

# POWER SERIES Plus

DIGITAL SWITCHBOARD METERS



YOKOGAWA 

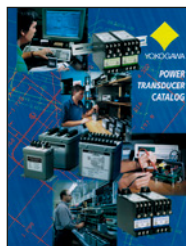


# POWER SERIES<sup>Plus</sup>

## DIGITAL SWITCHBOARD METER

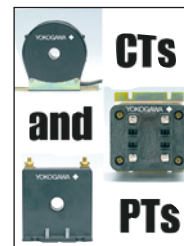
### Other Catalogs Available . . .

#### Power Transducers



Yokogawa Juxta Power Transducers (models 2469, 2489) are UL recognized and enclosed in a rugged case with either 0.2% or 0.5% accuracy.

#### Current & Potential Transformers



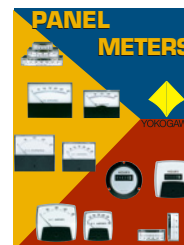
Yokogawa CT's and PT's provide high accuracy inputs to transformer-rated AC switchboard instruments and power transducers.

#### Hybrid Electronic Meter



The 2302 hybrid electronic meter was designed for a variety of applications where both analog and digital display information is required. Available with either yellow or green bargraph and backlighting, or monochromatic LCD bargraph with backlighting.

#### Panel Meters



Yokogawa has the broadest line of panel meters available today. In many cases, our panel meters are completely interchangeable with other manufacturer's products. UL and IP54 splash resistant models are available.

#### Digital Panel Meters



The 2350 Series Digital Panel meters provide high accuracy read out of AC and DC inputs and are capable of retransmitting analog signals to remote monitors, recorders and control systems. Available in 1/8 and 1/4 DIN case with single and multifunction capability.

#### Switchboard Instruments

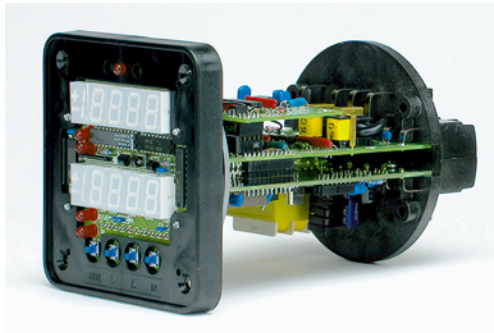


Yokogawa is the world leader in Analog Switchboard Instruments. Our catalog contains the entire switchboard line including AB/DB 14, 16, 17 and 40, and type 180 edge-wise. It also includes the 2180 mini-switchboard meters, potential transformers, transducers and digital switchboard meters.



# POWER SERIES<sup>Plus</sup>

## DIGITAL SWITCHBOARD METER



2492 with cover removed

The POWER SERIES<sup>Plus</sup> digital switchboard meter was developed by Yokogawa Corporation of America to provide our customers with a versatile AC digital power meter. The heart of our POWER SERIES<sup>Plus</sup> meter is a programmable ASIC Power Measurement Chip (PMC) which was jointly developed by the General Electric Company and Yokogawa Electric Corporation. This unique PMC capability will

continue to expand into many new power measurement and control products offered by Yokogawa Corporation of America.

The design of the POWER SERIES<sup>Plus</sup> combines a high accuracy digital switchboard meter with transducer output which can be

configured in the field by an end-user, or when installed in new electrical equipment by an OEM. It eliminates requirements for a large inventory of dedicated instruments, and provides flexibility when new panel designs or system upgrades require changes in instrument transformer ratings. Our rugged metal case fits standard panel cutouts for switchboard meters and makes it a perfect replacement for less versatile instruments. The RS-485 communications option allows up to 32 meters to be networked together for remote monitoring and control. In addition, the POWER SERIES<sup>Plus</sup> can be set up and locked out for security via the remote communications option.

## The NEW 2493 triple display multifunction power meter . . .

Ideally designed for easy retrofit into existing switchboard meter panel cutouts. The 2493 features three easy to read LED displays, minimum/maximum values at the touch of a button, scaling up to 1250:1 for potential transformers and 5000:1 for current transformers. Optional 0-1mA DC and 4-20mA DC analog outputs are configurable by the user and RS485 communications option is available at no additional cost. The 2493 is also available with a wide choice of power supply options.



