INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

—K-241 LINE SWITCHBOARD INSTRUMENTS FOUR AND ONE-HALF INCH CLASSIFICATION FULL-VIEW CIRCULAR SCALE TYPE

GENERAL

Type K-261 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-Attraction, moving iron
- P = Watt transducer plus X
- I = Rotating iron vane
- C = Rectifier plus X
- F = Iron core electromagnetic
- J = Power Factor Transducer Plus X
- V = Var Transducer Plus X

All of the above mechanisms employ the taut band suspension bearing system except the I and F types.

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.

DIAL NOTES

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

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: DO NOT REMOVE COVER WHILE THE INSTRUMENT IS ENERGIZED. DIAL AND POINTER MAY BE AT HAZARDOUS VOLTAGE LEVELS.

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

GROUNDING OF CASES

Ground instrument cases with No. 12 AWG Copper Wire to any one of the three instrument case to base screws.

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.

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

SUPERSEDES I.L. 43-241V, dated August 1975
✪ Changed since previous issue
EFFECTIVE OCTOBER 1976

LINE NO.	TYPE	INSTRUMENT	TERMINALS IN POSITION NO.	TERM. TIO. (USS)	DIM. A (INCHES)	DIM. A (MM)	RESISTOR CASE	ELECTROLUMINESCENT DIALS: DIAL ILLUMINATION TERMINALS	ELECTROLUMINESCENT DIALS: EXTERNAL TRANSFORMER	TUBULAR TYPE RESISTOR	EXTERNAL BOX: TYPE	EXTERNAL BOX: PEG
1	KX-231 KX-241	D.C. PANELS INCLUDING AMMETERS UP TO 20 AMP	3-5	10-32	2.813	71.5	NOT USED	6-7	USED	NOT USED	NOT USED	
2	KX-231 KX-241	D.C. AMMETERS 30 & 50 AMP.	3-5	1/4-28	2.813	71.5		6-7	USED	NOT USED		
3	KX-231 KX-241	RECTIFIER INSTS., EXCEPT TRANSDUCER TYPE	3-5	10-32	2.813	71.5		6-7	USED	NOT USED		
4	KX-231 KX-241	TEMPERATURE INDICATOR, 20 VDC POWER SUPPLY	3 4-5-6-7		2.813	71.5		9-10	USED	NOT USED		
5	KC-241	EXPANDED SCALE VOLTMETER MIL-V-231510	3-5		3.750	95.3		NOT USED	NOT USED	NOT USED		
6	KR4-241	FREQUENCY METER MIL-M-23167	3-5		3.750	95.3				NOT USED		
7	K1-231 K1-241	SYNCHROSCOPE-SINGLE PHASE COM. 50 & 60HZ	1-2-9-10		5.312	134.9				USED		
8	K1-231 K1-241	POWER FACTOR METER - SINGLE PHASE - COM 50 & 60HZ	1-2-9-10		5.312	134.9				USED		
9	K1-231 K1-241	POWER FACTOR METER - 3 PHASE	1-2-8-9-10		5.312	134.9	USED			NOT USED		
10	KP-231 KP-241	WATTMETER (3PH 3W) & KV-231 KV-241 VAR & C (3PH 3W)	1-2-3-5-6-7-9-10		5.312	134.9	NOT USED	5-7				
11	KR3-231 KR3-241	FREQUENCY METER (SELF CONTAINED)	3-5		3.750	95.3		6-7	USED			
12	KP-231 KP-241	WATTMETER (3 PH 4 W)	1 TO 10		5.312	134.9		5-7	NOT USED			
13	KP-231 KP-241	WATTMETER (SINGLE PHASE)	3-5-6-7		5.312	134.9		6-7	NOT USED			
14	KX-231 KX-241	D.C. VOLTMETER (3 TERM.)	3-4-5		2.813	71.5		6-7	USED			
15	KV-231 KV-241	VARMETER SELF CONT. (3PH 4W)	1 TO 12		5.312	134.9	*	NOT USED	NOT USED			
16	KA-231 KA-241	A.C. VOLTMETER	1-2		2.813	71.5	*	6-7	NOT USED			
17	KA-231 KA-241	A.C. AMMETER UP TO & INCLUDING 20 AMP	1-2		2.813	71.5	NOT USED	6-7	NOT USED			
18	KC-231 KC-241	ELECTRICALLY SUPPRESSED INST.	3-5		3.750	95.3		6-7	USED			
19	KA-231 KA-241	A.C. DOUBLE RANGE AMMETER	1-2-9-10		2.813	71.5		NOT USED	NOT USED			
20	KV2-231 KV2-241	INDICATING VAR TRANSDUCER S.C (3 PH. 3W)	1 TO 12		5.312	134.9		NOT USED				
21	KR-231 KR-241	SPEED INDICATOR	1-2-9-10		3.750	95.3		NOT USED				
22	KP-2-231 KP2-241	INDICATING WATT-TRANSDUCER (SINGLE PHASE)	3-5-6-7-11-12		5.312	134.9		6-7				
23	KP2-231 KP2-241	INDICATING WATT-TRANSDUCER (3PH 3W)	1-2-3-5-6-7-9 TO 12		5.312	134.9		5-7				
24	KP2-231 KP2-241	INDICATING WATT-TRANSDUCER (3PH 4W)	1 TO 12		5.312	134.9		5-7				
25	KC-231 KC-241	TRANSDUCER TYPE RECTIFIER AMMETER	3-5		3.750	95.3		6-7	USED			
26	KX-241	ELECTRICAL RESISTANCE THERMOMETER 120V AC POWER SUP	1-2-3-4-5-6-7		3.750	95.3		NOT USED	NOT USED			
27	KV2-231 KV2-241	INDICATING VAR TRANSDUCER S.C (3PH. 4W)	1 TO 14		5.312	134.9		NOT USED	NOT USED			
28	KP2-231 KP2-241	SPEED INDICATOR	1-2-3-5-9-10		3.750	95.3		NOT USED	NOT USED			
29	KC-241	EXPANDED SCALE VOLTMETER	3-5		3.750	95.3		6-7	USED			
30	K1-231 K1-241	SYNSCP.-ALL SINGLE PH. HI SHOCK & 400 HZ COM	1-2-9-10		5.312	134.9	USED	NOT USED	NOT USED			
31	K1-231 K1-241	P.F. METER-ALL SINGLE PH. HI SHOCK & 400HZ COM	1-2-9-10		5.312	134.9	USED	NOT USED				
32	K1-231 K1-241	P.F. METER 3 PHASE 4 WIRE	1-2-8-9-10		5.312	134.9	USED	NOT USED			VR 825	1
33	KP-231 KP-241	WATTMETER SINGLE PHASE	3-5-6-7		5.312	134.9	NOT USED	6-7			VV2-876	1
34	KP2-231 KP2-241	INDICATING VAR-TRANSDUCER SINGLE PHASE	3-5-6-7-11-12		5.312	134.9	NOT USED	6-7			VV2-876	1
35	KJ-231 KJ-241	TRANSDUCER TYPE P.F. METER 1PH & 3 PH.	1-2-9-10		5.312	134.9	NOT USED	NOT USED			NOT USED	
36	KX-241	FREQUENCY METER MIL-M-16125	3-5		3.750	95.3	NOT USED	6-7	USED		VC 841	1

* = USED ABOVE 600 VOLTS

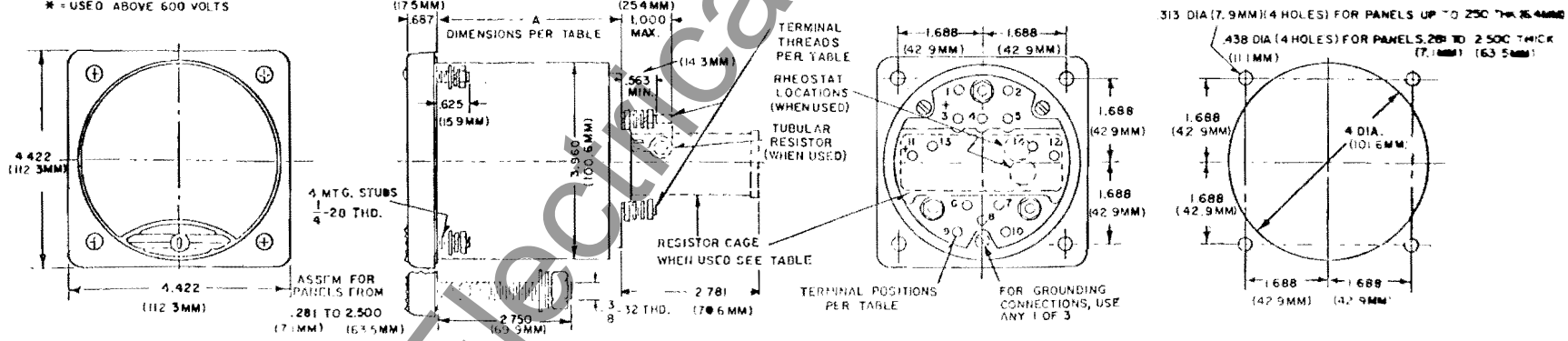

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Fig. 1.

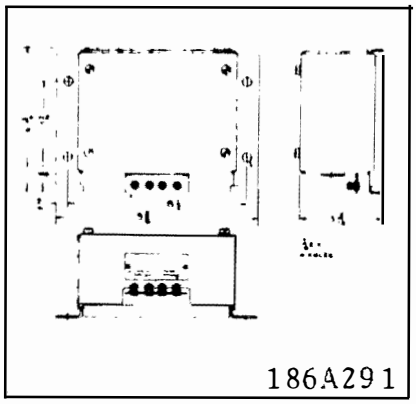

Fig. 2. Transducer used with Hi Shock Frequency Meter.

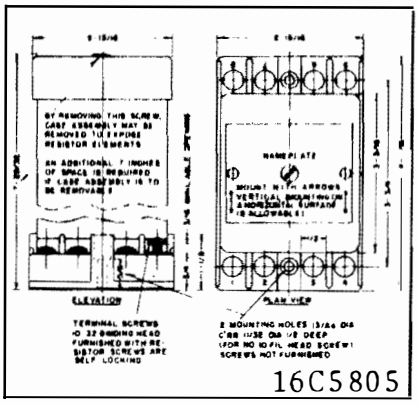

Fig. 3. VR-825 External Resistor.

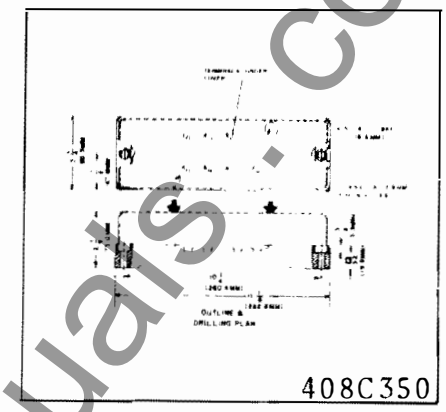

Fig. 4. Phase Shifting Transformer used with 3-phase, 3-wire and 3-phase 4-wire Varmeter.

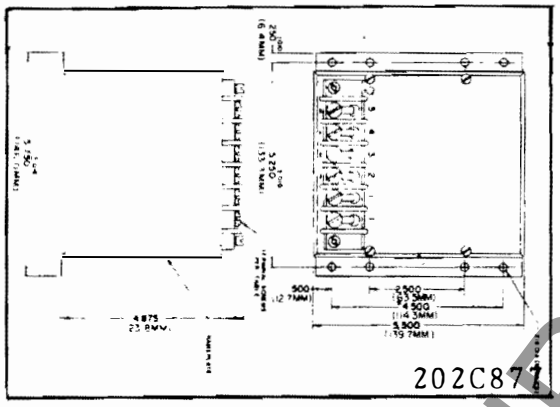

Fig. 5. VAR Compensator used with Single Phase Varmeter.

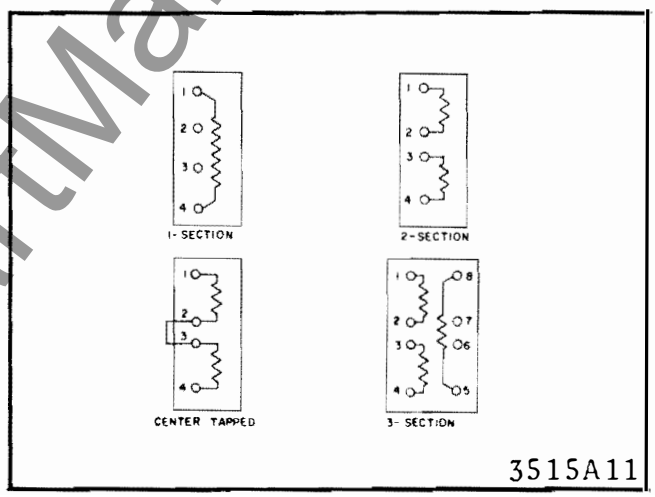

Fig. 6. Type VR825 Resistor Connections.

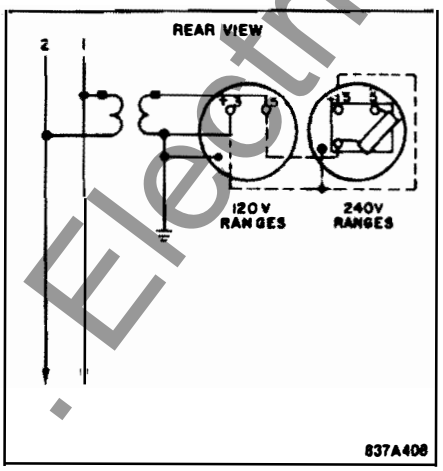

Fig. 7. Type KR3-241 Self Cont. Frequency Meter.

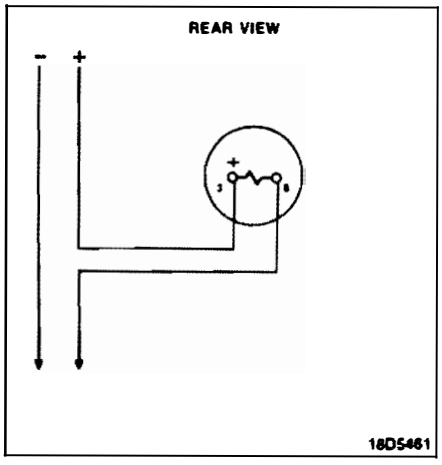

Fig. 8. Type KX-241 Ammeter and Milliameter (self-contained).

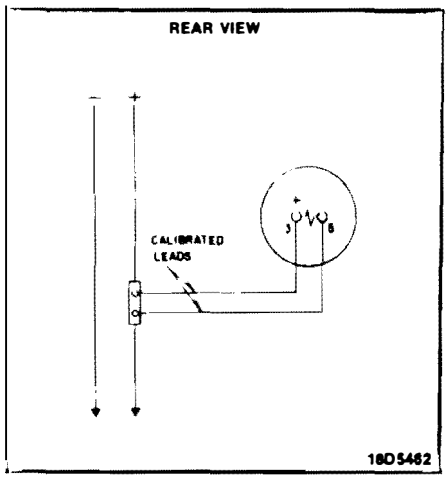

Fig. 9. Type KX-241 Ammeter with External Shunt.

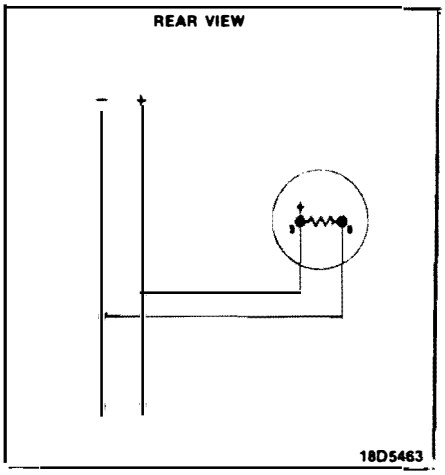

Fig. 10. Type KX-241 Voltmeter.

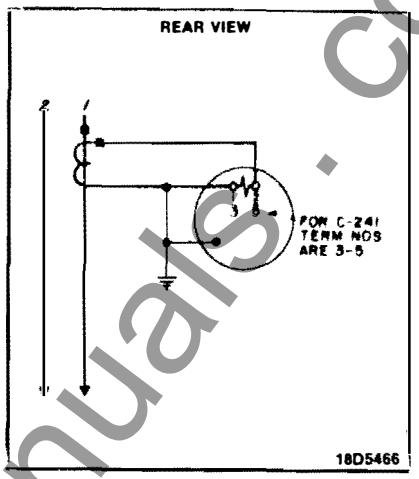

Fig. 11. Type KA-241 and KC-241 Ammeter.

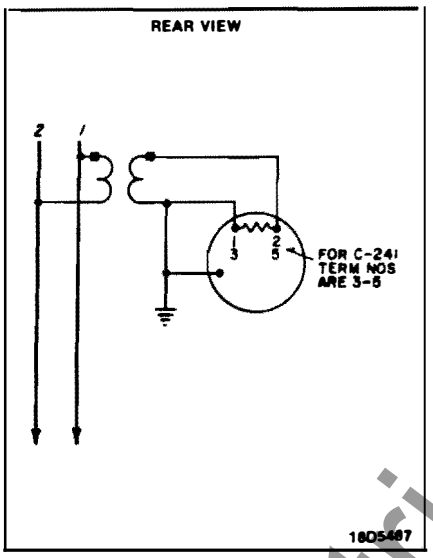

Fig. 12. Type KA-241 and KC-241 Voltmeter.

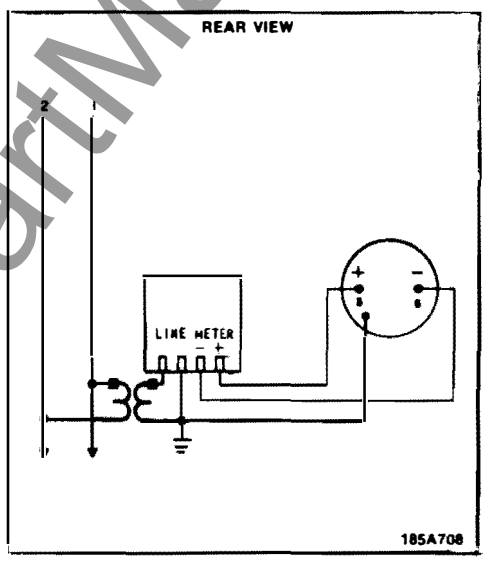

Fig. 13. Type KX-241 Frequency Meter, Hi-Shock, with External Transducer.

