range, the Relay will return ON again within the set time (ON Delay Time).

After the KM-22 circuit breaker or Relay OFF, can view the cause of the Relay OFF from the Display. The graph showing the operation of the Volt Protection is shown in graph 1.

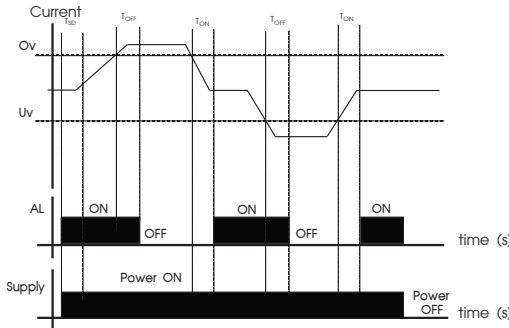
Graph1 shows Voltage Protection Relay operation



Current Protection Relay can set low current or can be between 0.1 to 9999A. Set the delay time before starting to run from 1-3600 seconds (ON delay time). When starting, it will catch the possibility of electricity. If the electricity is higher than that set, the Relay will order OFF within 0-3600 seconds, which can be set to cut fast or slow as needed and display the cause at Display. When the current level returns to the level below the set, Relay will return. ON again within 1-3600 seconds

After the KM-22 circuit breaker or Relay OFF, can see the cause of the Relay OFF from the Display or reverse function. The current protection relay operation graph is shown in graph 2.

Graph 2 show Current Protection Relay operation



Relay Output for kW, Hour and Counter

Alarm Relay for kW, Hour, Counter. This can be selected to act on load contact Which one is

kW Function can set kW 0-100% of Range and set the delay time before starting from 1-3600 seconds (ON Delay Time) when starting and then capturing the possibility of kW being used if the kW value is higher The relay set will order OFF within 0-3600 seconds, which can be set to cut fast or slow as needed. And display the reason that the Display when the kW level returns to the lower level than the Relay will return ON again within 1-3600 seconds or to work in the reverse (Inverse Function) is Relay will ON when the kW value is higher set

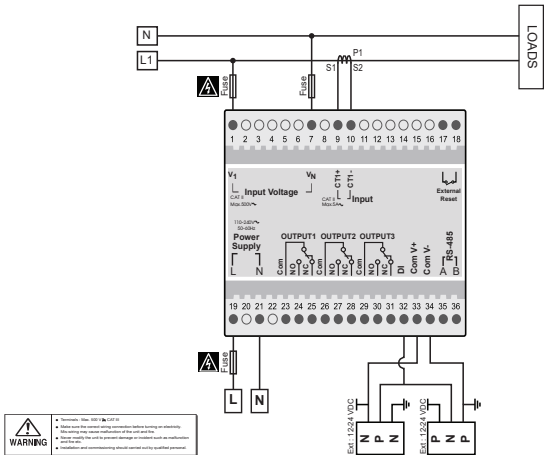
Hour Counter Function can set the desired working hours at the end of the time. Relay sends ON and can be reset to OFF by pressing the button or using the Terminal Reset PIN.

Counter Function can set the desired amount when the number is set. Relay will order ON and can reset to OFF by pressing the button or using Terminal Reset PIN.

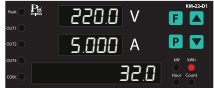
Manual and Auto Display

Display of Volt, Amp, kW, kWh, Hour and Counter values that can be measured in Manual mode, ie Volt, Amp, kW, kWh, Hour and Counter by pressing Key pad on the device or Auto is Displays Volt, Amp, kW, kWh, Hour and Counter values. Each phase rotates all the time. Which can be set to display values from 10 seconds to 60 seconds per phase If you do not want to display Auto, you can do so by setting the time to 0.

WIRING DIAGRAM

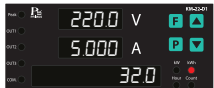


First Page

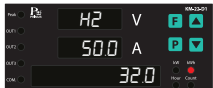


Show Volt, Current, kWh

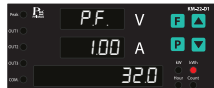
Show Hz, PF, angle Volt between Current



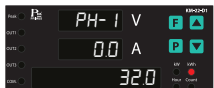
Show Volt, Current, kWh



Show Hz, kWh

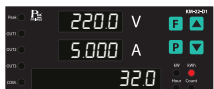


Show PF, kWh

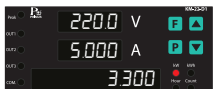


Show angle Volt between Current kWh

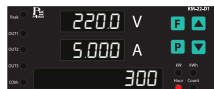
Show kWh, kW, Hour Counter, Digital Counter



