



INSTALLATION • OPERATION • MAINTENANCE I N S T R U C T I O N S

— 221 LINE — SWITCHBOARD INSTRUMENTS FOUR AND ONE -HALF-INCH CLASSIFICATION 100° SCALE TYPE

GENERAL

Type 221 instruments are designed and built to meet or exceed the requirements of American Standard C39.1 for electrical indicating switchboard instruments. The rated accuracy class is one per cent.

CASES

The first letter in the Type designation indicates the form of case used.

K=Rectangular Flush Case, Flange mounted.

MECHANISMS

The second letter in the type designation indicates the principle of operation.

X=Permanent magnet moving coil

A=Repulsion, moving iron

Y=Electrodynamic

C=Rectifier plus X

DESCRIPTION OF TAUT BAND SUSPENSION INSTRUMENTS

CAUTION: When the instrument mechanism is exposed, avoid contact with the tension springs. These springs are precisely made and positioned, and any pressures inadvertently applied to them may cause misalignment of the moving element.

The X-221 is a pivotless, bearingless d.c. instrument of the permanent magnet moving coil type. A suspension system is employed which replaces the conventional pivots, jewels, and control spring. At each end of the moving coil is attached a thin metallic band. At the front and rear bridges these bands are connected to tension springs. The tension springs exert axial forces which keep the metallic bands taut and the moving element from sagging. The taut bands serve to carry current to the moving coil, and also provide the necessary deflection counter-torque.

The A-221 Ammeters and Voltmeters employ

similar suspensions but operate on the repulsion, moving iron principle.

The taut band design eliminates pivot friction and allows the instrument to withstand severe conditions of shock and vibration. The suspension system assures longer life with reduced maintenance costs.

The Y221 wattmeters and power factor meters are the Electrodynamic pivot and jewel type.

DIAL NOTES

References to type style number, use of external components if required, coil ratings, calibration data etc., are made on the dial.

INSTALLATION

Unpack instruments carefully. Terminal and mounting hardware, and any external components may be in separate packages.

Drill panels and connect instruments according to the diagrams in this leaflet, or according to switchboard drawings if instruments are supplied as part of a switchboard.

Before energizing the instrument, adjust the pointer to zero by means of the zero adjuster at the front of the instrument.

CIRCUIT PRECAUTIONS

HIGH VOLTAGE OPERATION

All instruments are insulated for 800 volt maximum service.

When voltmeters are used with external resistors on voltages higher than the insulation rating of the instrument, one terminal of the instrument should be grounded.

Ammeters with external shunts must be used with leads having the resistance specified in the dial notes. If the circuit voltage exceeds the insulation

SUPERSEDES I.L. 43-221C

*Denotes Change from Superseded Issue.

EFFECTIVE MAY 1966

Fig. 4. Outline Dimensions and Drilling Plan for Phase Shifting Transformer used with 3-phase, 3-wire, and 3-phase 4-wire, Vameter.

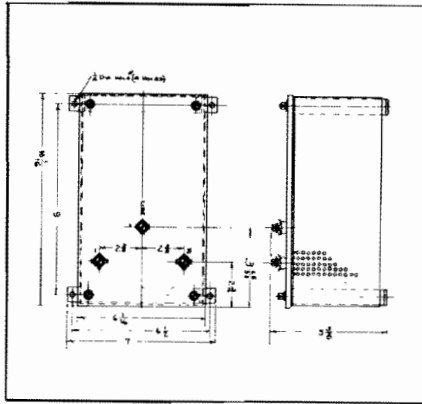


Fig. 5. Outline dimensions and Drilling. Plan Reactive Compensator used with Single Phase Varmeter.

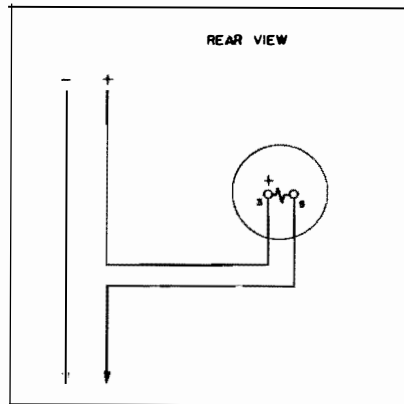


Fig. 6 Type X-221 Ammeter and Milliammeter (self contained).

