INSTALLATION

198 4555K18-001
Supersedes GEH-1412F

TYPES AB-14,-15,-16,-18,-19,-30, AND -40 SINGLE-PHASE AND POLYPHASE VARMETERS

(THIS PUBLICATION FORMERLY IDENTIFIED AS GEH-1412)

Single-element varmeters are supplied for use on single-phase or balanced polyphase systems. Two-element varmeters are supplied for use on balanced or unbalanced two-phase, three or four-wire circuits and on balanced or unbalanced three-phase, three-wire circuits. A modified two-element varmeter is furnished for use on three-phase, four-wire circuits.

Phase-shifting transformers are supplied with the instrument for measurement on standard three-phase, three-wire systems and on some three-phase, four-wire systems. On single phase, impedors are supplied with the instruments.

SCALE MARKINGS

The varmeter scales may be calibrated in VARS, KILOVARS, or MEGAVARS, as applicable. The designation IN and OUT refer to the direction of inductive or magnetizing reactive-power flow in relation to the source. The instrument will indicate to the right of the zero mark or OUT when the magnetizing reactive-power flow is from "SOURCE" to "LOAD". Conversely, the instrument will indicate to the left of the zero mark or IN when the direction of magnetizing reactive-power flow is from "LOAD" to "SOURCE".

UNCALIBRATED SCALES

CAUTION: For instruments with unmarked scales, incoming inspection (or acceptance) tests must be performed for "on zero," calibration at full scale, stickiness, etc. Failure to do so will place warranty in jeopardy. As with any instrument, extreme caution should be taken not to touch the pointer while removing cover and scale because of the possibility of unbalancing the element. The same precaution should be exercised in handling any other parts of the moving system.

MOUNTING

Complete all drilling and wiring on the switchboard before installing the instrument. Normal mounting is on a vertical panel.

These instruments are practically unaffected by stray fields, but it is advisable to keep wires carrying heavy currents as far as possible from all indicating instruments.

When the instrument is mounted, any deviation from zero should be corrected by the zero-set screw, located at the front of the instrument.

CONNECTIONS

If the instrument is to be used on a circuit of higher voltage or current value than that stamped on the rating plate, an instrument transformer(s) of the ratio indicated must be used. When the circuit exceeds 625 volts, a current transformer as well as a potential transformer must be used for purposes of insulation. A current or potential transformer, if used, must have a frequency rating which corresponds to that stamped on the instrument rating plate.

When an external resistor is supplied with the varmeter, the serial number on both the instrument and resistor must be the same.

Caution: In applications where compensating capacitor banks are put on and taken off the line, adequate protective devices, such as Thyrite* resistors across the current transformers, should be used.

with the provisions of the National Electric Code.

*Reg. Trade-mark of the General Electric Company

BURDEN DATA

TYPE	Impedance in Ohms	Effective Resistance in Ohms	Inductance in Henries	Volt-amperes	Watts	Vars	Power Factor
120-Volt, 60-cycle Potential Circuit							
Single-phase (AB-30)	6700	2120	16.8	2.15	0.676	2.04	0.315
Single-phase (all others)	4790	1510	12	3	0.945	2.85	0.315
Polyphase (AB-30)	10160	10160	0	1.42	1.42	0	1.0
Polyphase (all others)	7340	7340	0	1.96	1.96	0	1.0
5-ampere, 60-cycle Current Circuit							
Single-phase Varmeters	0.063	0.019	0.00016	1.58	0.48	1.51	0.30
Polyphase Varmeters	0.063	0.019	0.00016	1.58	0.48	1.51	0.30

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

GENERAL ELECTRIC

POLARITY MARKINGS OF TRANSFORMERS

These polarity markings indicated in the connection diagrams and on the transformer should be followed irrespective of their physical location on the transformers.

GROUNDING INSTRUMENT CASES

The cases of varmeters used with instrument transformers should be connected to the grounded side of the secondary circuits of the transformers. No. 12 Awg copper wire is suitable for this purpose. Grounding connections from the grounded side of the secondary circuits to earth should be made in accordance with the provisions of the National Electric Code.

REPAIR PARTS

Repair parts for these instruments and additional copies of this publication must be ordered through the nearest General Electric sales office or distributor.