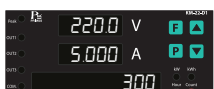
Show Volt, Current, kWh



Show Volt, Current, kW

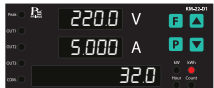


Show Volt, Current, Hour Counter

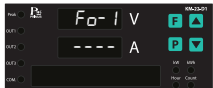


Show Volt, Current, Digital Counter

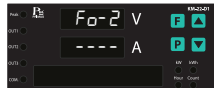
Show Previous Fault of Protection Relay



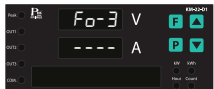
Show Volt, Current, kWh



Show Previous Fault Output 1

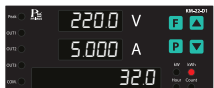


Show Previous Fault Output 2

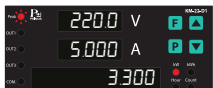


Show Previous Fault Output 3

Show Peak Volt each of Phase, Peak Current each of Phase, Demand kW

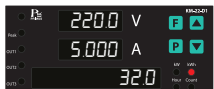


Show Volt, Current, kWh



Show Peak Volt ,
Peak Current , Demand kW

Fault of Volt and Current Protection Relay notification



How to Manual Reset Protection Relay

Press hold for 5 second Start Time will back to start again in Start Time phase use for

delay detect time of voltage, current and kWATT Protection in this time LED Out1, Out2, Out3 will flash

until Start Time run out and check Volt, current, kWATT in case Output Function in one of relay equal to

Disable Output that relay will not operate in Start Time. It made LED Out1, Out2, Out3 will not flash

ORDERING CODE

KM-22-1-DI - A		OPTION	
		None	
		B Alarm Relay 2	
		C Alarm Relay 3	
		M RS-485	

CONFIGURATION

KM-22-1-DI

Measurement Display
0000
Show Measurement Value
Press [F] hold 2 second

1. CT Ratio (For KM-21)
[Ct] [1]
CTratio range 1 to 2000
Press [F] 1 time

2. Start Delay Time
[SE] [003]
1 to 3600 Sec
Press [F] 1 time

3. Function Setting for Output1
[oPF1] [11]
Select Type and Function of Alarm Relay
Type: 1: Volt Protection, 2: Current Protection, 3: Inverse Current Protection
Alarm Function: 0: Disable, 1: Over and Under limit, 2: Over limit, 3: Under limit
Press [F] 1 time

4. Over limit setting for Output 1
[SPH1] [250]
Volt Protection : 50 to 500V
Current Protection : 0.1 to 9999 A
Press [F] 1 time

5. Under limit setting for Output 1
[SPL1] [190]
Volt Protection : 50 to 500V
Current Protection : 0.1 to 9999 A
Press [F] 1 time

6. ON Delay Time setting for Output 1
[ond1] [3]
1 to 3600 Sec
Press [F] 1 time

7. OFF Delay Time setting for Output 1
[oFd1] [3]
0 to 3600 Sec
Press [F] 1 time

8. Function Setting for Output 2
[oPF2] [11]
Select Type and Function of Alarm Relay
type: 1: Volt Protection, 2: Current Protection, 3: Inverse Current Protection
Alarm Function: 0: Disable, 1: Over and Under limit, 2: Over limit, 3: Under limit
Press [F] 1 time

9. Over limit setting for Output 2
[SPH2] [5.0]
Volt Protection : 50 to 500V
Current Protection : 0.1 to 9999 A
Press [F] 1 time

10. Under limit setting for Output 2
[SPL2] [0.1]
Volt Protection : 50 to 500V
Current Protection : 0.1 to 9999 A
Press [F] 1 time

11. ON Delay Time setting for Output 2
[ond2] [3]
1 to 3600 Sec
Press [F] 1 time

12. OFF Delay Time setting for Output 2
[oFd2] [3]
0 to 3600 Sec
Press [F] 1 time

13. Function Setting for Output 3
[oPF3] [11]
Select Type and Function of Alarm Relay
Type: 0: Non Inverse, 1: Inverse
Alarm Function: 0: Disable, 1: kWatt, 2: Hour, 3: Counter
Press [F] 1 time

14. kWatt setting for Output 3
[SPH3] [50]
kWatt Protection : 1 to 3,000 kWatt
Press [F] 1 time

15. Hour setting for Alarm 3
[SPHr] [1]
Hour Set point : 1 to 100,000
Press [F] 1 time

16. Counter setting for Alarm 3
[SPC1] [1]
Counter Set point : 1 to 99999999
Press [F] 1 time

17. ON Delay Time setting for Output 3
[ond3] [3]
1 to 3600 Sec
Press [F] 1 time

18. OFF Delay Time setting for Output 3
[oFd3] [3]
0 to 3600 Sec
Press [F] 1 time

19. Counter Input Filter
[CIF] [1]
0: Disable
1: Min. frequency < 10 Hz (Contact, Proximity)
2: Max. frequency 1kHz (Proximity)
Press [F] 1 time