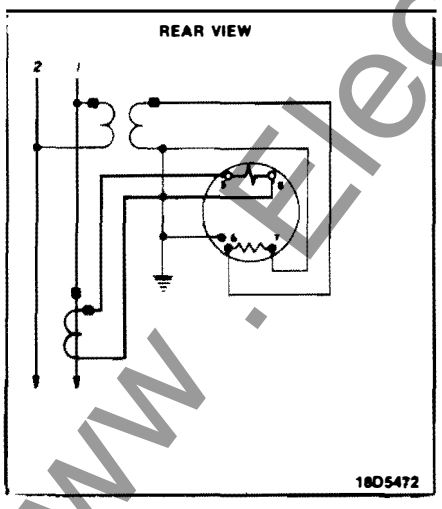

Fig. 14. Type KP-241 Single Phase Wattmeter.

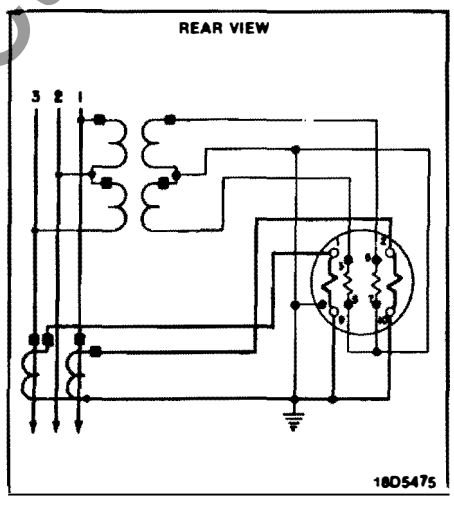

Fig. 15. Type KP-241 2 Current Coil Wattmeter.

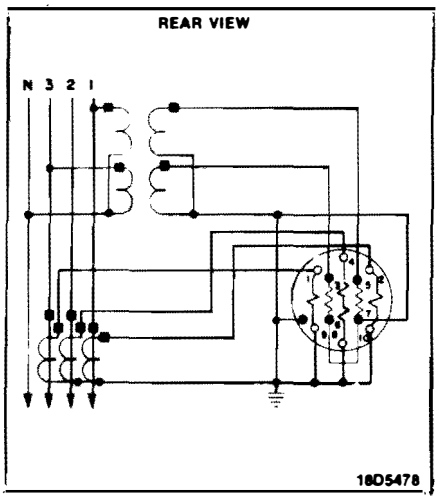

Fig. 16. Type KP-241 3 Current Coil Wattmeter.

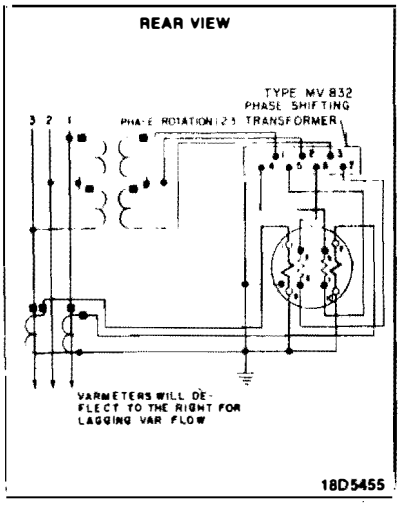

Fig. 17. Type KP-241 2 Current Coil Varmeter with phase shifter.

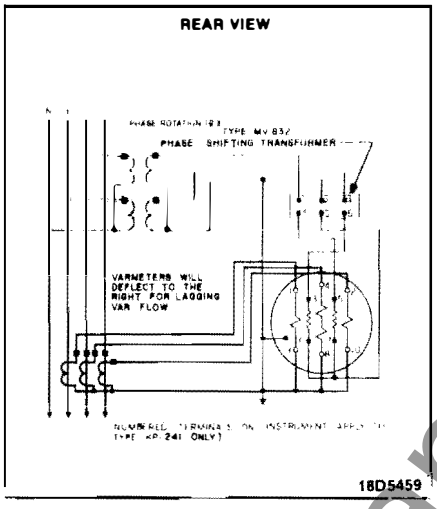

Fig. 18. Type KP-241 3 Current Coil Varmeter with phase shifter.

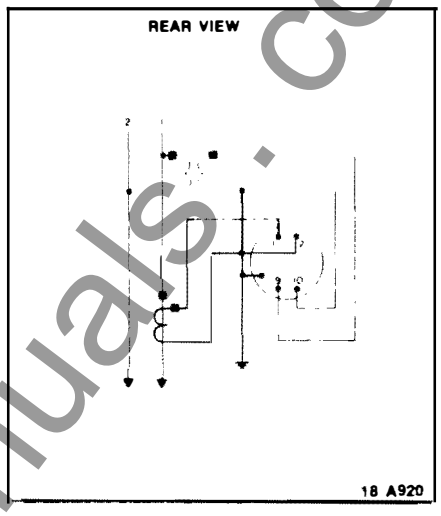

Fig. 19. Type KI-241 and KJ-241 Single Phase Power Factor Meter.

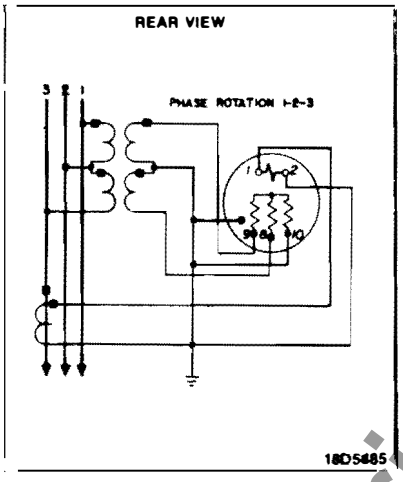

Fig. 20. Type KI-241 3 Phase-3 Wire Power Factor Meter.

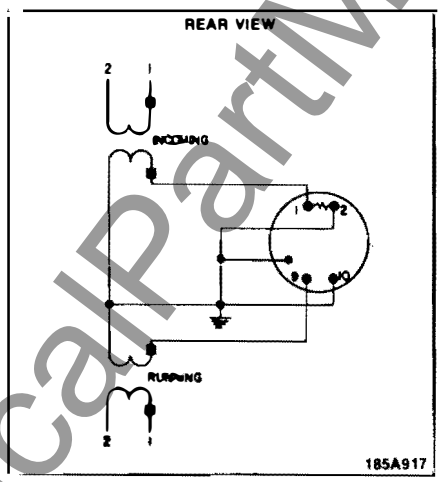

Fig. 21. Type KI-241 Synchroscope.

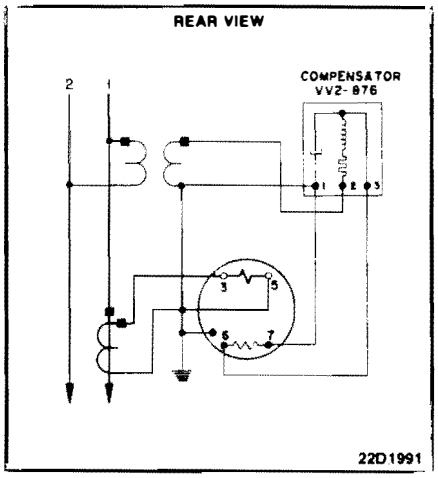

Fig. 22. Type KP-241 Single Phase Varmeter.

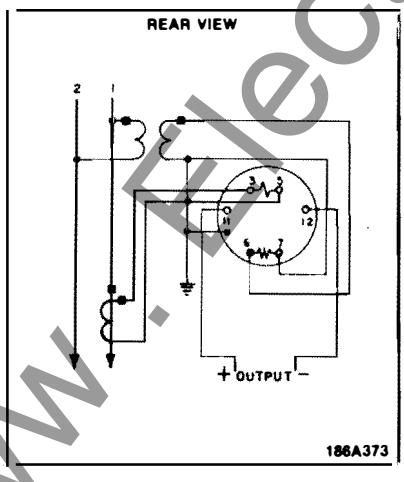

Fig. 23. Type KP2-241 Indicating Watt Transducer Single Phase.

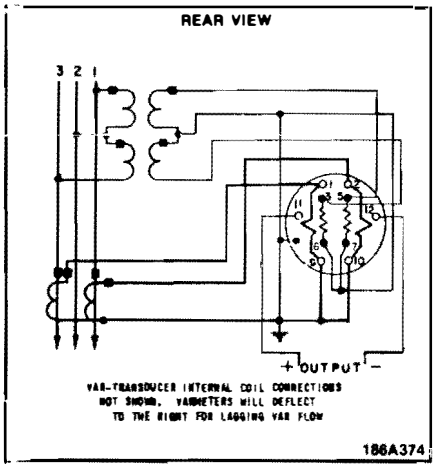

Fig. 24. Type KP2-241 Indicating Watt Transducer 2 Current Coil.

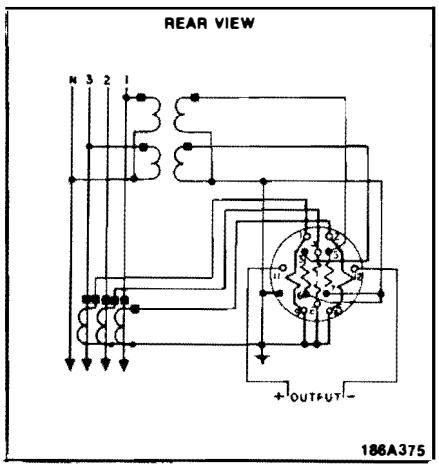

Fig. 25. Type KP2-241 Indicating Watt Transducer 3 Current Coil.

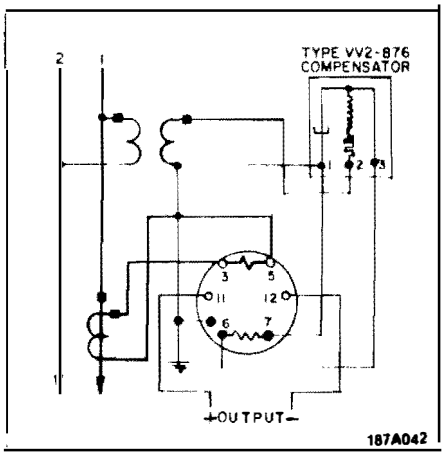

Fig. 26. Type KP2-241 Indicating VAR Transducer Single Phase.

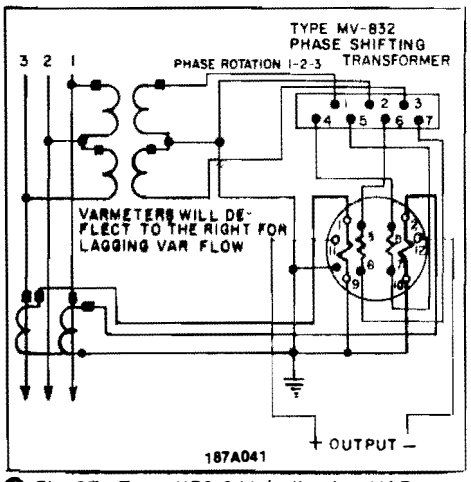

Fig. 27. Type KP2-241 Indicating VAR Transducer 2 Current Coil with phase shifter.

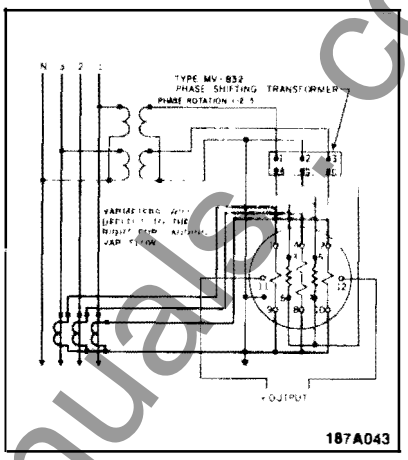

Fig. 28. Type KP2-241 Indicating VAR Transducer 3 Current Coil with phase shifter.

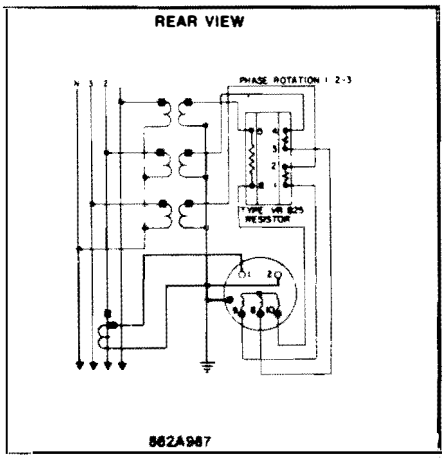

Fig 29 Type KI241 3 Phase 4 Wire Power Factor Meter.

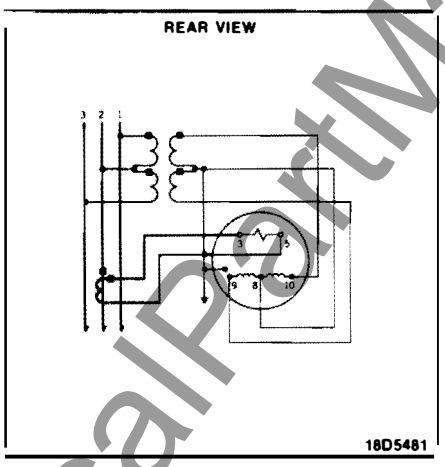

Fig. 30. Type KP241 Single Element Wattmeter for 3 Phase 3 Wire.

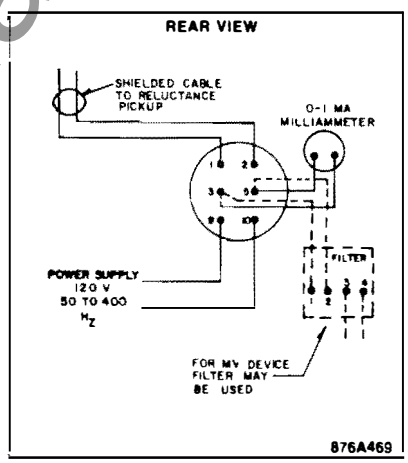

Fig. 31. Type KR2-241 Speed Indicator.

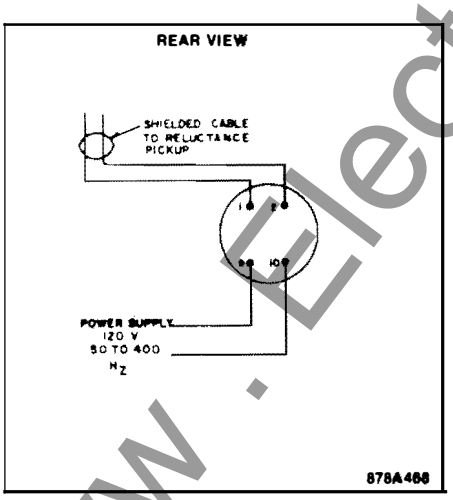

Fig. 32. Type KR241 Speed Indicator.

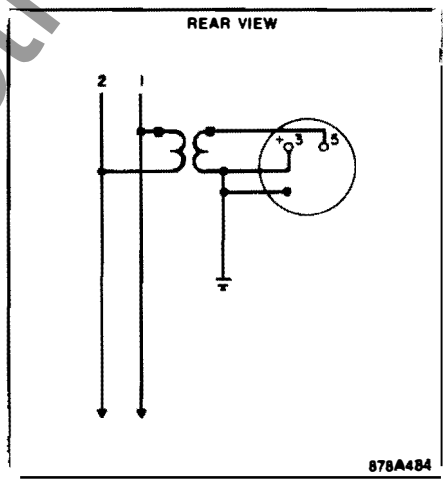

Fig. 33. Type KR4-241 Frequency Meter.

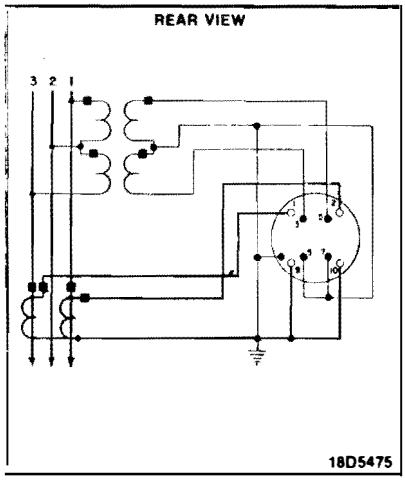

Fig. 34. Type KV-241 Two Current Coil Self Contained Varmeter. For single phase test connection see I.L. 43-241.1

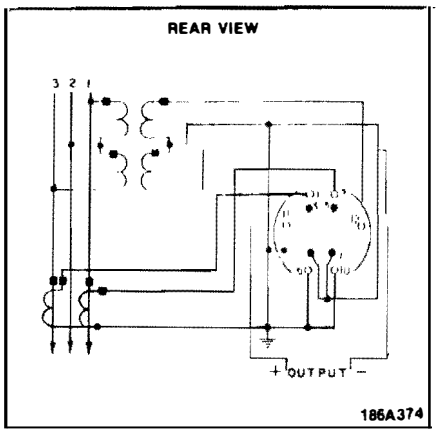

Fig 35 Type KV2-241 Two Current Coil Self contained indicating Var-Transducer. For single phase test connection, see I.L. 43-241.1.

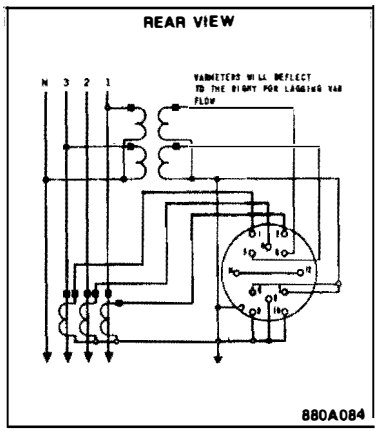

Fig. 36. Type KV-241 Three Current Coil Self Contained Varmeter. For single phase test connection, see I.L. 43 241.1.

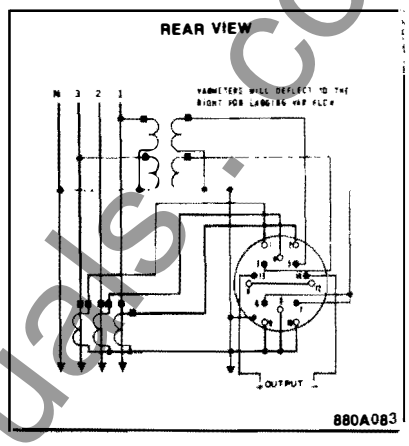

Fig. 37. Type KV2-241 Three Current Coil Self Contained Indicating VAR Transducer. For single phase test connection, see I.L. 43-241.1

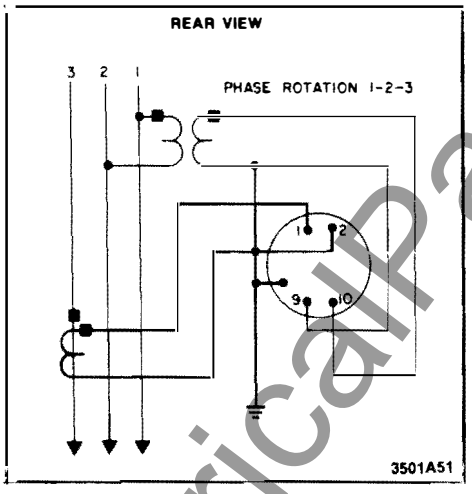

Fig. 38. Type KJ-241 3 phase, 3 wire Power Factor Meter.

