

MODEL 209

Line Voltage & Phase Sequence Detector

- Indicates Normal Condition
- Shows Missing Phase
- Indicates Phase Sequence ABC or CBA



DESCRIPTION

The Model 209 Line Voltage & Phase Sequence Detector can help prevent costly downtime and equipment damage by offering a quick and easy way to determine the phase sequence (ABC or CBA) and to check for missing phases in a 3-phase circuit.

To use, connect the Detector to any 3-phase circuit, Wye or Delta. If all three phases are present and in the proper sequence, the ABC rotation lamp and the three line voltage lamps (A, B and C) will illuminate. An improper phase sequence will cause the CBA rotation lamp to illuminate. An open phase condition will cause both rotation lamps to flash and only illuminate two line voltage lamps. See the Condition Chart.

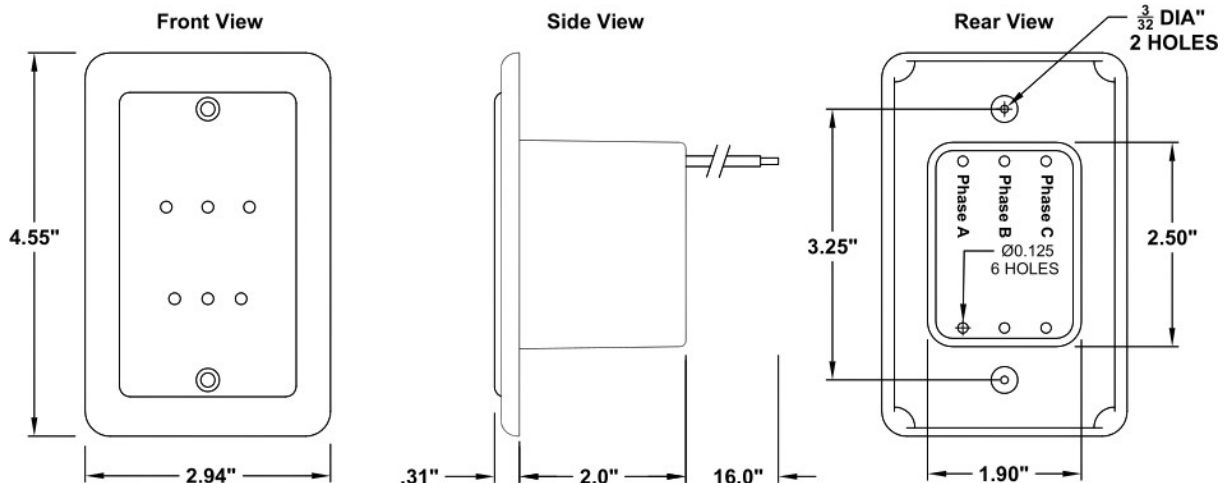
The Model 209 is available in either a 208/240V option or a 480V option. Both models can be used in a three phase circuit with a frequency of 50Hz, 60Hz or 400Hz.

SPECIFICATIONS

MODEL	209-208/240V	209-480V
Operating Voltage	187 - 264V ph-ph	432-528V ph-ph
Frequency	50 / 60 / 400 Hz	
Connection Time	Continuous	
Operating Temp.	-20° to 140° F	
Leads	Fly leads (22 AWG / 600V)	
Weight	3.2 oz	
Mounting	Panel Mount / Standard Wall Switch Box	
Enclosure Material	Noryl plastic	

CONDITION	LEDs LIT				
	ABC	CBA	A	B	C
ABC ROTATION	●	○	●	●	●
CBA ROTATION	○	●	●	●	●
PHASE A MISSING	FLASH		○	●	●
PHASE B MISSING			●	○	●
PHASE C MISSING			●	●	○
>2 Phases Missing	○				

DIMENSIONS



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READ ALL INSTRUCTIONS BEFORE INSTALLING, OPERATING OR SERVICING THIS DEVICE.
KEEP THIS DATA SHEET FOR FUTURE REFERENCE.

GENERAL SAFETY

POTENTIALLY HAZARDOUS VOLTAGES ARE PRESENT AT THE TERMINALS OF THE MODEL 209 DETECTOR. ALL ELECTRICAL POWER SHOULD BE REMOVED WHEN CONNECTING OR DISCONNECTING WIRING. THIS DEVICE AND WIRING SHOULD BE INSTALLED AND SERVICED BY QUALIFIED PERSONNEL.