20. Counter Input Delay Time
[CIdt] [1]
Delay input : 0 to 60 sec. (CIF = 1)
Press [F] 1 time

21. Decimal Point
[C.dp] [0]
0 = No Decimal
00 = Decimal 1 position
000 = Decimal 2 position
0000 = Decimal 3 position
00000 = Decimal 4 position
000000 = Decimal 5 position
0000000 = Decimal 6 position
Press [F] 1 time

22. Counter Multiply
[C.mUL] [1]
Multiply : 1 to 9999999
Press [F] 1 time

23. Counter Divisor
[C.dlv] [1]
Divisor : 1 to 9999999
Press [F] 1 time

24. Counter Reset Value
[C.ru] [1]
Reset Value : 0 to 9999999
Press [F] 1 time

25. Clear Peak Volt,Current and kWatt
[CL-P] [CLR]
---- : Disable
-CLR : Enable
Press [F] 1 time

26. Clear Previous Fault
[CL-F] [CLR]
---- : Disable
-CLR : Enable
Press [F] 1 time

27. Clear kWh, Hour Counter, Counter Input
[CL--] [CLR]
---- : Disable
CL-- : Clear kWh
CL-H : Clear Hour Counter
CL-C : Clear Counter Input
CL-R : Clear kWh, Hour Counter, Counter Input
Press [F] 1 time

28. RS-485 Address
[Addr] [1]
Setting Device Address 1 to 255
Press [F] 1 time

29. RS-485 Baud Rate
[bAud] [9600]
Baud rate: 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps
Press [F] 1 time

30. Communication Stop bit/Parity bit
[Com] [n15]
n15 : none parity, 1 stop bit
E15 : even parity, 1 stop bit
o15 : odd parity, 1 stop bit
n25 : none parity, 2 stop bit
E25 : even parity, 2 stop bit
o25 : odd parity, 2 stop bit
Press [F] 1 time

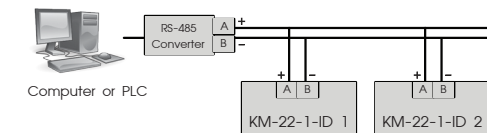
31. Auto Display
[AUto] [0]
Set time 10 to 60 second for change show Volt and Amp from measured by sort
If set to 0 : Disable
Press [F] 1 time

32. Edit kWh
[F'Wh] [10]
Set kWh as required as Table 2.
Press [F] 1 time

SERIAL COMMUNICATION

The KM-22 are Equipped With a RS-485 Series Communication Interface to Allow Connection to Computer or PLCs. MODBUS PROTOCOL is Provided as Standard Communication. The User Can Connect KM-22 as Network Up to 128 Meters.

Wiring Diagram



Computer or PLC

KM-22-1-ID 1

KM-22-1-ID 2

MODBUS PROTOCOL

This MODBUS PROTOCOL Has Been Implement In Accordance With MODBUS.ORG MODBUS Application PROTOCOL Specification V1.1 With The Following Conditions Applying. The Following Conditions Apply Baudrate Can Selected Refer 22. Speed Setting The Format Is MODBUS RTU UART Data Can Selected Refer 23. Communication Setting Data Is Considered To Be Half Duplex Using 2 Wire.

Modbus Function code

Function code	Operation	Broadcast
0x03	Read Holding Registers	No
0x04	Read Multiple Registers	No
0x06	Preset Single Registers	Yes
0x10	Preset Multiple Registers	Yes

Modbus Exception code

Code	Name	Meaning
01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the server (or slave).
02	ILLEGAL DATA ADDRESS	The data address received in the data field is not an allowable value for server (or slave).
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for server (or slave).

Example of a client request and server exception response

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
Slave Address	01	Slave Address	01
Function	04	Function	84
Starting Address Hi	00	Exception Code	02
Starting Address Lo	00	CRC Hi	C2
Quantity of Input Reg. Hi	00	CRC Lo	C1
Quantity of Input Reg. Lo	1E		
CRC Hi	70		
CRC Lo	02		

หน้าแรก



แสดงค่า Volt, Current, kWh

แสดงค่า Hz, PF, มุม Volt ระหว่าง current



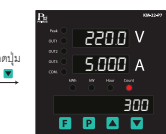
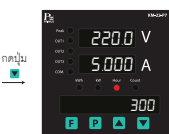
แสดงค่า Volt,
Current, kWh

แสดงค่า Hz,
kWh

แสดงค่า PF,
kWh

แสดงค่า มุม Volt ระหว่าง Current,
kWh

แสดงค่า kWh, kW, Hour Counter, Digital Counter



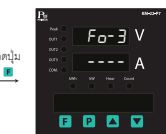
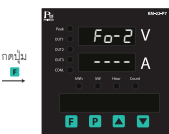
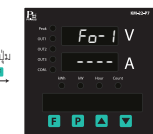
แสดงค่า Volt,
Current, kWh