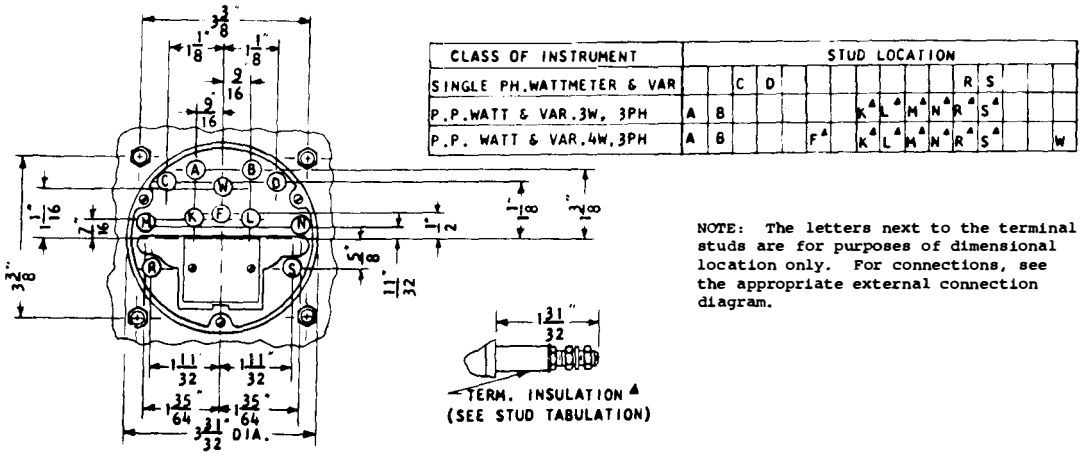


Fig. 1. Stud Location of Type AB Varmeters

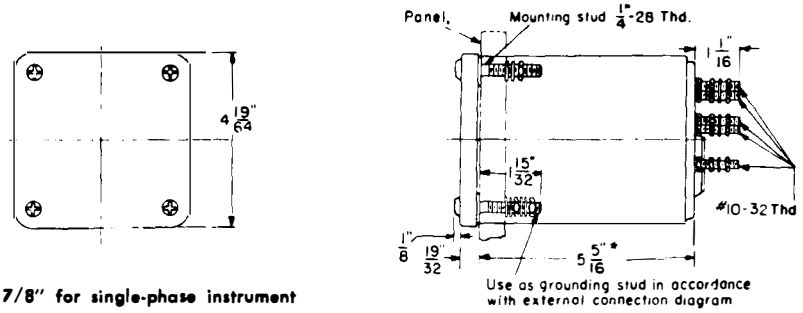


Fig. 2. Dimensions of Types AB-14, -15, and -19 varmeters.

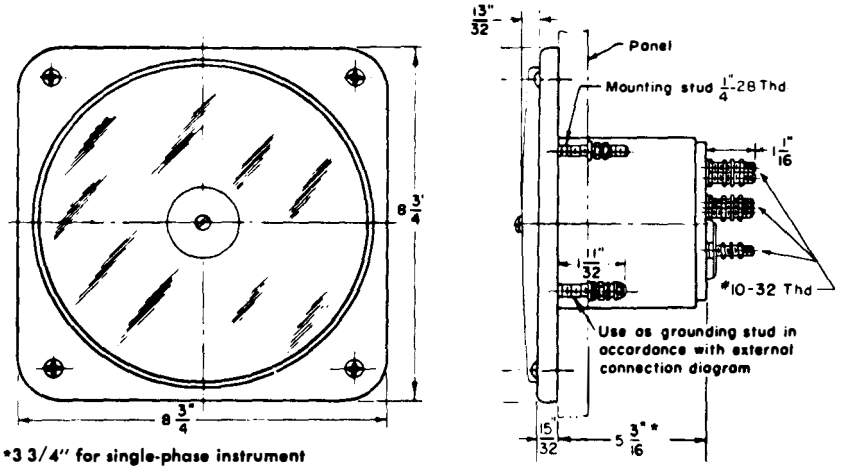
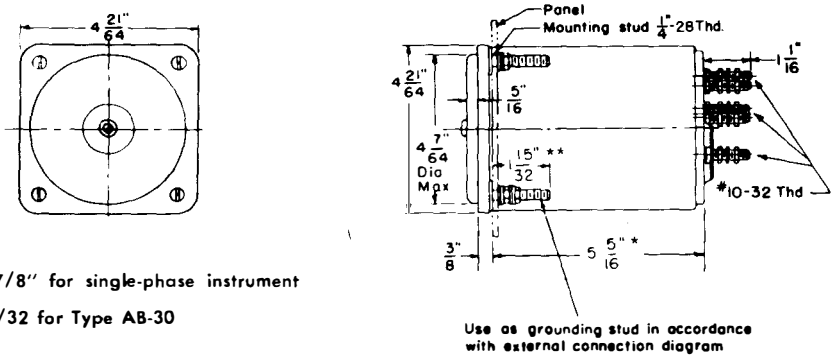


Fig. 3. Dimensions of Type AB-16 varmeters.



*3 7/8" for single-phase instrument

** 29/32 for Type AB-30

Fig. 4. Dimensions of Type AB-18, -30, and -40 varmeters

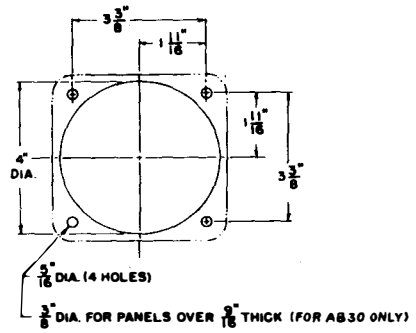


Fig. 5. Cut-out and panel-drilling dimensions

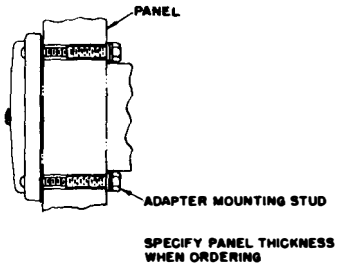


Fig. 6. Adaptor mounting stud for Type AB-30 varmeters used on panels over 9/16" thick