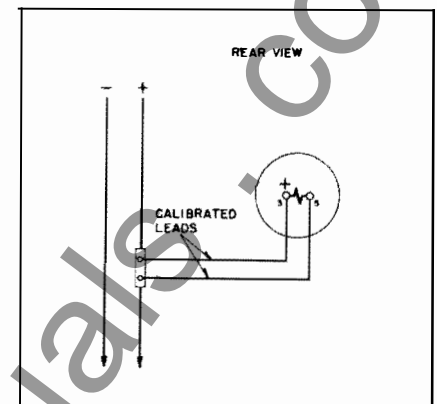


Fig. 7. Type X-221 Ammeter with External Shunt.

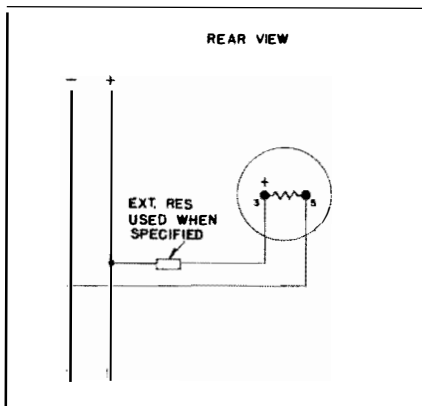


Fig. 8. Type X-221 Voltmeter.

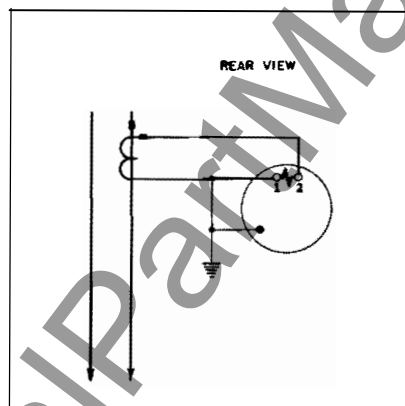


Fig. 9. Type A-221 Ammeter with Current Transformer.

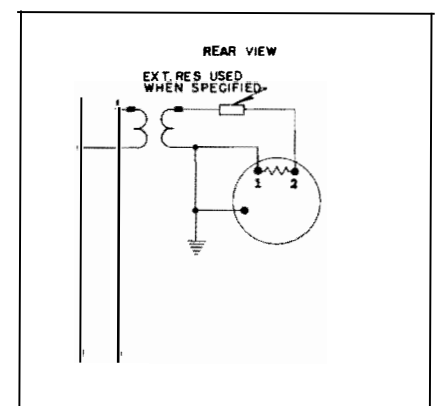


Fig. 10. Type A-221 Voltmeter with Potential Transformer.

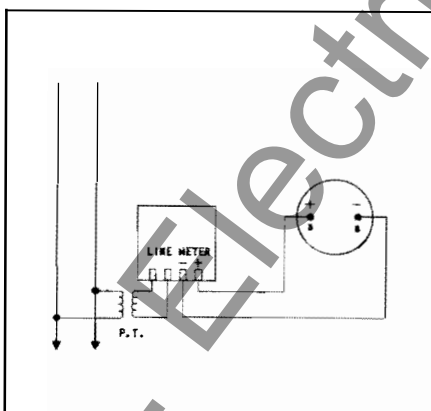


Fig. 11. Type X-221 Frequency Meter with External Transducer and Potential Transformer.

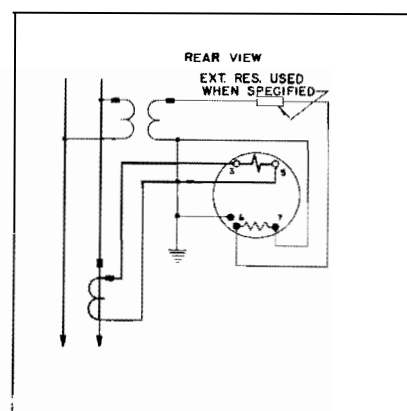


Fig. 12. Type Y-221 Single Phase Wattmeter with Current Transformer and Potential Transformer.