## Features

- Scaling of the instrument for PT (potential transformer) primary ratings up to 1250:1; and CT (current transformer) primary ratings up to 5000:1.
- Adjustable transducer output proportionate to the primary input setting.
- Electrical legends (i.e., Watts, Kilowatts, Megawatts) can be set by the user and indicated by a red LED adjacent to the selected legend.
- Display average setting: Adjustable to obtain a "rolling average" of inputs. Increasing the number of samples reduces annoying "digit bounce" by the least significant digit.
- All settings are stored in non-volatile memory. If there is a loss of power to the instrument, all settings will remain as they were prior to power loss.
- Accuracy of  $\pm 0.2\%$  of reading,  $\pm 0.1\%$  of full scale.
- True RMS current and voltage measuring capability. A most desirable feature when distorted wave forms are present on the line.
- High resolution/ high intensity LED displays that can be viewed from almost any angle.

# POWER SERIES<sup>Plus</sup>

## DIGITAL SWITCHBOARD METER



## Set-up and Configuration (2491, 2492)

The POWER SERIES<sup>Plus</sup> can be configured for primary and secondary transformer inputs, legends, outputs and averaging function. At Yokogawa, we program each model according to the specified options required by the user. This minimizes the number of steps to set up the instrument at the job site or on the factory floor.





Each model is programmed only for the options selected, so there are no unnecessary menu items. If you select a Voltmeter without analog output, then set up will be limited to PT ratios, LED display, and average setting. All can be accomplished in less than one minute. If no transformer is required, the ratio entered for PT P and PT S is 1 (1:1).

Set up functions appear on the display as symbols. They are accessible when you press the MODE pushbutton located behind the front cover and beneath the LED display. After pressing MODE, you are in the setting mode “rSEt” and can begin setting up. Error codes during set up mean your inputs may be incorrect or outside of the range of the instrument. Refer to the instruction manual for range/span restrictions for each model selected.

The pushbutton setting switches are described below. In order for a setting to be entered into memory, you must complete all entries for that mode such as: “PT P” and “PT S” (PT primary and PT secondary). If the values do not need to be changed from a previous setting, simply push the EN switch several times to go to the next mode.

After auxiliary power connection and removal of the cover, the instruction manual will guide you through set up. Pushbutton switches are located directly below the LED display. The POWER SERIES<sup>Plus</sup> can be set up before, or after installation in a panel. Once set up is complete, replace the cover and make the appropriate input connections.

### PUSHBUTTON SETTING SWITCHES (under the cover)

 <p><b>Mode</b></p> <p><i>Mode switch transfers user back and forth between standard mode (present setting) and “rSEt” mode.</i></p>	 <p><i>This switch moves from one unit setting to another, or mode to mode</i></p>	 <p><i>This switch moves digits to selected values and moves decimal position.</i></p>	 <p><b>EN</b></p> <p><i>After each setting, this switch enters input data, then proceeds to next sequence.</i></p>
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# POWER SERIES<sup>Plus</sup>

## DIGITAL SWITCHBOARD METER

## Set-up and Configuration (2493)

The new triple display POWER SERIES<sup>Plus</sup> has front panel pushbuttons which can be used for setting voltage and current inputs from instrument transformers, as well as analog outputs and a rolling average. The exact functions depend on the model options selected by the customer. For example: If you selected a 3 in 1 Voltmeter with no analog output, you would only need to set the PT ratio and average. If you are tied into a network with RS485, then you would also need to identify the network address and baud rate.

All set-up functions can be performed using the four buttons on the front panel (see below). You can also use the buttons to display the minimum and maximum readings and, on some models, to change from phase to phase.