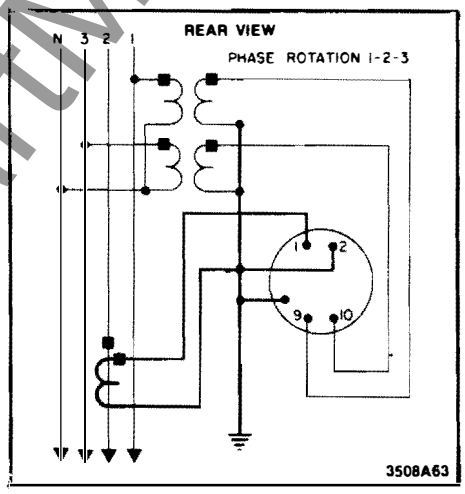

Fig. 39. Type KJ-241 3 phase, 4 wire Power Factor Meter.

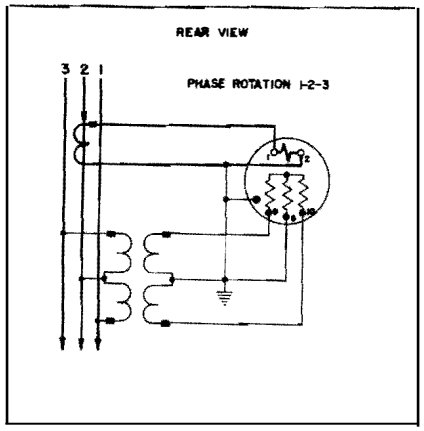

Fig. 14. Type I-241 Polyphase Power Factor Meter.

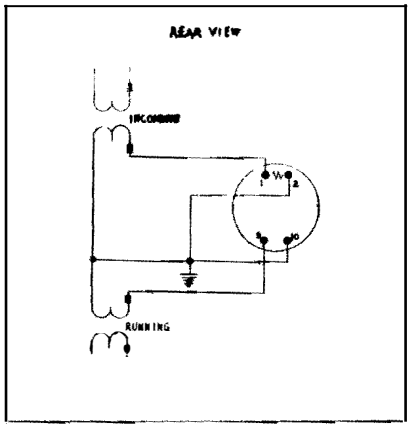

Fig. 15. Type I-241 Synchroscope.

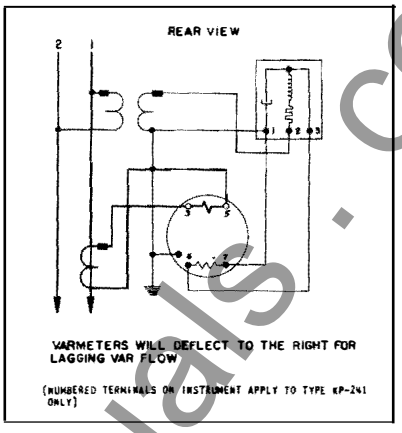

Fig. 16. Types F-241 and P-241 Single Phase Varmeter.

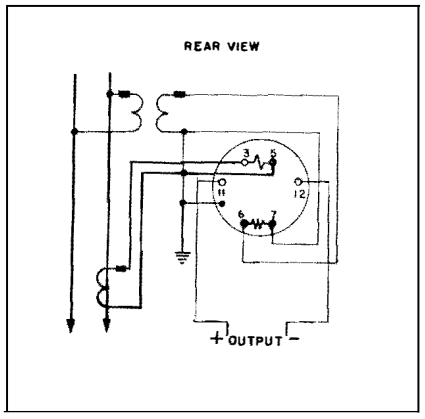

Fig. 17. Type KP2-241 Indicating Watt Transducer Single Phase.

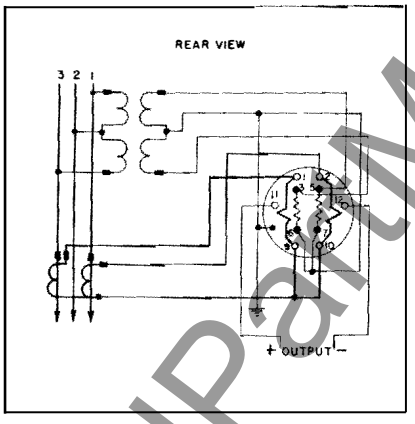

Fig. 18. Type KP2-241 Indicating Watt Transducer 2 Current Coil.

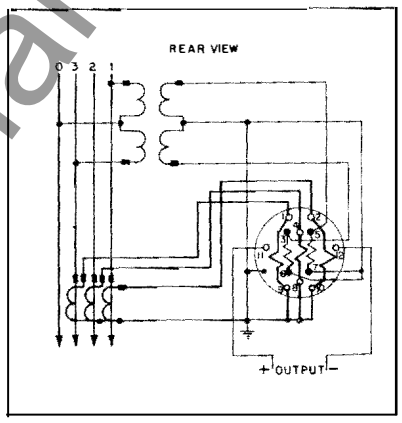

Fig. 19. Type KP2-241 Indicating Watt Transducer 3 Current Coil.

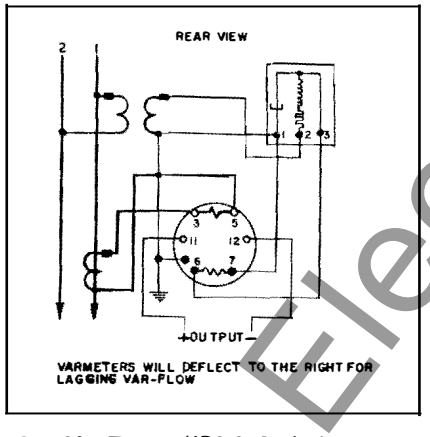

Fig. 20. Type KP2-241 Indicating VAR Transducer Single Phase.

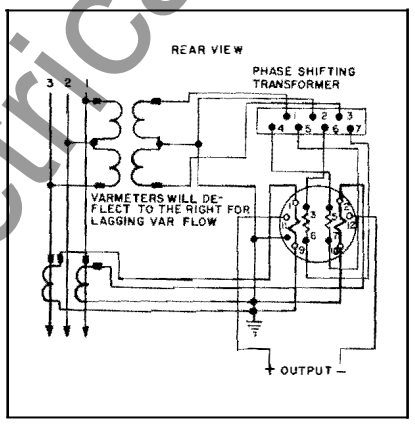

Fig. 21. Type KP2-241 Indicating VAR Transducer 2 Current Coil.

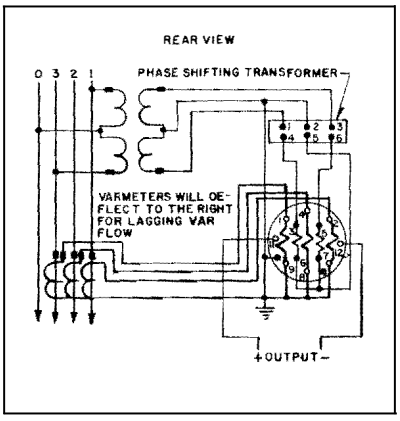

Fig. 22. Type KP2-241 Indicating VAR Transducer 3 Current Coil.

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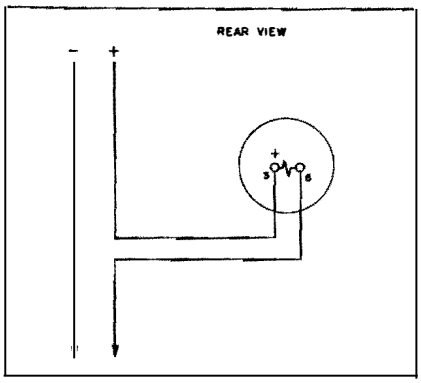


Fig. 2. Type X-241 Ammeter and Milliameter (self-contained).

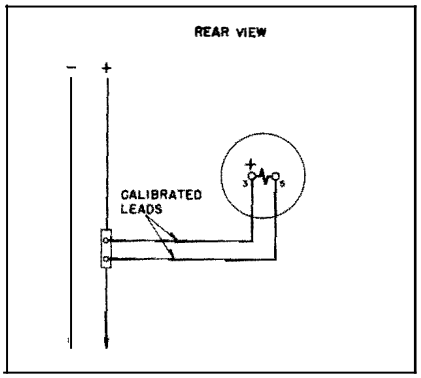


Fig. 3. Type X-241 Ammeter with External Shunt.

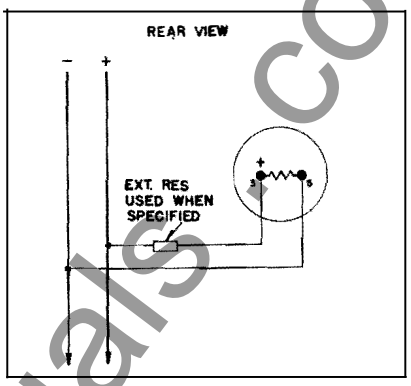


Fig. 4. Type X-241 Voltmeter.

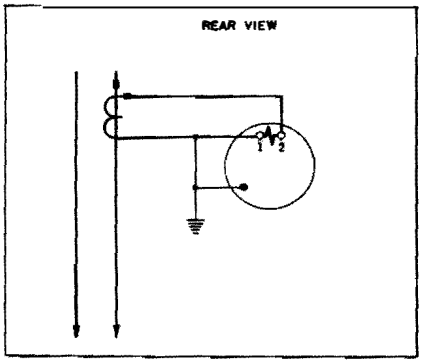


Fig. 5. Type A-241 and C-241 Ammeter.

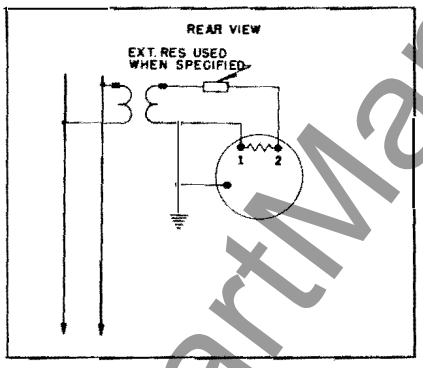


Fig. 6. Type A-241 and C-241 Voltmeter.

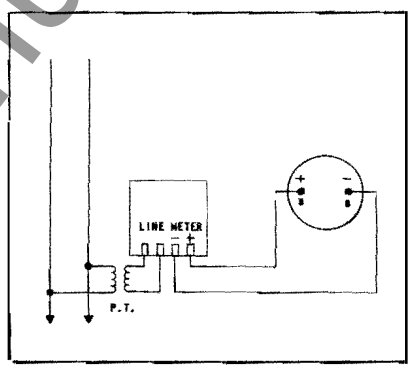


Fig. 7. Type X-241 Frequency Meter with External Transducer.

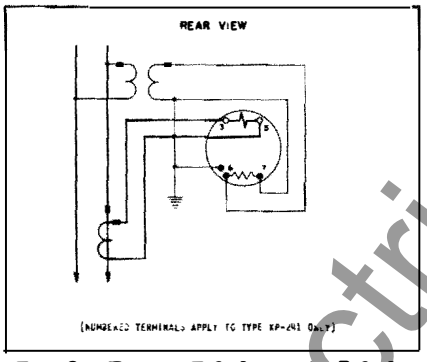


Fig. 8. Type F-241 and P-241 Single Phase Wattmeter.

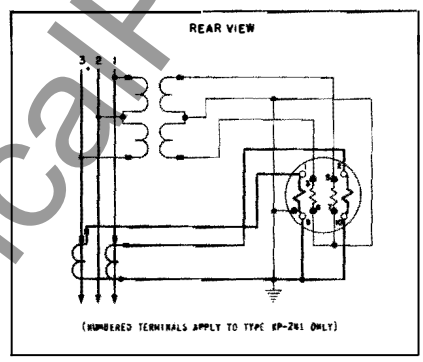


Fig. 9. Types F-241 and P-241 polyphase 2 current coil wattmeter.

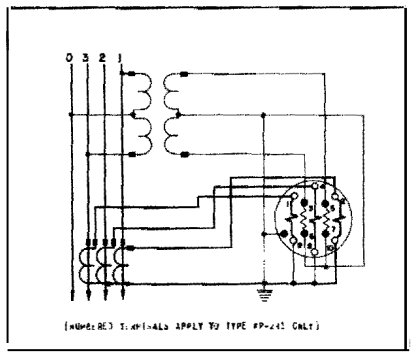


Fig. 10. Types F-241 and P-241 Polyphase 3 current coil wattmeter.

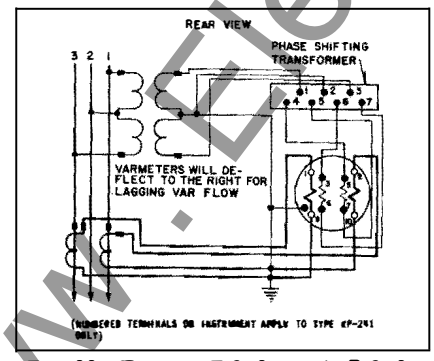


Fig. 11. Types F-241 and P-241 Polyphase 2 Current Coil Varmeter.

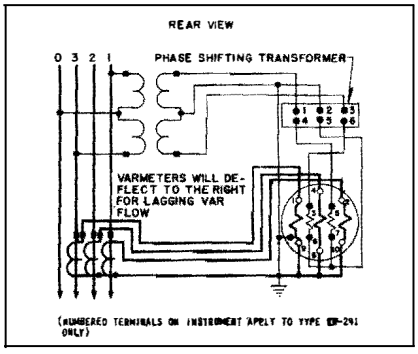


Fig. 12. Types F-241 and P-241 Palyphase 3 Current Coil Varmeter.

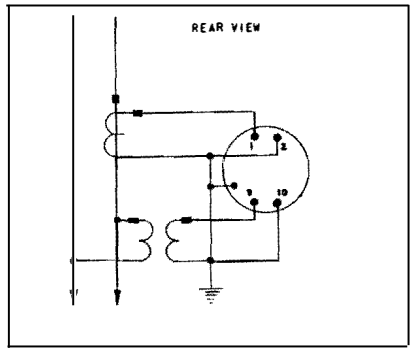
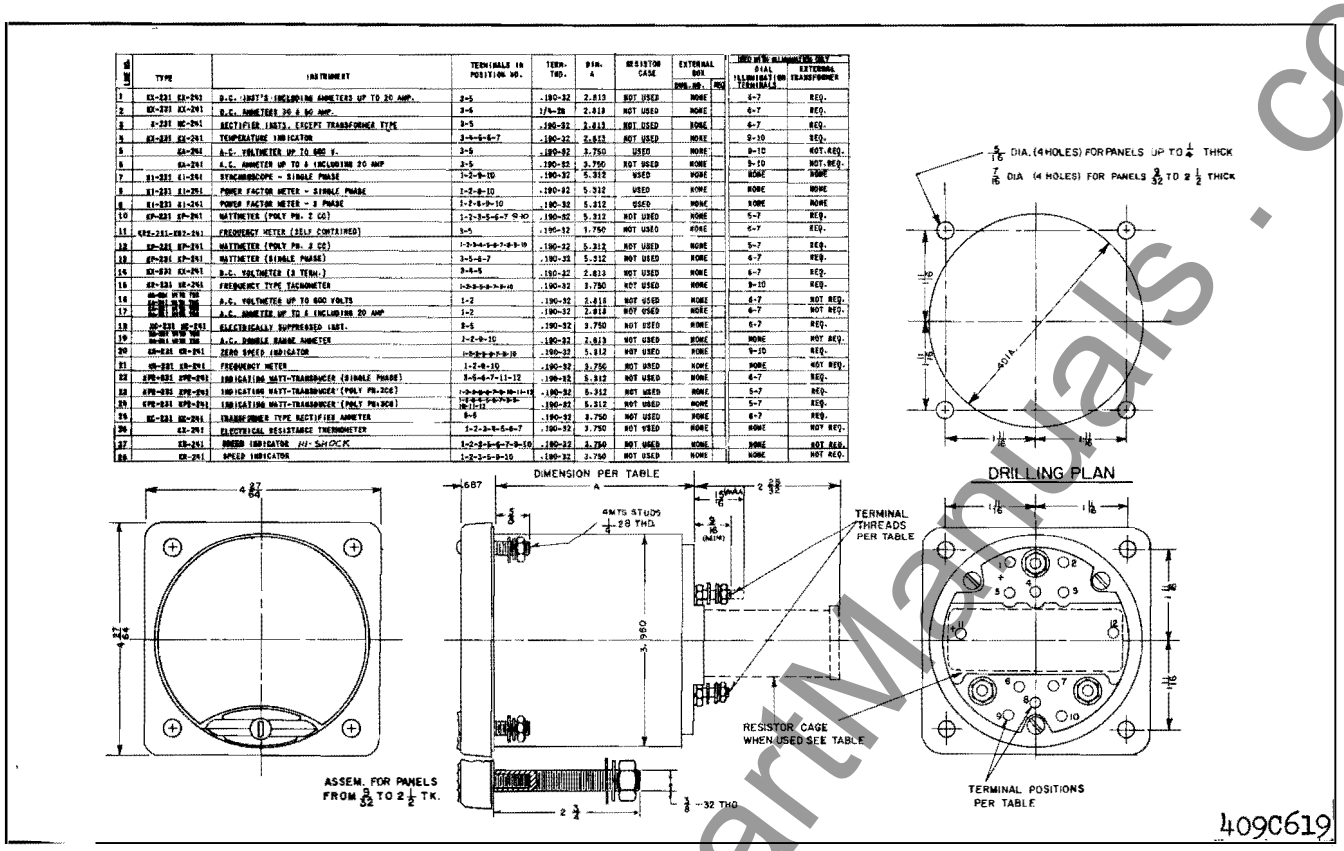
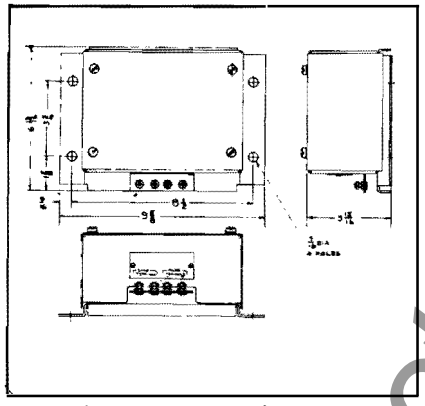


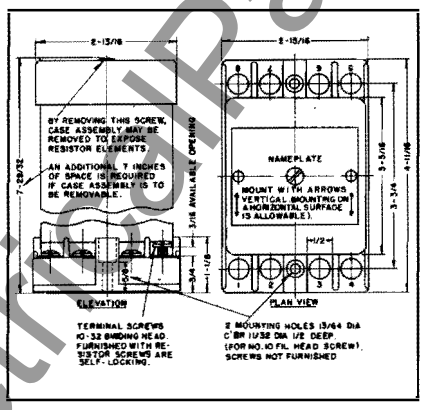
Fig. 13. Type I-241 Single Phase Power Factor Meter.