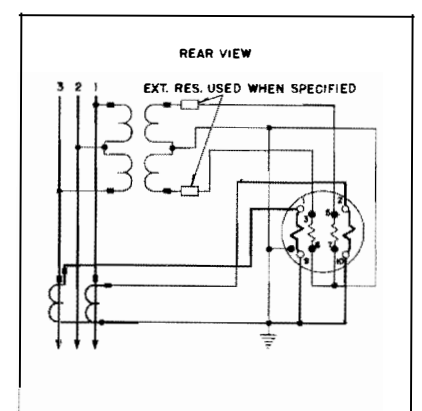


Fig. 13. Types Y-221 polyphase 2 current coil wattmeter with Current Transformer and Potential Transformer.

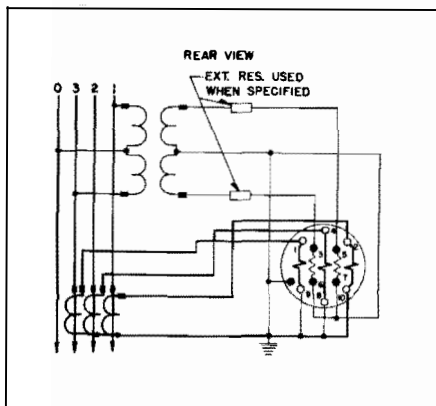


Fig. 14. Types Y-221 Polyphase 3 current coil wattmeter with Current Transformer and Potential Transformer.

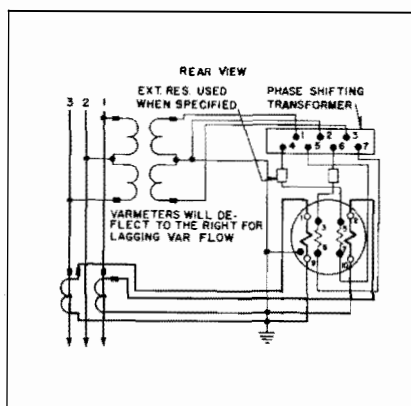


Fig. 15. Types Y-221 Polyphase 2 Current Coil Varmeter with Current Transformer and Potential Transformer.

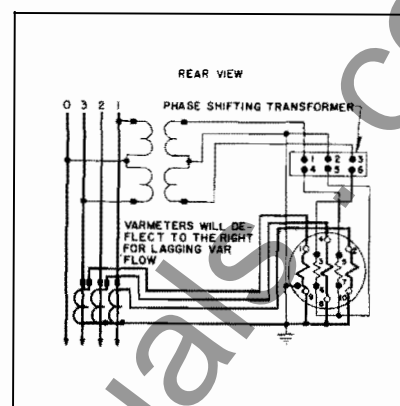


Fig. 16. Types Y-221 Polyphase 3 Current Coil Varmeter with Current Transformer and Potential Transformer.

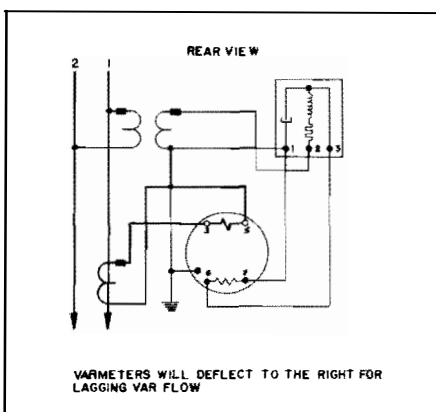


Fig. 17. Types Y-221 Single Phase Varmeter with C.T. and P.T.

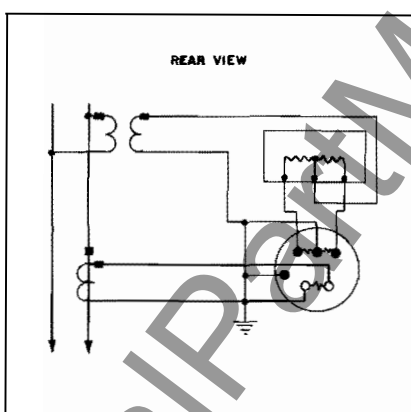


Fig. 18. Type KY-221 Single Phase Power Factor Meter With External Reactor.

