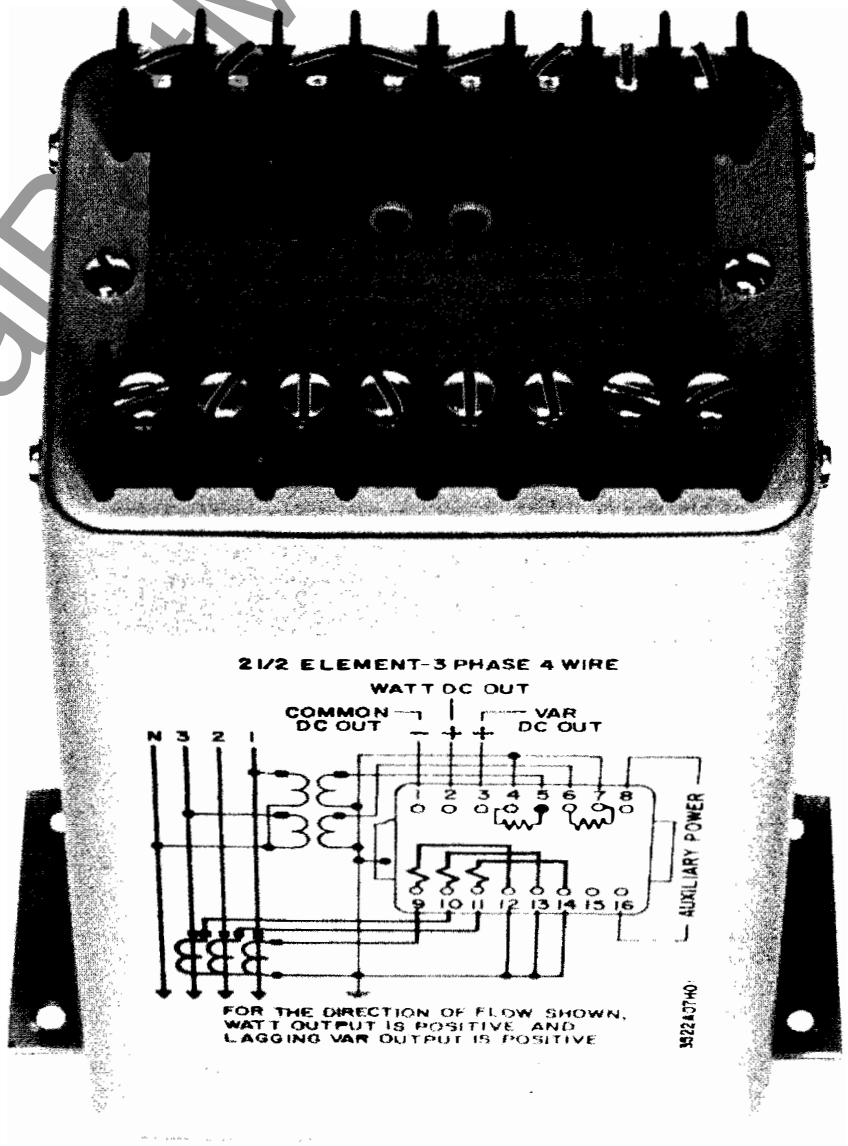
Westinghouse Electric Corporation
Relay-Instrument Division
Coral Springs, FL 33060

May, 1979
New Information
E, D, C/2043/DB

Load Independent Output
¼% Accuracy Class

Type VPV5 Combination Watt-Var Transducer



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Application
The VPV5 watt-var transducer is designed for data collection and the telemetry systems. It is a high accuracy device designed for industrial and utility systems. It offers savings in installation and space costs in that current and voltage connection can be made to a single device which will provide simultaneous outputs representing true watts and vars. The output is bi-directional and can be used by indicating or recording instruments, computers, data systems or for remote indication. Any load resistance up to 10,000 ohm can be accommodated with a constant current output of 1 ma dc at full rated watt or var input.

Operation
These transducers employ the time-division multiplication principle. The measuring circuitry generates a train of pulses whose height is proportional to current and whose length is proportional to voltage. The area of each pulse is proportional to the power flowing within the duration of each pulse. There are many pulses per cycle. Integrating these pulses, therefore, yields a rate of flow of power. The circuitry presents this in the form of a proportional dc signal.

Var measurement is obtained through an internal R-C network that shifts the potential circuits 90 degrees.

To obtain both Watt and Var operation from the same input circuitry synchronous switches are employed to switch the multiplier circuits to the Watt amplifier or the Var amplifier at a speed of 2000 Hz. The standard RC filter smooths the output.

The Watt and Var amplifiers are separate constant current 2 stage amplifiers having a common terminal in their outputs and working from one power supply.

Features
Westinghouse is a major supplier of the apparatus and the systems which control electrical power systems. They are, consequently, especially knowledgeable of the actual needs in the accessories for such systems.

