EKM METERING INC.

EKM-Omnimeter II UL v.3 Spec Sheet

- Nominal Voltage Ranges:
  120V , 2-wire, Single-phase, One Line and Neutral
  120/208 to 240V, 3-wire, Single-phase, 2 Lines and Neutral
  120V, 3-wire, 3-phase, 3 Lines, No Neutral
  120/208 to 240V, 4-wire, 3-phase, 3 Lines and Neutral
- Range of allowable environmental conditions: Pollution Degree 2, Measurement Category III, Altitude rating 2000 meters max. Maximum Temperature Range: -30 Deg. C to 70 Deg. C. Tamper Detection Class 1.
- The equipment is protected throughout by double insulation as indicated by this symbol: ⧈
- Accuracy Class 0.5
- Rated Frequency: 50Hz/60Hz
- Red LED on the meter face flashes 800 times/kWh. 1 flash = 1.25Wh.
- Received California Type Approval for revenue grade metering

Safety Precautions:

- Meter should be installed by a qualified electrician.
- Turn off all power supplying the equipment before preforming any wiring. Use a properly rated volt meter to confirm power is off.
- Use of this device inconsistent with this manual can cause permanent damage to the unit and/or serious harm to the operator.

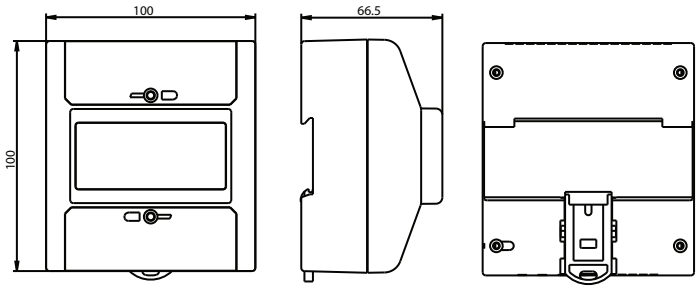
Tools/Materials List:

- Volt meter
- Small standard screwdriver
- Wire stripper
- DIN-Rail
- 16-22 AWG UL rated stranded copper wire
- UL Approved Current Transformer(s). See *(Fig 6)*
- UL rated inline fuse holder with maximum 1Amp UL Listed fuse
- UL Listed Type 4 Enclosure (with appropriately rated conduit and fittings) is required if meter will be installed outdoors

Installation Instructions

For All Systems:

1. Disconnect or switch power off before attempting to install, connect, disconnect or service the meter or the external current transformers (CTs). ALL POWER MUST BE DISCONNECTED!
2. Mount the meter using 35mm DIN Rail in a protected indoor location. If installing outdoors, a UL Listed Type 4 Enclosure is required.
3. IMPORTANT: Distinguish and then identify the Neutral and the Line(s) ('hot' wire(s), usually black or red). Label the Neutral and then, depending on your electrical system, assign labels as described below.
4. Meter installation shall include a disconnect, and labels to indicate:
   a. In the case of the meter being installed on a circuit panel which has a Main Breaker, that this Main Breaker is the disconnect device for the meter.
   b. In the case of the meter being installed on a circuit panel which DOES NOT have a Main Breaker, the location of the Main Breaker for that panel.
5. Tightening torque of terminals:
   All terminals: 4.4 in-lb. (0.5 Nm)

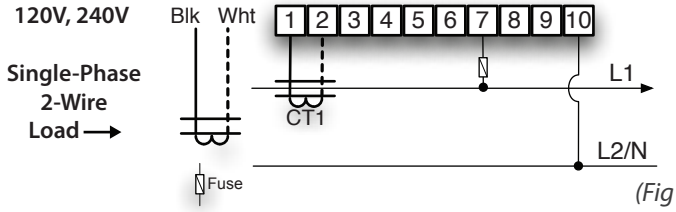


Load current	Power factor COSθ	Basic error %	
		Class 0.5	Class 1
0.05Ib	1.0	±1.0	±1.5
0.1Ib~Imax	1.0	±0.5	±1.0
0.1Ib	0.5(L)	±1.0	±1.5
	0.8(C)	±1.0	±1.5
0.2Ib~Imax	0.5(L)	±0.5	±1.0
	0.8(C)	±0.5	±1.0

(Fig 1)