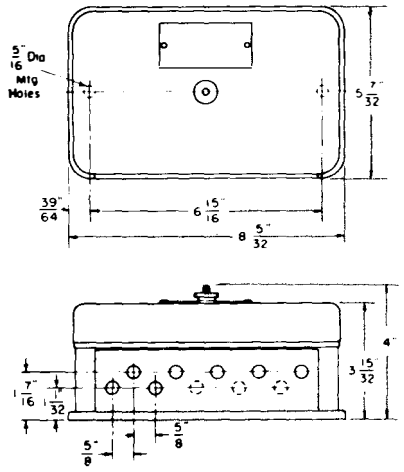


Fig. 7. Dimensions of Types MC-21 and MC-22 phase-shifting transformers

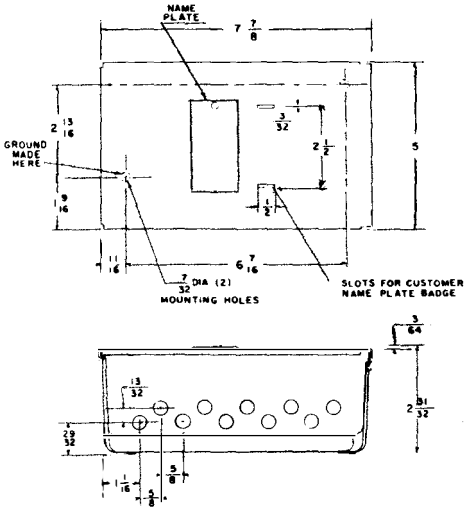


Fig. 8. Dimensions of Types MC-63 and MC-65 phase-shifting transformers.