### PUSHBUTTON SETTING SWITCHES (front panel)

Mode	Next	Inc Max	Set Min
<i>This button starts all operations. When viewing or changing settings it is used to back out of a mode.</i>	<i>This button can change the phase being displayed. When viewing or changing settings, it moves between settings or between digits.</i>	<i>This button will increment the value being changed. It is also used to display Max readings.</i>	<i>This button, when viewing or changing settings, is used to select a mode, save it, and then move to the next mode in the sequence. It is also used to display Min readings.</i>

All button operations begin with the Mode button. To see the Min or Max, push the Mode button and then the button of the reading you want to see - Min or Max. The values will display for 10 seconds before reverting to the normal display. If you want to reset the values, push the Min or Max button again before 10 seconds have passed.

If the model that you select can change between phases, it is done by pressing the Mode button first, and then the Next button. The display will switch to the next phase in the sequence. For example: A Volt-Amp-Hertz meter with 3P4W connections would cycle A-B-C-AB-BC-CA and then back to A.

To view the configuration settings, press Mode twice (Mode-Mode) and then press Set. The first setting will be displayed. For a Triple Amp meter this setting will be the Current Transformer (Ct), for all other models this will be the Potential Transformer (Pt). To see the other settings, press Next. You can scroll through all the settings by pressing Next. To go back to normal operations, press Mode. To change the setting being shown, press Set. See the above paragraphs on the specific settings for details. Once a setting is changed it will display the next setting. At any point while changing settings, pressing Mode will exit without changing anything.



# Model Types and Rated Inputs

MEASURING CAPABILITY	MODEL NUMBER	CONNECTIONS AVAILABLE*	MAXIMUM INPUT RATING	ELECTRICAL LEGEND	ORDER INFO.
AC AMPERES	249111	Single phase	0-1 Amp AC	Amps AC	Page 7
	249115	Single phase	0-5 Amp AC	Kiloamps AC	
	249305	Three phase	0-1 Amp AC	Amps	Page 15
	249306	Three phase	0-5 Amp AC	Kiloamps	
AC VOLTAGE	249121	Single phase	0-150 Volt AC	Volts AC	Page 7
	249125	Single phase	0-300 Volt AC	Kilovolts AC	
	249301	3P3W Delta	0-150 Volt AC		
	249302	3P4W Wye	0-150 Volt AC	Volts	Page 15
	249303	3P3W Delta	0-300 Volt AC	Kilovolts	
	249304	3P4W Wye	0-300 Volt AC		
FREQUENCY	249181	Single phase	150 Volt AC	Hertz	Page 7
	249183	Single phase	300 Volt AC		
WATTS	249151	1P2W	(select one)		
	249152	1P3W	120V AC 1 Amp	Watts	
	249153	3P3W	240V AC 1 Amp	Kilowatts	Page 8
	249154	3P4W(2 1/2 Element)	120V AC 5 Amp	Megawatts	
	249155	3P4W(3 Element)	240V AC 5 Amp		
VARS	249161	1P2W	(select one)		
	249162	1P3W	120V AC 1 Amp	Vars	
	249163	3P3W	240V AC 1 Amp	Kilovars	Page 8
	249164	3P4W(2 1/2 Element)	120V AC 5 Amp	Megavars	
	249165	3P4W(3 Element)	240V AC 5 Amp		
POWER FACTOR	249171	1P2W	(select one)		
	249172	1P3W	120V AC 1 Amp	Power Factor	
	249173	3P3W	240V AC 1 Amp	Lag	Page 9
	249174	3P4W(2 1/2 Element)	120V AC 5 Amp	Lead	
	249175	3P4W(3 Element)	240V AC 5 Amp		
PHASE ANGLE	249191	1P2W	(select one)		
	249192	1P3W	120V AC 1 Amp	Phase Angle	
	249193	3P3W	240V AC 1 Amp	Lag	Page 9
	249194	3P4W(2 1/2 Element)	120V AC 5 Amp	Lead	
	249195	3P4W(3 Element)	240V AC 5 Amp		
VOLT / AMP DUAL FUNCTION	249212	Single phase	150V / 1 Amp	Volts	
	249213	Single phase	300V / 1 Amp	Kilovolts	Page 10
	249216	Single phase	150V / 5 Amp	Amps	
	249217	Single phase	300V / 5 Amp	Kiloamps	
VOLT / HERTZ DUAL FUNCTION	249222	Single phase	150V & 50/60Hz	Volts	
	249223	Single phase	300V & 50/60Hz	Kilovolts	Page 11
	249226	Single phase	150V & 400Hz	Hertz	
	249227	Single phase	300V & 400Hz		
VOLT / AMP / HZ	249307	1P2W	(select one)	Amps/Kiloamps	
	249308	3P3W Delta	150V or 300V AC	Volts	Page 16
	249309	3P4W Wye	1A or 5A AC 50/60Hz or 400Hz	Kilovolts Hertz	
WATT / VAR DUAL FUNCTION	249240	1P2W	(select one)		
	249241	1P3W	120V AC 1 AMP	Watts/Kilowatts	
	249242	3P3W	240V AC 1 AMP	Megawatts	Page 12
	249243	3P4W(2 1/2 Element)	120V AC 5 AMP	Vars/Kilovars	
	249244	3P4W(3 Element)	240V AC 5 AMP	Megavars	
WATT / PF DUAL FUNCTION	249245	1P2W	(select one)		
	249246	1P3W	120V AC 1 AMP	Watts	
	249247	3P3W	240V AC 1 AMP	Kilowatts	Page 13
	249248	3P4W(2 1/2 Element)	120V AC 5 AMP	Megawatts	
	249249	3P4W(3 Element)	240V AC 5 AMP	Power Factor Lag Lead	
WATT / VAR / PF	249334	1P2W	(select one)		
	249335	1P3W	120V AC 1 AMP	Watts/Vars	
	249336	3P3W	240V AC 1 AMP	Kilowatts/Kilovars	Page 14
	249337	3P4W(2 1/2 Element)	120V AC 5 AMP	Megawatts/Megavars	
	249338	3P4W(3 Element)	240V AC 5 AMP	Power Factor Lag Lead	