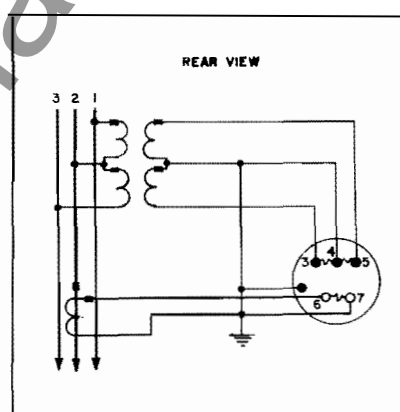


Fig. 19. Type KY-221 3-Phase 3-Wire Power Factor Meter.

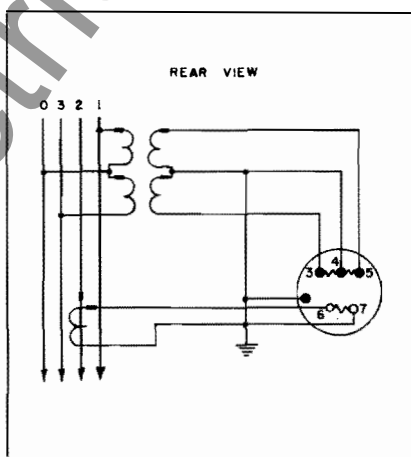


Fig. 20. Type KY-221 3-Phase 4-Wire Power Factor Meter External Wiring



INSTALLATION • OPERATION • MAINTENANCE INSTRUCTIONS

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MECHANISMS

The second letter in the type designation indicates the principle of operation.

X=Permanent magnet moving coil

A=Repulsion, moving iron

Y=Electrodynamic

C=Rectifier plus X

DESCRIPTION OF TAUT BAND SUSPENSION INSTRUMENTS

CAUTION: When the instrument mechanism is exposed, avoid contact with the tension springs. These springs are precisely made and positioned, and any pressures inadvertently applied to them may cause misalignment of the moving element.

The X-221 is a pivotless, bearingless d.c. instrument of the permanent magnet moving coil type. A suspension system is employed which replaces the conventional pivots, jewels, and control spring. At each end of the moving coil is attached a thin metallic band. At the front and rear bridges these bands are connected to tension springs. The tension springs exert axial forces which keep the metallic bands taut and the moving element from sagging. The taut bands serve to carry current to the moving coil, and also provide the necessary deflection counter-torque.

The A-221 Ammeters and Voltmeters employ similar suspensions but operate on the repulsion, moving iron principle.

These instructions neither cover all details or variations in equipment nor provide for all contingencies with regard to installation, operation or maintenance. On request, Westinghouse will be glad to supply further information as to particular problems or questions which are not covered sufficiently for the purchaser's needs.

The taut band design eliminates pivot friction and allows the instrument to withstand severe conditions of shock and vibration. The suspension system assures longer life with reduced maintenance costs.

The Y221 wattmeters and power factor meters are the Electrodynamic pivot and jewel type.

DIAL NOTES

References to type style number, use of external components if required, coil ratings, calibration data etc., are made on the dial.

INSTALLATION

Unpack instruments **carefully**. Terminal and mounting hardware, and any external components may be in separate packages.

Drill panels and connect instruments according to the diagrams in this leaflet, or according to switchboard drawings if instruments are supplied as part of a switchboard.

Before energizing the instrument, adjust the pointer to zero by means of the zero adjuster at the front of the instrument.

CIRCUIT PRECAUTIONS

* **CAUTION:** Dial and pointer may be at dangerous voltage levels when instrument is energized.

HIGH VOLTAGE OPERATION

All instruments are insulated for 800 volt maximum service.

When voltmeters are used with external resistors on voltages higher than the insulation rating of the instrument, one terminal of the instrument should be grounded.

Ammeters with external shunts must be used with leads having the resistance specified in the dial notes. If the circuit voltage exceeds the insulation

K-221 LINE SWITCHBOARD INSTRUMENTS

rating of the instrument, the shunt should be in the grounded side of the line.

GROUNDING OF CASES

Instruments, when mounted on grounded metal structures, are considered adequately grounded when secured to the structures by metal hardware. For mounting on insulated structures any one of the three case to base mounting screws may be used as a grounding terminal.