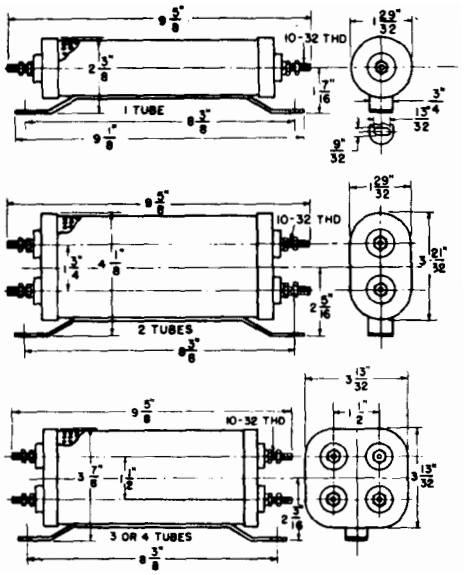


Fig. 9. Dimensions of Form-3 resistor cages

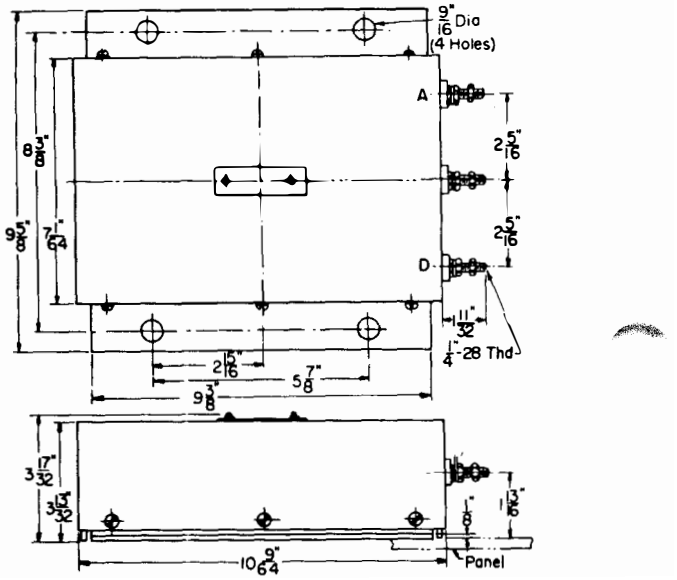


Fig. 10. Dimensions of external impedor

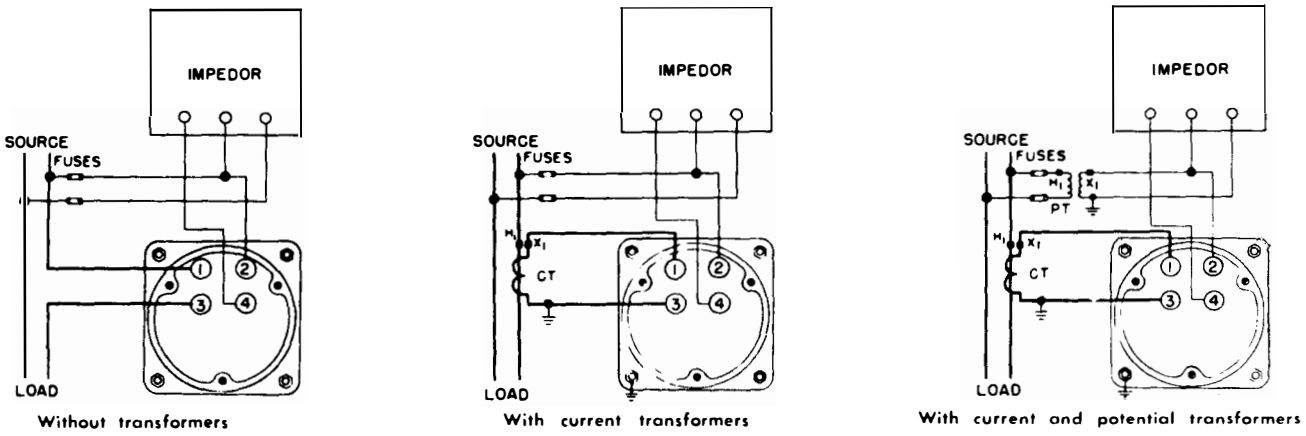


Fig. 11. Connections for single-phase varmeters rated 0-125 volts

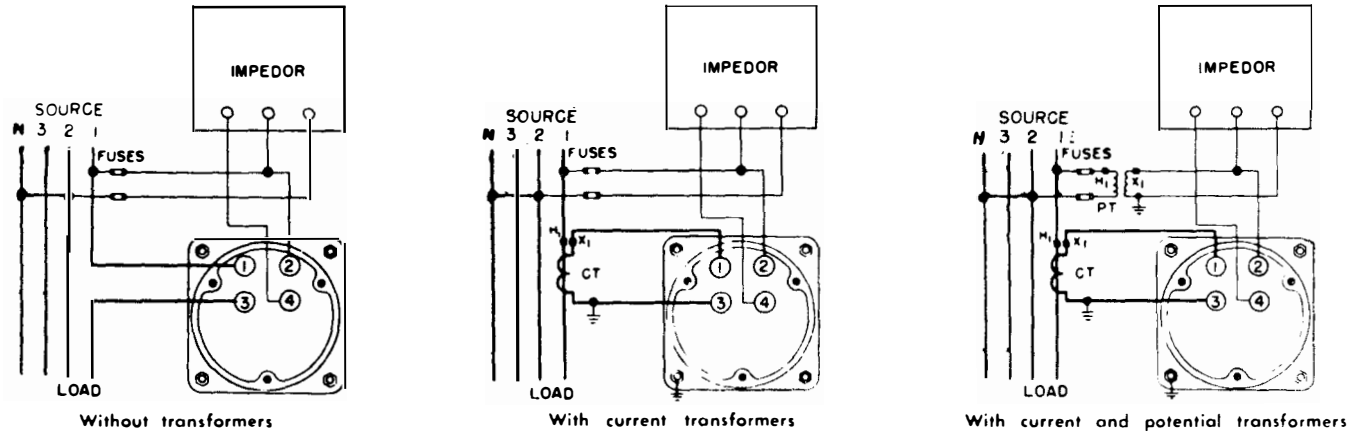


Fig. 12. Connections for single-element varmeters rated 0-125 volts with impedor on balanced 4-wire, 3-phase circuit. (See Fig. 12, Fig. 13, and footnote A.)

Footnote A: Connections assume a phase sequence 1-2-3. If instrument (normally zero-center with "out" side to right) shows "in" and "out" reversed, correct by reversing connections to "2" and "4".

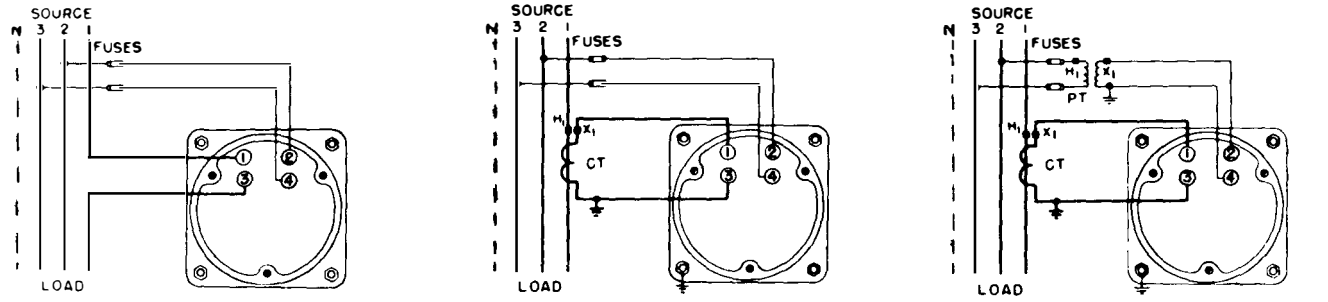


Fig. 13. Connections for single-element varmeters rated 0-125 volts (with internal resistor) used to measure vars on 3- or 4-wire, 3-phase and 3-wire, 2-phase circuits. On 3-wire, 2-phase circuits, line 2 is common. (See footnote A.) Use line N on 4-wire circuit only. (These connections are recommended in preference to Fig. 12.)