\*see pages 17 through 21 for connection diagrams

# General Specifications

DISPLAY	Type:  Digit height: Response time:	4 digit red LED (9999 counts) for 2493 readouts (3 displays) 4 1/2 digit red LED for 2491, 2492 0.56 inch or 14mm 200ms min. update time for 2491, 2492 160ms min. update time for V/V/V, A/A/A, Watt/VAR/PF 2493 320ms min. update time for V/A/Hz 2493	
AUXILIARY POWER	2491: 2492: 2493:	Choice of 120V or 240V AC (±15%), 45-65 Hz, 4.5VA max. Select either 120V or 240V AC (±15%), 45-65Hz, 4.5VA max. 120 or 240V AC (±15%), 45-65 Hz, power consumption 10VA max. Optional 24, 48, 125V DC power supplies (contact factory)	
INPUT RATING	Current: Voltage:  Frequency:	0 to 1A AC; 0 to 5A AC 0-120V AC, 0-240V AC (W/VAR/PF/PA) 0-150V AC, 0-300V AC (Volt/Freq) 50/60 Hz and 400 Hz	
INPUT RANGE	Rated current: Rated voltage:	A/W/VAR: 0-200%; PF/PA : 20-200% V/W/VAR: 0-120%; PF/PA: 50-120%; Frequency: 20-120%	
INPUT FREQUENCY RANGE	Volts, Amps, Hertz:	45-65Hz up to the 9th harmonic measuring capability ±2% of specified accuracy	
SUSTAINED INPUT	Rated current: Rated voltage:	A/W/VAR/PF/PA: 200% continuous; 10x rating for 5 seconds V/W/VAR/FREQ : 120% continuous; PF/PA : 150% continuous	
BURDEN	Current: Voltage:	<0.2 VA per element 120V: <0.2VA per element; 240V: <0.4VA per element	
ACCURACY	Reference condition: 25°C, 45-74%RH, at rated input 60Hz sine wave, 30 min. warmup	Voltage Current Watt/VAR Power Factor Phase Angle *Frequency	± 0.2% of reading ± 0.1% of full scale  ±0.05 Power factor ±0.5° Phase Angle ±0.01Hz @ 40-70Hz, ±0.1Hz @ 300-500 Hz
ANALOG OUTPUT AND RESPONSE TIME	0 to 1mA, 0 to ± 1mA: 4 to 20mA, 12 ± 8mA:	10VDC compliance into 10k ohm load maximum 15VDC compliance into 750 ohm maximum 1 second maximum response time within ±1% of final value	
OUTPUT RIPPLE		0.5% peak-to-peak maximum of output span	
COMMUNICATIONS	Optional	RS-485 half duplex interface with networking up to 32 units Selectable Baud Rate	
ISOLATION VOLTAGE AND INSULATION RESISTANCE	Input to output/case: Aux. power to case:  Aux. power to output:  Output to case:	2500V AC for 1 minute / more than 10 Megohm @ 500V DC AC: 2000V AC for 1 minute / more than 10 Megohm @ 500V DC DC: 500V DC minimum / 10 Megohm minimum @ 100V DC AC: 2000V AC for 1 minute / more than 10 Megohm @ 500V DC DC: 500V DC minimum / 10 Megohm minimum @ 100V DC 1000V AC for 1 minute / more than 10 Megohm @ 500V DC	