แสดงค่า Volt,
Current, kW

แสดงค่า Volt
Current, Hour Counter

แสดงค่า Volt,
Current, Digital Counter

แสดงค่า Previous Fault ของ Protection Relay



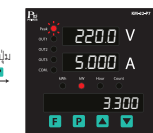
แสดงค่า Volt,

แสดงค่า Previous Fault Output 1

แสดงค่า Previous Fault Output 2

แสดงค่า Previous Fault Output 3

แสดงค่า Peak Volt , Peak Current, Demand kW



แสดงค่า Volt,
Current, kWh

แสดงค่า Peak Volt ,
Peak Current ,
Demand kW

การแจ้งเตือน Fault ของ Volt และ Current Protection Relay



ทุก 3 วินาที

วิธี Manual Reset Protection Relay

กดปุ่ม ค้างไว้ 5 วินาที Start Time จะกลับมาเริ่มต้นใหม่ช่วงเวลา Start Time ใช้สำหรับ
หน่วงเวลาการตรวจการทำงานของ Volt , Current และ kWATT Protection ในช่วงเวลานี้ LED
Out1, Out2, Out3 จะกะพริบจนหมดช่วงเวลา Start Time และทำการตรวจสอบ Volt , Current,
kWATT ในกรณีที่ Output Function ตัวใดตัวหนึ่ง เท่ากับ Disable Output ตัวนั้นจะไม่ทำงานในช่วง
เวลา Start Time ทำให้ LED Out1, Out2, Out3 จะไม่กะพริบ

CONFIGURATION

KM-22-1-P7

Measurement Display	0000	Show Measurement Value										
Press hold 2 second												
1. CT Ratio (For KM-21)	CT	CTratio range 1 to 2000										
Press 1 time												
2. Start Delay Time	St	1 to 3600 Sec										
Press 1 time												
3. Function Setting for Output1	oPF1	Select Type and Function of Alarm Relay										
<table border="1"> <tr> <td>Type</td> <td>Alarm Function</td> </tr> <tr> <td>0 : Disable</td> <td>0 : Disable</td> </tr> <tr> <td>1 : Volt Protection</td> <td>1 : Over and Under limit</td> </tr> <tr> <td>2 : Current Protection</td> <td>2 : Over limit</td> </tr> <tr> <td>3 : Inverse Current Protection</td> <td>3 : Under limit</td> </tr> </table>			Type	Alarm Function	0 : Disable	0 : Disable	1 : Volt Protection	1 : Over and Under limit	2 : Current Protection	2 : Over limit	3 : Inverse Current Protection	3 : Under limit
Type	Alarm Function											
0 : Disable	0 : Disable											
1 : Volt Protection	1 : Over and Under limit											
2 : Current Protection	2 : Over limit											
3 : Inverse Current Protection	3 : Under limit											
Press 1 time												
4. Over limit setting for Output 1	SPH1	Volt Protection : 50 to 500V Current Protection : 0.1 to 9999 A										
Press 1 time												
5. Under limit setting for Output 1	SPL1	Volt Protection : 50 to 500V Current Protection : 0.1 to 9999 A										
Press 1 time												
6. ON Delay Time setting for Output 1	ond1	1 to 3600 Sec										
Press 1 time												
7. OFF Delay Time setting for Output 1	oFd1	0 to 3600 Sec										
Press 1 time												
8. Function Setting for Output 2	oPF2	Select Type and Function of Alarm Relay										
<table border="1"> <tr> <td>type</td> <td>Alarm Function</td> </tr> <tr> <td>0 : Disable</td> <td>0 : Disable</td> </tr> <tr> <td>1 : Volt Protection</td> <td>1 : Over and Under limit</td> </tr> <tr> <td>2 : Current Protection</td> <td>2 : Over limit</td> </tr> <tr> <td>3 : Inverse Current Protection</td> <td>3 : Under limit</td> </tr> </table>			type	Alarm Function	0 : Disable	0 : Disable	1 : Volt Protection	1 : Over and Under limit	2 : Current Protection	2 : Over limit	3 : Inverse Current Protection	3 : Under limit
type	Alarm Function											
0 : Disable	0 : Disable											
1 : Volt Protection	1 : Over and Under limit											
2 : Current Protection	2 : Over limit											
3 : Inverse Current Protection	3 : Under limit											
Press 1 time												
9. Over limit setting for Output 2	SPH2	Volt Protection : 50 to 500V Current Protection : 0.1 to 9999 A										
Press 1 time												
10. Under limit setting for Output 2	SPL2	Volt Protection : 50 to 500V Current Protection : 0.1 to 9999 A										
Press 1 time												
11. ON Delay Time setting for Output 2	ond2	1 to 3600 Sec										

