Overview

KW320B 3 Channel Power Meter, 0.2 Class Accuracy, BACnet IP Only

The KW320B meter combines high performance with ease of integration via BACnet-IP (BTL- Listed) to provide a power and energy monitoring solution. Over 100 metering parameters can be monitored in real-time from a built-in web interface and encryption ensures that communication is secure. The mobile-friendly web interface allows users to remotely monitor and configure meter on mobile devices. KW320B meters support all electrical system configurations from single phase to three phase and their tamper-proof design is approved for revenue applications (ANSI C12.20 Class 0.2 and IEC 62053-22 0.2s). The meter comes standard to be mounted in a 4" Round or an IEC 92mm DIN Square form or has the flexibility to be mounted to 35mm DIN rail with the N2-AXM-DIN adapter (See Accessories Ordering). This product provides demand measurement of Current,

Active Power, Reactive Power and Apparent Power – see table 1 for all parameters monitored and metered. Current input are compatible with a 333mV and Flexible Rogowski Coil CT. Meters come standard with a three channel CT input to accurately measure neutral current. CTs are sold separately as shown on the Split-Core, Solid-Core and Rogowski Current Transformer product data sheets.

Applications: Tenant Billing, Data Centers, Sub-Metering Electrical Panel, Equipment Load Monitoring, Industrial Applications, Predictive Maintenance, Renewable Energy, Overhead Cost Reduction, "NET ZERO" Buildings, LEED Buildings, Green Buildings, and Refrigeration

The KW320B Power Meters are covered by a Five (5) Year Limited Warranty.

Part Numbers

N2-KW320B-P1-D-IP-A	**N2-USB-RS485**	**N2-AK-03**	**N2-AXM-DIN**

Specifications

Service Type:	Single Phase, 3 Phase – Four Wire (WYE), Three Phase – Three Wire (Delta)
Power[1]:	100 - 415Vac, 50/60Hz, 100 - 300Vdc on terminals L and N
Burden:	5W
Withstand:	3250Vac, 50/60Hz for 1 minute
Power Supply Wiring:	AWG22-16 (0.6-1.5mm2)
AC Fuse Protection:	External 1A/250VAC Fuse ***(Recommended)***
Rated Voltage:	100-400VAC Line to Neutral (L-N) or 100-690VAC Line to Line (L-L) RMS for three phase or 100-400VAC RMS for single phase; 100-300 VDC
Number of CT Inputs:	3
Revenue Grade Accuracy:	**Active Energy:** Class 0.2s (According to IEC 62053-22) and Class 0.2s (According to ANSI C12.20) **Reactive Energy**: Class 2 (According to IEC 62053-23) – See Table 2 for parameter accuracy, resolution, and range
Voltage Channels:	400 Volts AC (L-N), 690 VAC (L-L), 45Hz - 65Hz, 300Hz - 500Hz
Withstand Voltage:	1500Vac Continuous, 2500Vac, 50/60Hz for 1 Minute
Input Impedance:	2M ohm per Phase
Pickup Voltage:	10VAC
Current Channels:	3 Channels, 0.525 VAC max, 333 mV CT's or 0 to 6000 Amps with Rogowski Coils
Maximum Current Input:	150% of current sensor rating (mV CT's) to maintain accuracy. Up to 6000 Amps w/ Rogowski Coils

Harmonic Resolution:	63rd Harmonic (50Hz or 60Hz type) or 15th Harmonic (400Hz type)
Measurement Type:	Real-time, True RMS measurement of instantaneous Voltage, Current, Power, Frequency, Harmonics, Phase Angle, Demand, Unbalance Factor, Running Time, and Power Factor
Line Frequency:	50/60 Hz
Measurement Data Parameters:	See Table 1
Real Time Parameter Update Rate:	100 mS
Accumulated Parameter Update Rate:	1 Sec
LCD Display:	Multiple Display Modes (Important Parameter's, All Parameter's, Settings Display Modes)
Communication Protocol:	**Ethernet:** BACnet Over IP Only
Enclosure Material / Flammability Rating:	Polycarbonate / UL 94V-0
Operating Temperature Range:	-13 to 158oF (-25 to 70oC)
Storage Temperature Range:	-40 to 185oF (-40 to 85oC)
Operating / Storage Humidity Range:	5 to 95%, non-condensing
Wiring Connections:	Screw Connections
Wire Size:	14-22 AWG (2.5 to 0.34 mm2)
Mounting:	ANSI C39.1 (4" Round) or an IEC 92mm DIN (Square) form.
Utility Software:	Acuview Utility Software, Windows Based;
Agency Approvals:	BTL Certified, CE, UKCA, RoHS2, cULus Listed (File # E359521)
Standard Compliance:	***Measurement Standard:*** IEC 62053-22; ANSI C12.20 ***Environmental Standard:*** IEC 60068-2 ***Safety Standard:*** IEC 61010-1, UL 61010-1, IEC 61557-12 ***EMC Standard:*** IEC 61000-4/-2-3-4-5-6-8-11, CISPR 22, IEC 61000-3-2, IEC 61000-6-2/4 ***Outlines Standard:*** DIN 43700, ANSI C39.1
Face Dimensions (L x W x H):	3.80" (96 mm) x 3.80" (96 mm) x 1.99" (50.7 mm)
Power Meter Weight:	0.77 lbs. (350g)