120V, 2-Wire, Single Phase:

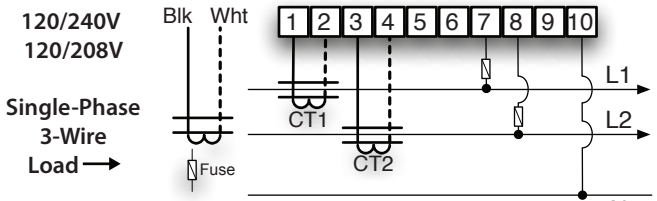
1. Label Line 1 as L1.
2. Fit CT1 around L1. Make sure the arrow is facing towards the load (in the direction of flow). *(Fig 2)*
3. Black CT wire connects to Port 1 on the Omnimeter. White CT wire connects to Port 2. *(Fig 2)*
4. With split core CTs, close the CT around the wire to be measured and press firmly until you feel and hear it click to indicate full closure. The buttons should be fully out. Use a zip tieto ensure the CTs remain securely closed.
5. To power the meter and get a voltage reference: Use a maximum 1.0 Amp inline fuse on L1. Connect one fuse holder pigtail to the breaker, lug or an appropriate line-tap device, and connect the other pigtail to 16-22 AWG UL rated stranded copper wire for connection to the meter.
6. L1 connects to Port 7 on the Omnimeter, Neutral to Port 10. *(Fig 2)*
7. Once the meter is properly mounted to the DIN Rail or enclosure and all wiring is completed, with terminal block covers installed, power can be turned back on.
8. Meter will then begin cycling through meter values. For details go to: *http://documents.ekmmetering.com/EKM_Metering_LCD_Display_Value_Reading.pdf*
9. A video of proper install of a 120V system can be found here: *http://www.youtube.com/watch?v=ky9sgr1LTMk*



(Fig 2)

120/240V, 120/208V, Single Phase, 3-Wire:

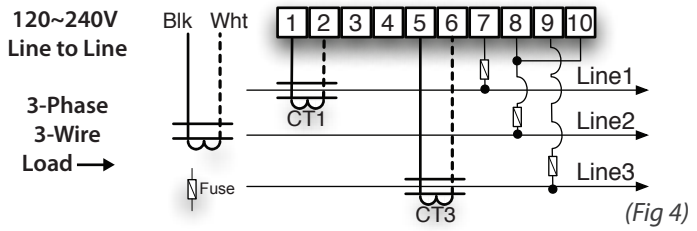
1. Label L1 and L2. (Arbitrarily assign labels.)
2. You will be using 2 CTs for this install. Label them CT1 and CT2.
3. Fit CT1 around L1. Make sure the arrow is facing towards the load.
4. Fit CT2 around L2.
5. CT1: Black wire connects to Port 1. White wire connects to Port 2.*(Fig3)*
6. CT2: Black wire connects to Port 3. White wire connects to Port 4.*(Fig3)*
7. With split core CTs, close the CT around the wire to be measured and press firmly until you feel and hear it click to indicate full closure. The buttons should be fully out. Use a zip tieto ensure the CTs remain securely closed.
8. To power the meter and get a voltage reference: Use a maximum 1 Amp inline fuse on L1 and L2. Connect one fuse holder pigtail to the breaker, lug or an appropriate line-tap device, connect the other pigtail to 16-22 AWG UL rated stranded copper wire.
9. Tap into L1 at the breaker panel, with small stranded copper wire. This L1 tap connects to Port 7 on the Omnimeter. *(Fig 3)*
10. Tap into L2 at the breaker panel with small stranded copper wire. This L2 tap connects to Port 8 on the Omnimeter. *(Fig 3)*
11. Neutral connects to Port 10.
12. Once the meter is properly mounted to the DIN Rail or enclosure and all wiring is completed, with terminal block covers installed, power can be turned back on.
13. Meter will then begin cycling through meter values. For details go to: *http://documents.ekmmetering.com/EKM_Metering_LCD_Display_Value_Reading.pdf*
14. A video of a proper install of a 120V/240V system can be found here: *http://www.youtube.com/watch?v=ky9sgr1LTMk*



(Fig 3)

120V, 3-Phase, 3-Wire:

