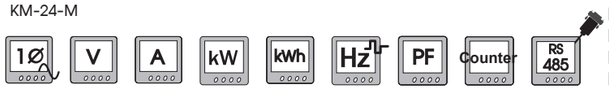
KM-24-M

SINGLE PHASE kWh-METER WITH RS-485

Primus
User Manual

KM-24-M



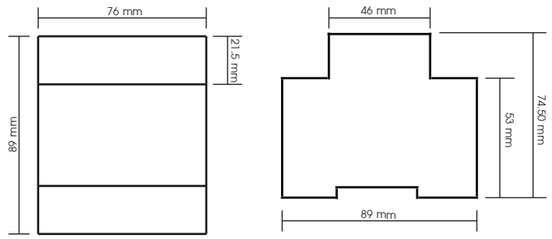
TECHNICAL SPECIFICATION

Power Supply		110-240VAC 50/60Hz
Power Consumption		2.5VA
Display		6 LED, 7-Segment size 0.39 inch
Input	Volt	1 Phase
	Volt Range	110-240 VAC
	Accuracy Volt	±0.5% FS.
	Current	0.02 - 45 A
	Accuracy Current	±0.5% FS.
	kW, PF	±0.5% FS.
	kWh	Class 1
	Counter Input	Dry contact Max 100 Hz
	Input Filter	0.00 to 10.00 Sec
	Accuracy Input Filter	±10 ms
Output		3200 Impulse/kWh
RS-485 Communication	Protocol	MODBUS RTU
	Baud Rate	2400, 4800, 9600, 19200, 38400, 57600 bps
	Parity	None, Even, Odd
	Stop Bits	1, 2
	Data Bits	8 Bits
	Address	1-127
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		89 x 76 x 74.50 ± 0.5 mm.
Weigth		295 g.

ORDERING CODE

KM-24 - M

DIMENSION

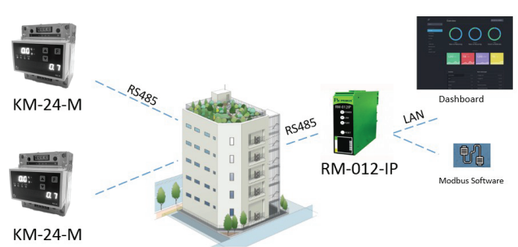


DESCRIPTION

- KM-24-M is 1 phase electrical meter
- Can install meter more than 127 per 1 system RS485
- Can measure voltage (V), Current (A), Power(kW), Electrical energy (kWh) and display result of water usage in cubic metre (m^3) unit from Pulse of of Water Meter.
- Input for receive pulse from water meter to send data water usage with cubic meter unit.
- Electrical measure in True RMS has high accuracy.
- Voltage measure range 110-240 VAC.
- Current measure range 0.02 - 45 A
- 7-Segment LED display.
- Communication is RS485 Modbus RTU Protocol.
- Can set Input filter time since 0.00 - 10.00 Sec.

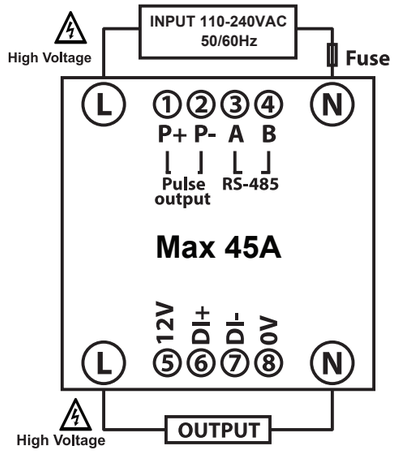
OPERATION

Use with current 45 A. It can measure V, A, kW, kWh and display water usage in cubic metre unit (m^3) by receive Water Meter and send data from measure both electrical and water usage. User can connect meter 127 devices per 1 system RS485. It convince for use by Online system all the time. Decrease staff and give correctness to record and saving energy. Display by 7-Segment LED. Top row show Volt and Amp alternately. Below show kW, kWh and water usage in cubic meter(m3) all the time.

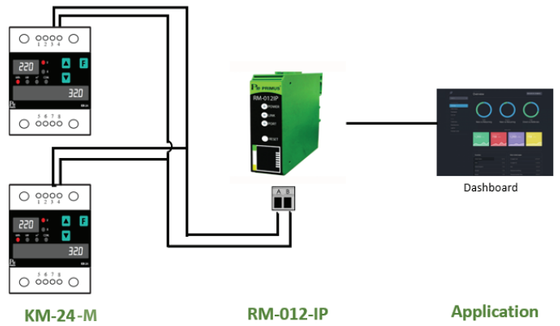


Example picture install KM-24-M at Condominium. Device will measure electrical power and send to RM-012-IP and display via Dashboard to check power or water usage by no need to see at meter.

WIRING DIAGRAM



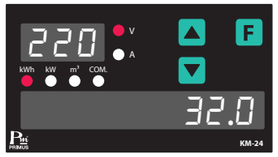
DATA FLOW ARCHITECTURE



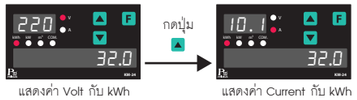
Picture 1. Data Flow Archotecture

Show network system that use KM-24-M with RM-012-IP for display value via Dashboad by use KM-24-M at pin 3(A) with pin 4(B) connect to RM-012-IP via RS485 use Modbus RTU Protocol and RM-012-IP connect to computer or PLC or Scada for display result on UI application.