ITEM NO.	TYPE	INSTRUMENT	TERMINALS IN POSITION NO.	TERM-TRD.	DIM. A	RESISTOR CASE	EXTERNAL DATA (SYM. NO. REQ.)	USED WITH ILLUMINATING DIAL: DIAL ILLUMINATION TERMINALS	USED WITH ILLUMINATING DIAL ONLY: EXTERNAL TRANSFORMER
1	KX-231 KX-241	D.C. UNIT'S INCLUDING AMMETERS UP TO 20 AMP.	2-5	.190-32	2.813	NOT USED	NONE	4-7	REQ.
2	KX-231 KX-241	D.C. AMMETERS 30 & 50 AMP.	3-6	1/4-28	2.813	NOT USED	NONE	4-7	REQ.
3	X-231 WX-241	RECTIFIER UNITS, EXCEPT TRANSFORMER TYPE	3-5	.190-32	2.813	NOT USED	NONE	4-7	REQ.
4	KX-231 KX-241	TEMPERATURE INDICATOR	3-4-5-6-7	.190-32	2.813	NOT USED	NONE	9-10	REQ.
5	SX-241	A.C. VOLTMETER UP TO 600 V.	3-6	.190-32	3.750	USED	NONE	9-10	NOT REQ.
6	SX-241	A.C. AMMETER UP TO 6 (INCLUDING 20 AMP	3-5	.190-32	3.750	NOT USED	NONE	9-10	NOT REQ.
7	SY-231 SY-241	SYNCHROSCOPE - SINGLE PHASE	1-2-9-10	.190-32	5.312	USED	NONE	NONE	NONE
8	SY-231 SY-241	POWER FACTOR METER - SINGLE PHASE	1-2-8-10	.190-32	5.312	USED	NONE	NONE	NONE
9	SY-231 SY-241	POWER FACTOR METER - 3 PHASE	1-2-8-9-10	.190-32	5.312	USED	NONE	NONE	NONE
10	KP-231 KP-241	WATTMETER (POLY PH. 2 CO)	1-2-3-5-6-7-9-10	.190-32	5.312	NOT USED	NONE	5-7	REQ.
11	KPF-231-KBF-241	FREQUENCY METER (SELF CONTAINED)	5-5	.195-32	1.750	NOT USED	NONE	6-7	REQ.
12	KP-231 KP-241	WATTMETER (POLY PH. 2 CO)	1-3-4-5-6-7-8-9-10	.190-32	5.312	NOT USED	NONE	5-7	REQ.
13	KP-231 KP-241	WATTMETER (SINGLE PHASE)	3-5-6-7	.190-33	5.312	NOT USED	NONE	6-7	REQ.
14	KX-231 KX-241	D.C. VOLTMETER (2 TERM.)	5-6	.190-32	2.813	NOT USED	NONE	6-7	REQ.
15	KF-231 KF-241	FREQUENCY TYPE TACHOMETER	1-2-3-5-6-7-9-10	.190-32	3.750	NOT USED	NONE	9-10	REQ.
16	WITH TAB	A.C. VOLTMETER UP TO 600 VOLTS	1-2	.190-32	2.813	NOT USED	NONE	6-7	NOT REQ.
17	WITHOUT TAB	A.C. AMMETER UP TO 6 (INCLUDING 20 AMP	1-2	.190-32	2.813	NOT USED	NONE	6-7	NOT REQ.
18	KP-231 KP-241 WITH TAB; KP-241 WITH TAB	ELECTRICALLY SUPPRESSED INST.	5-5	.190-32	2.750	NOT USED	NONE	6-7	REQ.
19	KP-231 KP-241 WITHOUT TAB; KP-241 WITHOUT TAB	A.C. DOUBLE RANGE AMMETER	1-2-9-10	.190-32	2.813	NOT USED	NONE	NONE	NOT REQ.
20	KM-231 KM-241	ZERO SPEED INDICATOR	1-3-5-6-7-9-10	.190-32	5.312	NOT USED	NONE	9-10	REQ.
21	KM-231 KM-241	FREQUENCY METER	1-2-9-10	.190-32	3.750	NOT USED	NONE	NONE	NOT REQ.
22	KPR-231 KPR-241	INDICATING WATT-TRANSDUCER (SINGLE PHASE)	3-5-6-7-11-12	.190-32	5.312	NOT USED	NONE	6-7	REQ.
23	KPR-235 KPR-245	INDICATING WATT-TRANSDUCER (POLY PH. 2CS)	1-3-5-6-7-9-10-11-12	.190-32	5.312	NOT USED	NONE	5-7	REQ.
24	KPR-231 KPR-241	INDICATING WATT-TRANSDUCER (POLY PH. 3CS)	1-2-3-5-6-7-9-10-11-12	.190-32	5.312	NOT USED	NONE	5-7	REQ.
25	KC-231 KC-241	TRANSFORMER TYPE RECTIFIED AMMETER	5-6	.190-32	3.750	NOT USED	NONE	6-7	REQ.
26	SX-241	ELECTRICAL RESISTANCE THERMOMETER	1-2-3-5-6-7	.190-32	3.750	NOT USED	NONE	NONE	NOT REQ.
27	KB-241	SPEED INDICATOR HI-SHOCK	1-2-3-5-6-7-9-10	.190-32	3.750	NOT USED	NONE	NONE	NOT REQ.
28	KB-241	SPEED INDICATOR	1-2-3-5-9-10	.190-32	3.750	NOT USED	NONE	NONE	NOT REQ.

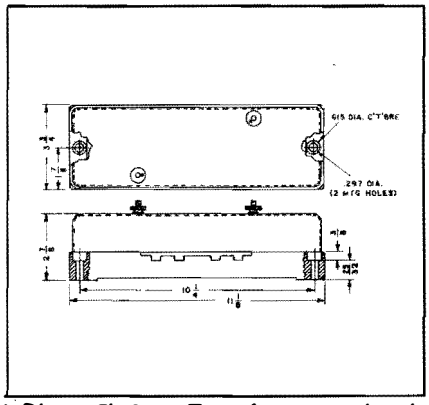




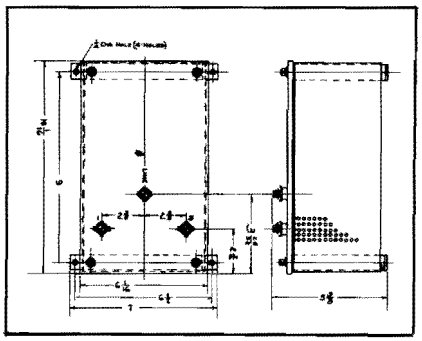
Transducer used with Frequency Meter.



VR-825 External Resistor.



** Phase Shifting Transformer used with 3-phase, 3-wire and 3-phase 4-wire Varmeter.*



Reaction Compensation used with Single Phase Varmeter.

Fig. 1. Outline Dimensions and Drilling Plan for Type K-241 Instruments and Accessories.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

—K-241 LINE—
SWITCHBOARD INSTRUMENTS
FOUR AND ONE-HALF INCH CLASSIFICATION
FULL-VIEW CIRCULAR SCALE TYPE

GENERAL

Type K-241 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-Attraction, moving iron
P = Watt transducer plus X
I = Rotating iron vane
C = Rectifier plus X
F = Iron core electromagnetic

All of the above mechanisms employ the taut band suspension bearing system except the I and F types.

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.

DIAL NOTES

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

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 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

The usual procedures and practices employed for servicing mechanisms of pivot-jewel type instruments cannot be applied to suspension type instruments. For this reason we recommend that all instruments in need of mechanism servicing be returned to the factory.

Orders for renewal parts should include the name of the part and the style and serial number of the instrument, appearing on the dial mask.

SUPERSEDES I.L. 43-241J
*Denotes change from superseded issue.

EFFECTIVE JULY 1966

WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

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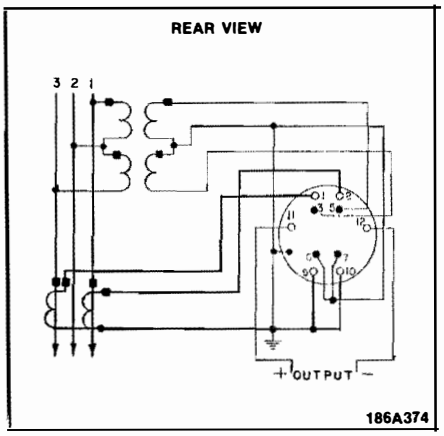


Fig. 35. Type KV2-241 Two Current Coil Self contained indicating Var-Transducer. For single phase test connection, see I.L. 43-241.1.

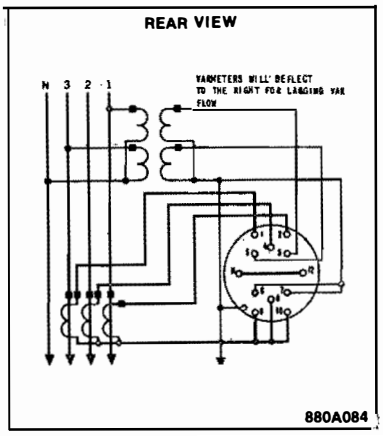


Fig. 36. Type KV-241 Three Current Coil Self Contained Varmeter. For single phase test connection, see I.L. 43 241.1.

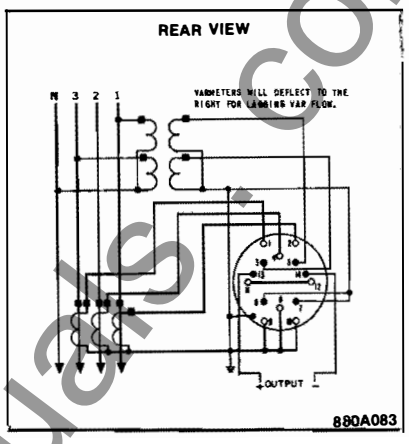


Fig. 37. Type KV2-241 Three Current Coil Self Contained Indicating VAR Transducer. For single phase test connection, see I.L. 43-241.1.

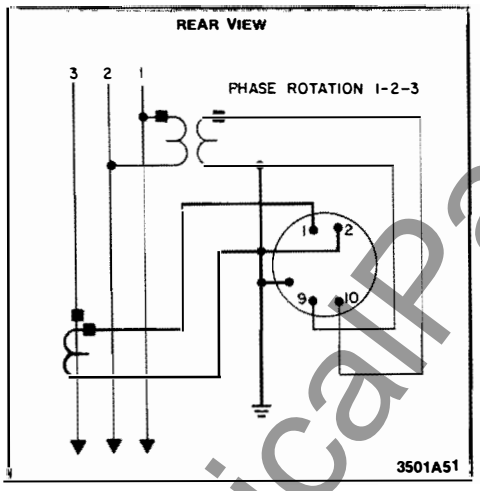


Fig. 38. Type KJ-241 3 phase, 3 wire Power Factor Meter.

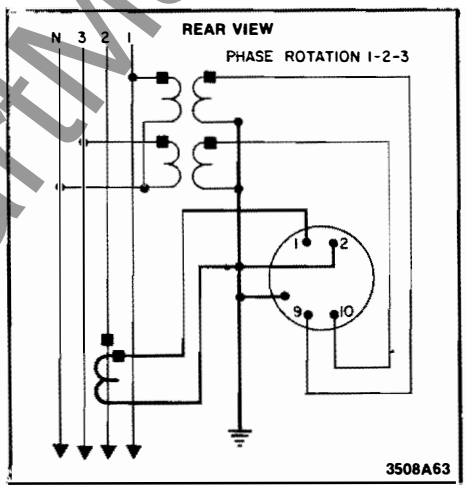


Fig. 39. Type KJ-241 3 phase, 4 wire Power Factor Meter.

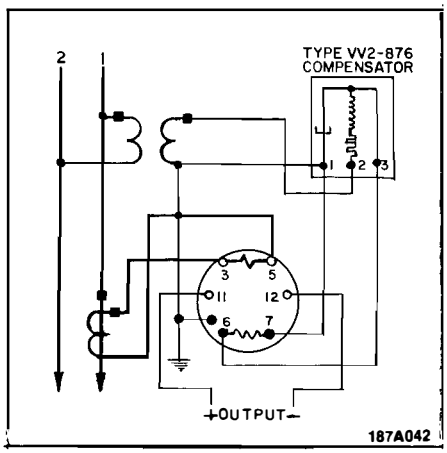


Fig. 26. Type KP2-241 Indicating VAR Transducer Single Phase.

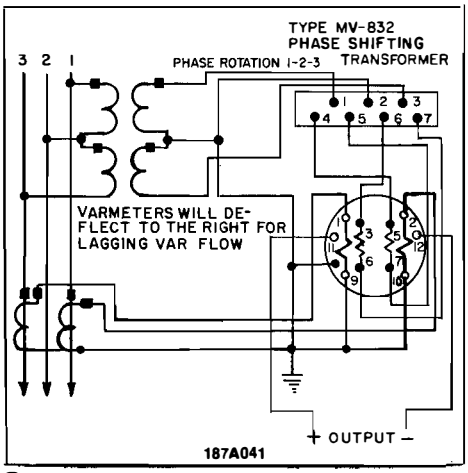


Fig. 27. Type KP2-241 Indicating VAR Transducer 2 Current Coil with phase shifter.

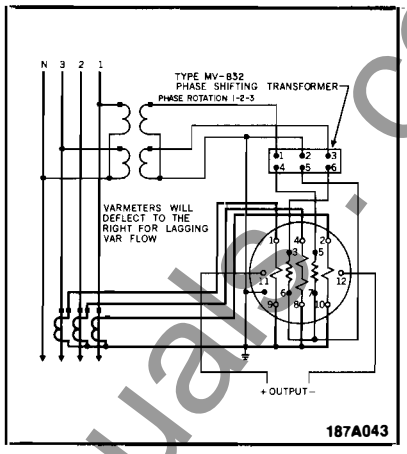


Fig. 28. Type KP2-241 Indicating VAR Transducer 3 Current Coil with phase shifter.

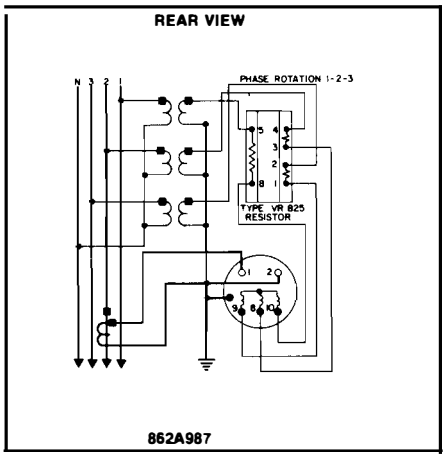


Fig. 29. Type KI241 3 Phase 4 Wire Power Factor Meter.

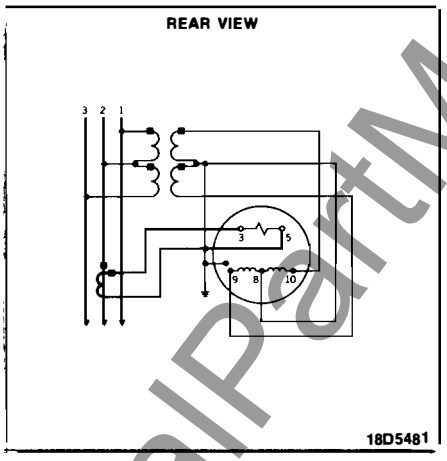


Fig. 30. Type KP241 Single Element Wattmeter for 3 Phase 3 Wire.

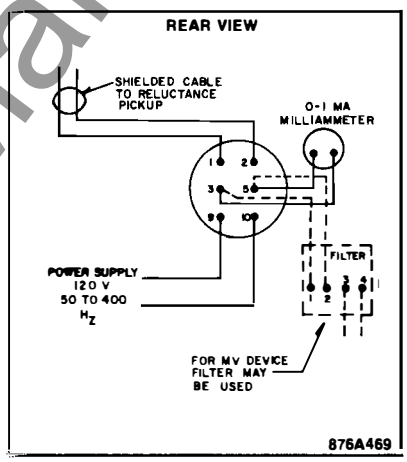


Fig. 31. Type KR2-241 Speed Indicator.

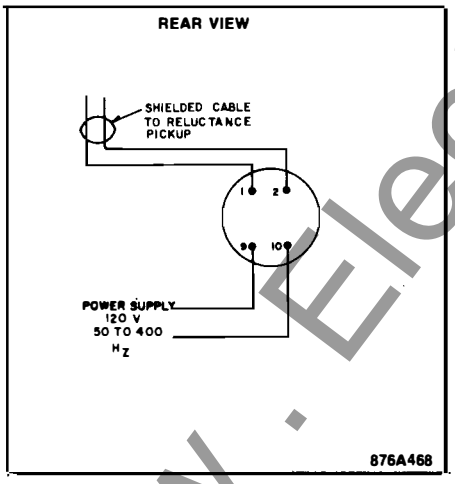


Fig. 32. Type KR241 Speed Indicator.

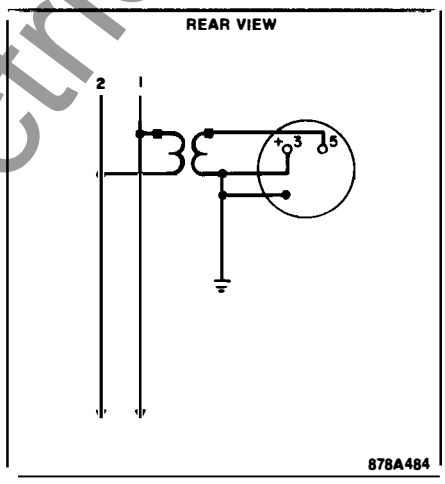


Fig. 33. Type KR4-241 Frequency Meter.

