KM-20-P7

| 1∅ | V | A | Hz | TRUE RMS | RS 485 | Peak Hold | Voltage Relay | Current Relay |

■ TECHNICAL SPECIFICATION

| Power Supply		230 ±15% VAC 50-60 Hz
		115 ±15% VAC
Power Consumption		2.5VA
Display		7-Segment, Size 0.56 Inch,
Input	Volt	1 Phase
	Volt Range	20-500 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.
Output	Relay Output	SPDT 5A 250VAC / 5A 30VDC
Communication	Protocol	MODBUS RTU
	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 ℃ to 60 ℃
	Humidity	85 % RH Non-Condensing
Ambient Storage	Temperature	-20℃ to 80 ℃
	Humidity	85 % RH Non-Condensing
Protection Degree		IP30
Installation		Panel
Material		ABS-V0
Size		72 x 72 x 73 mm.
Weigth		280 g.

■ DIMENSION
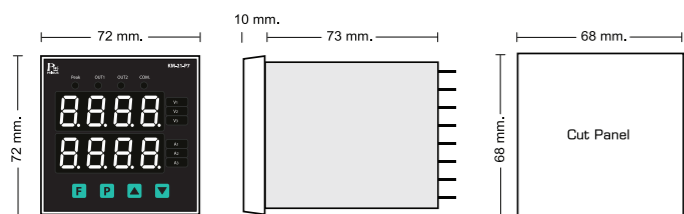
■ DESCRIPTION

- Single phase voltage measurement system for up to maximum 500 VAC
- Current measurement range 0.01 - 5 A, showing maximum current value 9999 A by passing C.T. Ratio Range 1 - 2000 (10000 / 5A)
- Under and Over Voltage Protection Relay
- Under and Over Current Protection Relay
- Peak Hold for Maximum of voltage, current
- Fault Display with Memory
- RS - 485 Modbus RTU
- Shows value from measure, Output and Peak.
- Manual / Auto Display Current and voltage values

■ OPERATION

The KM - 20 - P7 is a measurement and display device for both the voltage and current in the same phase along with Voltage Protection Relay to prevent power failure , Overload . Peak value of voltage and current can be remembered happened to analyze the feasibility of the system

Voltage Protection Relay can set the power to fall Overloaded during 20 - 500 VAC by setting delay before starting work from 1 - 3600 seconds (ON Delay Time) will capture the voltage . If the voltage is lower or higher than the value set, the Relay will order OFF within 0 - 3600 seconds, which can be set to cut fast or slow as needed and display the reason that Display when the voltage level returns to the voltage range at set Relay to return ON again within the set time (ON delaytime). After the KM-20-P7 circuit breaker or Relay OFF, can see the cause of the Relay OFF from the Display. Graph showing the operation of the Volt Protection is shown in graph 1.


Graph 1 display Voltage protection relay operation
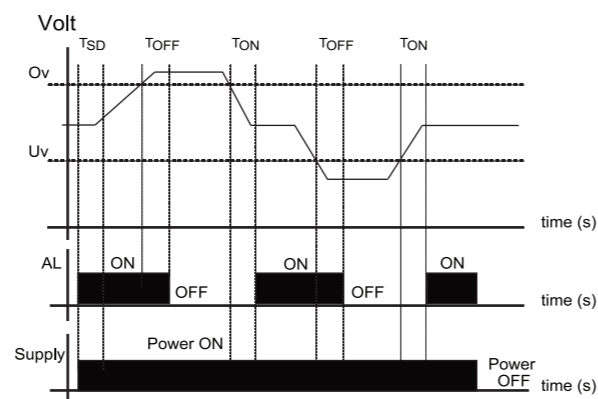
Current Protection Relay can set low current or can be between 0.1 to 9999A. Set the delay time before starting to run from 1-3600 seconds (ON delay time). When starting, it will catch the possibility of electricity. If the electricity is higher than that set, the Relay will order OFF within 0 - 3600 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 - 20 - P7 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.
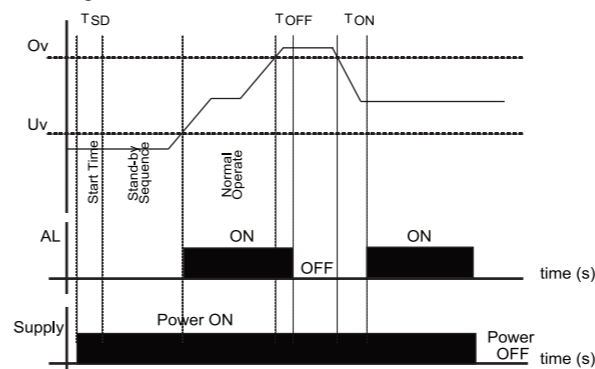
Graph 2 display the Current protection relay operation
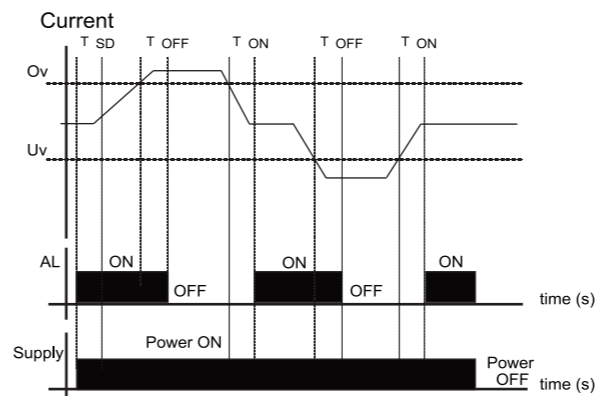
Stand-by Sequence