TABLE # 1

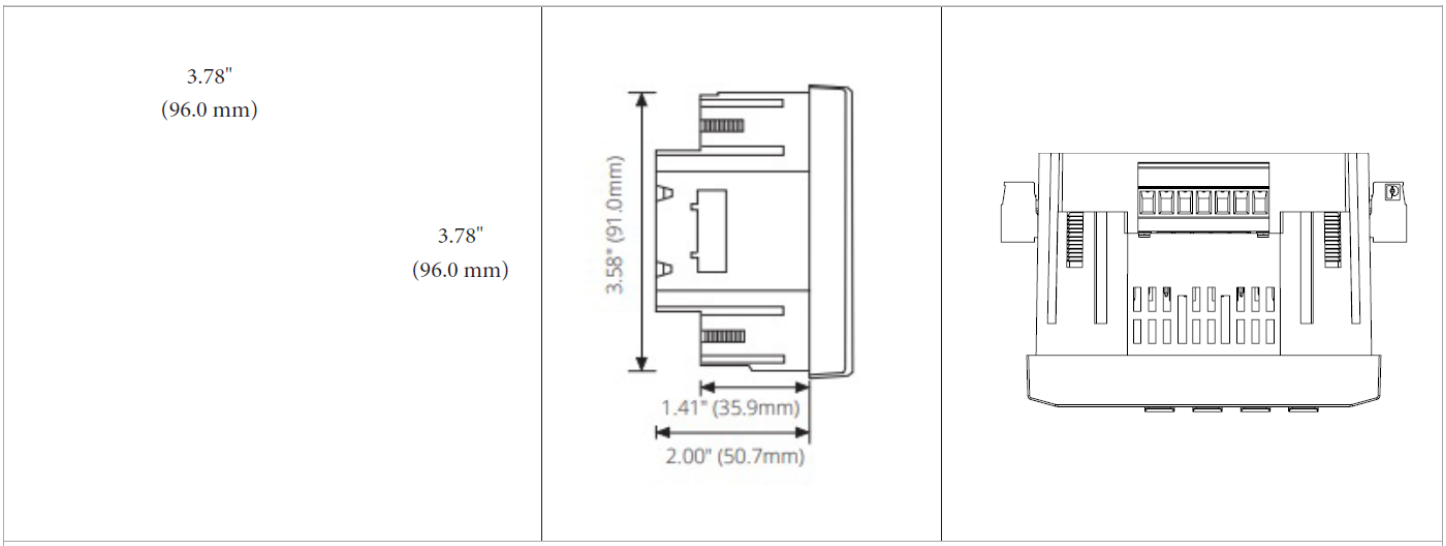
CATEGORY		ITEM	Parameters
Metering	**Real time metering**	Phase Voltage	V1, V2, V3, Vlnavg
		Line Voltage	V12, V23, V31, Vllavg
		Current	I1, I2, I3, In, Iavg
		Power	P1, P2, P3, Psum
		Reactive Power	Q1, Q2, Q3, Qsum
		Apparent Power	S1, S2, S3, Ssum
		Power Factor	PF1, PF2, PF3, PF
		Frequency	F
	Energy & demand	Energy	Ep_imp, Ep_exp, Ep_total, Ep_net, Epa_imp, Epa_exp, Epb_imp, Epb_exp, Epc_imp, Epc_exp
		Reactive Energy	Eq_imp, Eq_exp, Eq_total, Eq_net, Eqa_imp, Eqa_exp, Eqb_imp, Eqb_exp, Eqc_imp, Eqc_exp
		Apparent Energy	Es, Esa, Esb, Esc
		Demand	Dmd_P, Dmd_Q, Dmd_S, Dmd_I1, Dmd_I2, Dmd_I3
Monitoring	**Power quality**	Voltage Unbalance Factor	U_unbl
		Current Unbalance Factor	I_unbl
		Voltage THD	THD_V1,THD_V2,THD_V3, THD_Vavg
		Current THD	THD_I1, THD_I2, THD_I, THD_Iavg

TABLE #2

METERING

Parameters		Accuracy	Resolution	Range
Voltage		0.2%	0.1V	10V~1000kV
Current		0.2%	0.001A	5mA~50000A
Power		0.2%	1W	-9999MW~9999MW
Reactive Power		0.2%	1var	-9999Mvar~9999Mvar
Apparent Power		0.2%	1VA	0~9999MVA
Power Demand		0.2%	1W	-9999MW~9999MW
Reactive Power Demand		0.2%	1var	-9999Mvar~9999Mvar
Apparent Power Demand		0.2%	1VA	0~9999MVA
Power Factor		0.2%	0.001	-1.000~1.000
Frequency		0.02%	0.01Hz	45.00~65.00Hz (50 or 60Hz type) 300.00Hz~500.00Hz (400Hz type)
Energy	Primary	0.2%	0.1kWh	0-99999999.9kWh
	Secondary	0.2%	0.001kWh	0-999999.999kWh
Reactive Energy	Primary	0.2%	0.1kvarh	0-99999999.9kvarh
	Secondary	0.2%	0.001kvarh	0-999999.999kvarh
Apparent Energy	Primary	0.2%	0.1kVAh	0-99999999.9kVAh
	Secondary	0.2%	0.001kVAh	0-999999.999kVAh