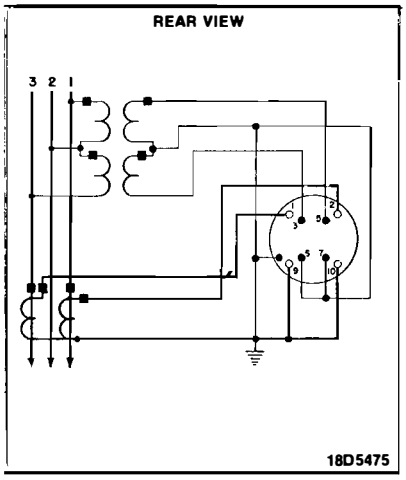


Fig. 34. Type KV-241 Two Current Coil Self Contained Varmeter. For single phase test connection see I.L. 43-241.1.

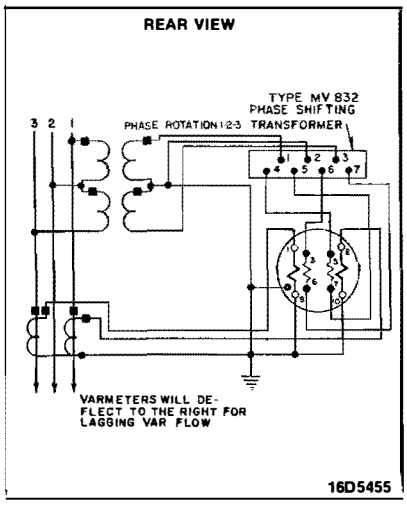


Fig. 17. Type KP-241 2 Current Coil Varmeter with phase shifter.

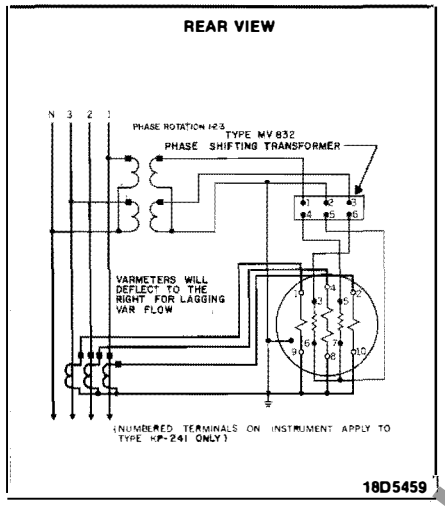


Fig. 18. Type KP-241 3 Current Coil Varmeter with phase shifter.

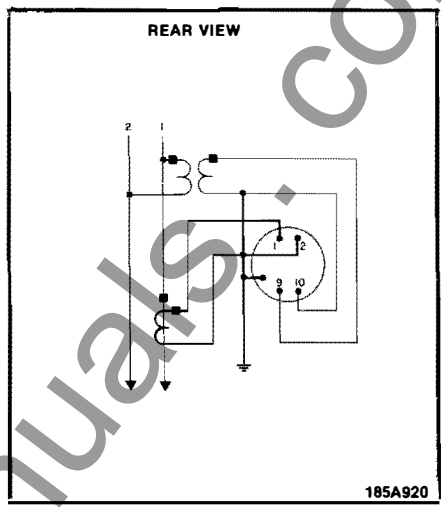


Fig. 19. Type KI-241 and KJ-241 Single Phase Power Factor Meter.

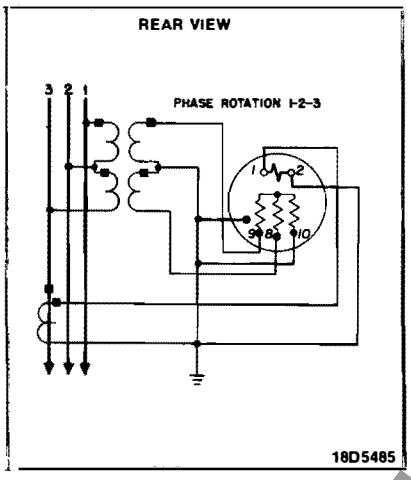


Fig. 20. Type KI-241 3 Phase-3 Wire Power Factor Meter.

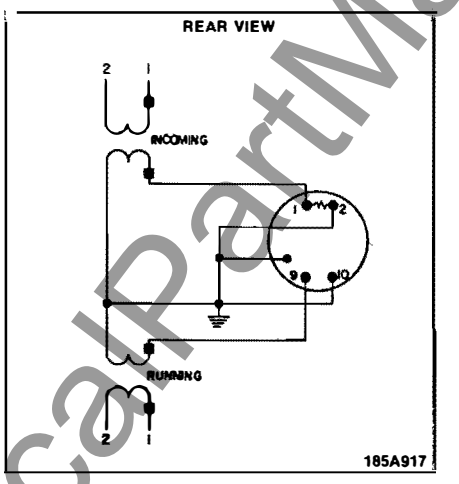


Fig. 21. Type KI-241 Synchroscope.

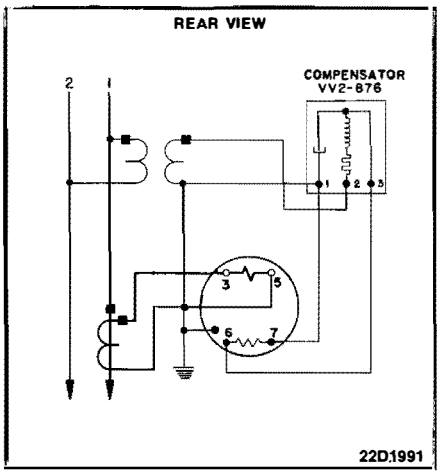


Fig. 22. Type KP-241 Single Phase Varmeter.

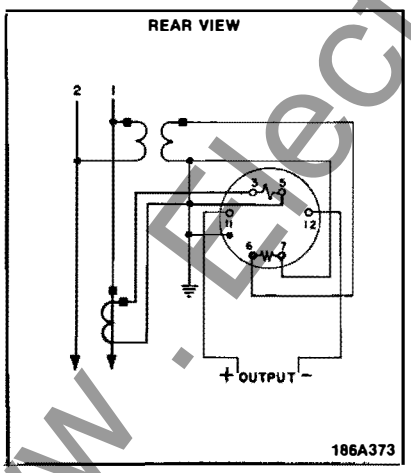


Fig. 23. Type KP2-241 Indicating Watt Transducer Single Phase.

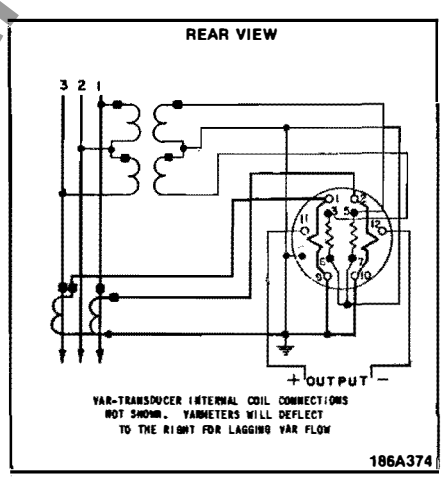


Fig. 24. Type KP2-241 Indicating Watt Transducer 2 Current Coil.

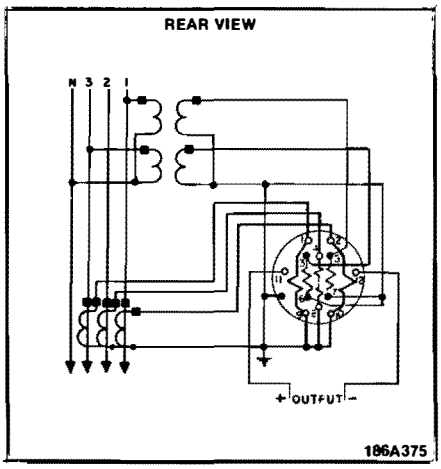


Fig. 25. Type KP2-241 Indicating Watt Transducer 3 Current Coil.

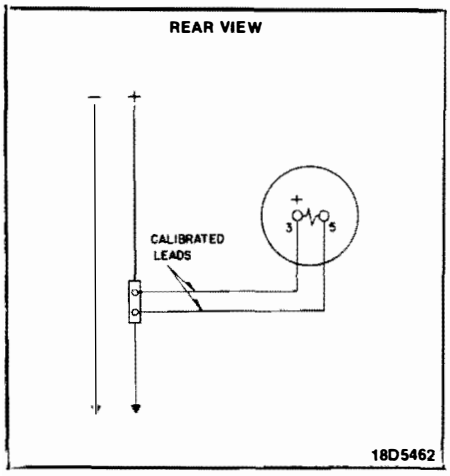


Fig. 9. Type KX-241 Ammeter with External Shunt.

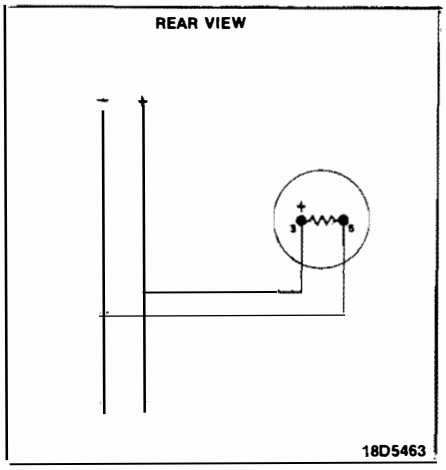


Fig. 10. Type KX-241 Voltmeter.

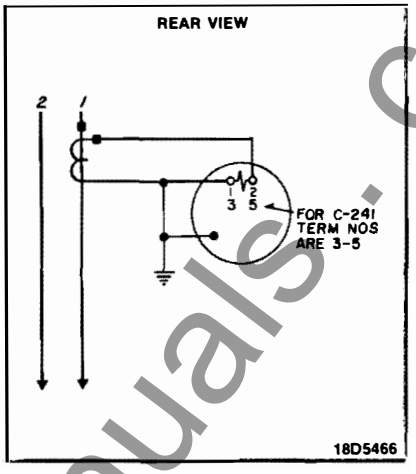


Fig. 11. Type KA-241 and KC-241 Ammeter.

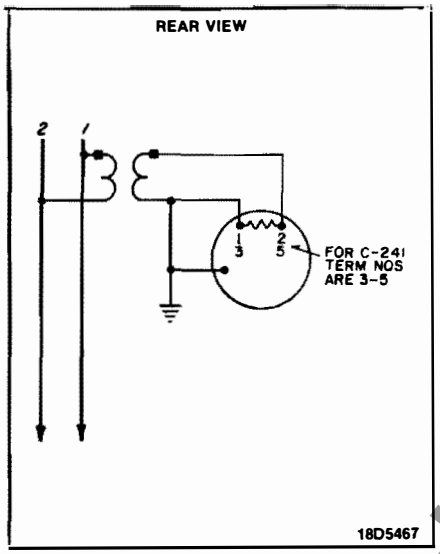


Fig. 12. Type KA-241 and KC-241 Voltmeter.

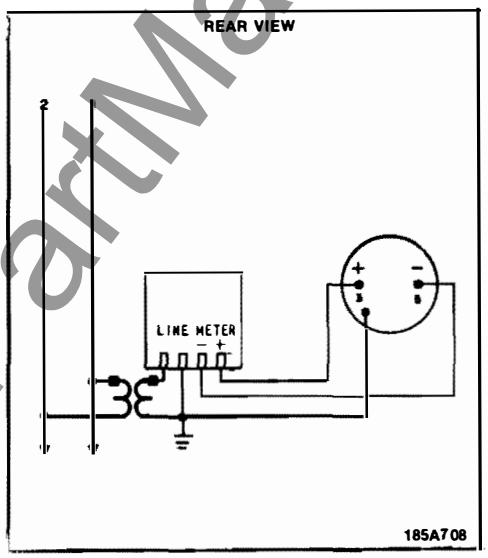


Fig. 13. Type KX-241 Frequency Meter, Hi-Shock, with External Transducer.

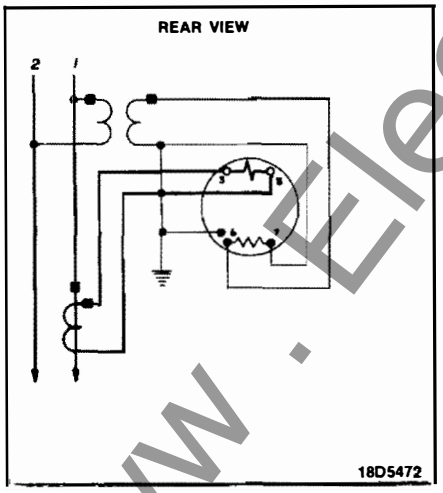


Fig. 14. Type KP-241 Single Phase Wattmeter.

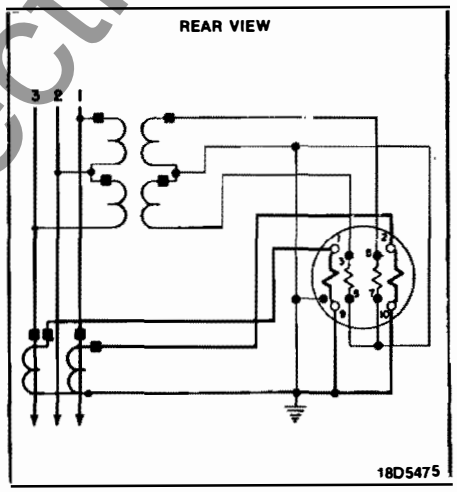


Fig. 15. Type KP-241 2 Current Coil Wattmeter.

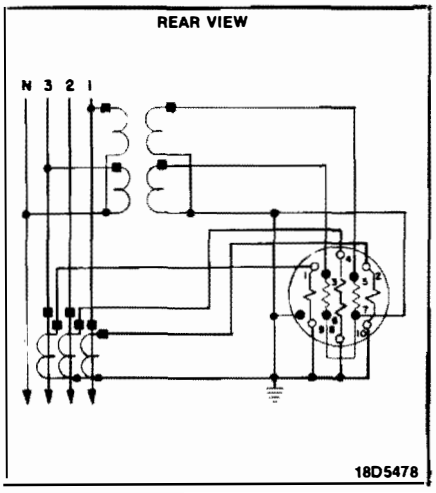


Fig. 16. Type KP-241 3 Current Coil Wattmeter.

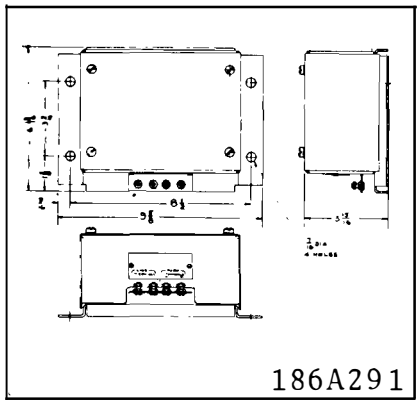


Fig. 2. Transducer used with Hi Shock Frequency Meter.

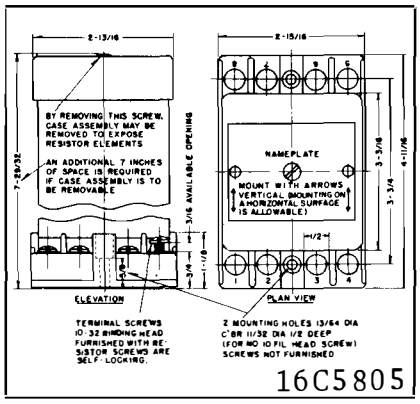


Fig. 3. VR-825 External Resistor.

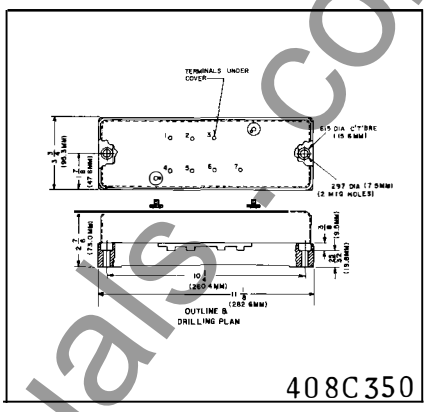


Fig. 4. Phase Shifting Transformer used with 3-phase, 3-wire and 3-phase 4-wire Varmeter.

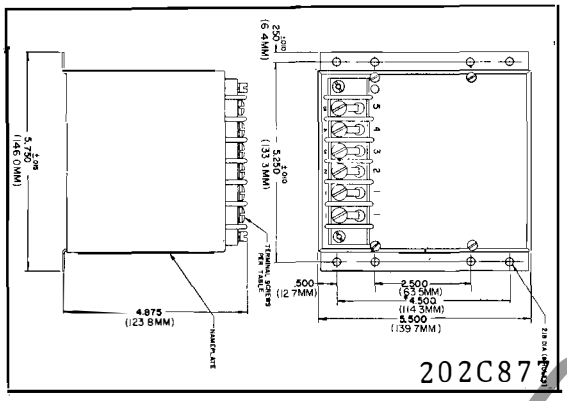


Fig. 5. VAR Compensator used with Single Phase Varmeter.

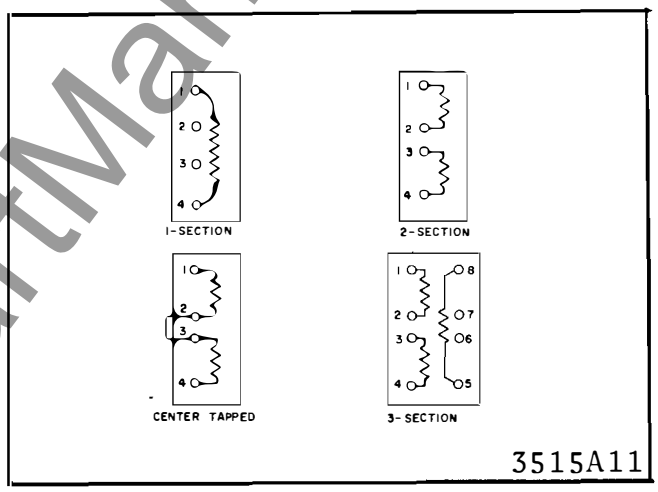


Fig. 6. Type VR825 Resistor Connections.

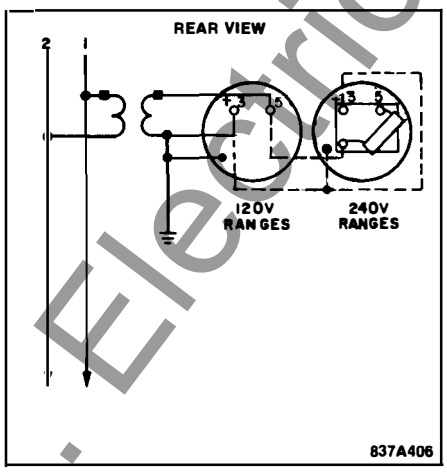


Fig. 7. Type KR3-241 Self Cont. Frequency Meter.