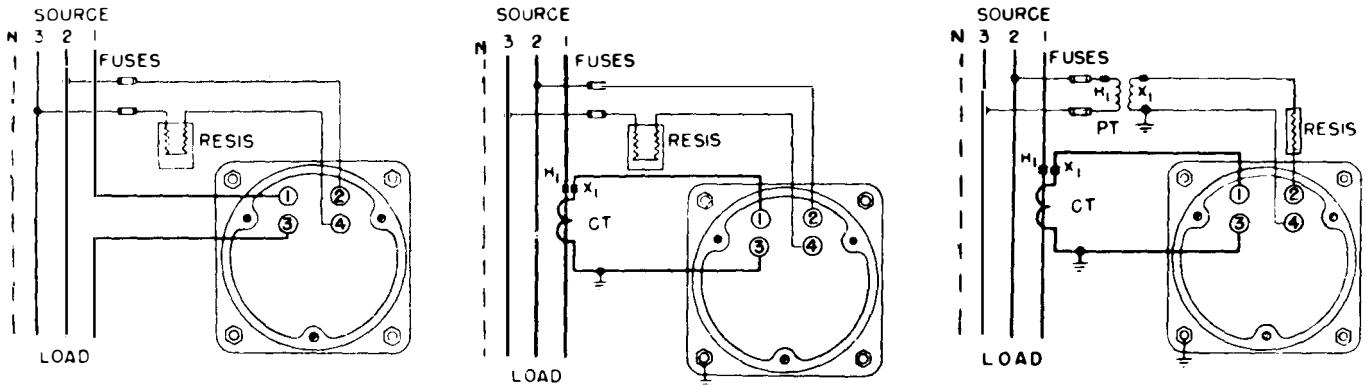


Fig. 14. Connections for single-element varmeters rated above 125 volts (with external resistor) used to measure vars on 3- or 4-wire, 3-phase and 3-wire, 2-phase balanced circuits. On 3-wire, 2-phase circuits, line 2 is common. (See footnote A.) Use line N on 4-wire circuit only.

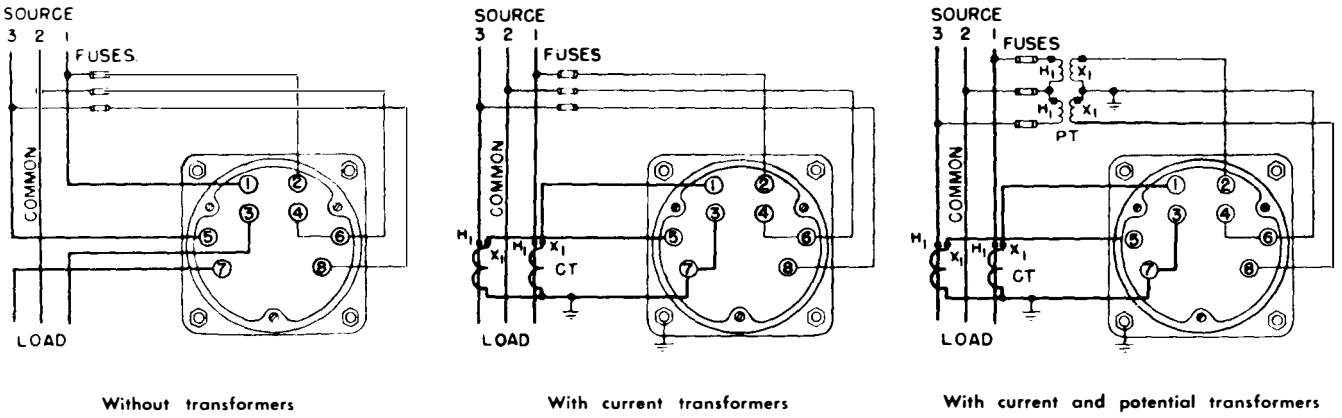


Fig. 15.. Connections for two-element varmeters rated 0-125 volts (with internal resistor) used to measure vars on 3-wire, 2-phase circuits. (See footnote B.)

Footnote A: Connections assume a pnase sequence 1-2-3. If instrument (normally zero-center with "out" side to right) shows "in" and "out" reversed, correct by reversing connections to "2" and "4".

Footnote B: Connections assume a phase sequence 1-2-3. If instrument (normally zero-center with "out" side to right) shows "in" and "out" reversed, correct by reversing connections to "2" and "4" and also to "6" and "8".