12. OFF Delay Time setting for Output 2	oFd2	0 to 3600 Sec										
Press 1 time												
13. Function Setting for Output 3	oPF3	Select Type and Function of Alarm Relay										
<table border="1"> <tr> <td>Type</td> <td>Alarm Function</td> </tr> <tr> <td>0 : Non Inverse</td> <td>0 : Disable</td> </tr> <tr> <td>1 : Inverse</td> <td>1 : kWatt</td> </tr> <tr> <td></td> <td>2 : Hour</td> </tr> <tr> <td></td> <td>3 : Counter</td> </tr> </table>			Type	Alarm Function	0 : Non Inverse	0 : Disable	1 : Inverse	1 : kWatt		2 : Hour		3 : Counter
Type	Alarm Function											
0 : Non Inverse	0 : Disable											
1 : Inverse	1 : kWatt											
	2 : Hour											
	3 : Counter											
Press 1 time												
14. kWatt setting for Output 3	SPW	kWatt Protection : 1 to 3,000 kWatt										
Press 1 time												
15. Hour setting for Alarm 3	SPHr	Hour Set point : 1 to 100,000										
Press 1 time												
16. Counter setting for Alarm 3	SPC1	Counter Set point : 1 to 9999999										
Press 1 time												
17. ON Delay Time setting for Output 3	ond3	1 to 3600 Sec										
Press 1 time												
18. OFF Delay Time setting for Output 3	oFd3	0 to 3600 Sec										
Press 1 time												
19. Counter Input Filter	CIF	0 : Disable 1 : Min. frequency < 10 Hz (Contact, Proximity) 2 : Max. frequency 1kHz (Proximity)										
Press 1 time												
20. Counter Input Delay Time	CIdt	Delay input : 0 to 60 sec. (CIF = 1)										
Press 1 time												
21. Decimal Point	CdP	0 = No Decimal 00 = Decimal 1 position 000 = Decimal 2 position 0000 = Decimal 3 position 00000 = Decimal 4 position 000000 = Decimal 5 position 0000000 = Decimal 6 position										
Press 1 time												
22. Counter Multiply	CmUL	Multiply : 1 to 9999999										
Press 1 time												

23. Counter Divisor	CdW	Divisor : 1 to 9999999
Press 1 time		
24. Counter Reset Value	Crw	Reset Value : 0 to 9999999
Press 1 time		
25. Clear Peak Volt, Current and kWatt	CL-P	---- : Disable -CLR : Enable
Press 1 time		
26. Clear Previous Fault	CL-F	---- : Disable -CLR : Enable
Press 1 time		
27. Clear kWh, Hour Counter, Counter Input	CL--	---- : Disable CL-- : Clear kWh CL-H : Clear Hour Counter CL-C : Clear Counter Input CL-R : Clear kWh, Hour Counter, Counter Input
Press 1 time		
28. RS-485 Address	Addr	Setting Device Address 1 to 255
Press 1 time		
29. RS-485 Baud Rate	BAUD	Baud rate 2400 bps 19200 bps 115200 bps 4800 bps 38400 bps 9600 bps 57600 bps
Press 1 time		
30. Communication Stop bit/Parity bit	CoPi	n15 : none parity, 1 stop bit E15 : even parity, 1 stop bit o15 : odd parity, 1 stop bit n25 : none parity, 2 stop bit E25 : even parity, 2 stop bit o25 : odd parity, 2 stop bit
Press 1 time		
31. Auto Display	Auto	Set time 10 to 60 second for change show Volt and Amp from measured by sort If set to 0 : Disable
Press 1 time		
32. Edit kWh	kWh	Set kWh as required as Table 2.



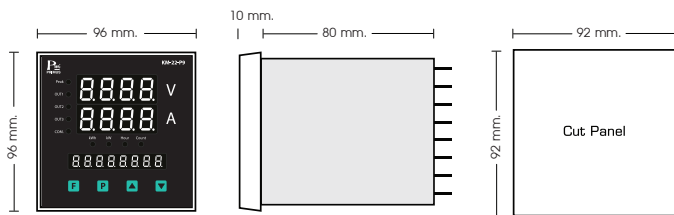
KM-22-1-P9



TECHNICAL SPECIFICATION

Power Supply		110-240 VAC 50-60 Hz
Power Consumption		3.5VA
Display		7-Segment, Size 0.56 Inch
Input	Volt	1 Phase
	Volt Range	10-400 VAC
	Accuracy Volt	±0.5% FS.
	Current	Connection 1 CT, Direct
	Current Transformer Ratio	1-2000
	Primary	9999 AMP
	Secondary	0.01-5A
	Accuracy Current	±0.5% FS.
	kWh	Class 1
Output	Relay Output	SPDT 5A 250VAC / 5A 30VDC
	Protocol	MODBUS RTU
Communication	Baud Rate	2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
	Parity	None, Even, Odd
	Stop Bits	1, 2
	Data Bits	8 Bits
	Support Device Node	255
Ambient Operation	Temperature	-10 °C to 60 °C
	Humidity	85 % RH Non-Condensing
Ambient Storage	Temperature	-20 °C to 80 °C
	Humidity	85 % RH Non-Condensing
Protection Degree		IP30
Installation		Panel Mounting
Material		ABS-V0
Size		96 x 96 x 80 mm.
Weigth		320 g.