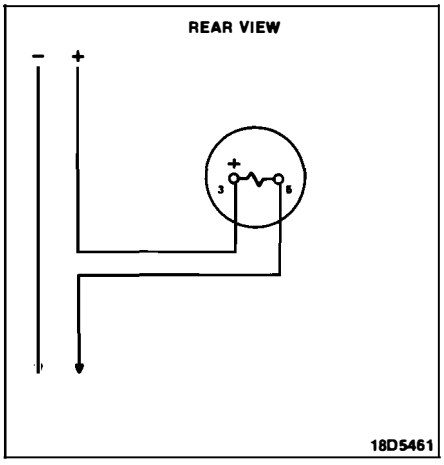
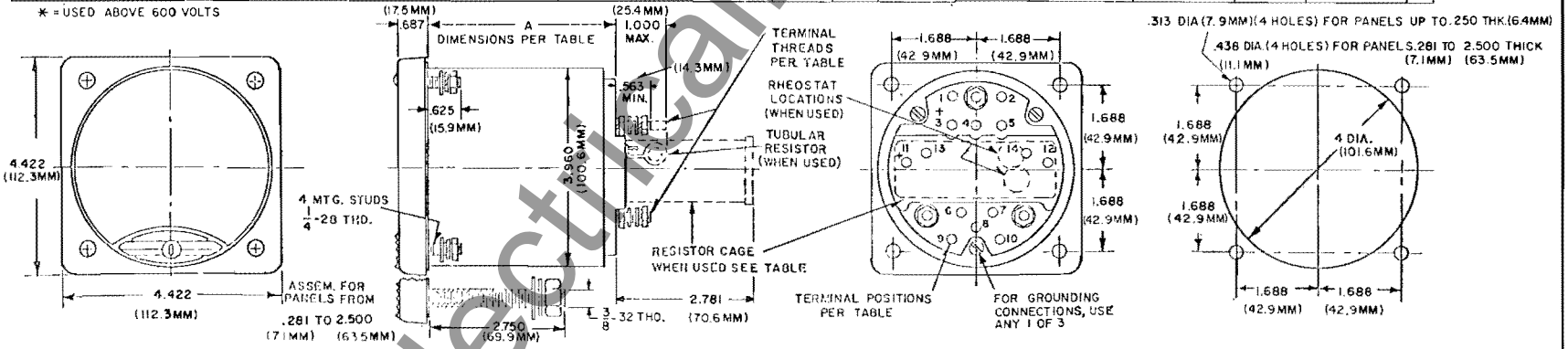


Fig. 8. Type KX-241 Ammeter and Milliameter (self-contained).

LINE NO.	TYPE	INSTRUMENT	TERMINALS IN POSITION NO.	TERM. THD. (USS)	DIM. A INCHES	DIM. A (MM)	RESISTOR CAGE	ELECTROLUMINESCENT DIALS: DIAL ILLUMINATION TERMINALS	ELECTROLUMINESCENT DIALS: EXTERNAL TRANSFORMER	TUBULAR TYPE RESISTOR	EXTERNAL BOX: TYPE	EXTERNAL BOX: REQ
1	KX-231 KX-241	D.C. INSTS. INCLUDING AMMETERS UP TO 20 AMP	3-5	10-32	2.813	71.5	NOT USED	6-7	USED	NOT USED	NOT USED	
2	KX-231 KX-241	D.C. AMMETERS 30 & 50 AMP.	3-5	1/4-28	2.813	71.5		6-7	USED	NOT USED		
3	KX-231 KX-241	RECTIFIER INSTS., EXCEPT TRANSFORMER TYPE	3-5	10-32	2.813	71.5		6-7	USED	NOT USED		
4	KX-231 KX-241	TEMPERATURE INDICATOR, 20 VDC POWER SUPPLY	3-4-5-6-7		2.813	71.5		9-10	USED	NOT USED		
5	KC-241	EXPANDED SCALE VOLTMETER MIL-V-23151B	3-5		3.750	95.3		NOT USED	NOT USED	NOT USED		
6	KR4-241	FREQUENCY METER MIL-M-23167	3-5		3.750	95.3				NOT USED		
7	KI-231 KI-241	SYNCHROSCOPE-SINGLE PHASE COMM. 50 & 60HZ	1-2-9-10		5.312	134.9				USED		
8	KI-231 KI-241	POWER FACTOR METER - SINGLE PHASE - COMM 50 & 60HZ	1-2-9-10		5.312	134.9				USED		
9	KI-231 KI-241	POWER FACTOR METER - 3 PHASE	1-2-8-9-10		5.312	134.9	USED			NOT USED		
10	KP-231 KP-241	WATTMETER (3PH 3W) & KV-231 KV-241 VAR S.C. (3PH 3W)	1-2-3-5-6-7-9-10		5.312	134.9	NOT USED	5-7				
11	KR3-231 KR3-241	FREQUENCY METER (SELF CONTAINED)	3-5		3.750	95.3		6-7	USED			
12	KP-231 KP-241	WATTMETER (3 PH 4 W)	1 TO 10		5.312	134.9		5-7	NOT USED			
13	KP-231 KP-241	WATTMETER (SINGLE PHASE)	3-5-6-7		5.312	134.9		6-7	NOT USED			
14	KX-231 KX-241	D.C. VOLTMETER (3 TERM.)	3-4-5		2.813	71.5		6-7	USED			
15	KV-231 KV-241	VARMETER SELF CONT. (3PH 4W)	1 TO 12		5.312	134.9		NOT USED	NOT USED			
16	KA-231 KA-241	A.C. VOLTMETER	1-2		2.813	71.5	*	6-7	NOT USED			
17	KA-231 KA-241	A.C. AMMETER UP TO & INCLUDING 20 AMP	1-2		2.813	71.5	NOT USED	6-7	NOT USED			
18	KC-231 KC-241	ELECTRICALLY SUPPRESSED INST.	3-5		3.750	95.3		6-7	USED			
19	KA-231 KA-241	A.C. DOUBLE RANGE AMMETER	1-2-9-10		2.813	71.5		NOT USED	NOT USED			
20	KV2-231 KV2-241	INDICATING VAR-TRANSDUCER S.C. (3 PH. 3W)	1 TO 12		5.312	134.9		NOT USED				
21	KR-231 KR-241	SPEED INDICATOR	1-2-9-10		3.750	95.3		NOT USED				
22	KP-2-231 KP2-241	INDICATING WATT-TRANSDUCER (SINGLE PHASE)	3-5-6-7-11-12		5.312	134.9		6-7				
23	KP2-231 KP2-241	INDICATING WATT-TRANSDUCER (3 PH 3 W)	1-2-3-5-6-7-9 TO 12		5.312	134.9		5-7				
24	KP2-231 KP2-241	INDICATING WATT-TRANSDUCER (3 PH 4 W)	1 TO 12		5.312	134.9		5-7				
25	KC-231 KC-241	TRANSFORMER TYPE RECTIFIER AMMETER	3-5		3.750	95.3		6-7	USED			
26	KX-241	ELECTRICAL RESISTANCE THERMOMETER 120V AC POWER SUP	1-2-3-4-5-6-7		3.750	95.3		NOT USED	NOT USED			
27	KV2-231 KV2-241	INDICATING VAR TRANSDUCER S.C. (3PH. 4W)	1 TO 14		5.312	134.9		NOT USED	NOT USED			
28	KP2-231 KP2-241	SPEED INDICATOR	1-2-3-5-9-10		3.750	95.3		NOT USED	NOT USED			
29	KC-241	EXPANDED SCALE VOLTMETER	3-5		3.750	95.3		6-7	USED			
30	KI-231 KI-241	SYNSCP.-ALL SINGLE PH. HI SHOCK & 400 HZ COMM	1-2-9-10		5.312	134.9	USED	NOT USED	NOT USED			
31	KI-231 KI-241	P.F. METER-ALL SINGLE PH. HI SHOCK & 400HZ COMM	1-2-9-10		5.312	134.9	USED	NOT USED				
32	KI-231 KI-241	P.F. METER 3 PHASE 4 WIRE	1-2-8-9-10		5.312	134.9	USED	NOT USED			VR-825	1
33	KP-231 KP-241	VARMETER SINGLE PHASE	3-5-6-7		5.312	134.9	NOT USED	6-7			VV2-876	1
34	KP2-231 KP2-241	INDICATING VAR-TRANSDUCER SINGLE PHASE	3-5-6-7-11-12		5.312	134.9	NOT USED	6-7			VV2-876	1
35	KJ-231 KJ-241	TRANSDUCER TYPE P.F. METER 1 PH. & 3 PH.	1-2-9-10		5.312	134.9	NOT USED	NOT USED			NOT USED	
36	KX-241	FREQUENCY METER MIL-M-16125	3-5		3.750	95.3	NOT USED	6-7	USED		VC 841	1

* = USED ABOVE 600 VOLTS



SUB. 39
409C619

Fig. 1.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

—K-241 LINE—
SWITCHBOARD INSTRUMENTS
FOUR AND ONE-HALF INCH CLASSIFICATION
FULL-VIEW CIRCULAR SCALE TYPE

GENERAL

Type K-261 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-Attraction, moving iron
P = Watt transducer plus X
I = Rotating iron vane
C = Rectifier plus X
F = Iron core electromagnetic
J = Power Factor Transducer Plus X
V = Var Transducer Plus X

All of the above mechanisms employ the taut band suspension bearing system except the I and F types.

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.

DIAL NOTES

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

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: DO NOT REMOVE COVER WHILE THE INSTRUMENT IS ENERGIZED. DIAL AND POINTER MAY BE AT HAZARDOUS VOLTAGE LEVELS.

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

GROUNDING OF CASES

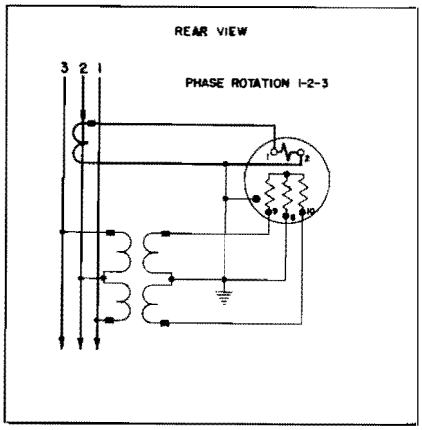
Ground instrument cases with No. 12 AWG Copper Wire to any one of the three instrument case to base screws.

REPAIRS AND RENEWAL PARTS

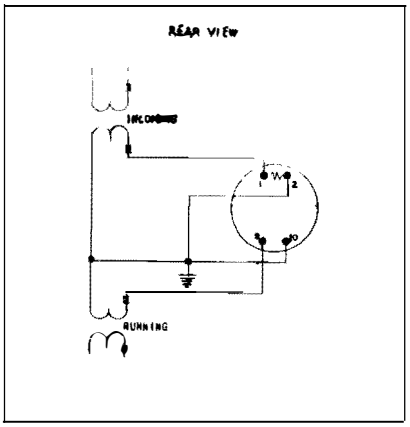
Repair work can be done most satisfactorily at the factory, or at any authorized Instrument Repair Facility (see Service Directory 43-000). However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts always give complete nameplate data.

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

SUPERSEDES I.L. 43-241V, dated August 1975
✪ Changed since previous issue
EFFECTIVE OCTOBER 1976



* Fig. 14. Type I-241 Polyphase Power Factor Meter.



* Fig. 15. Type I-241 Synchroscope.

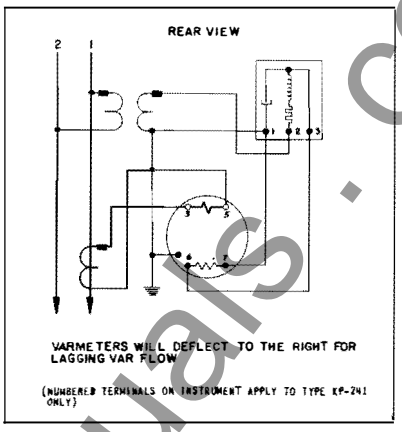


Fig. 16. Types F-241 and P-241 Single Phase Varmeter.

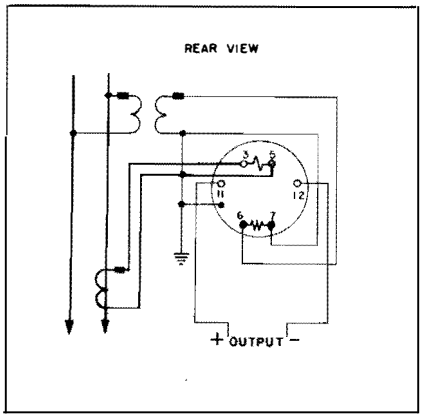


Fig. 17. Type KP2-241 Indicating Watt Transducer Single Phase.

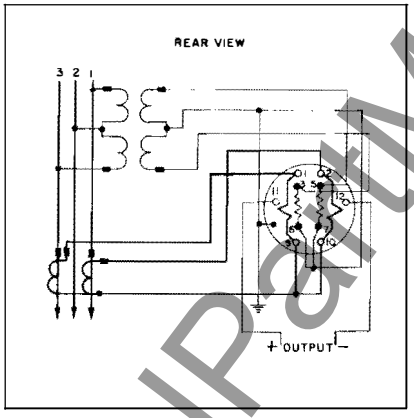


Fig. 18. Type KP2-241 Indicating Watt Transducer 2 Current Coil.

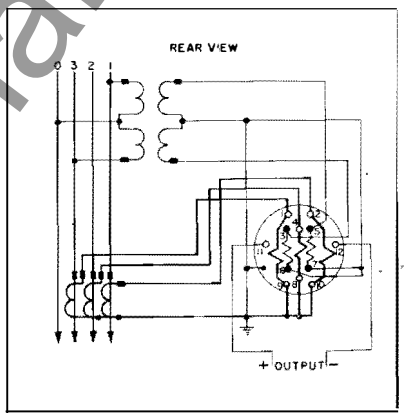


Fig. 19. Type KP2-241 Indicating Watt Transducer 3 Current Coil.

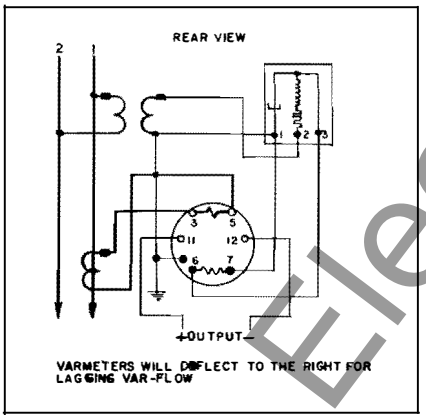


Fig. 20. Type KP2-241 Indicating VAR Transducer Single Phase.

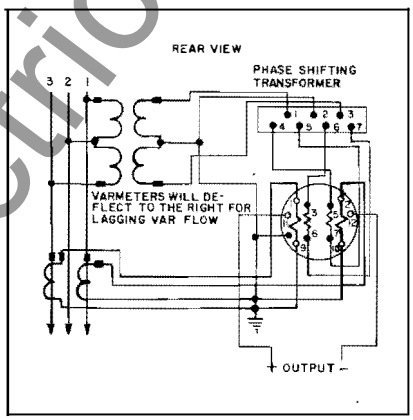


Fig. 21. Type KP2-241 Indicating VAR Transducer 2 Current Coil.

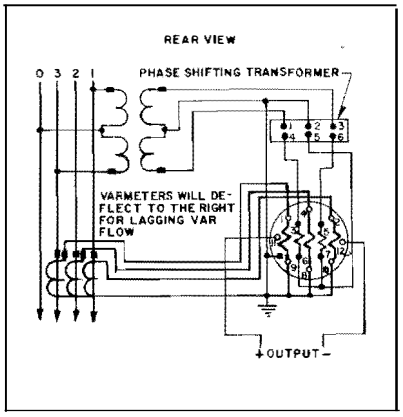


Fig. 22. Type KP2-241 Indicating VAR Transducer 3 Current Coil.

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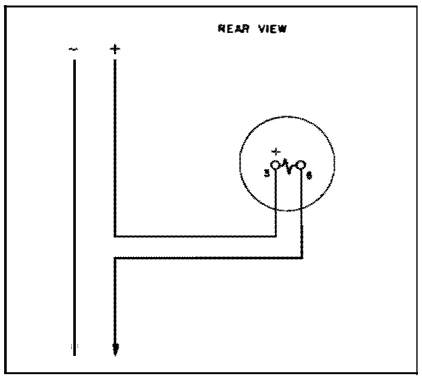


Fig. 2. Type X-241 Ammeter and Milliameter (self-contained).

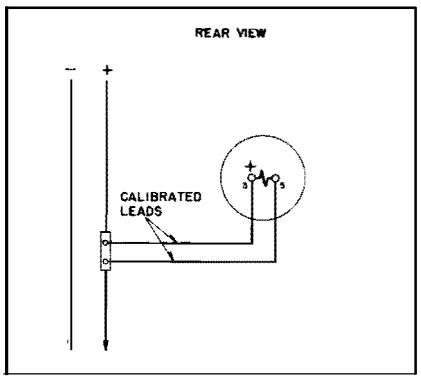


Fig. 3. Type X-241 Ammeter with External Shunt.

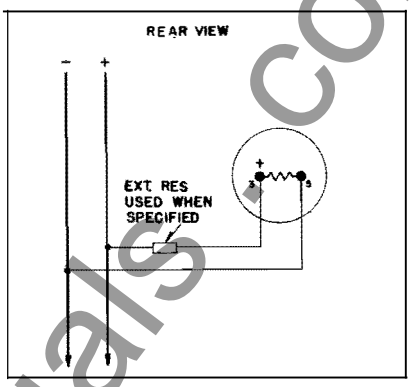


Fig. 4. Type X-241 Voltmeter.

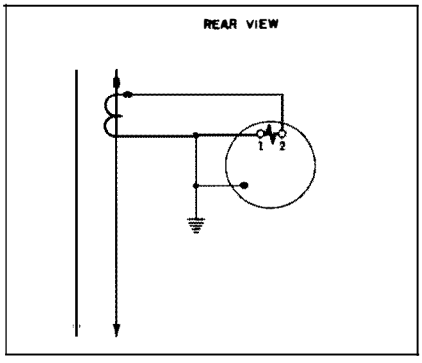


Fig. 5. Type A-241 and C-241 Ammeter.

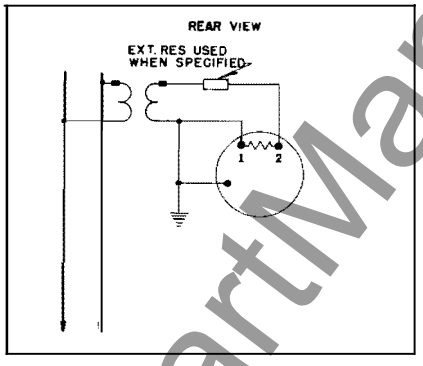


Fig. 6. Type A-241 and C-241 Voltmeter.