Function of this function will check whether the voltage or current of each phase. After the end of the Start Time period, the Output Relay will not work until the value is in the Output Relay phase. Shown as graph 3

Graph 3 shows Voltage Stand-by sequence operation

Manual and Auto Display

The display of the measured Volt, Amp values can be either Manual. click on the Volt, Amp value by pressing the key pad on the device or Auto is shown. Volt, Amp, each phase is rotated all the time, 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.

How to Calculate value

$$Volt = \frac{Volt\ Reg}{10}$$

$$Current = \frac{Current\ Reg}{Current\ Exponential\ 10}$$

$$Hz = \frac{Hz\ Reg}{10}$$

■ WIRING DIAGRAM
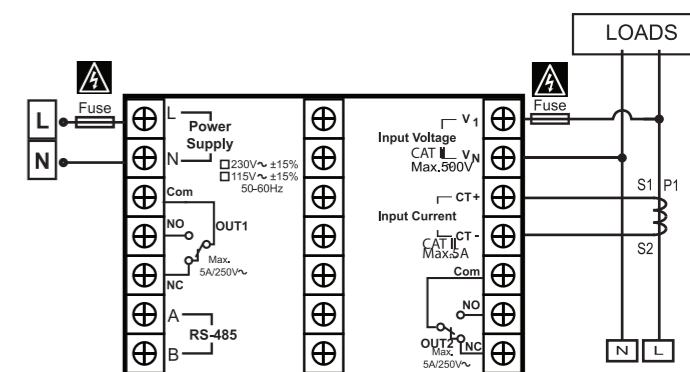
■ ORDERING CODE

KM-20-P7 – A ☐ ☐ – ☐

	OPTION		SUPPLY
		None	230 VAC
B	Alarm Relay 2	115	115 VAC
M	RS-485		

First pape

Display Volt , Current value

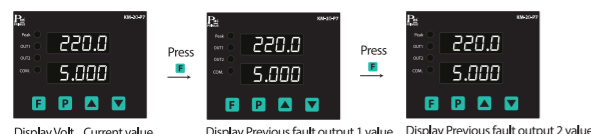### Display Volt , Current value

Press

Display Volt , Current value   Display Hz Value

Displays the Previous Fault value of Protection Relay, Volt angle between Current,Hz

Display Volt , Current value   Display Previous fault output 1 value   Display Previous fault output 2 value

Display Peak Volt, Peak Current value

Displays Volt angle between Current   Display Peak Volt, Peak Current value

Volt Fault alert and Current of Protection Relay

every 3 seconds

Display Volt , Current value   Display Volt , Current value

Manual Reset Protection Relay

Press ◉ hold 5 seconds start Time will start again. Start Time is used to delay the detection of Volt, Current during this time, LED Out1, Out2 will flash until the end of the Start Time and check Volt, Current In the case that one of the output functions is Disable Output, the function will not work during the Start Time period. LED Out1, Out2 will not flash.

How to Reset Peak Volt, Current

1. Set parameter $CL-P$ to become $-CLr$
2. Must be on page display peak results on any one page and press button ▲ + ▼ hold 5 seconds
3. When Reset parameter value $CL-P$ to become $----$

How to Reset Fault Alarm

1. Set parameter $CL-F$ to become $-CLr$
2. Must be on page display Fault alarm on any one page and press button ▲ + ▼ hold 5 seconds
3. When Reset parameter value $CL-P$ to become $----$

■ CONFIGURATION

KM-21-P7

Measurement Display
| 0000 | Show Measurement Value |

Press F hold 2 seconds

1. CT Ratio (For KM-21)
| CE → 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
| OPF 1 → 11 | Select Type and Function of Alarm Relay |

| 1 1 |

Type	Alarm Function
1 : Volt Protection	0 : Disable
2 : Current Protection	1 : Over and Under limit
3 : Inverse Current Protection	2 : Over limit
	3 : Under limit

Press F 1 time

4.Stand-by Sequence
| SEb 1 → oFF | OFF : Disable / ON : Enable |

Press F 1 time

5. Over limit setting for Output 1
| SPH 1 → 250 | Volt Protection : 50.0 to 500.0V / Current Protection : 0.1 to 999.0 A |

Press F 1 time

6. Under limit setting for Output 1
| SPL 1 → 190 | Volt Protection : 50.0 to 500.0V / Current Protection : 0.1 to 999.0 A |