Dimensional Drawing



FRONT VIEW **SIDE VIEW** **TOP VIEW**

Mounting Instructions

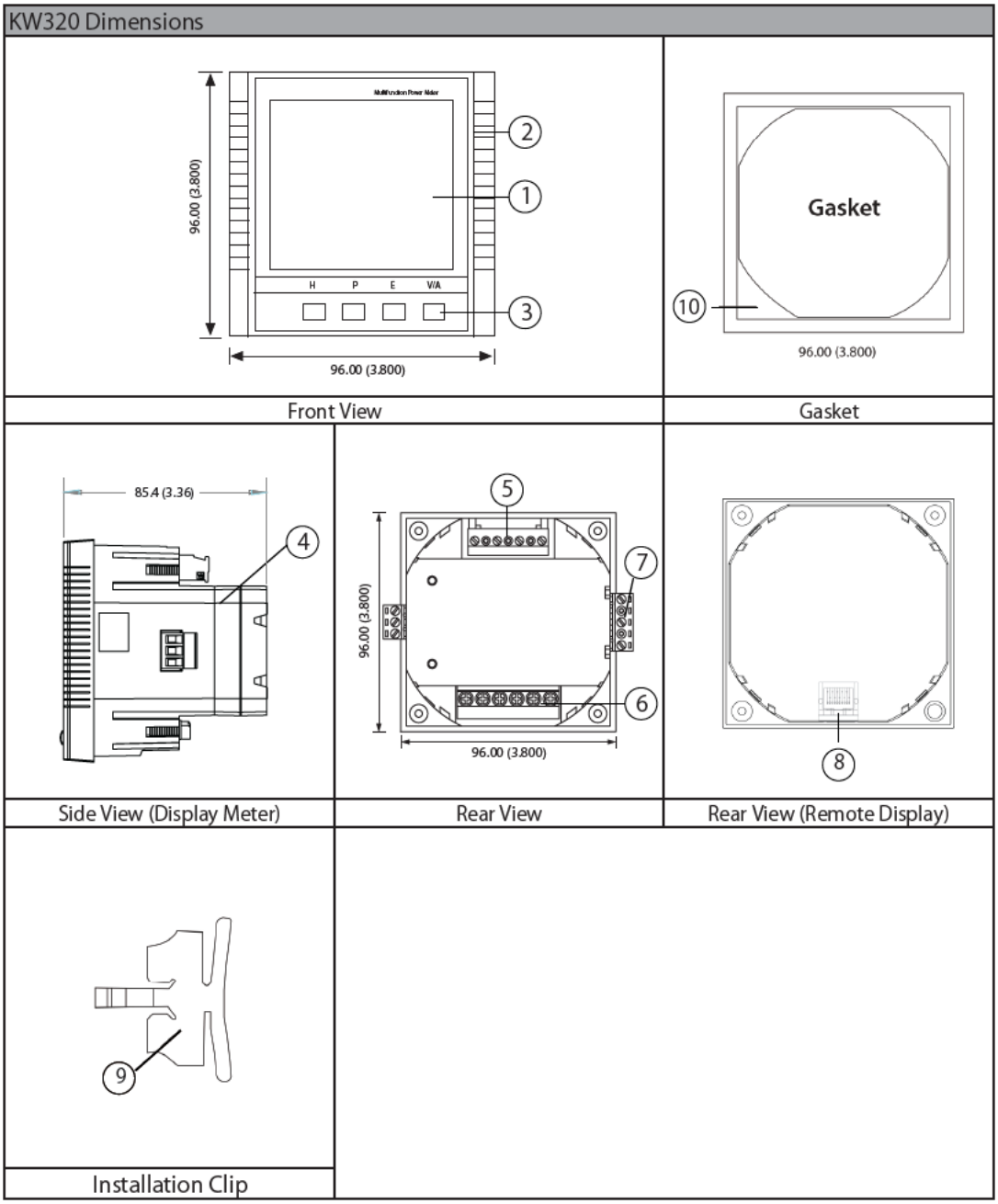


Figure 1: Dimensions and Part Names

Part Name	Description
1. LCD Display	Large bright white backlight LCD display
2. Front Casing	Visible portion (for display and control) after mounting onto a panel
3. Key	Four keys are used to select display and set
4. Enclosure	The KW320 series meter enclosure is made of high strength anti-combustible engineering plastic
5. Voltage Input Terminals	Used for voltage input
6. Current Input Terminals	Used for current input
7. Power Supply Terminals	Used for control power input
8. Communication Terminals	Communication output
9. Installation Clip	Used for fixing the meter to the panel
10. Gasket	Insert the gasket in between the meter and the cutout to cover up gaps from the round hole

Installation Methods

- Environmental:
  Before installation, please check the environment, temperature and humidity to ensure the KW320 series meter is being placed where optimum performance will occur.

- Temperature:
  Operation: -25 to 70°C (-13 to 158°F) Storage: -40 to 85°C (-40 to 185°F) Humidity: 5% to 95% non-condensing.

- Location:
  KW320 series meter should be installed in a dry and dust free environment. Avoid exposing the meter to excessive heat, radiation and high electrical noise sources.

Installation Steps:

The KW320 series meter can be installed into a standard ANSI C39.1 (4" Round) or an IEC 92mm DIN (Square) form.

1. Cut a square hole or round hole on the panel of the switch gear. The cutting size is show in fig 2.

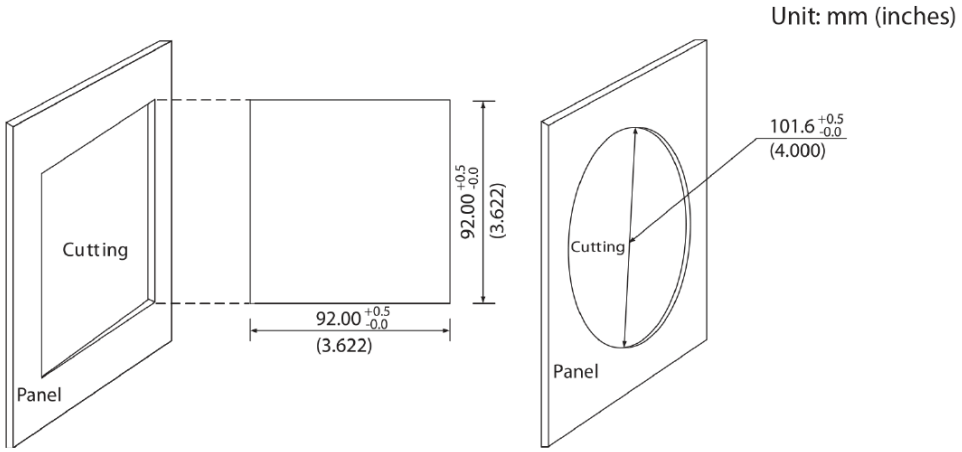


Figure 2: Panel Cutout

2. Remove the clips from the meter and insert the meter into the square hole from the front side. Please note: optional rubber gasket must be installed on the meter before inserting the meter into the cut out.

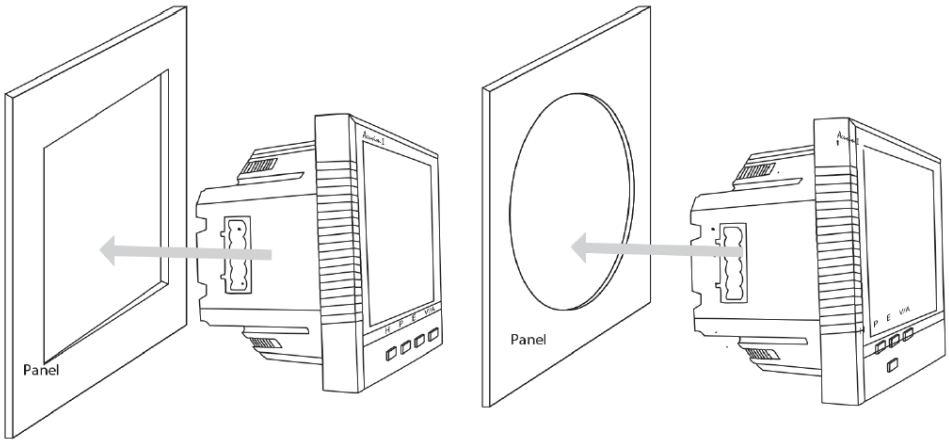


Figure 3: Put the meter in the opening

3. Install clips on the back side of the meter and secure tightly to ensure the meter is affixed to the panel.

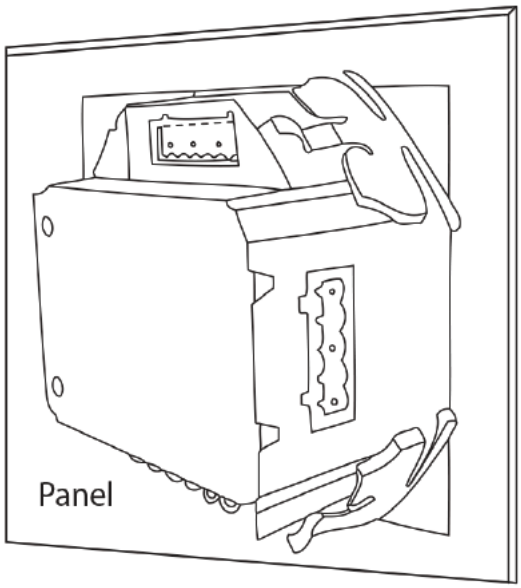


Figure 4: Use the clips to fix the meter on the panel

NOTE The display meter and the remote display unit have the same installation method. The DIN rail meter is simply installed on a 35mm DIN rail.