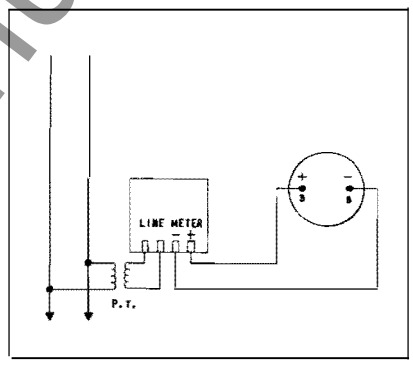


Fig. 7. Type X-241 Frequency Meter with External Transducer.

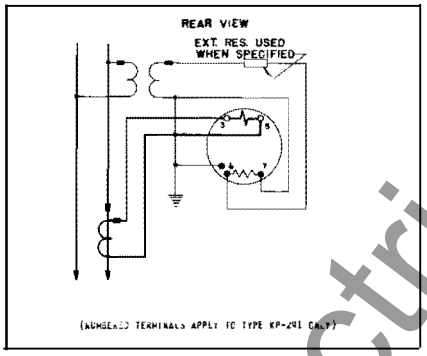


Fig. 8. Type F-241 and P-241 Single Phase Wattmeter.

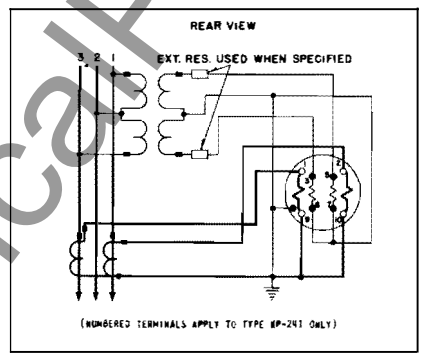


Fig. 9. Types F-241 and P-241 polyphase 2 current coil wattmeter.

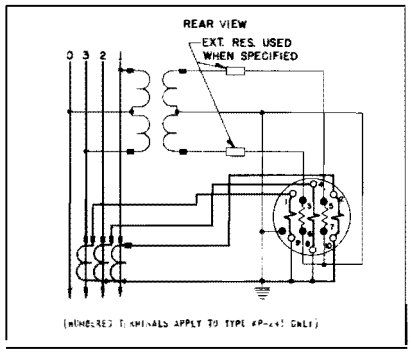


Fig. 10. Types F-241 and P-241 Polyphase 3 current coil wattmeter.

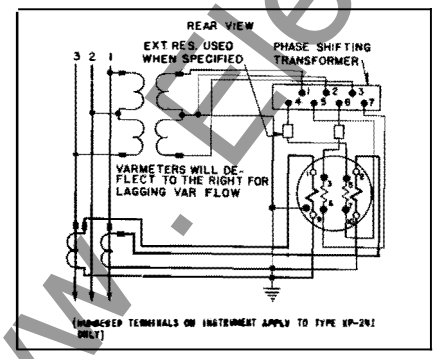


Fig. 11. Types F-241 and P-241 Polyphase 2 Current Coil Varmeter.

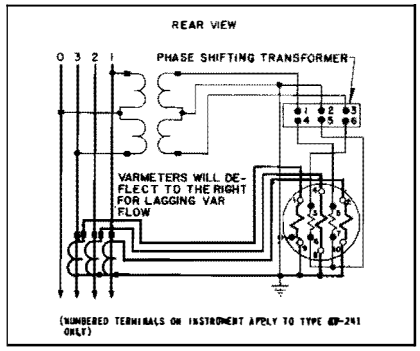


Fig. 12. Types F-241 and P-241 Polyphase 3 Current Coil Varmeter.

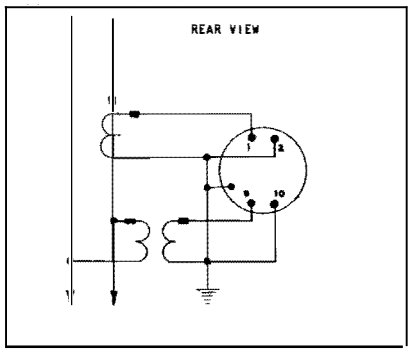
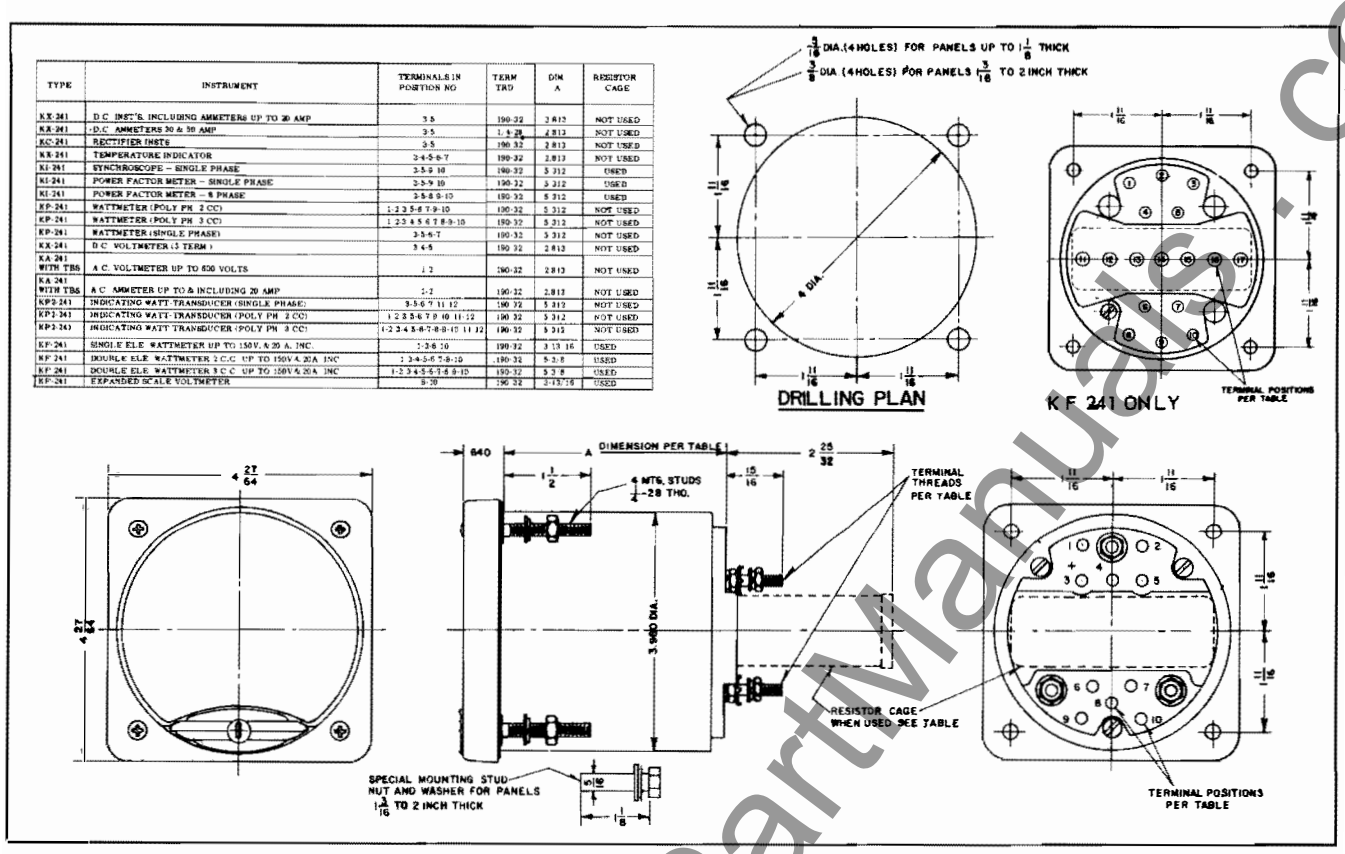
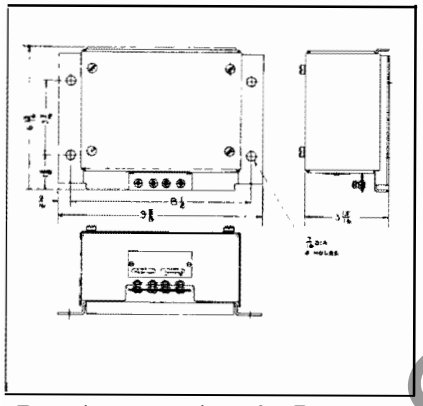


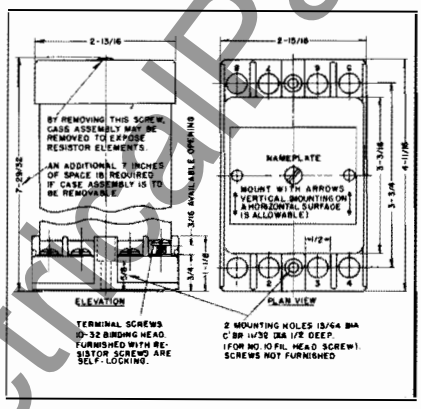
*Fig. 13. Type I-241 Single Phase Power Factor Meter.

TYPE	INSTRUMENT	TERMINALS IN POSITION NO	TERM TAP	DIM A	RESISTOR CAGE
KK-241	D C INST'S. INCLUDING AMMETERS UP TO 20 AMP	3-5	190-32	2.813	NOT USED
KK-241	D.C. AMMETERS 30 & 50 AMP	3-5	1-1/4	2.813	NOT USED
KC-241	RECTIFIER INSTS	3-5	190-32	2.813	NOT USED
KK-241	TEMPERATURE INDICATOR	3-4-5-6-7	190-32	2.813	NOT USED
KI-241	SYNCHROSCOPE – SINGLE PHASE	3-5-9-10	190-32	5 3/32	USED
KI-241	POWER FACTOR METER – SINGLE PHASE	3-5-9-10	190-32	5 3/32	USED
KI-241	POWER FACTOR METER – 3 PHASE	3-5-8-9-10	190-32	5 3/32	USED
KP-241	WATTMETER (POLY PH 2 CC)	1-2-3-5-6-7-9-10	190-32	5 3/32	NOT USED
KP-241	WATTMETER (POLY PH 3 CC)	1-2-3-4-5-6-7-8-9-10	190-32	5 3/32	NOT USED
KP-241	WATTMETER (SINGLE PHASE)	3-5-6-7	190-32	5 3/32	NOT USED
KK-241	D.C. VOLTMETER (3 TERM.)	3-4-5	190-32	2.813	NOT USED
KA-241 WITH TBS	A.C. VOLTMETER UP TO 600 VOLTS	1-2	190-32	2.813	NOT USED
KA-241 WITH TBS	A.C. AMMETER UP TO & INCLUDING 20 AMP	1-2	190-32	2.813	NOT USED
KPD-241	INDICATING WATT TRANSDUCER (SINGLE PHASE)	3-5-6-7-11-12	190-32	5 3/32	NOT USED
KPD-241	INDICATING WATT TRANSDUCER (POLY PH 2 CC)	1-2-3-5-6-7-9-10-11-12	190-32	5 3/32	NOT USED
KPD-241	INDICATING WATT TRANSDUCER (POLY PH 3 CC)	1-2-3-4-5-6-7-8-9-10-11-12	190-32	5 3/32	NOT USED
KF-241	SINGLE ELE. WATTMETER UP TO 150 V. & 20 A. INC.	1-2-6-10	190-32	3 13/16	USED
KF-241	DOUBLE ELE. WATTMETER 2 C.C. UP TO 150 V. & 20 A. INC.	1-2-3-4-5-6-7-8-10	190-32	5-3/8	USED
KF-241	DOUBLE ELE. WATTMETER 3 C.C. UP TO 150 V. & 20 A. INC.	1-2-3-4-5-6-7-8-9-10	190-32	5 3/8	USED
KF-241	EXPANDED SCALE VOLTMETER	9-10	190-32	2-15/16	USED

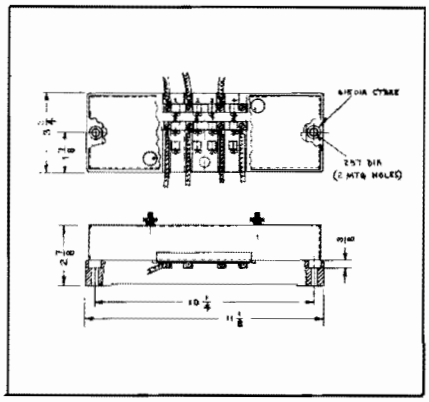




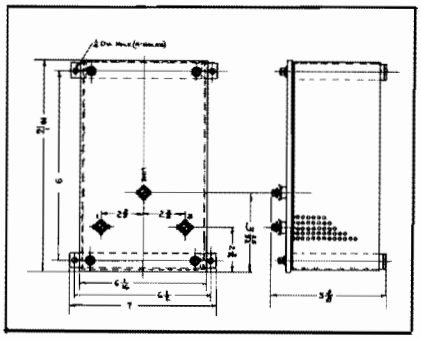
** Transducer used with Frequency Meter.*



VR-825 External Resistor.



** Phase Shifting Transformer used with 3-phase, 3-wire and 3-phase 4-wire Varmeter.*



Reaction Compensation used with Single Phase Varmeter.

Fig. 1. Outline Dimensions and Drilling Plan for Type K-241 Instruments and Accessories.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

—K-241 LINE—
SWITCHBOARD INSTRUMENTS
FOUR AND ONE-HALF INCH CLASSIFICATION
FULL-VIEW CIRCULAR SCALE TYPE

GENERAL

Type K-241 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-Attraction, moving iron
P = Watt transducer plus X
I = Rotating iron vane
C = Rectifier plus X
F = Iron core electromagnetic

All of the above mechanisms employ the taut band suspension bearing system except the I and F types.

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.

DIAL NOTES

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

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 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

The usual procedures and practices employed for servicing mechanisms of pivot-jewel type instruments cannot be applied to suspension type instruments. For this reason we recommend that all instruments in need of mechanism servicing be returned to the factory.

Orders for renewal parts should include the name of the part and the style and serial number of the instrument, appearing on the dial mask.

SUPERSEDES I.L. 43-241E
*Denotes Change from superseded issue

EFFECTIVE FEBRUARY 1964

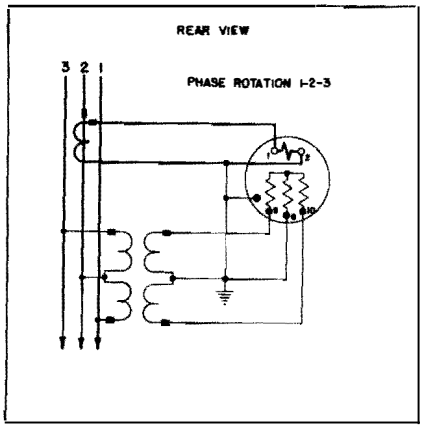


Fig. 14. Type I-241 Polyphase Power Factor Meter.

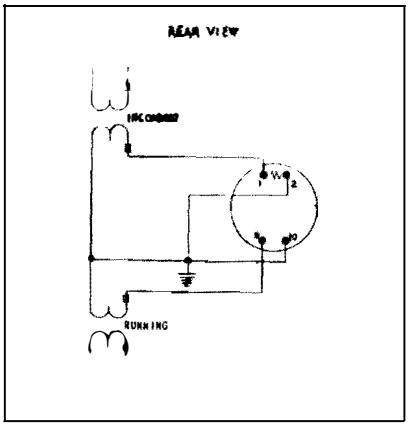


Fig. 15. Type I-241 Synchroscope.

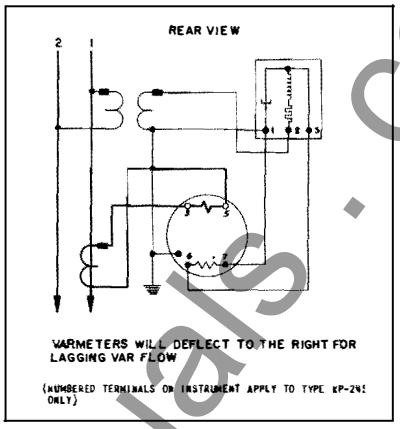


Fig. 16. Types F-241 and P-241 Single Phase Varmeter.

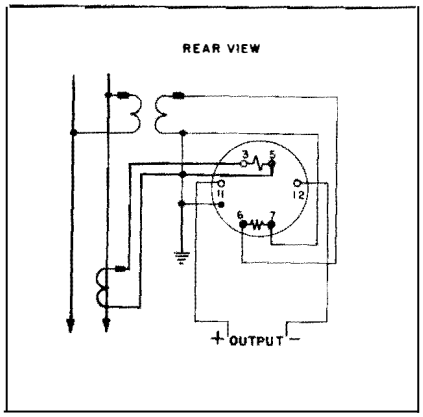


Fig. 17. Type KP2-241 Indicating Watt Transducer Single Phase.

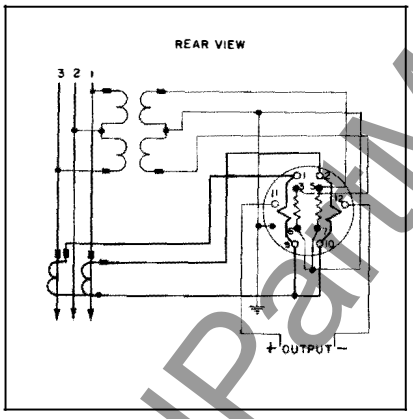


Fig. 18. Type KP2-241 Indicating Watt Transducer 2 Current Coil.

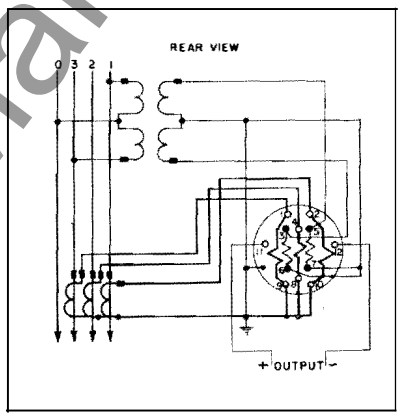


Fig. 19. Type KP2-241 Indicating Watt Transducer 3 Current Coil.