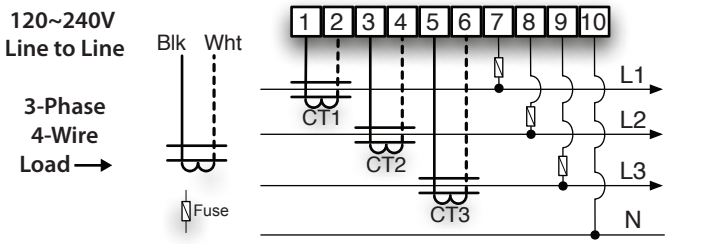
1. Label L1, L2 and L3. (Arbitrarily assign labels.)
2. You will be using 2 CTs for this install. Label them CT1 and CT3.
3. Fit CT1 around L1. Make sure the arrow is facing towards the load.
4. Fit CT3 around L3.
5. CT1: Black wire connects to Port 1. White wire connects to Port 2.*(Fig4)*
6. CT3: Black wire connects to Port 5. White wire connects to Port 6.*(Fig4)*
7. With split core CTs, close the CT around the wire to be measured and press firmly until you feel and hear it click to indicate full closure. The buttons should be fully out. Use a zip tieto ensure the CTs remain securely closed.
8. To protect the meter, use a max 1 Amp inline fuse on each line.
9. To power the meter and get a voltage reference: Tap into L1 at the breaker panel. Connect one fuse holder pigtail to the breaker, lug or an appropriate line-tap device, and connect the other pigtail to16-22 AWG UL rated stranded copper wire for connection to the meter. This L1 tap connects to Port 7 on the Omnimeter. Tap into L2 and L3 and repeat the connection process. L2 tap connects to Port 8. Be sure to add a jumper to Port 10. *(Fig 4)* L3 tap connects to Port 9.
10. Once the meter is properly mounted to the DIN Rail or enclosure and all wiring is completed, with terminal block covers installed, power can be turned back on.
11. Meter will then begin cycling through meter values. For details go to: *http://documents.ekmmetering.com/EKM_Metering_LCD_Display_Value_Reading.pdf*
12. A video of a proper 120V-208V, 3-Wire, 3-Phase system can be found here: *http://www.youtube.com/watch?NR=1&v=upNgFNV6EDM*



(Fig 4)

120V-240V, 3-Phase, 4-Wire:

1. Label L1, L2 and L3. (Arbitrarily assign labels.)
2. You will be using 3 CTs for this install. Label them CT1, CT2 and CT3.
3. Fit CT1 around L1. Make sure the arrow is facing towards the load (in the direction of flow).
4. Fit CT2 around L2.
5. Fit CT3 around L3.
6. Black wire from CT1 connects to Port 1 on the Omnimeter. White wire from CT1 connects to Port 2. *(Fig 5)*
7. Black wire from CT2 connects to Port 3 on the Omnimeter. White wire from CT2 connects to Port 4. *(Fig 5)*
8. Black wire from CT3 connects to Port 5 on the Omnimeter. White wire from CT3 connects to Port 6. *(Fig 5)*
9. With split core CTs, close the CT around the wire to be measured and press firmly until you feel and hear it click to indicate full closure. The buttons should be fully out. Use a zip tieto ensure the CTs remain securely closed.
10. Use a max 1.0 Amp inline fuse on each line to protect the meter.
11. To power the meter and get a voltage reference: Tap into L1 at the breaker panel. Connect one fuse holder pigtail to the breaker, lug or an appropriate line-tap device, and connect the other pigtail to 16-22 AWG UL rated stranded copper wire for connection to the meter. L1 connects to Port 7. Tap into L2 and L3 and repeat the connection process. L2 connects to Port 8. L3 connects to Port 9. Neutral connects to Port 10. *(Fig 5)*
12. Once the meter is properly mounted to the DIN Rail or enclosure and all wiring is completed, with terminal block covers installed, power can be turned back on.
13. Meter will then begin cycling through meter values. For details go to: *http://documents.ekmmetering.com/EKM_Metering_LCD_Display_Value_Reading.pdf*
14. A video of proper install of a 120V-208V, 3-Phase, 4-Wire system can be found here: http://www.youtube.com/watch?v=DeKiZddR0K8



(Fig 5)