Wiring Instructions

Warning	• Installation of the meter must be performed by qualified personnel only, who follow standard safety precautions through the installation procedures. Those personnel should have appropriate training and experience with high voltage devices. Appropriate safety gloves, safety glasses and protective clothing are recommended. • During normal operation, dangerous voltage may flow through many parts of the meter, including terminals, and any connected CTs (Current Transformers) and PTs (Potential Transformers) and their circuits. All primary and secondary circuits can, at times, produce lethal voltages and currents. AVOID contact with any current- carrying surfaces. • The meter and its I/O output channels are NOT designed as primary protection devices and shall NOT be used as primary circuit protection or in an energy limiting capacity. The meter and its I/O output channels can only be used as secondary protection. AVOID using the meter under situations where failure of the meter may cause injury or death. AVOID using the meter for any application where risk of fire may occur. • All meter terminals should be inaccessible after installation. • When removing meter for service, use fuses for voltage leads and power supply to prevent hazardous voltage conditions or damage to CTs. • IF THE EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.

Warning	• DISCONNECT DEVICE: The following part is considered the equipment disconnect device. • A SWITCH OR CIRCUIT-BREAKER SHALL BE INCLUDED IN THE INSTALLATION. THE SWITCH SHALL BE IN CLOSE PROXIMITY TO THE EQUIPMENT AND WITHIN EASY REACH OF THE OPERATOR. THE SWITCH SHALL BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT

Caution	• Do NOT perform Dielectric (HIPOT) test to any inputs, outputs or communication terminals. High voltage testing may damage electronic components of the meter. • Applying more than the maximum voltage the meter and/or its modules can withstand will permanently damage the meter and/or its modules. Please refer to the specifications for all devices before applying voltages. • THERE IS NO REQUIRED PREVENTIVE MAINTENANCE OR INSPECTION NECESSARY FOR SAFETY. HOWEVER, ANY REPAIR OR MAINTENANCE SHOULD BE PERFORMED BY THE FACTORY.

Tip	Automated Logic® recommends using a dry cloth to wipe the meter.

Terminal Strips

There are four terminal strips at the back of the KW320 series meter. The three-phase voltage and current are represented by using 1, 2 and 3 respectively. These numbers have the same meaning as A, B and C or R, S and T used in other literature.

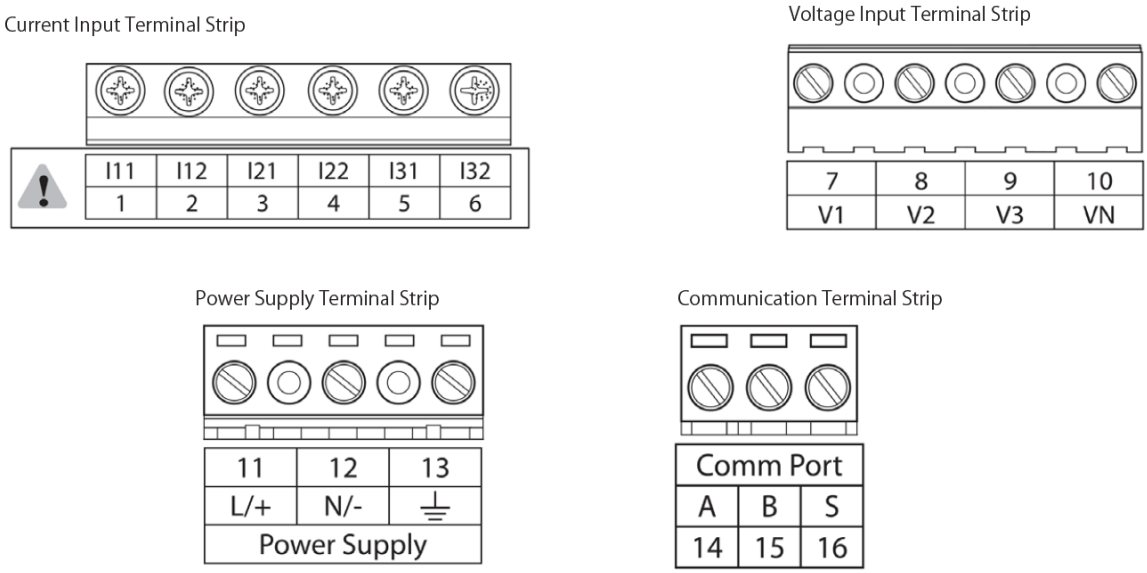


Figure 5: Terminal Strips

Warning	• DISCONNECT DEVICE: The following part is considered the equipment disconnect device. • A SWITCH OR CIRCUIT-BREAKER SHALL BE INCLUDED IN THE INSTALLATION. THE SWITCH SHALL BE IN CLOSE PROXIMITY TO THE EQUIPMENT AND WITHIN EASY REACH OF THE OPERATOR. THE SWITCH SHALL BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT • Make sure the control power terminal of the meter ground is connected to the safety Earth of switchgear. • Make sure the voltage of power supply is the same as what the meter needed for its control power. • Safety Earth Connection Before setting up the meter's wiring, please make sure that the switch gear has an earth ground terminal. Connect both the meter's and the switch gear's ground terminal together. The following ground terminal symbol is used in this user's manual.

Power Requirement

Control Power:

There are 2 options for the Control Power of the KW320 series meter:

Standard: 100~415 VAC (50/60Hz) or 100-300VDC

The meter's typical power consumption is very low and can be supplied by an independent source or by the measured load line. A regulator or an uninterrupted power supply (UPS) should be used under high power fluctuation conditions. Terminals for the control power supply are 11, 12 and 13 (L, N and Ground). A switch or circuit-breaker shall be in close proximity to the equipment, within easy reach of the operator and shall be marked as the disconnecting device for the equipment.