F

7. ON Delay Time setting for Output 1
| Ond 1 → 3 | 1 to 3600 Sec |

Press F 1 time

8. OFF Delay Time setting for Output 1
| OFd 1 → 3 | 0 to 3600 Sec |

Press F 1 time

9. Function Setting for Output 2
| OPF2 → 11 | Select Type and Function of Alarm Relay |

| 1 1 |

Type	Alarm Function
1 : Volt Protection :	0 : Disable
2 : Current Protection	1 : Over and Under limit
3 : Inverse Current Protection	2 : Over limit
	3 : Under limit

Press F 1 time

10. Stand-by Sequence 2
| SEb2 → oFF | OFF : Disable / ON : Enable |

Press F 1 time

11. 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

12. Under limit setting for Output 2
| SPL2 → 0.1 | Volt Protection : 50.0 to 500.0V / Current Protection : 0.1 to 999.0A |

Press F 1 time

13. ON Delay Time setting for Output 2
| Ond2 → 3 | 1 to 3600 Sec |

Press F 1 time

14. OFF Delay Time setting for Output 2
| OFd2 → 3 | 0 to 3600 Sec |

Press F 1 time

15. Clear Peak Volt,Current
| CL-P → -CLr | ---- : Disable / -CLr : Enable |

Press F 1 time

16. Clear Previous Fault
| CL-F → -CLr | ---- : Disable / -CLr : Enable |

Press F 1 time

17. RS-485 Address
| Addr → 1 | Setting Device Address 1 to 255 |

Press F 1 time

18. 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

19. Communication Stop bit/Parity bit
| Comm → n 1S | N1S : none parity, 1 stop bit / e1S : even parity, 1 stop bit / o1S : odd parity, 1 stop bit / n2S : none parity, 2 stop bit / e2S : even parity, 2 stop bit / o2S : odd parity, 2 stop bit |

Press F 1 time

20. Auto Display
| AUtO → 0 | Set the time 10 to 60 seconds for changing showing the Volt and Amp values that are measured in order If set to 0: Disable |

Table 1

Symbol	Display	Comment
0	----	None
1	Ouu	Over Volt
2	Unu	Under Volt
3	OuC	Over Current
4	UnC	Under Current

■ SERIAL COMMUNICATION

The KM - 20 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 - 20 as Network Up to 128 Meters.

Wiring Diagram

Computer or PLC   RS-485 Converter A/B +/−   KM-20 ID 1   KM-20 ID 2
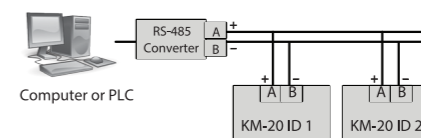
MODBUS PROTOCOL

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 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	Brodcast
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		

MODBUS table of KM - 20 as shown in the following table

Modbus Table 1

Reg. Address		Contents	Format	Word	Access	Comment
Decimal	Hex					
0	0x0	Volt	Unsigned int	1	Read Only	
1	0x1	Current	Unsignde int	1	Read Only	
2	0x2	Current Exponential	Unsigned int	1	Read Only	
3	0x3	Hz	Unsignde int	1	Read Only	
4	0x4	Peak Volt	Unsigned int	1	Read Only	
5	0x5	Peak Current	Unsignde int	1	Read Only	
6	0x6	Peak Current Exponential	Unsigned int	1	Read Only	
7	0x7	Previous Fault Alarm 1	Unsignde int	1	Read Only	
8	0x8	Previous Fault Alarm 2	Unsigned int	1	Read Only	

Modbus Table 2

Reg. Address		Contents	Format	Word	Access	Comment
Decimal	Hex					
256	0x100	CT Ratio	Unsignde int	1	R/W	
257	0x101	Start Time	Unsignde int	1	R/W	1-3600
258	0x102	On Delay 1 Time	Unsignde int	1	R/W	1-3600
259	0x103	Off Delay 1 Time	Unsignde int	1	R/W	0-3600
260	0x104	Function Alarm 1	Unsignde int	1	R/W	
261	0x105	Stand-by Sequence 1	Unsignde int	1	R/W	
262	0x106	On Delay 2 Time	Unsignde int	1	R/W	1-3600
263	0x107	Off Delay 2 Time	Unsignde int	1	R/W	0-3600
264	0x108	Function Alarm 2	Unsignde int	1	R/W	
265	0x109	Stand-by Sequence 2	Unsignde int	1	R/W	
266	0x10A	Over Limit Alarm 1	Unsignde int	1	R/W	Volt : 50-500 / Current : 1-9990
267	0x10B	Under Limit Alarm 1	Unsignde int	1	R/W	Volt : 50-500 / Current : 1-9990
268	0x10C	Over Limit Alarm 2	Unsignde int	1	R/W	Volt : 50-500 / Current : 1-9990
269	0x10D	Under Limit Alarm 2	Unsignde int	1	R/W	Volt : 50-500 / Current : 1-9990