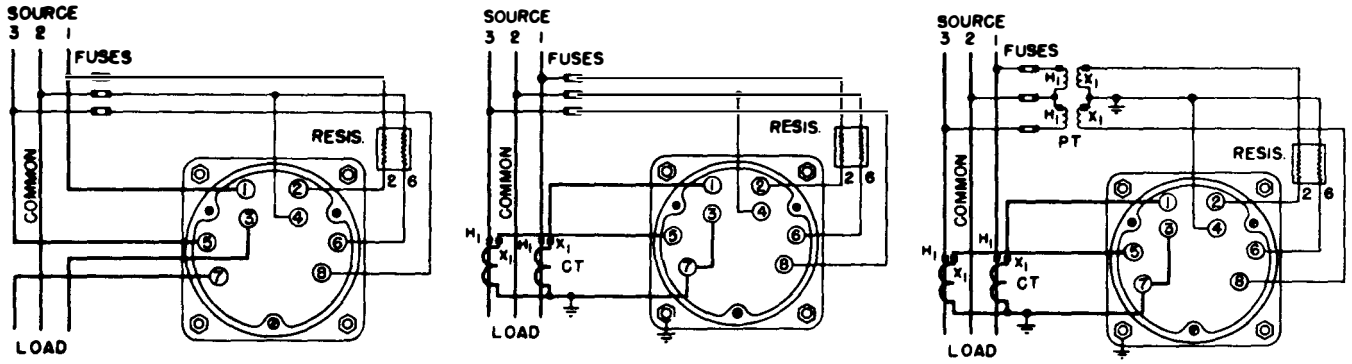


Fig. 16. Connections for two-element varmeters rated above 125 volts (with external resistor) used to measure vars on 3-wire, 2-phase circuits. (See footnote B.)

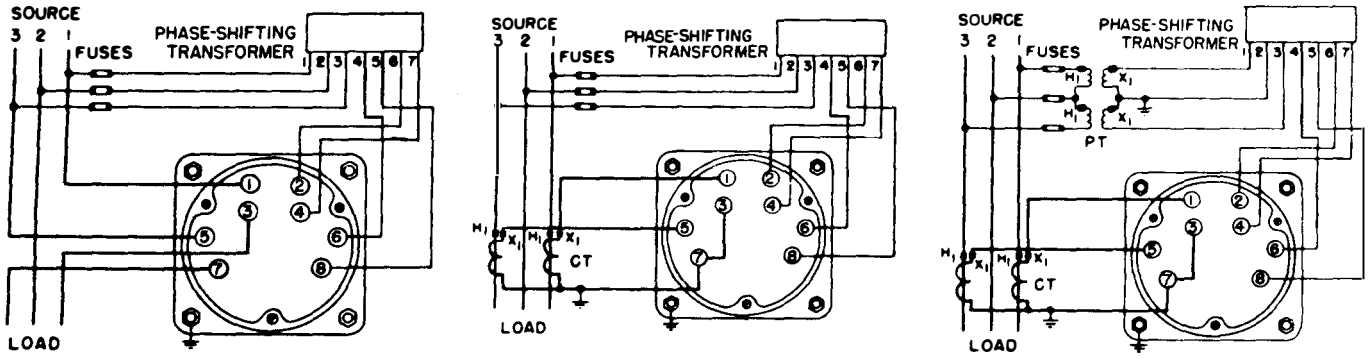


Fig. 17. Connections for two-element varmeters rated 0-125 volts (with internal resistor) with Type MC-21 or MC-63 phase-shifting transformer used on 3-wire, 3-phase circuits. (See footnote A.)

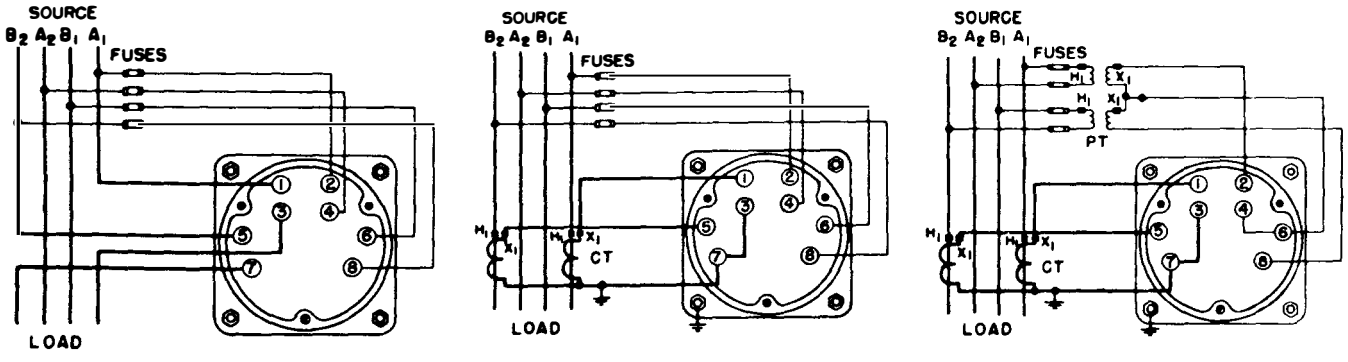


Fig. 18. Connections for two-element varmeters rated 0-125 volts (with internal resistor) used to measure vars on 4-wire, 2-phase circuits. (See footnote B.)

Footnote A: Connections assume a phase sequence 1-2-3. If instrument (normally zero-center with "out" side to right) shows "in" and "out" reversed, correct by reversing connections to "2" and "4" and also to "6" and "8".

Footnote B: Connections assume a phase sequence A_1-B_1-A_2-B_2. If instrument (normally zero-center with "out" side to right) shows "in" and "out" reversed, correct by reversing connections to "2" and "4" and also to "6" and "8".