DIMENSION



DESCRIPTION

- Voltage range in 1 phase maximum 400 VAC
- Current measure range 0.01-5A show maximum 9999 A by C.T. Ratio Range 1-2000 (10000/5A)
- kw, kWh, Hour Counter, Counter Display with Relay Output
- Under and Over Voltage and Current Protection Relay
- Peak Hold for Maximum voltage, current and kW
- Fault Display with Memory
- RS-485 Modbus RTU
- LED shows measured value of Phase, Output and Peak
- Manual / Auto Display current and voltage of that phase.

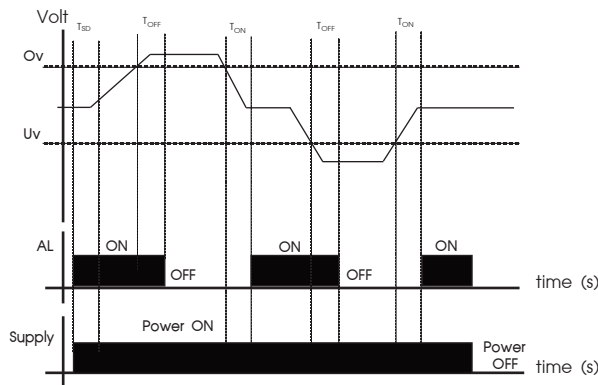
OPERATION

KM-22 is a measurement and display device for both voltage and current values in 3 phases. It also displays the values of kW, kWh, Hour and Counter. Hour values are the measurement of the working hours of the electrical system or machines to schedule maintenance. Counter is the number of products produced. To compare with the electrical energy (kWh) used to measure energy efficiency In addition, the peak value of voltage (V), current (A), and power (kW), can be remembered that can happen To analyze the feasibility of the electrical system

Voltage Protection Relay can set the voltage to fall or exceed between 50 to 500 VAC by setting the delay before starting from 1-3600 seconds (ON Delay Time), but if the phase sequence is incorrect, the Relay will not work and do not delay. When starting to work, it will capture the possibility of voltage if the voltage is lower or higher than the set value. Or the unbalance phase exceeds the set value or the missing phase. Relay will order OFF within 0-3600 seconds, which can be set to cut fast or slow as needed and display the reason Display. When the voltage level returns to the set voltage range, the Relay will return ON again within the set time (ON Delay Time).

After the KM-22 circuit breaker or Relay OFF, can view the cause of the Relay OFF from the Display. The graph showing the operation of the Volt Protection is shown in graph 1.

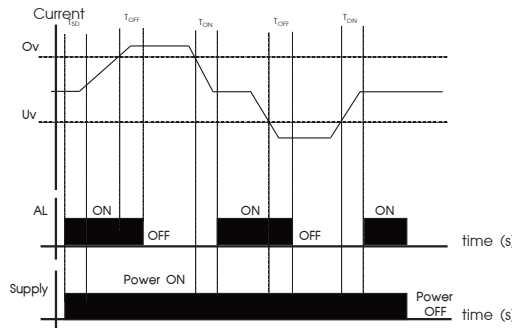
Graph1 shows Voltage Protection Relay operation



Current Protection Relay can set low current or can be between 0.1 to 9999A. Set the delay time before starting to run from 1-3600 seconds (ON delay time). When starting, it will catch the possibility of electricity. If the electricity is higher than that set, the Relay will order OFF within 0-3600 seconds, which can be set to cut fast or slow as needed and display the cause at Display. When the current level returns to the level below the set, Relay will return. ON again within 1-3600 seconds

After the KM-22 circuit breaker or Relay OFF, can see the cause of the Relay OFF from the Display or reverse function. The current protection relay operation graph is shown in graph 2.