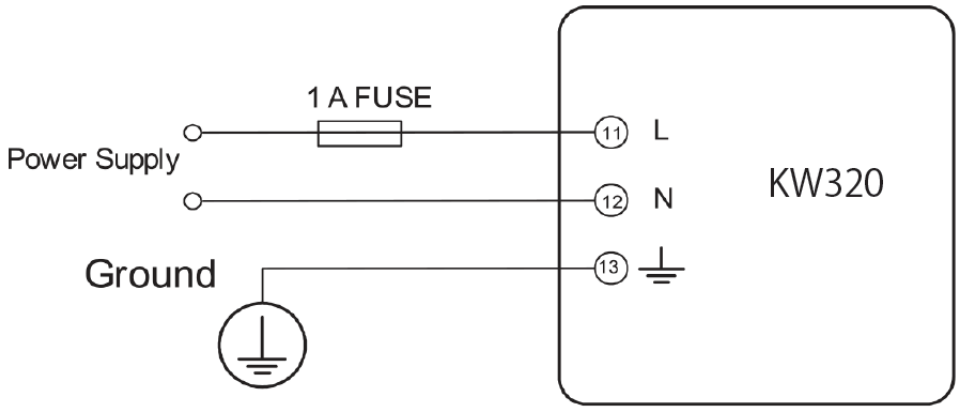


Figure 6: Power Supply

A fuse (typical 1A/250VAC) should be used in the auxiliary power supply loop. No. 13 terminal must be connected to the ground terminal of the switchgear. An isolated transformer or EMC filter should be used in the control power supply loop if there is a power quality problem in the power supply.

Tip	A filter should be used if there is an EMI problem.

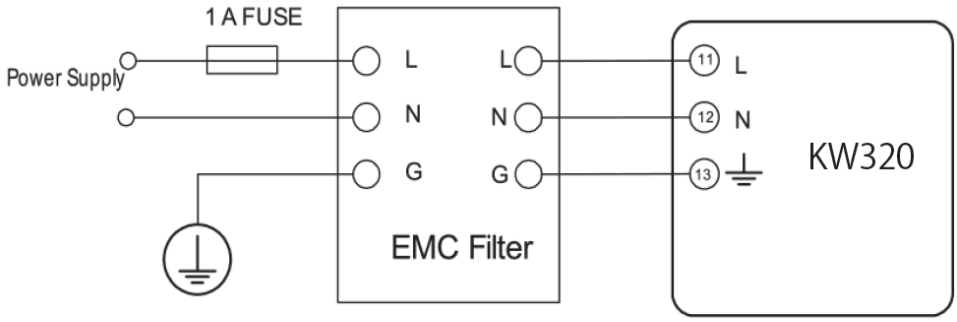


Figure 7: Power Supply With EMC Filter

Choice of wire of power supply is AWG 22-16 or 0.6-1.5 mm2.

Voltage Input:

Maximum input voltage for the KW320 series meter shall not exceed 400LN/690LL VAC rms for three phase or 400LN VAC rms for single phase. Potential Transformer (PT) must be used for high voltage systems. Typical secondary output for PT's shall be 100V or 120V. Please make sure to select an appropriate PT to maintain the measurement accuracy of the meter. When connecting using the star configuration wiring method, the PT's primary side rated voltage should be equal to or close to the line voltage of the system. A fuse (typical 1A/250VAC) should be used in the voltage input loop. The wire for voltage input is AWG16-12 pr 1.3-2.0 mm2.

NOTE In no circumstance should the secondary of the PT be shorted. The secondary of the PT should be grounded at one end. Please refer to the wiring diagram section for further details.

Current Input:

Current Transformers (CTs) are required in most applications. The KW320 series meter supports two CT input types: 333mV (SC) or Rogowski coil (RCT). Meter model selection is determined by which style of current transformer input being used. The CT should be selected to maintain revenue grade accuracy of the system. The distance between CT and the meter should be as short as possible as the length of the CT leads will have an effect on the accuracy.

The meter requires AWG22-14 as the wire size to the current input terminals.

NOTE The secondary side of the CT should not be open circuit in any circumstance when the power is on. There should not be any fuse or switch in the CT loop.

When using mV and RCT CT's the secondary leads must not be grounded.

VN Connection:

VN is the reference point of the KW320 series meter voltage input. Low wire resistance helps improve the measurement accuracy. Different system wiring 20 modes require different VN connection methods. Please refer to the wiring diagram section for more details.

Three Phase Wiring Diagram:

This meter can satisfy almost any kind of three phase wiring diagrams. Please read this section carefully before choosing the suitable wiring method for your power system.

Voltage and current input wiring mode can be set separately in the meter parameter setting process. The voltage wiring mode can be set as 3-phase 4-line Wye (3LN), 3-phase 3-line direct connection (3LL), 3-phase 3-line open delta (2LL), single phase 2-line (1LN) and single phase 3-line (1LL). The current input wiring mode can be set as 3CT, 2CT and 1CT.

Voltage Input Wiring

3-Phase 4-Line Wye Mode (3LN):

The 3-Phase 4-Line Wye mode is commonly used in low voltage electric distribution power systems. For voltage lower than 400LN/690LL VAC, power line can be connected directly to the meter's voltage input terminal as shown in Fig 2-9a. For high voltage systems (over 400LN/690LL VAC), PT's are required as shown in Fig 2-9b. The meter should be set to 3LN for both voltage levels.