REPAIRS AND RENEWAL PARTS

Repair work can be done most satisfactorily at the factory, or at any authorized Instrument Repair Facility (see Service Directory 43-000). However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts always give complete nameplate data.

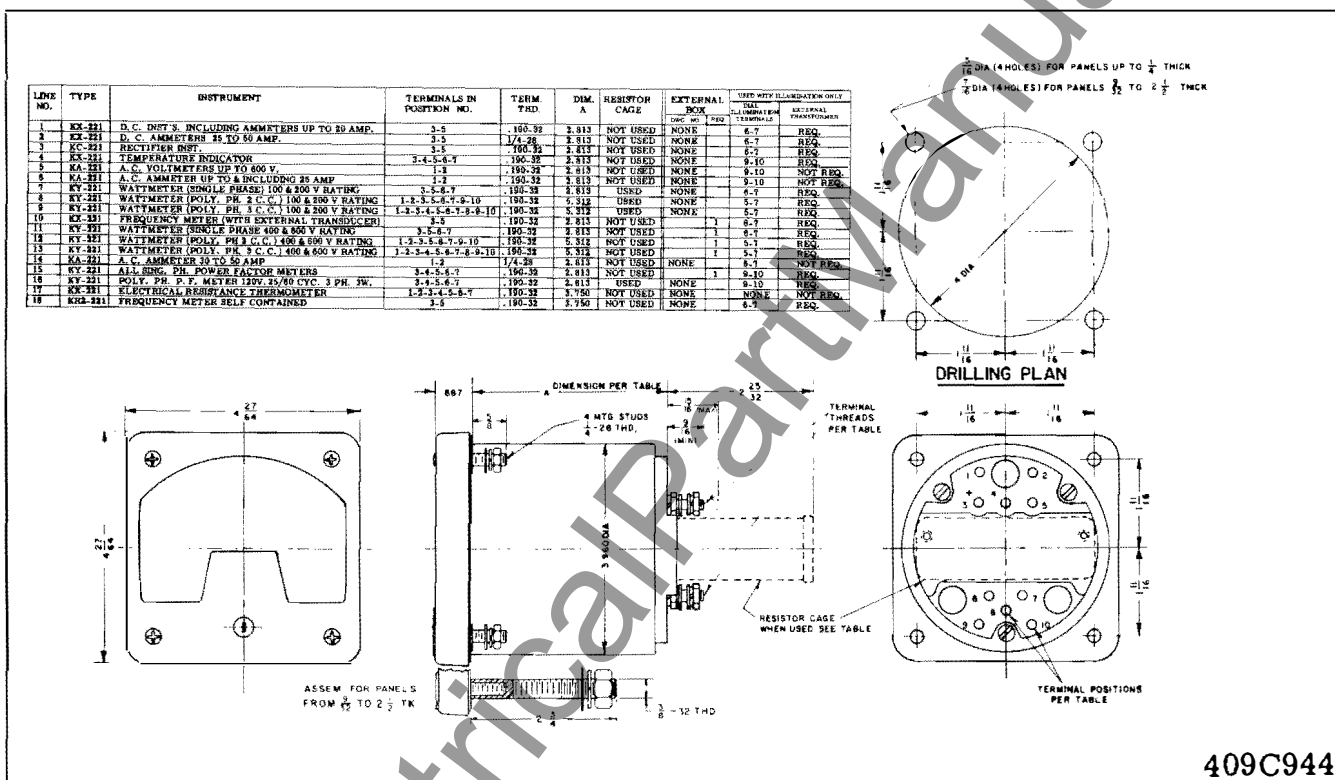


Fig. 1. Outline Dimensions and Drilling Plan for Type K-221 Instruments.



Fig. 2. Outline Dimensions and Drilling Plan for Transducer used with Frequency Meter.

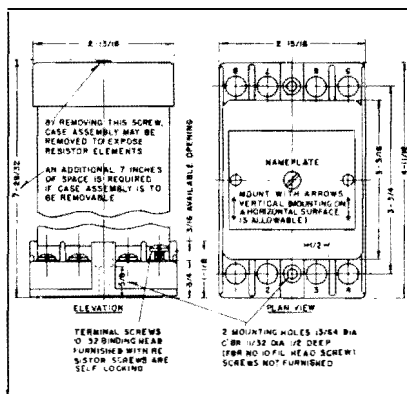


Fig. 3. Outline Dimensions and Drilling Plan for VR-825 External Resistor.