OPERATOR INSTRUCTIONS

CONNECTION

Connect the three leads to the 3-phase power source as shown on the back of the Model 209. Refer to Typical Application diagram.

Apply AC power. One of the phase sequence detector lamps and each of the three phase lamps should illuminate. If both "ABC" and "CBA" phase sequence lamps are flashing or, if any or all of the phase lamps are off check for a loss of voltage. If the desired phase sequence lamp is not lit, change any two of the three leads.

Read the 3-phase designation on the back panel; then connect corresponding leads to your equipment.

3-PHASE POWER BASICS

In 3-phase power, there are three lines which carry the voltage normally designated as A-B-C. In some installations, however, they may be designated L1-L2-L3, or T1-T2-T3. The phase sequence as generated is A-B-C.

As the voltage on these lines rotates through 360 degrees, phase B lags phase A by 120 degrees; while phase C lags phase A by 240 degrees. The voltage on each of these lines vary as shown in *figure 1*, a graph of voltage versus degrees of rotation.

figure 1.

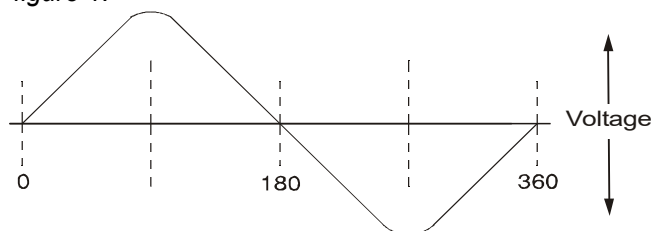
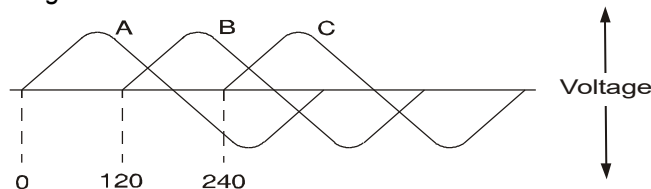


figure 2.



If all phases are shown on the same graph, they would appear as shown in *figure 2*.

Pictured on a rotating phasor diagram, the angle between each phase is fixed at 120 degrees as they rotate in unison at the line frequency (see *figure 3*).

From *figure 4*, you can see if any two phases are reversed, the direction of rotation will be in the opposite direction. This reversal of the rotating sequence will cause motors to run in the opposite direction. Many other types of equipment are phase sensitive and will not perform as intended if the phase sequence is incorrect.

figure 3

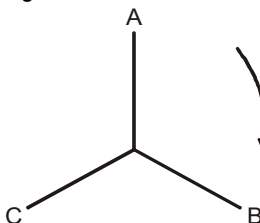
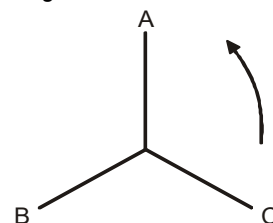
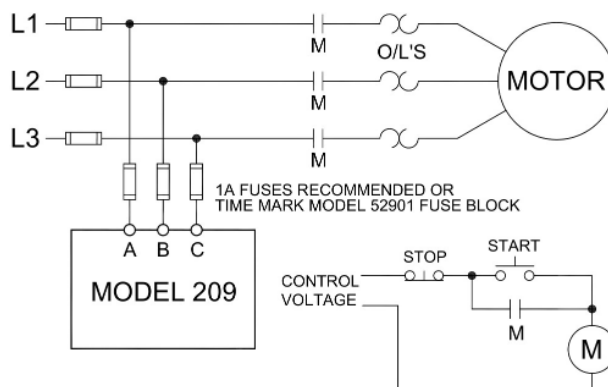


figure 4



TYPICAL APPLICATION



WARRANTY

This product is warranted to be free from defects in materials and workmanship for one year. Should this device fail to operate, we will repair it for one year from the date of manufacture. For complete warranty details, see the *Terms and Conditions of Sales* page in the front section of the Time Mark catalog or contact Time Mark at 1-800-862-2875.

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