Graph 2 show Current Protection Relay operation



Relay Output for kW, Hour and Counter

Alarm Relay for kW, Hour, Counter. This can be selected to act on load contact Which one is

kW Function can set kW 0-100% of Range and set the delay time before starting from 1-3600 seconds (ON Delay Time) when starting and then capturing the possibility of kW being used if the kW value is higher The relay set will order OFF within 0-3600 seconds, which can be set to cut fast or slow as needed. And display the reason that the Display when the kW level returns to the lower level than the Relay will return ON again within 1-3600 seconds or to work in the reverse (Inverse Function) is Relay will ON when the kW value is higher set

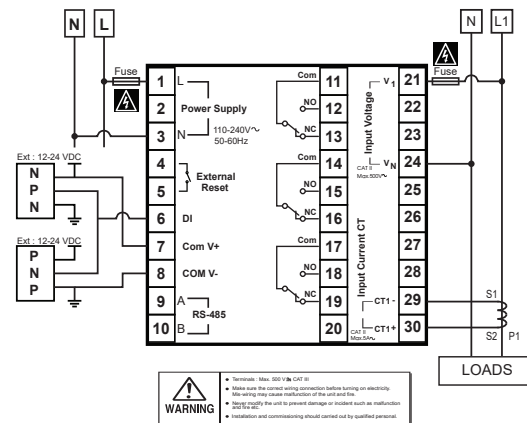
Hour Counter Function can set the desired working hours at the end of the time. Relay sends ON and can be reset to OFF by pressing the button or using the Terminal Reset PIN.

Counter Function can set the desired amount when the number is set. Relay will order ON and can reset to OFF by pressing the button or using Terminal Reset PIN.

Manual and Auto Display

Display of Volt, Amp, kW, kWh, Hour and Counter values that can be measured in Manual mode, ie Volt, Amp, kW, kWh, Hour and Counter by pressing Key pad on the device or Auto is Displays Volt, Amp, kW, kWh, Hour and Counter values. Each phase rotates all the time. Which can be set to display values from 10 seconds to 60 seconds per phase If you do not want to display Auto, you can do so by setting the time to 0.

WIRING DIAGRAM



หน้าแรก



แสดงค่า Volt, Current, kWh

แสดงค่า Hz,PF,มุม volt ระหว่าง current



แสดงค่า Volt, Current, kWh



แสดงค่า Hz, kWh



แสดงค่า PF, kWh



แสดงค่า มุม volt ระหว่าง current, kWh

แสดงค่าkWh, kW, Hour Counter, Digital Counter



แสดงค่า Volt, Current, kWh



แสดงค่า Volt, Current, Total kW



แสดงค่า Volt, Current, Hour Counter



แสดงค่า Volt, Current, Digital Counter

แสดงค่าPrevious Fault ของ Protection Relay



แสดงค่า Volt, Current, kWh



แสดงค่า Previous Fault Output 1



แสดงค่า Previous Fault Output 2

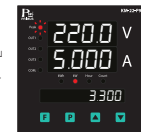


แสดงค่า Previous Fault Output 3

แสดงค่า Peak Volt, Peak Current, Demand kW



แสดงค่า Volt, Current, kWh



แสดงค่า Peak Volt, Peak Current, Demand kW

การแจ้งเตือนFault ของ Volt และ Current Protection Relay



How to Manual Reset Protection Relay

Press hold for 5 second Start Time will back to start again in Start Time phase use for

delay detect time of voltage, current and kWATT Protection in this time LED Out1, Out2, Out3 will flash

until Start Time run out and check Volt, current, kWATT in case Output Function in one of relay equal to

Disable Output that relay will not operate in Start Time. It made LED Out1, Out2, Out3 will not flash

ORDERING CODE

KM-22-1-P9 - A

OPTION

	None
B	Alarm Relay 2
C	Alarm Relay 3
M	RS-485

■ CONFIGURATION

KM-22-1-P9

Measurement Display
0000 Show Measurement Value
Press **F** hold 2 second

1. CT Ratio (For KM-21)
Ct range 1 to 2000
Press **F** 1 time

2. Start Delay Time
1 to 3600 Sec
Press **F** 1 time

3. Function Setting for Output1
Select Type and Function of Alarm Relay
Type: 1: Volt Protection, 2: Current Protection, 3: Inverse Current Protection
Alarm Function: 0: Disable, 1: Over and Under limit, 2: Over limit, 3: Under limit
Press **F** 1 time

4. Over limit setting for Output 1
Volt Protection : 50 to 500V
Current Protection : 0.1 to 9999 A
Press **F** 1 time

5. Under limit setting for Output 1
Volt Protection : 50 to 500V
Current Protection : 0.1 to 9999 A
Press **F** 1 time

6. ON Delay Time setting for Output 1
1 to 3600 Sec
Press **F** 1 time

7. OFF Delay Time setting for Output 1
0 to 3600 Sec
Press **F** 1 time

8. Function Setting for Output 2
Select Type and Function of Alarm Relay
type: 1: Volt Protection, 2: Current Protection, 3: Inverse Current Protection
Alarm Function: 0: Disable, 1: Over and Under limit, 2: Over limit, 3: Under limit
Press **F** 1 time