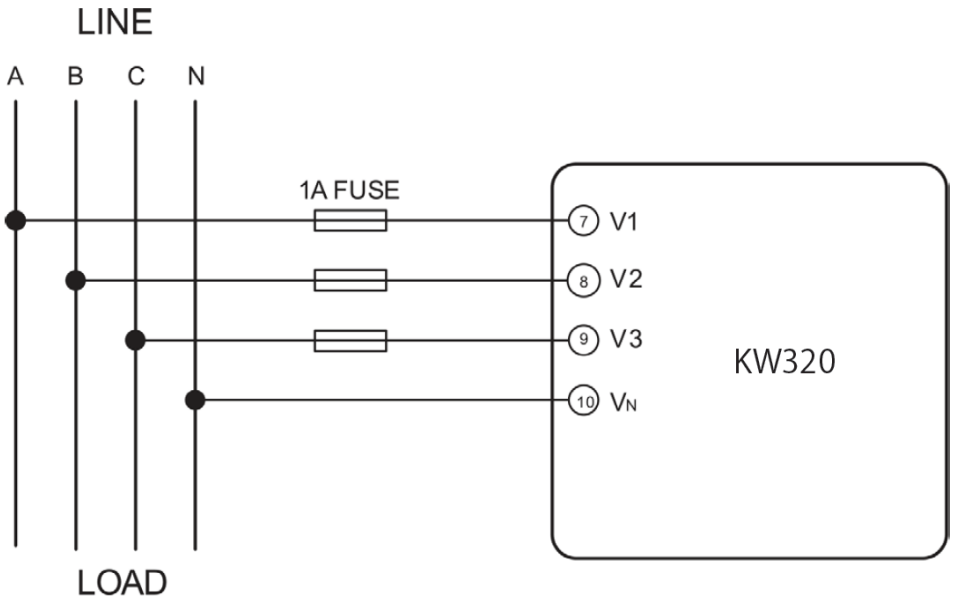


Figure 8: 3LN Direct Connection

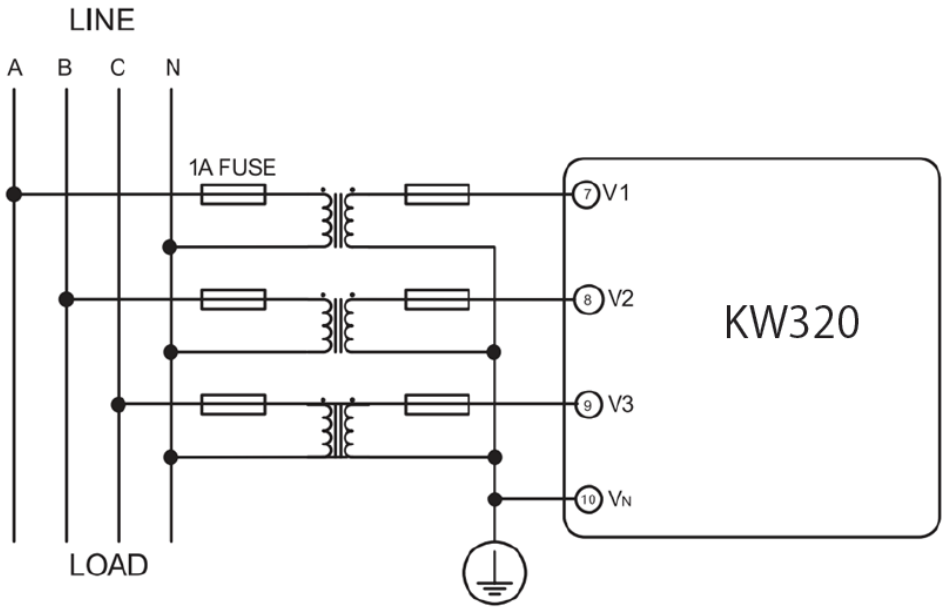


Figure 9: 3LN With 3PT

3-Phase 3-Line Direct Connection Mode (3LL):

In a 3-Phase 3-Line system, power line A, B and C are connected to V1, V2 and V3 directly. VN is floated. The voltage input mode of the meter should be set to 3LL.

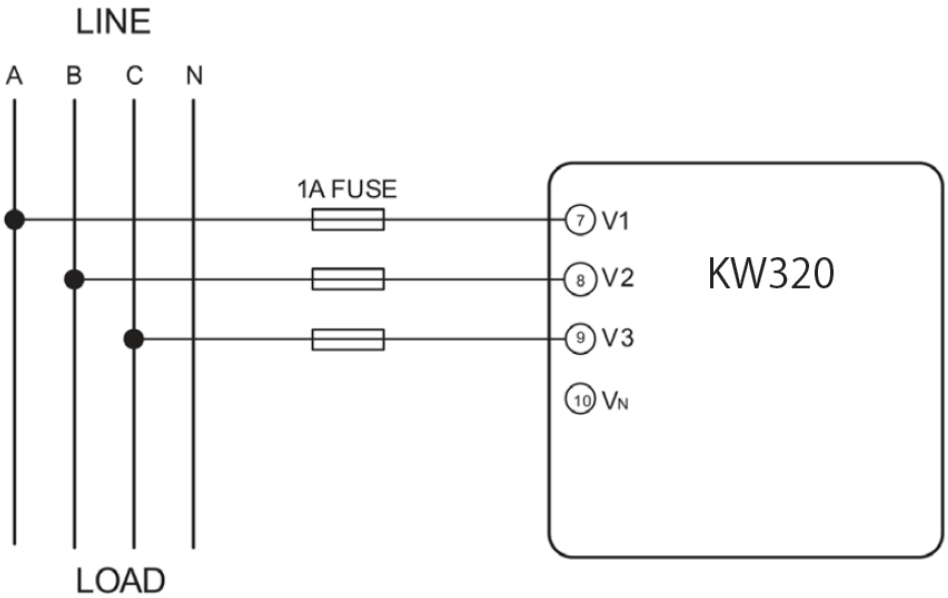


Figure 10: 3LL 3-Phase 3-Line Direct Connection

3-Phase 3-Line Open Delta Mode (2LL):

Open Delta Wiring Mode is often used in high voltage systems. V2 and VN are connected together in this mode. The voltage input mode of the meter should be set to 2LL for this voltage input wiring mode.

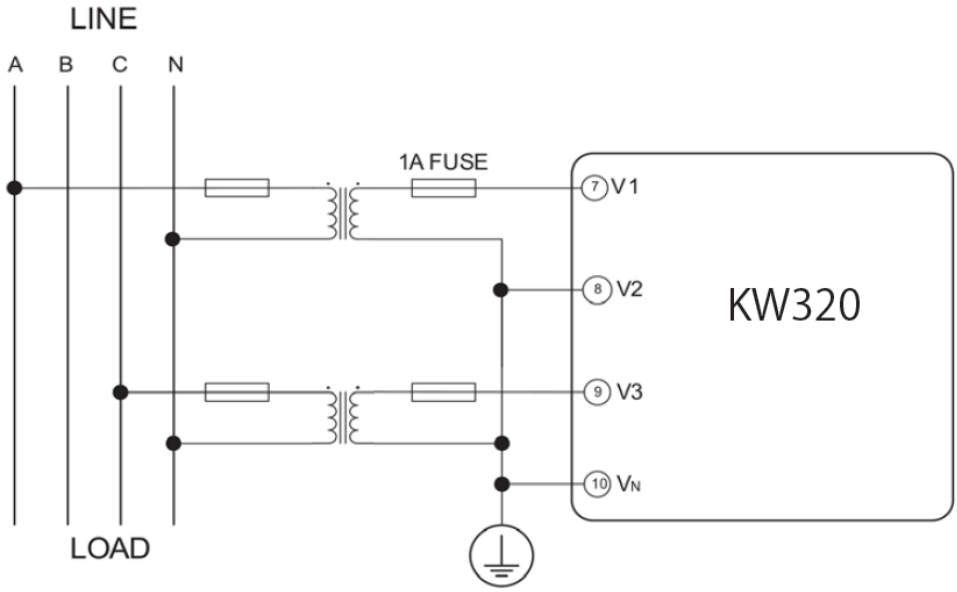


Figure 11: 2LL With 2PT's

Current Input Wiring

3CT:

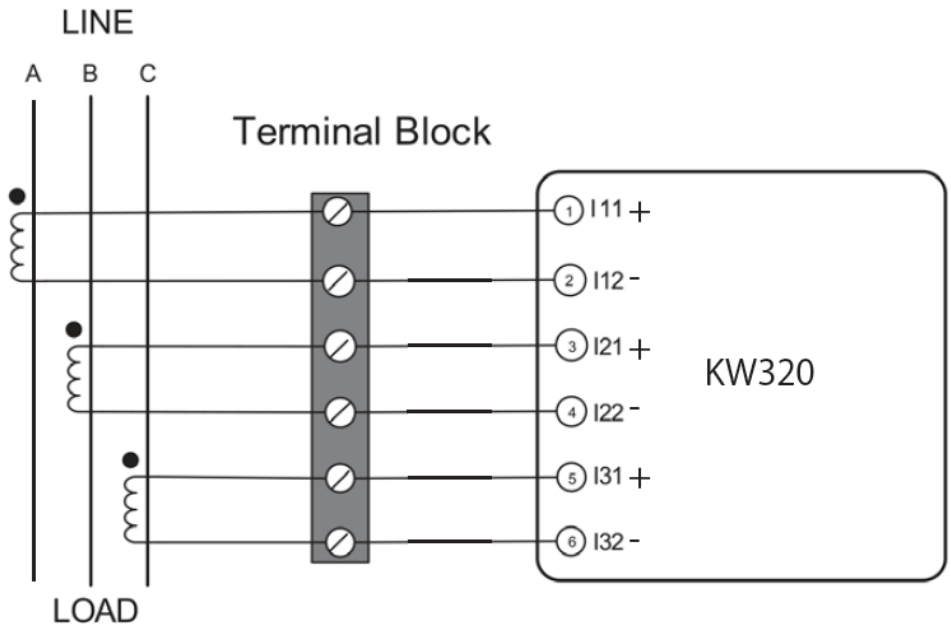


Figure 12: 3CT

2CT:

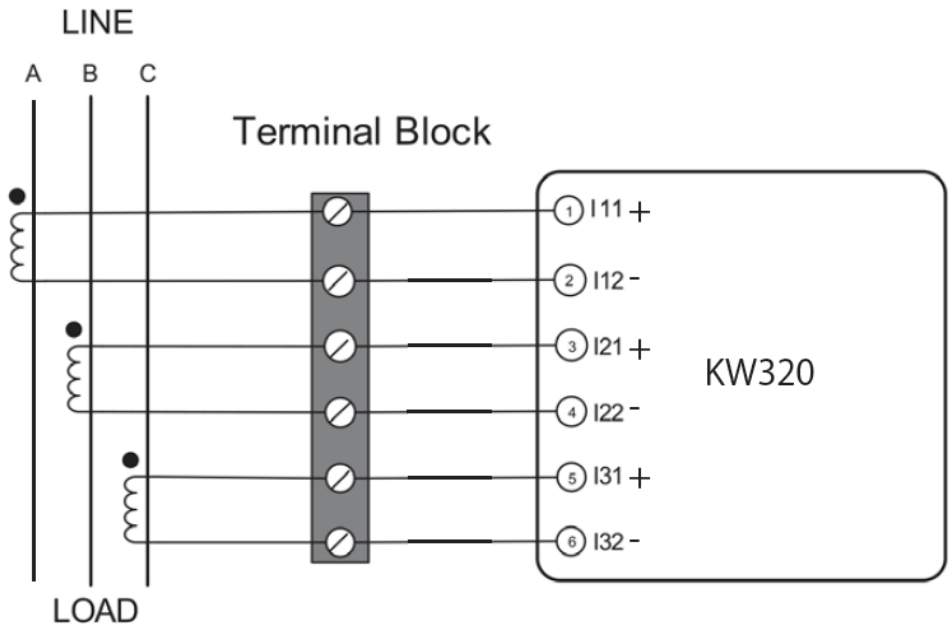


Figure 13: 2CT

1CT:

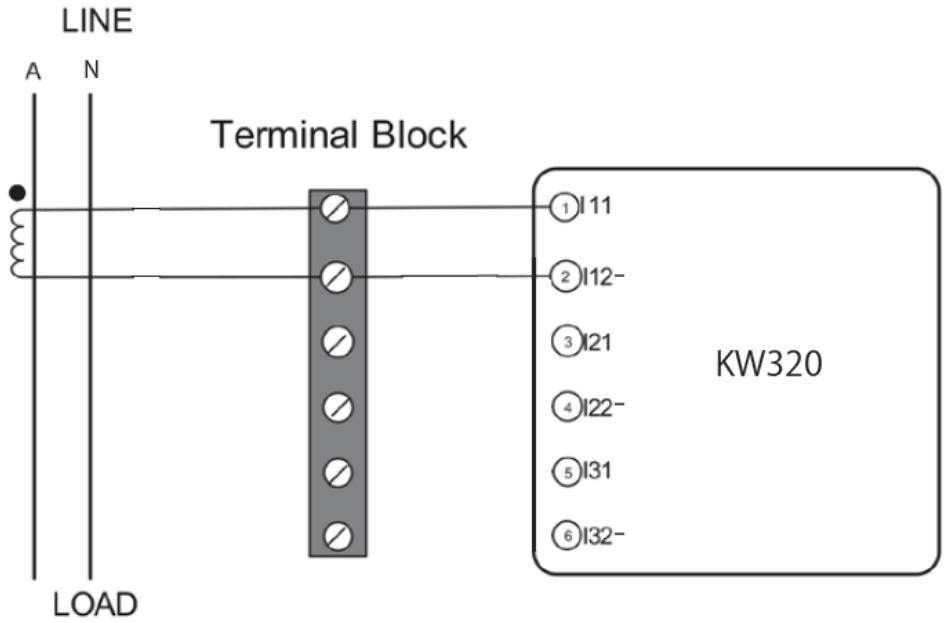


Figure 14: 1CT

Frequently Used Wiring Method

In this section, the most common voltage and current wiring combinations are shown in different diagrams. In order to display measurement readings correctly, please select the appropriate wiring diagram according to your setup and application.