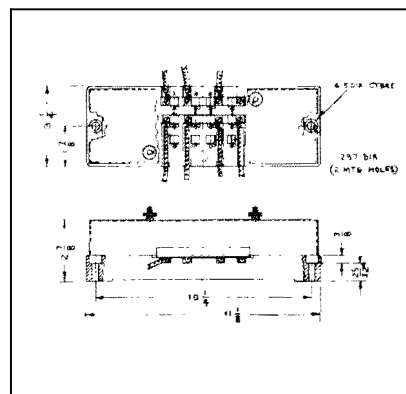


Fig. 4. Outline Dimensions and Drilling Plan for Phase Shifting Transformer used with 3-phase, 3-wire, and 3-phase 4-wire, Varmeter.

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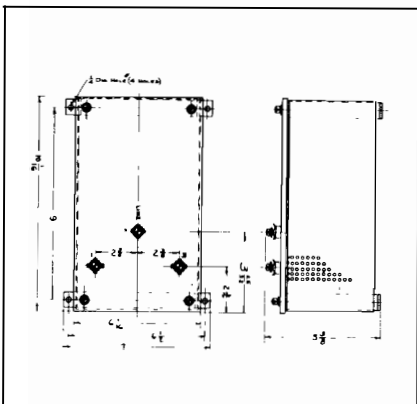


Fig. 5. Outline dimensions and Drilling. Plan Reactive Compensator used with Single Phase Varmeter.

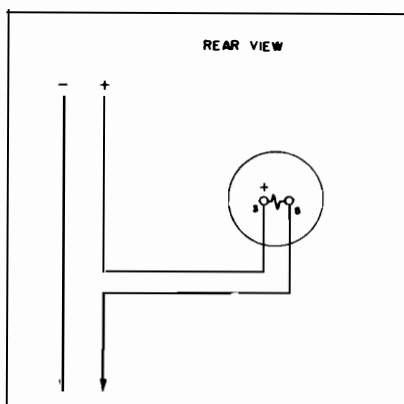


Fig. 6 Type X-221 Ammeter and Milliammeter (self contained).

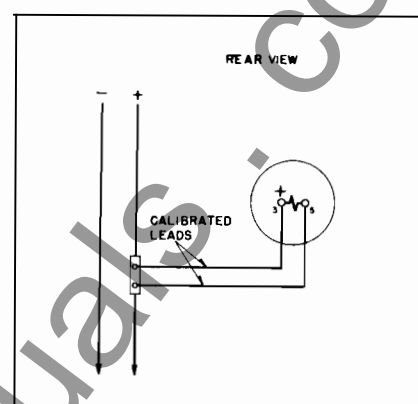


Fig. 7. Type X-221 Ammeter with External Shunt.

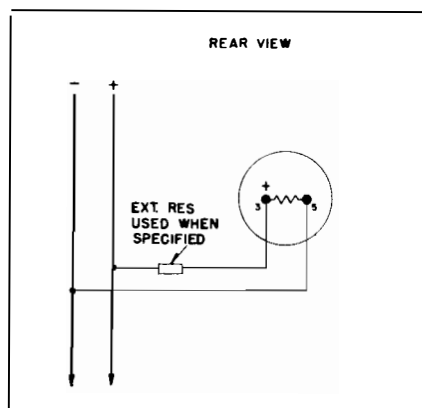


Fig. 8. Type X-221 Voltmeter.

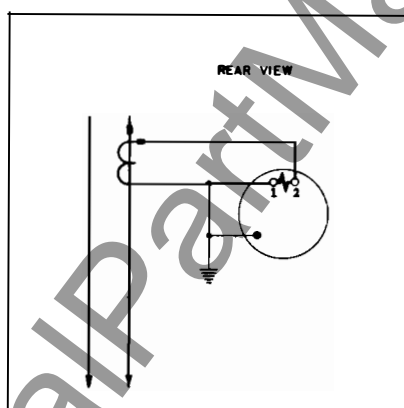


Fig. 9. Type A-221 Ammeter with Current Transformer.