9. Over limit setting for Output 2
Volt Protection : 50 to 500V
Current Protection : 0.1 to 9999 A
Press **F** 1 time

10. Under limit setting for Output 2
Volt Protection : 50 to 500V
Current Protection : 0.1 to 9999 A
Press **F** 1 time

11. ON Delay Time setting for Output 2
1 to 3600 Sec

12. OFF Delay Time setting for Output 2
0 to 3600 Sec
Press **F** 1 time

13. Function Setting for Output 3
Select Type and Function of Alarm Relay
Type: 0: Non Inverse, 1: Inverse
Alarm Function: 0: Disable, 1: kWatt, 2: Hour, 3: Counter
Press **F** 1 time

14. kWatt setting for Output 3
kWatt Protection : 1 to 3,000 kWatt
Press **F** 1 time

15. Hour setting for Alarm 3
Hour Set point : 1 to 100,000
Press **F** 1 time

16. Counter setting for Alarm 3
Counter Set point : 1 to 99999999
Press **F** 1 time

17. ON Delay Time setting for Output 3
1 to 3600 Sec
Press **F** 1 time

18. OFF Delay Time setting for Output 3
0 to 3600 Sec
Press **F** 1 time

19. Counter Input Filter
0: Disable
1: Min. frequency < 10 Hz (Contact, Proximity)
2: Max. frequency 1kHz (Proximity)
Press **F** 1 time

20. Counter Input Delay Time
Delay input : 0 to 60 sec. (C IF = 1)
Press **F** 1 time

21. Decimal Point
0 = No Decimal
00 = Decimal 1 position
000 = Decimal 2 position
0000 = Decimal 3 position
00000 = Decimal 4 position
000000 = Decimal 5 position
0000000 = Decimal 6 position
Press **F** 1 time

22. Counter Multiply
Multiply : 1 to 9999999
Press **F** 1 time

23. Counter Divisor
Divisor : 1 to 9999999
Press **F** 1 time

24. Counter Reset Value
Reset Value : 0 to 9999999
Press **F** 1 time

25. Clear Peak Volt,Current and kWatt
---- : Disable
-Clr : Enable
Press **F** 1 time

26. Clear Previous Fault
---- : Disable
-Clr : Enable
Press **F** 1 time

27. Clear kWh, Hour Counter, Counter Input
---- : Disable
CL-H : Clear kWh
CL-H : Clear Hour Counter
CL-C : Clear Counter Input
CL-R : Clear kWh, Hour Counter, Counter Input
Press **F** 1 time

28. RS-485 Address
Setting Device Address 1 to 255
Press **F** 1 time

29. RS-485 Baud Rate
Baud rate: 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps
Press **F** 1 time

30. Communication Stop bit/Parity bit
n15 : none parity, 1 stop bit
E15 : even parity, 1 stop bit
o15 : odd parity, 1 stop bit
n25 : none parity, 2 stop bit
E25 : even parity, 2 stop bit
o25 : odd parity, 2 stop bit
Press **F** 1 time

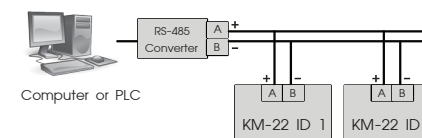
31. Auto Display
Set time 10 to 60 second for change show Volt and Amp from measured by sort
If set to 0 : Disable
Press **F** 1 time

32. Edit kWh
Set kWh as required as Table 2.

■ SERIAL COMMUNICATION

The KM-22 are Equipped With a RS-485 Series Communication Interface to Allow Connection to Computer or PLCs. MODBUS PROTOCOL is Provided as Standard Communication. The User Can Connect KM-22 as Network Up to 128 Meters.

Wiring Diagram



MODBUS PROTOCOL

This MODBUS PROTOCOL Has Been Implement In Accordance With MODBUS.ORG MODBUS Application PROTOCOL Specification V1.1 With The Following Conditions Applying. The Following Conditions Apply Baudrate Can Selected Refer 22. Speed Setting The Format Is MODBUS RTU Refer 22. Speed Setting The Format Is MODBUS RTU UART Data Can Selected Refer 23. Communication Setting Data Is Considered To Be Half Duplex Using 2 Wire.

Modbus Function code

Function code	Operation	Broadcast
0x03	Read Holding Registers	No
0x04	Read Multiple Registers	No
0x06	Preset Single Registers	Yes
0x10	Preset Multiple Registers	Yes

Modbus Exception code

Code	Name	Meaning
01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the server (or slave).
02	ILLEGAL DATA ADDRESS	The data address received in the data field is not an allowable value for server (or slave).
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for server (or slave).

Example of a client request and server exception response

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
Slave Address	01	Slave Address	01
Function	04	Function	84
Starting Address Hi	00	Exception Code	02
Starting Address Lo	00	CRC Hi	C2
Quantity of Input Reg. Hi	00	CRC Lo	C1
Quantity of Input Reg. Lo	1E		
CRC Hi	70		
CRC Lo	02		