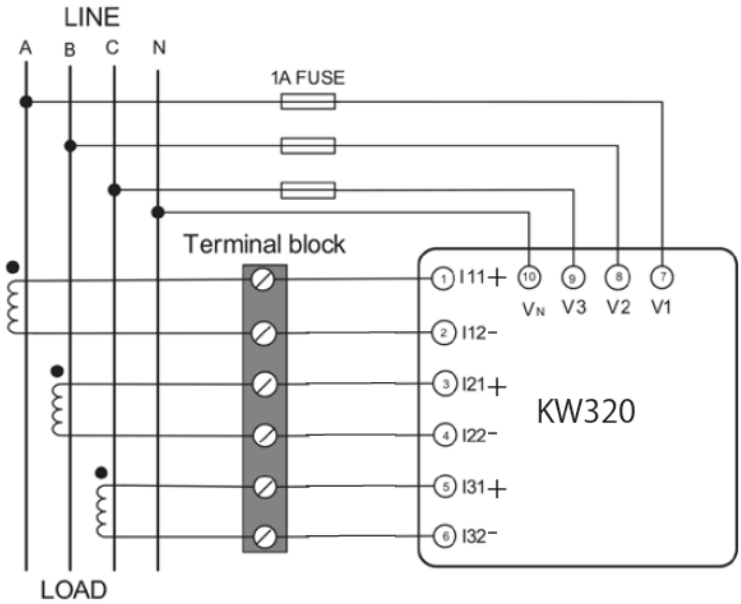


Figure 15: 3LN, 3CT

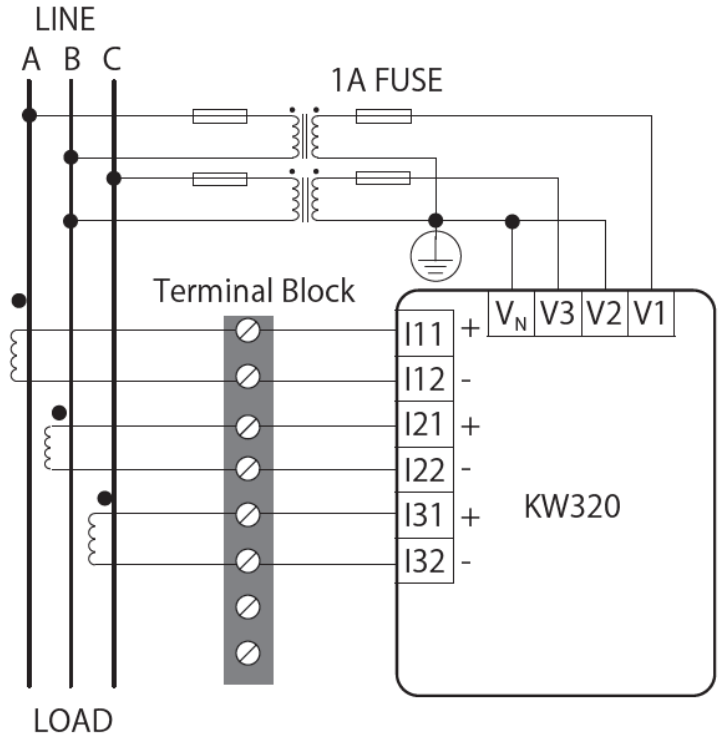


Figure 16: 2LL, 3CT

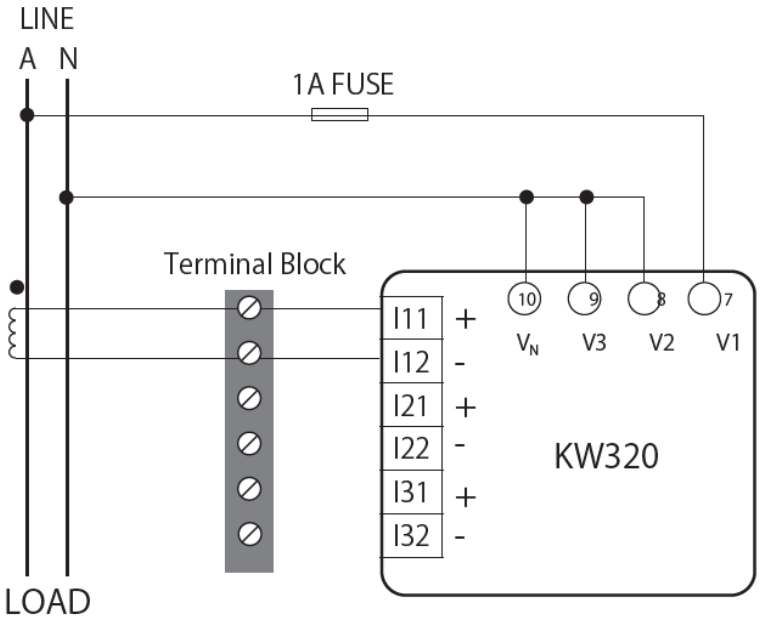


Figure 17: 1LN, 1CT

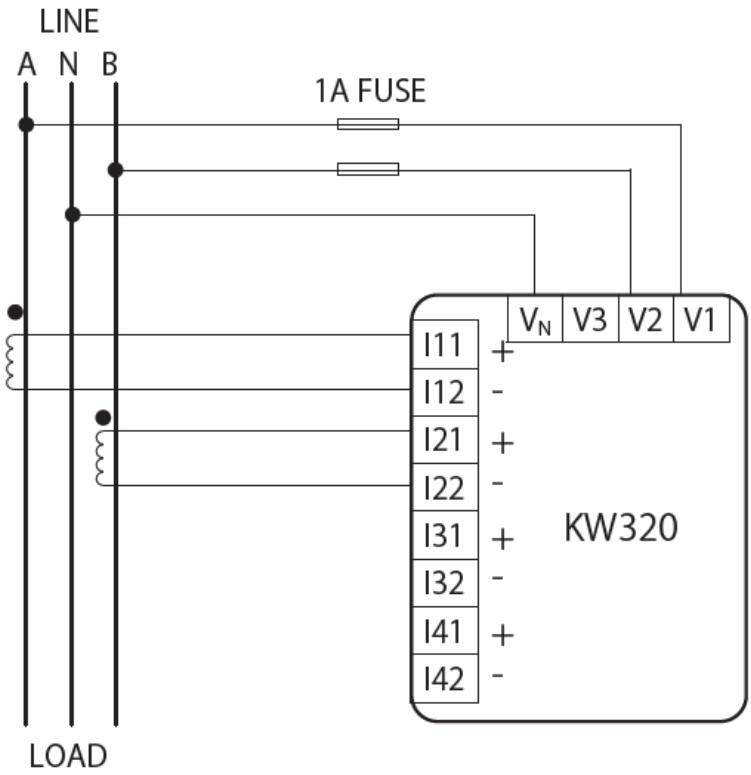


Figure 18: 1LL, 2CT

Appendix – Symbols Key

Warning	Potential for death, serious injury, or permanent damage to a system.
Caution	Potential for injury, damage to a system, or system failure.
Tip	Useful information not related to injury or system damage.

W.E.E.E. DIRECTIVE

At the end of their useful life the packaging and product should be disposed of via a suitable recycling center. Do not dispose of with household waste. Do not burn.