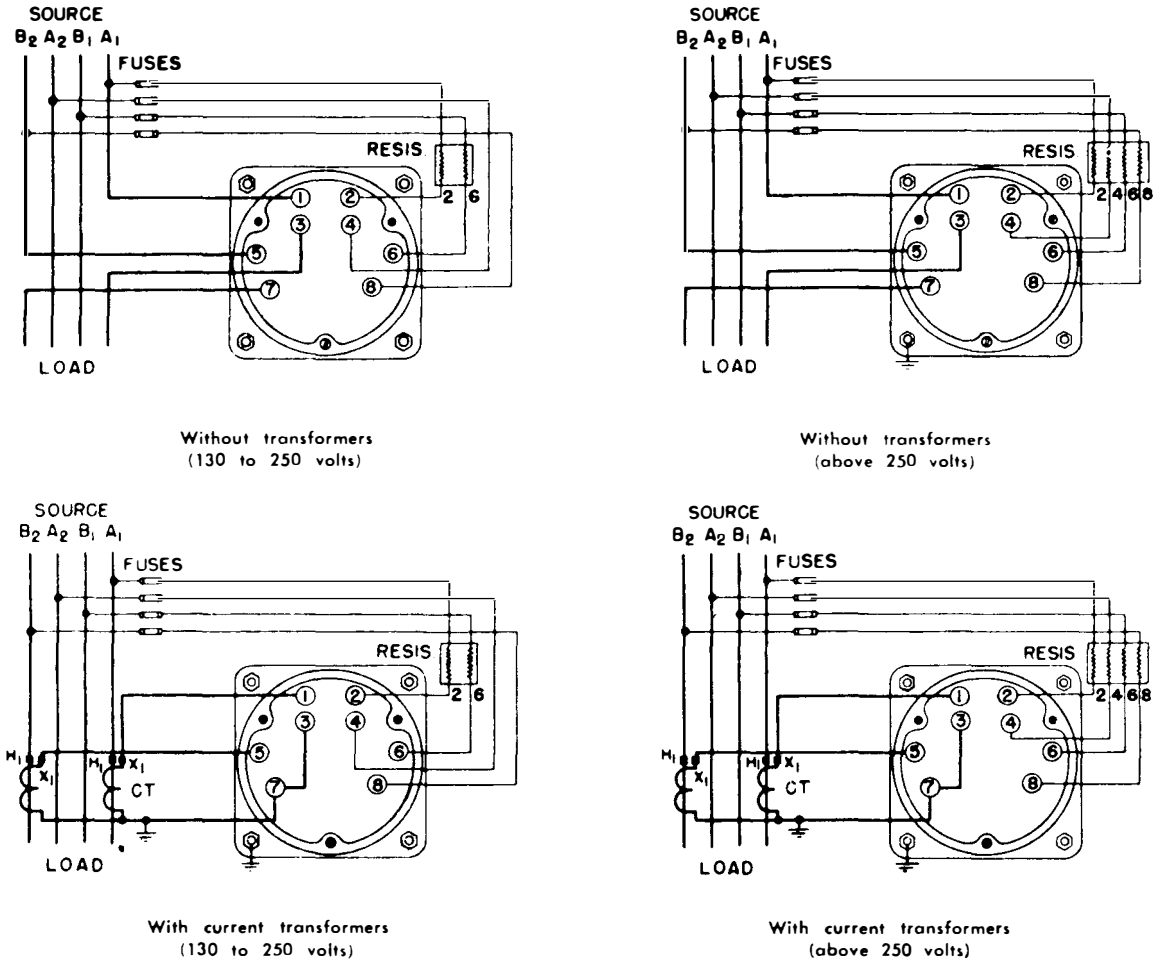


Fig. 19. Connections for two-element varmeters rated above 125 volts (with external resistor) used to measure vars on 4-wire, 2-phase circuits. (See footnote A.)

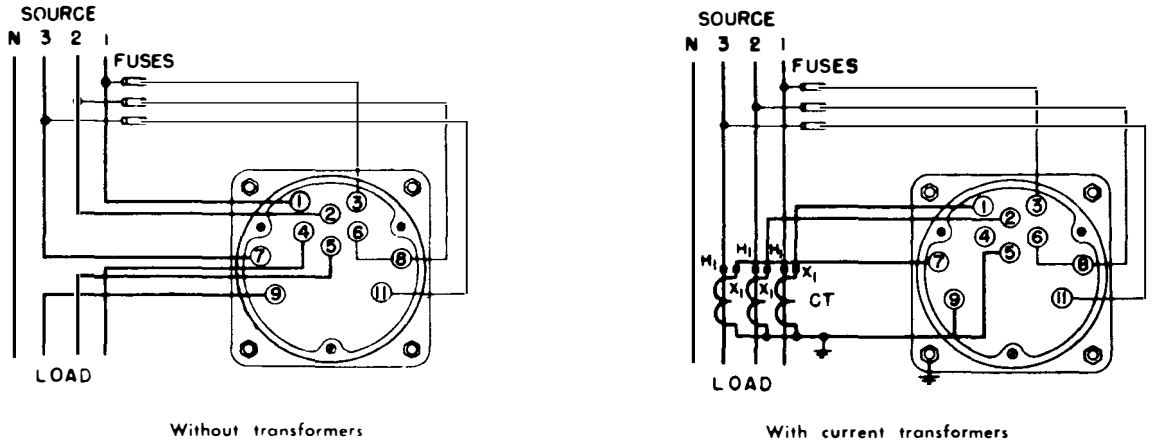
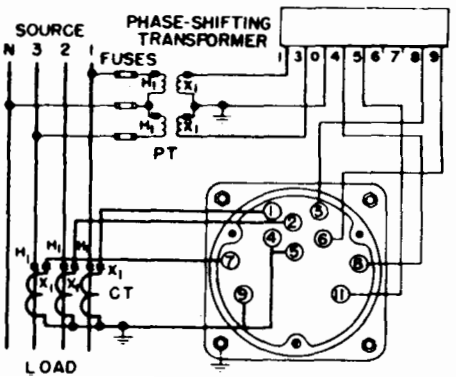