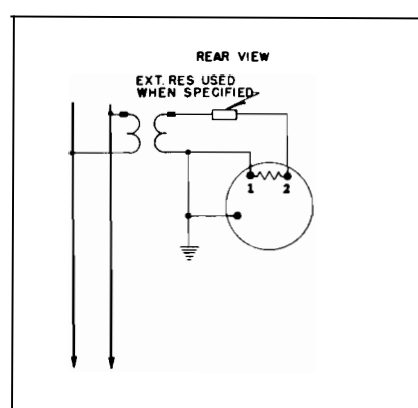


Fig. 10. Type A-221 Voltmeter with Potential Transformer.

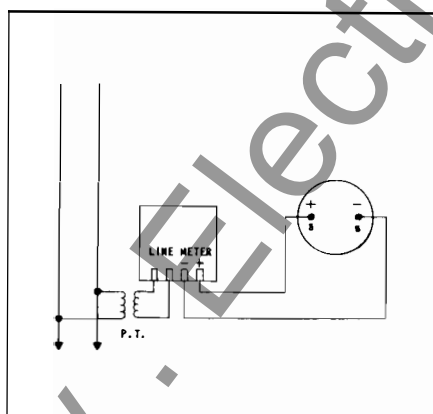


Fig. 11. Type X-221 Frequency Meter with External Transducer and Potential Transformer.

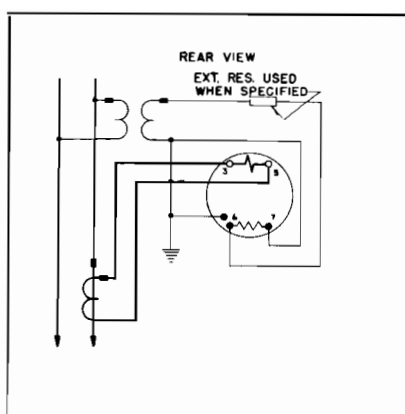


Fig. 12. Type Y-221 Single Phase Wattmeter with Current Transformer and Potential Transformer.

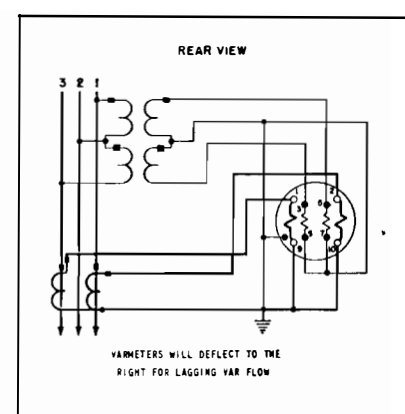


Fig. 13. Types Y-221 polyphase 2 current coil wattmeter with Current Transformer and Potential Transformer.

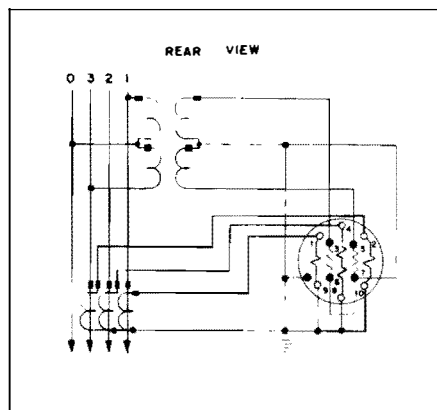


Fig. 14. Types Y-221 Polyphase 3 current coil wattmeter with Current Transformer and Potential Transformer.

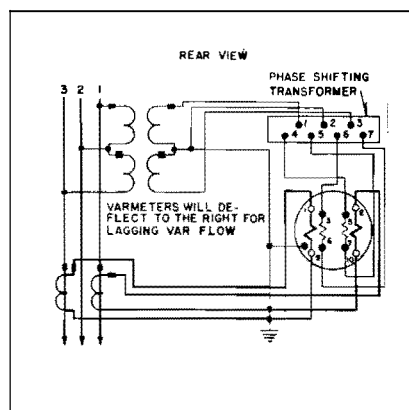


Fig. 15. Types Y-221 Polyphase 2 Current Coil Varmeter with Current Transformer and Potential Transformer.