DISPLAY

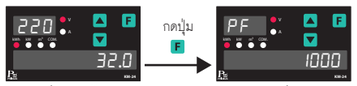


Home Display



แสดงค่า Volt กับ kWh — แสดงค่า Current กับ kWh

แสดงค่า Volt กับ kWh — แสดงค่า Volt กับ kW — แสดงค่า Volt กับ m^3



แสดงค่า Volt กับ kWh — แสดงค่า PF

- V : shows Volt
- A : shows Current
- kWh : shows kilowatt per hour
- kW : shows kilowatt
- m^3 : shows water usage
- COM. : shows communication status

KM-24-M SINGLE PHASE kWh-METER WITH RS-485

FUNCTION

Show Model
- Display: KM-24
- Show Model KM-24

Show Last Version
- Display: rEv 1.7
- Show Last Version

Measurement Display
- Display: 220 / 32.0
- Show Measurement Display

Press F hold for 3 seconds

Edit kWh
- Display: kWH / 0.0
- Set kWh as required 0.0 — 9999999.9
- Press ▲ to increase
- Press ▼ to decrease
- Press F to slide position
- Press F hold back to Measurement Display

กดปุ่ม F

Edit Counter
- Display: CtS / 0.000
- Set Counter 0.000 — 99999.999
- Press ▲ to increase
- Press ▼ to decrease
- Press F to slide position
- Press F hold back to Measurement Display

Press F

Pulse Per m³
- Display: PPm / 1.000
- Set Pulse per cubic metre 0.000 — 9.999
- Press ▲ to increase
- Press ▼ to decrease
- Press F to slide position
- Press F hold back to Measurement Display

Press F

Input Filter
- Display: IF / 0.00
- Set time to filter input can set since
- 0.00 - 10.00 second

Press F

Input Mode
- Display: Mod / UP
- Set input operation mode by choosing
- 2 mode are Up or Down

Note.
Input Mode = UP must have Input more than time Input Filter to count value
Input Mode = Down after must have no Input signal more than time Input Filter it will count value.

Press F

Scan Display Time 1
- Display: SC1 / 0
- Set time to display Volt and Current value
- can set since 0 — 10 second

Press F

Scan Display Time 2
- Display: SC2 / 0
- Set time to display kW, kWh and m³
- can set since 0 — 10 seconds

Press F

RS-485 Address
- Display: Adr / 1
- Device Address set 1 to127

Press F

RS-485 Buad Rate
- Display: bPS / 9600
- Baud Rate
- 2400 ,4800 ,9600 ,19200 ,38400 และ 57600

Press F

Communication Setting
- Display: Com / 8n1
- Set Communication

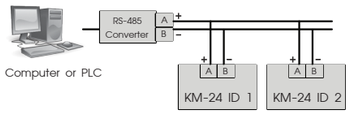
8n1

Parity bit	Stop bit
n : None E : Even o : Odd	1 : 1 Stop bit 2 : 2 Stop bit

SERIAL COMMUNICATION

The KM-24 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-24 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	Brodcast
0x03	Read Holding Registers	Yes
0x04	Read Multiple Registers	Yes
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		

ตาราง MODBUS ของ KM-24-M ดังตารางต่อไปนี้

Modbus Table 1

Reg. Address		Contents	Description	Format	Word	Access	Comment
Decimal	Hex						
0	0000	Volt		Unsignde int	1	R	
1	0001	LCurrent		Unsignde int	1	R	
2	0002	NCurrent		Unsignde int	1	R	
3	0003	PF		int	1	R	
4	0004	Hz		Unsignde int	1	R	
5	0005	Tamping Status		Unsignde int	1	R	
6	0006	Watt MSB		Long	2	R	
7	0007	Watt LSB					
8	0008	VAR MSB		Long	2	R	
9	0009	VAR LSB					
10	000A	VA MSB		Long	2	R	
11	000B	VA LSB					
12	000C	kWh MSB	0-99999999	Long	2	R/W	*Case kWh over 99999999 reset to be 0
13	000D	kWh LSB					
14	000E	Counter MSB	0-99999999	Long	2	R/W	*Case Counter over 99999999 จะทำการรีเซ็ทให้เป็น 0
15	000F	Counter LSB					

Modbus Table 2

Reg. Address		Contents	Description	Format	Word	Access	Comment
Decimal	Hex						
256	0100	Pulse Per m³	0-9999	Unsignde int	1	R/W	
257	0101	Scan Display 1	0-10	Unsignde int	1	R/W	*Set time to change screen Top row
258	0102	Scan Display 2	0-10	Unsignde int	1	R/W	*Set time to change screen Below Row
259	0103	Input Filter	0-1000	Unsignde int	1	R/W	*Set time to Input Filter
260	0104	Input Mode	0-1	Unsignde int	1	R/W	*Set time to operate Input Mode

Register Calculation

V calculate

$$V = \frac{V}{100} = \frac{22000}{100} = 220.00\ V$$

A Calculate

$$A = \frac{A}{1000} = \frac{5000}{1000} = 5\ A$$

PF Calculate

$$PF = \frac{PF}{1000} = \frac{1000}{1000} = 1.0$$

Hz Calculate

$$Hz = \frac{Hz}{100} = \frac{5000}{100} = 50\ Hz$$

kWh Calculate

$$kWh = \frac{kWh}{10} = \frac{20}{10} = 2.0\ kWh$$

kW Calculate

$$kW = \frac{kW}{1000} = \frac{34}{1000} = 0.034\ kW$$

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