Fig. 20. Connections for two-element varmeters rated 0-125 volts (with internal resistor) used to measure vars on 4-wire, 3-phase circuits. (See footnote B.)

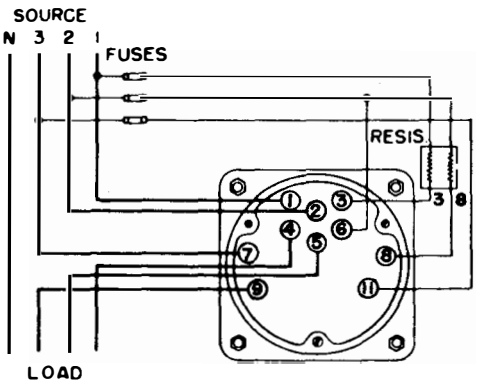
Footnote A: Connections assume a phase sequence A_1-B_1-A_2-B_2. If instrument (normally zero-center with "out" side to right) shows "in" and "out" reversed, correct by reversing connections to "2" and "4" and also to "6" and "8".

Footnote B: Connections assume a phase sequence 1-2-3. If instrument (normally zero-center with "out" side to right) shows "in" and "out" reversed, correct by reversing connections to "3" and "6" and also to "8" and "11".

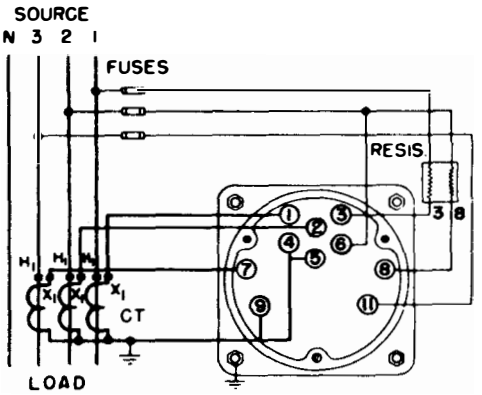


With current and potential transformers

Fig. 21. Connections for two-element varmeters rated 0-125 volts (with internal resistor) with Type MC-22 or MC-65 phase-shifting transformer used to measure vars on 4-wire, 3-phase circuits. (See footnote.)

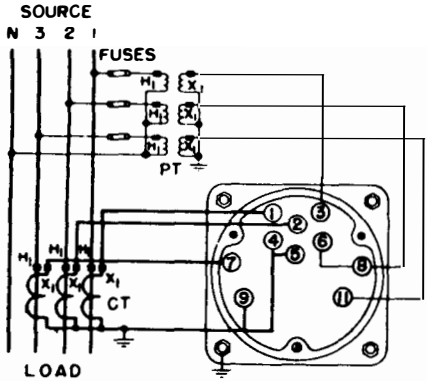


Without transformers

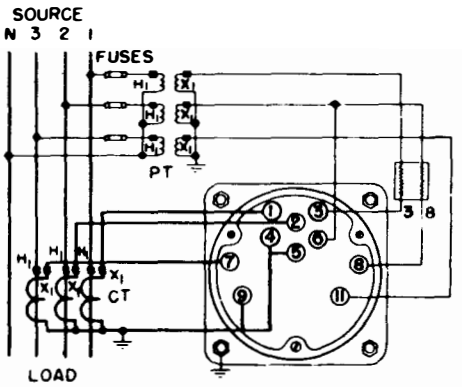


With current transformers

Fig. 22. Connection for two-element varmeters rated above 125 volts (with external resistor) used to measure vars on 4-wire, 3-phase circuits. (See footnote.)



Without external resistor
(0 to 125 volts)



With external resistor
(above 125 volts)

Fig. 23. Connections for two-element varmeters with three potential transformers (connected Y-Y) and three current transformers. (See footnote.)

Footnote: Connections assume a phase sequence 1-2-3. If instrument (normally zero-center with "out" side to right) shows "in" and "out" reversed, correct by reversing connections to "3" and "6" and also to "8" and "11".