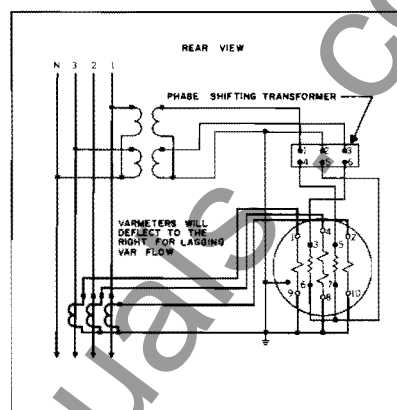


Fig. 16. Types Y-221 Polyphase 3 Current Coil Varmeter with Current Transformer and Potential Transformer.

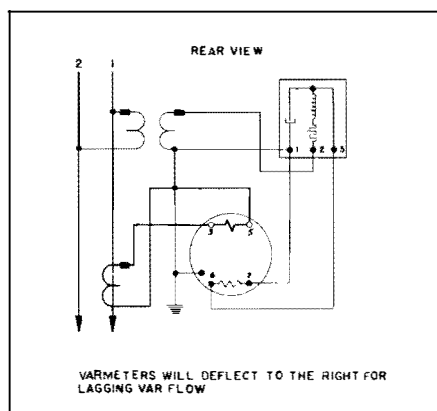


Fig. 17. Types Y-221 Single Phase Varmeter with C.T. and P.T.

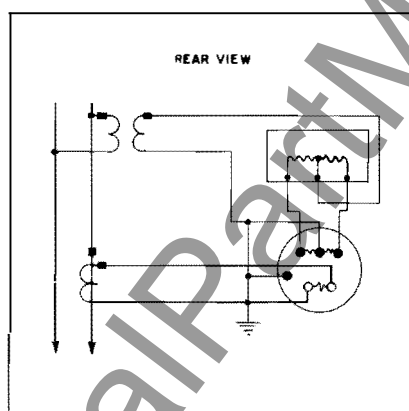


Fig. 18. Type KY-221 Single Phase Power Factor Meter With External Reactor.

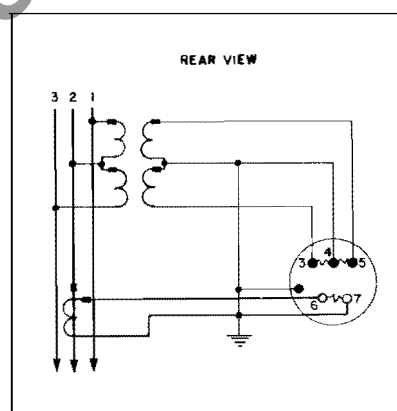


Fig. 19. Type KY-221 3-Phase 3-Wire Power Factor Meter.

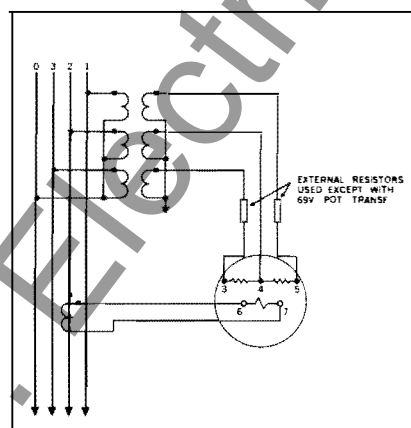


Fig. 20 Type KY-221 3-Phase 4-Wire Power Factor Meter External Wiring

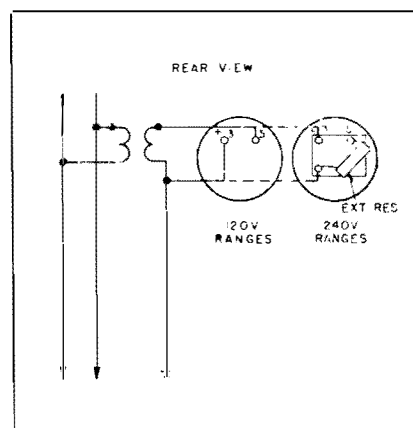


Fig. 21 Type KR3-221 Self Contained Frequency Meter