TEMPERATURE RANGE	Operating: Storage:	-20 to +60°C at 90% RH maximum (non-condensing) -40 to +85°C	
TEMPERATURE COEFFICIENT	Display and Comm: Analog Output:	±150 PPM/°C maximum of full scale ±250 PPM/°C maximum of full scale	
INFLUENCE OF:	Magnetic field: Input voltage: Shock/Vibration: Unbalanced current: Input frequency: Load resistance: (Analog input)	0.5% maximum at 400 ampere turns/meter <0.05 Power Factor (10-120% of rated voltage) per ANSI C39.1 <0.2% of full scale <0.05 Power Factor (45-65Hz) 0 to 1mA, 0 to ± 1mA : 0 - 10K ohm within ±0.05% of full scale 4 to 20mA, 12 ± 8mA : 0-750 ohm within ±0.05% of full scale	
DIMENSIONS : WEIGHT :	Reference page 22 Meter with hardware	W x D x H = 4.33 x 6.54 x 4.33 inches 2491: 1000g (2.2 lbs), 2492: 1100g (2.4 lbs), 2493: 1250g (2.75 lbs)	

\*2493 accuracy is  $\pm 0.1\text{Hz}$  @ 40-70 Hz and  $\pm 0.5\text{Hz}$  @ 300-500Hz

# POWER SERIES<sup>Plus</sup>

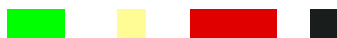
DIGITAL SWITCHBOARD METER



2491

## AC AMPS / AC VOLTS / FREQUENCY

① — ② — ③ — ④



MODEL FORMAT: 2491

Insert model code from the selection below:

MODEL

2491

①

MAX. INPUT RATING

11

1 AMP AC

15

5 AMP AC

21

150 VOLTS AC

25

300 VOLTS AC

81

FREQUENCY (150 V Rating)

83

FREQUENCY (300 V Rating)

②

FREQUENCY

1

50/60 Hz

2

400 Hz

③

ANALOG OUTPUT (see notes below)

AAA

No output

AFA

0 TO 1 mA

AFB

0 TO  $\pm 1$  mA

AHD

4 TO 20 mA

AHF

12  $\pm 8$  mA

④

COMMUNICATION

0

NONE

1

RS-485



### NOTES:

- 1) MAXIMUM SCALING RATIO FOR AMPS IS 5000:1 (25.00 KILOAMPS FOR 5A INPUT).
- 2) MAXIMUM SCALING RATIO FOR VOLTS IS 1250:1 (150 KILOVOLTS FOR 120V INPUT).
- 3) AHD SUFFIX NOT AVAILABLE WITH FREQUENCY METER.
- 4) AFB AND AHF SUFFIX NOT AVAILABLE WITH AMP OR VOLT METERS.
- 5) 120/240V AUXILIARY POWER IS STANDARD WITH ALL 2491 MODELS.
- 6) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 7) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.
- 8) CERTIFICATE OF CONFORMANCE: NO CHARGE, BUT SPECIFY WITH ORDER.