Time-Division Multiplier
This circuitry employs the time-division principle and complementary MOS integrated circuits for superior accuracy, linearity and stability.

Printed Circuit Construction
All components are mounted on printed circuit boards of a glass-epoxy. This material possesses great strength; it does not support fungus growth; it has a high resistance to damage due to a re-soldering of parts during repair or modification under field conditions. All circuit boards are accessible for repair. This is especially important in the case of the power supply and amplifier board which is exposed to externally-caused damage from accidental misconnection to sources beyond the level of the inherent protective circuitry.

Plug-in Integrated Circuits
All amplifiers and multipliers are IC's for consistency in performance with plug-in mounting for convenience in servicing. Frit-seal designs are used for greater reliability.

Convertible Power Supply
Terminals are provided to allow the use of a separate source for the internal power supply. Jumpers may be used to adjacent terminals in order to draw power from the measured circuit.

Amplifier Protective Circuit
The output amplifier is protected from damage due to inadvertently applied voltages or induced surges on the output leads. The amplifier can withstand the application across its terminals of a surge equivalent to the SWC test.

Radio-Frequency By-Pass
Each transducer contains by-pass circuitry to give the device a relatively high immunity to radio frequency interference (RFI).

Mounting
Dimensions and terminal connections have been chosen to approximate those common in the industry. These units may be substituted for most competitive units without a major change in cable arrangement.

Terminal Blocks
Molded terminal blocks with #8-32 screws to accept wire sizes up to #12 in lugs to $^{11}/_{32}$ width.

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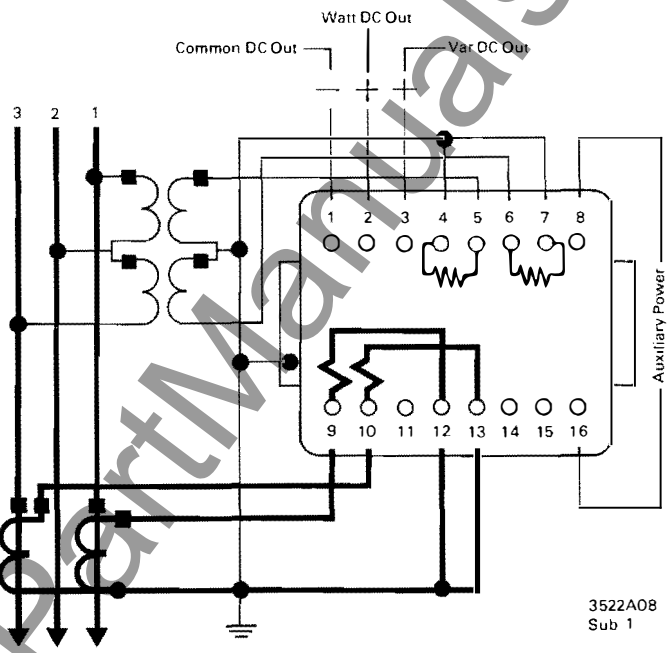
Standard Specifications

Application	**3 PH-3W**	**3 PH-4W**
Catalog Number	VPV56A1246	VPV56A1256
No. of Elements	2	2½
Requirement	–	Balanced Voltage
3 PH. Watts-Vars Input For Rated Output (R.O.)	1000	1500
1 PH. Test Watts-Vars input	500	375
Rated Voltage	120 Volts	
Rated Current	5 Amps	
Frequency	60 HZ.	
Power Supply	120 Volts	
Rated Output	0-±1 MA DC Watts 0-±1 MA DC Vars ±0.1% Typical	
Accuracy (% Rated Output)	±0.25 Worst Case	
Output Load	0-10000 OHMS	
Output Compliance	10 Volts Min.	
DC Output Adjustment	± 10%	
Zero Adjustment	Not Required	
Voltage Range	0-150 Vac	
Voltage Overload Continuous	180 Vac	
Potential Circuit Burden	0.12 VA/EL., .9 P.F. @ 120V.	
Current Range	0-6.25 Amps.	
With Linearity	10 Amps	
Overload Continuous	25 Amps	
Overload 10 Sec.	100 Amps	
Overload 1 Sec.	500 Amps	
Current Circuit Burden	0.10 VA/EL., 1.0 P.F. @ 5A	
Response Time (To 99%)	<400 ms	
Output Ripple Peak to Peak	<1.0% R.O.	
Temperature Range	−20°C To +65°C	
Temperature Coefficient	±.005%/°C Watt ±.01%/°C Var	
Power Factor Range	0 Lead to 0 Lag	
Dimensions	See Outline Dwg.	
Dielectric Test	1800 Vac	
Isolation	Between Circuits and Between Circuits and Case	
Surge Withstand	IEEE SWG Test IEEE Std. 472-1974	
Power Supply	85-135 Vac 60 HZ 3.25 Watt Burden @ 120 V	