RS-485 and Pulse Output:
• Terminal 20 (A) connects to RS-485+ or T+ on the RS-485 network. Terminal 21 (B) connects to RS-485- or T-. Terminal 22 (G) is used for the RS-485 network (signal) ground if needed. Observe proper RS-485 network topology. Twisted pair wiring is recommended. Shielded twisted pair may be beneficial in electrically noisy environments or for very long runs. RS-485 supports up to 256 devices on up to 4000 feet wire. Terminating resistors may be beneficial.
• Terminals 16 and 17 are for pulse output. Pulse rate: 800 Impulse/kWh when set to 200A. Polarity sensitive. Maximum 27VDC, 27mA. • Red LED on the meter face flashes 800 times/kWh(1 flash = 1.25Wh) when set to 200A.

CT Ratio	Impulse Constant
100/26.6	1600
200/26.6	800
400/26.6	400
800/26.6	200
1500/26.6	106.67
3000/26.6	53.33
5000/26.6	32

(Fig 7)

UL Approved Current Transformers			
Part Number	Type	Inside Diameter	Max Amperage
EKM BCT-013-200	Solid Core	13mm	200A
EKM BCT-015-200	Solid Core	15mm	200A
EKM BCT-025-200	Solid Core	25mm	200A
EKM BCT-025-400	Solid Core	25mm	400A
EKM SCT-013-200	Split Core	13mm	200A
EKM SCT-023-400	Split Core	23mm	400A
EKM SCT-032-400	Split Core	32mm	400A

(Fig 8)

All EKM meters, including the Omnimeter II UL v.3, have a Pulse Output. The Pulse Output pulses at a rate of 800 pulses per kilowatt hour when set to use 200 amp current transformers. This is the same rate that the red LED flashes on the meter face — 800 times/kWh. These are unpowered electronic dry contact pulses that can be counted by standard electronic pulse counters. Pulse counters can be located up to 200 feet away from the Omnimeter.

Working Principle:
When the meter is working, the energy consumed by the user is transformed into voltage and current signals, which are sampled by sample circuits. A pulse signal is then produced by a specialized IC. The Pulse signal is directly proportional to power consumption. The MCU records and stores the corresponding energy use. The LCD screen displays the energy use. Recorded information and data can be transferred using the RS485 interface.

Data:
The LCD display shows 15 pieces of data: total energy consumption(kWh), reverse kWh, voltage L1,voltage L2,voltage L3, current(Amps) L1, current L2, current L3, power(watts) L1, power L2, power L3, total power(watts), COSθ(power factor) L1, COSθ L2, and COSθ L3. Every five seconds the LCD screen will display a new piece of data. The meter also provides max demand(kW) data and the demand period can be set to one of three intervals: 15minutes, 30 minutes, or 60 minutes. The max demand can be reset to zero in software over RS485. The meter has four time-of-use tariffs(T1, T2, T3, T4) to calculate the power during different time periods, and it can set up to four time periods per day, and specify the number of the tariff for that period(from T1 to T4). The meter time can be set using the RS485 interface. By design the kWh cannot be reset. The meter will go at least 30 years without power and still keep its kWh readings. In other words, the memory will not be erased if there is no power. See figure 8 for meter display values:

#	LCD Display Data	#	LCD Display Data	#	LCD Display Data
01	Total kWh (forward + reverse)	06	Amps L1	11	Watts L3
02	Reverse kWh	07	Amps L2	12	Watts Total
03	Volts L1 (Line 1)	08	Amps L3	13	CosΘ L1 (Power Factor)
04	Volts L2	09	Watts L1	14	CosΘ L2
05	Volts L3	10	Watts L2	15	CosΘ L2

(Fig 9)

Transport and Handling:
The meter should be handled with care, as there are precision components inside that could break and/or cause faulty readings should the meter become damaged. The process of transportation, handling, and installation should be done according to the transportation and storage rule of GB/T15464-1995. Keep the meter in the original packaging when stored. The storage temperature range should be 0–40°C. The relative humidity should be ≤85%. There should be no toxic chemicals present and no corrosive substances or gases in the air. The meters should be stacked on a platform no more than ten units high.

Warranty:
Within ten years from the date of sale, and on the condition that the user abide by the specifications and installation instructions listed here, and the sealing is kept completely intact. If the meter does not correspond with the rule of the enterprise standard, the meter shall be repaired free or replaced.