# POWER SERIES<sup>Plus</sup>

DIGITAL SWITCHBOARD METER

## AC WATTS AND VARS



MODEL FORMAT: 2491

MODEL  
2491

### ① FUNCTION / CONNECTIONS

51	WATT 1P2W
52	WATT 1P3W
53	WATT 3P3W
54	WATT 3P4W (2 1/2 element)
55	WATT 3P4W (3 element)
61	VAR 1P2W
62	VAR 1P3W
63	VAR 3P3W
64	VAR 3P4W (2 1/2 element)
65	VAR 3P4W (3 element)

### ② AC INPUT RATING

11	120 VOLT/1 AMP
15	120 VOLT/5 AMP
21	240 VOLT/1 AMP.
25	240 VOLT/5 AMP.

### ③ FREQUENCY

3	50/60 Hz
6	400 Hz

### ④ ANALOG OUTPUT

NO OUTPUT
0 TO 1 mA
0 TO ±1 mA
4 TO 20 mA
12 ± 8 mA

AFA  
AFB  
AHD  
AHF

### ⑤ COMMUNICATION

NONE
1 RS-485



### NOTES:

- 1) WATTS/KILOWATTS/ MEGAWATTS AND VARS/KILOVARS/MEGAVARS LEGENDS ARE USER SELECTABLE.
- 2) 120/240V AUXILIARY POWER IS STANDARD WITH ALL 2491 MODELS.
- 3) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 4) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.
- 5) CERTIFICATE OF CONFORMANCE: NO CHARGE, BUT SPECIFY WITH ORDER.

# POWER SERIES<sup>Plus</sup>

DIGITAL SWITCHBOARD METER



2491

## POWER FACTOR AND PHASE ANGLE

MODEL FORMAT: 2491



MODEL  
2491

### FUNCTION/CONNECTIONS

①

71	POWER FACTOR 1P2W
72	POWER FACTOR 1P3W
73	POWER FACTOR 3P3W
74	POWER FACTOR 3P4W (2 1/2 element)
75	POWER FACTOR 3P4W (3 element)
91	PHASE ANGLE 1P2W
92	PHASE ANGLE 1P3W
93	PHASE ANGLE 3P3W
94	PHASE ANGLE 3P4W (2 1/2 element)
95	PHASE ANGLE 3P4W (3 element)

②

### AC INPUT RATING

11	120 VOLT/1 AMP
15	120 VOLT/5 AMP
21	240 VOLT/1 AMP
25	240 VOLT/5 AMP

③

### FREQUENCY

5	50/60 Hz
6	400 Hz

④

### ANALOG OUTPUT

AAA	NO OUTPUT
AFA	0 TO 1 mA
AFB	0 TO $\pm 1$ mA
AHD	4 TO 20 mA
AHF	$12 \pm 8$ mA

⑤

### COMMUNICATION

0	NONE
1	RS-485



### NOTES:

- 1) THESE MODELS HAVE 3 1/2 DIGIT DISPLAY.
- 2) 120/240V AUXILIARY POWER IS STANDARD WITH ALL MODELS.
- 3) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 4) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.
- 5) CERTIFICATE OF CONFORMANCE: NO CHARGE, BUT SPECIFY WITH ORDER.



# POWER SERIES<sup>Plus</sup>

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## AC VOLT / AMP DUAL FUNCTION

① — ② — ③ — ④ — ⑤

■ ■ ■ ■ ■

MODEL FORMAT : 2492

MODEL  
2492

### ① INPUT RATING

- 12 150 VOLT / 1 AMP AC
- 13 300 VOLT / 1 AMP AC
- 16 150 VOLT / 5 AMP AC
- 17 300 VOLT / 5 AMP AC

### ② FREQUENCY

- 1 50/60 Hz
- 2 400 Hz

### ③ ANALOG OUTPUT

- AAA None
- AFA 0 TO 1 mA
- AHD 4 TO 20 mA

### ④ COMMUNICATION

- 0 NONE
- 1 RS-485

### ⑤ AUX. POWER SUPPLY

- 1 120 V 50/60 Hz
- 2 240 V 50/60 Hz



### NOTES:

- 1) MAXIMUM SCALING RATIO FOR VOLTS IS 1250:1; FOR AMPS IT IS 5,000:1.
- 2) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 3) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.
- 4) CERTIFICATE OF CONFORMANCE: NO CHARGE, BUT SPECIFY WITH ORDER.