Type VPV-5, 2 Element – 3 Phase 3 Wire



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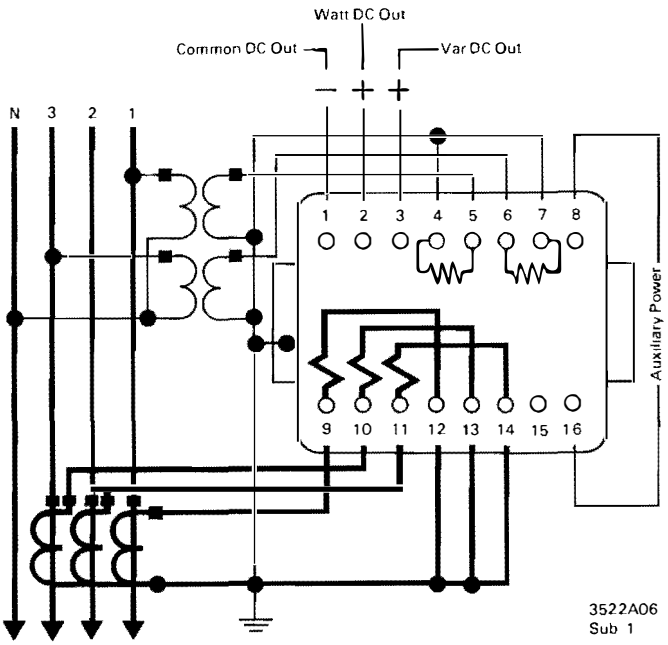
Type VPV-5, 2½ Element – 3 Phase 4 Wire



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For the Direction of Flow Shown, Watt Output is Positive and Lagging Var Output is Positive

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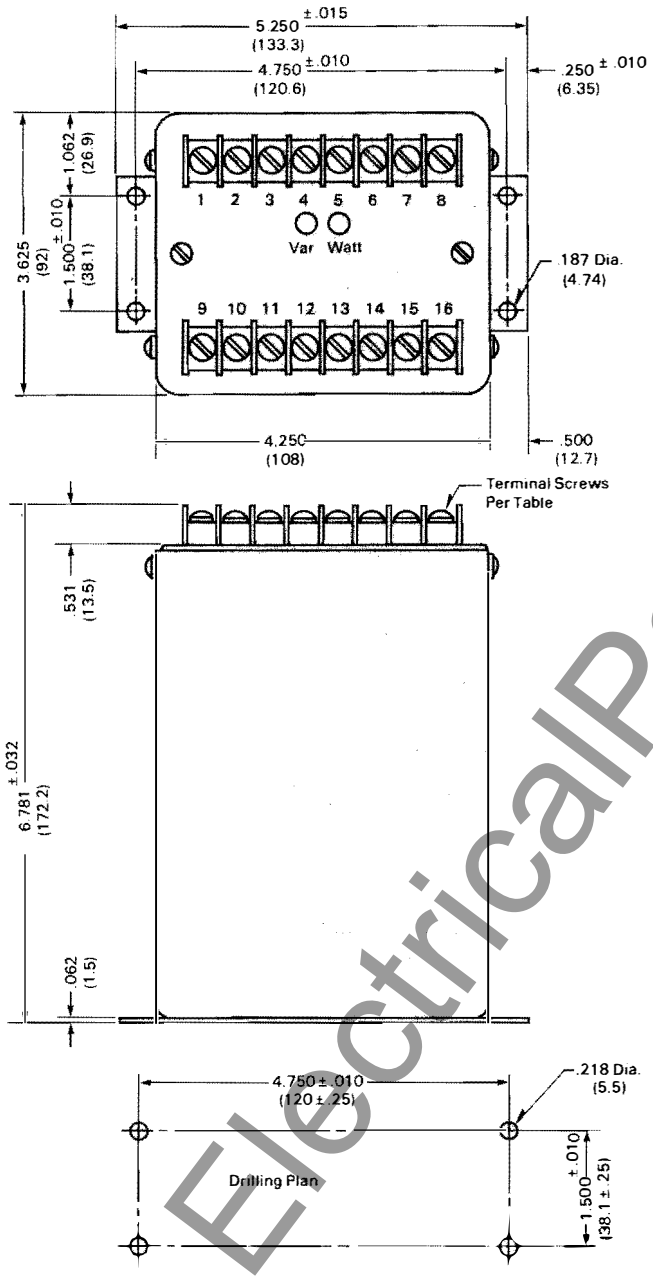
Outline Drawing - Dimensions in Inches (Millimeters)



Transducer Type	Terminal in Position Number	Terminal Screw
VPV5 — 3 Wire 2 El. Watt-Var	1-2-3-4-5-6-7-8-9-10-12-13-16	.164 - 32
VPV5 — 4 Wire 2½ El. Watt-Var 4 Wire 3 El. Watt-Var	1-2-3-4-5-6-7-8-9-10-11-12-13-14-16	.164 - 32

Decimal Dimensions are in Inches
Dimensions in ( ) are Millimeter Equivalant

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