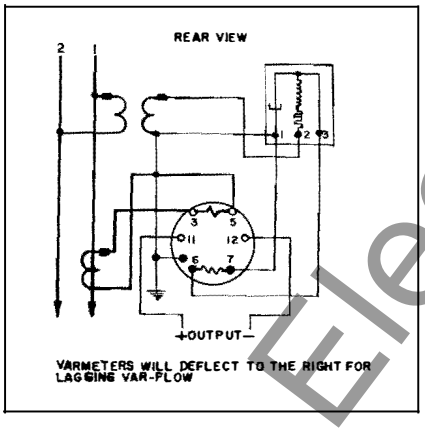


Fig. 20. Type KP2-241 Indicating VAR Transducer Single Phase.

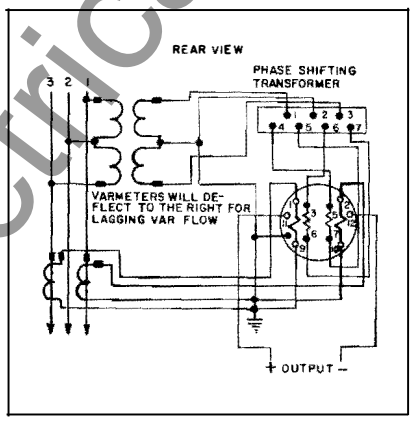


Fig. 21. Type KP2-241 Indicating VAR Transducer 2 Current Coil.

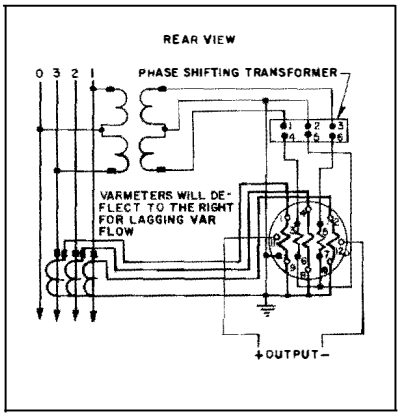


Fig. 22. Type KP2-241 Indicating VAR Transducer 3 Current Coil.

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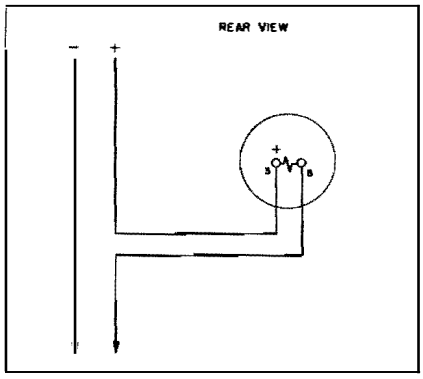


Fig. 2. Type X-241 Ammeter and Milliameter (self-contained).

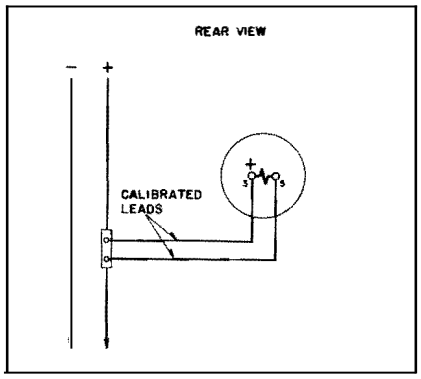


Fig. 3. Type X-241 Ammeter with External Shunt.

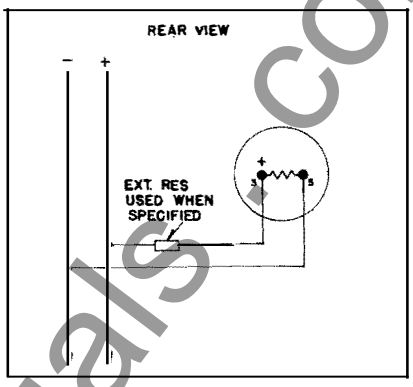


Fig. 4. Type X-241 Voltmeter.

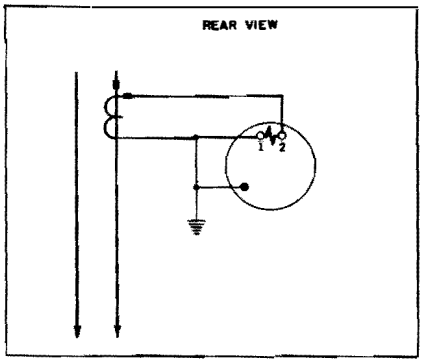


Fig. 5. Type A-241 and C-241 Ammeter.

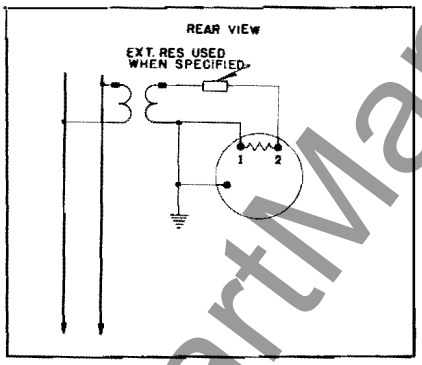


Fig. 6. Type A-241 and C-241 Voltmeter.

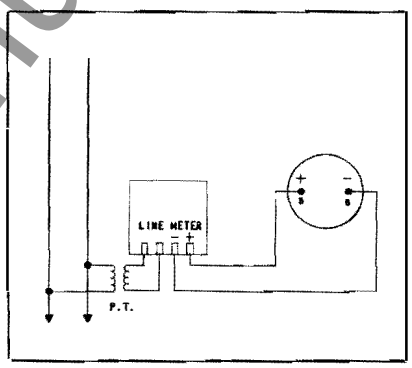


Fig. 7. Type X-241 Frequency Meter with External Transducer.

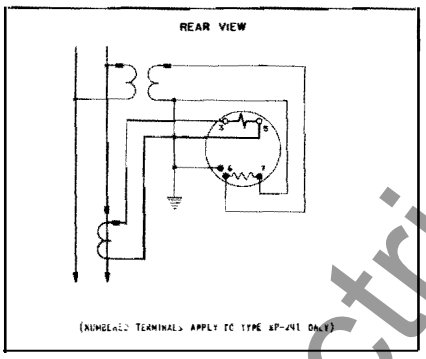


Fig. 8. Type F-241 and P-241 Single Phase Wattmeter.

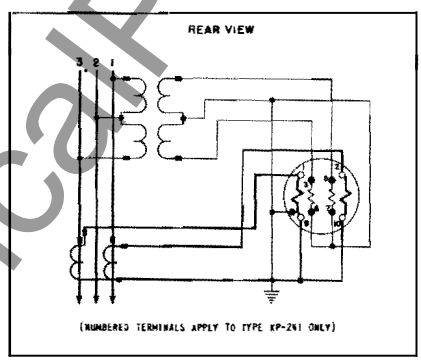


Fig. 9. Types F-241 and P-241 polyphase 2 current coil wattmeter.

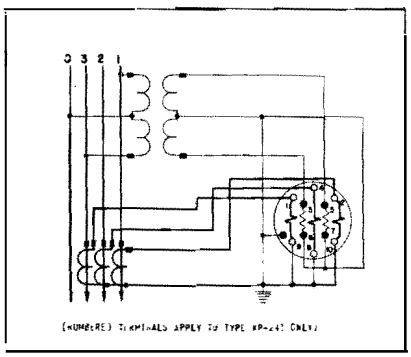


Fig. 10. Types F-241 and P-241 Polyphase 3 current coil wattmeter.

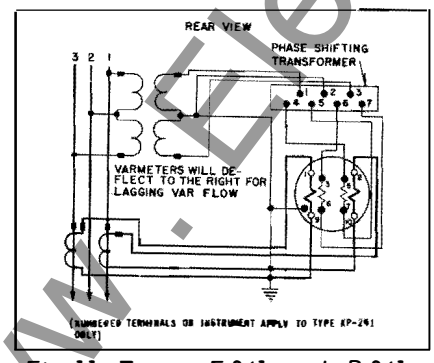


Fig. 11. Types F-241 and P-241 Polyphase 2 Current Coil Varmeter.

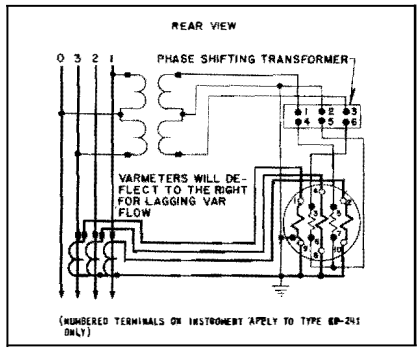


Fig. 12. Types F-241 and P-241 Polyphase 3 Current Coil Varmeter.

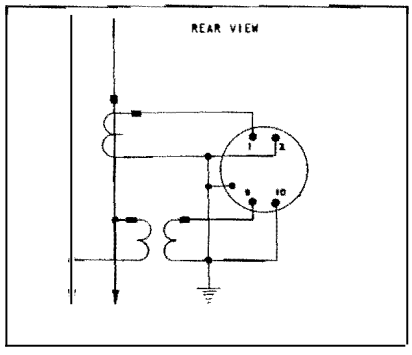
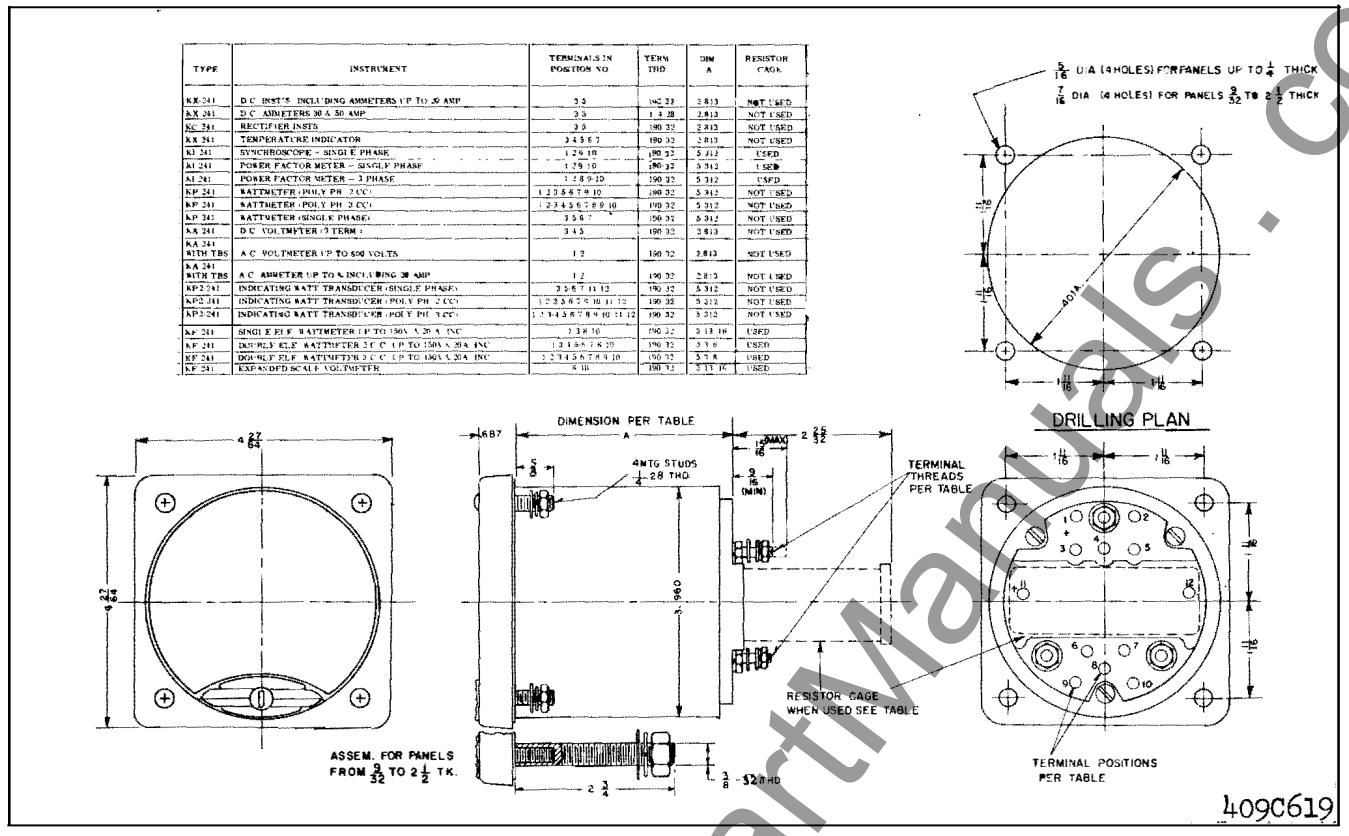
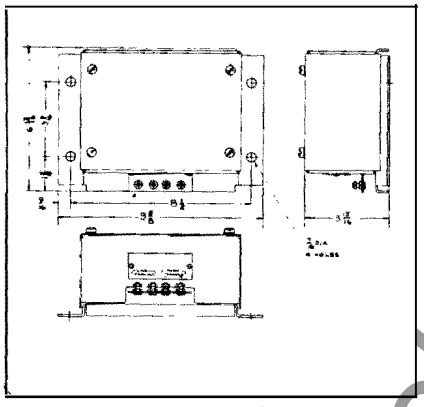


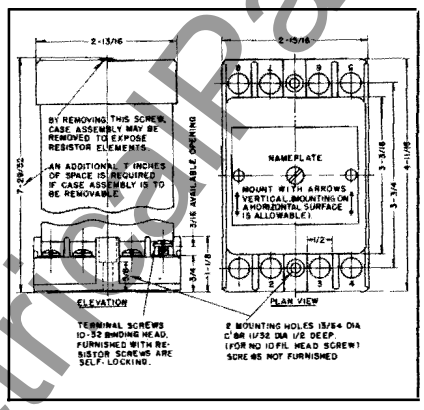
Fig. 13. Type I-241 Single Phase Power Factor Meter.

TYPE	INSTRUMENT	TERMINALS IN POSITION NO	TERM THD	DIM A	RESISTOR CAGE
KK 241	D C INSTS INCLUDING AMMETERS UP TO 50 AMP	3 5	190 32	2 813	NOT USED
KX 241	D C AMMETERS 30 A 50 AMP	3 5	1 4 28	2 813	NOT USED
KC 241	RECTIFIER INSTS	3 5	190 32	2 813	NOT USED
KX 241	TEMPERATURE INDICATOR	3 4 5 6 7	190 32	2 813	NOT USED
KJ 241	SYNCHROSCOPE – SINGLE PHASE	1 2 9 10	190 32	5 312	USED
AI 241	POWER FACTOR METER – SINGLE PHASE	1 2 9 10	190 32	5 312	USED
AI 241	POWER FACTOR METER – 3 PHASE	1 2 8 9 10	190 32	5 312	USED
KP 241	WATTMETER (POLY PH 2 CC)	1 2 3 5 6 7 9 10	190 32	5 312	NOT USED
KP 241	WATTMETER (POLY PH 3 CC)	1 2 3 4 5 6 7 8 9 10	190 32	5 312	NOT USED
KP 241	WATTMETER (SINGLE PHASE)	3 5 6 7	190 32	5 312	NOT USED
KX 241	D C VOLTMETER (3 TERM)	3 4 5	190 32	2 813	NOT USED
KA 241 WITH TBS	A C VOLTMETER UP TO 600 VOLTS	1 2	190 32	2 813	NOT USED
KA 241 WITH TBS	A C AMMETER UP TO 5 INCLUDING 30 AMP	1 2	190 32	2 813	NOT USED
KP 241	INDICATING WATT TRANSDUCER (SINGLE PHASE)	3 5 6 7 11 12	190 32	5 312	NOT USED
KP2 241	INDICATING WATT TRANSDUCER (POLY PH 2 CC)	1 2 3 5 6 7 9 10 11 12	190 32	5 312	NOT USED
KP3 241	INDICATING WATT TRANSDUCER (POLY PH 3 CC)	1 2 3 4 5 6 7 8 9 10 11 12	190 32	5 312	NOT USED
KF 241	SINGLE ELE WATTMETER UP TO 150V 5 20 A INC	2 3 9 10	190 32	5 13 16	USED
KF 241	DOUBLE ELE WATTMETER 3 C C UP TO 150V 5 20A INC	1 2 3 4 5 6 7 8 9 10	190 32	5 3 8	USED
KF 241	DOUBLE ELE WATTMETER 3 C C UP TO 150V 5 20A INC	1 2 3 4 5 6 7 8 9 10	190 32	5 5 8	USED
KF 241	EXPANDED SCALE VOLTMETER	8 10	190 32	5 11 16	USED

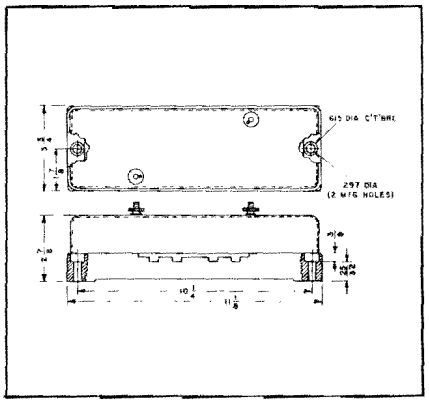




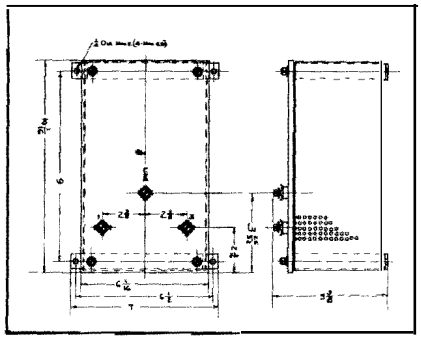
Transducer used with Frequency Meter.



VR-825 External Resistor.



** Phase Shifting Transformer used with 3-phase, 3-wire and 3-phase 4-wire Varmeter.*



Reaction Compensation used with Single Phase Varmeter.

Fig. 1. Outline Dimensions and Drilling Plan for Type K-241 Instruments and Accessories.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

— K-241 LINE —
SWITCHBOARD INSTRUMENTS
FOUR AND ONE-HALF INCH CLASSIFICATION
FULL-VIEW CIRCULAR SCALE TYPE

GENERAL

Type K-241 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-Attraction, moving iron
P = Watt transducer plus X
I = Rotating iron vane
C = Rectifier plus X
F = Iron core electromagnetic

All of the above mechanisms employ the taut band suspension bearing system except the I and F types.

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.

DIAL NOTES

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

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 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

The usual procedures and practices employed for servicing mechanisms of pivot-jewel type instruments cannot be applied to suspension type instruments. For this reason we recommend that all instruments in need of mechanism servicing be returned to the factory.

Orders for renewal parts should include the name of the part and the style and serial number of the instrument, appearing on the dial mask.

SUPERSEDES I.L. 43-241H
*Denotes change from superseded issue.

EFFECTIVE SEPTEMBER 1965