# POWER SERIES<sup>Plus</sup>

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2492

## AC VOLT / FREQUENCY DUAL FUNCTION

MODEL FORMAT: 2492

① — ② — ③ — ④



MODEL

2492

VOLTAGE AND FREQUENCY

①

22	150 VOLT AND 50/60 Hz
23	300 VOLT AND 50/60 Hz
26	150 VOLT AND 400 Hz
27	300 VOLT AND 400 Hz

②

ANALOG OUTPUT

AAA	None
AFA	0 TO 1 mA
AHD	4 TO 20 mA

③

COMMUNICATION

0	None
1	RS-485

④

AUX. POWER SUPPLY

1	120 V 50/60 Hz
2	240 V 50/60 Hz



### NOTES:

- 1) MAXIMUM SCALING RATIO FOR VOLTS IS 1250:1.
- 2) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 3) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.
- 4) CERTIFICATE OF CONFORMANCE: NO CHARGE, BUT SPECIFY WITH ORDER.



# POWER SERIES<sup>Plus</sup>

## DIGITAL SWITCHBOARD METER

## AC WATT / VAR DUAL FUNCTION

**MODEL FORMAT: 2492**



**MODEL  
2492**

### FUNCTIONS / CONNECTIONS

①

40	WATT / VAR 1P2W
41	WATT / VAR 1P3W
42	WATT / VAR 3P3W
43	WATT / VAR 3P4W (2 1/2 elmt.)
44	WATT / VAR 3P4W (3 elmt.)

②

### AC INPUT RATING

12	120 VOLT/1 AMP
13	120 VOLT/5 AMP
16	240 VOLT/1 AMP
17	240 VOLT/5 AMP

③

### FREQUENCY

5	50/60 Hz
6	400 Hz

④

### ANALOG OUTPUT

AAA	None
AFA	0 TO 1 mA
AFB	0 TO ±1 mA
AHD	4 TO 20 mA
AHF	12 ± 8 mA

⑤

### COMMUNICATION

0	None
1	RS-485

⑥

### AUX. POWER SUPPLY

1	120 V 50/60 Hz
2	240 V 50/60 Hz



### NOTES:

- 1) MAXIMUM SCALING RATIO FOR VOLTAGE IS 1250:1; AND FOR AMPERES IT IS 5000:1.
- 1) WATTS/KILOWATTS/MEGAWATTS AND VARS/KILOVARS/MEGAVARS LEGENDS ARE USER SELECTABLE.
- 2) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 3) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.
- 4) CERTIFICATE OF CONFORMANCE: NO CHARGE, BUT SPECIFY WITH ORDER.



# POWER SERIES<sup>Plus</sup>

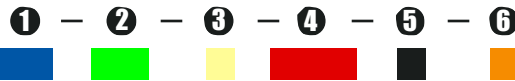
DIGITAL SWITCHBOARD METER



2492

## AC WATT / POWER FACTOR DUAL FUNCTION

MODEL FORMAT: 2492



LIST  
PRICE  
AND  
ADDERS

MODEL  
2492

### FUNCTIONS / CONNECTIONS

- 1**
- 45** WATT / POWER FACTOR 1P2W
  - 46** WATT / POWER FACTOR 1P3W
  - 47** WATT / POWER FACTOR 3P3W
  - 48** WATT / POWER FACTOR 3P4W (2 1/2 element)
  - 49** WATT / POWER FACTOR 3P4W (3 element)

### **2** AC INPUT RATING

- 12** 120 VOLT/1 AMP
- 13** 120 VOLT/5 AMP
- 16** 240 VOLT/1 AMP
- 17** 240 VOLT/5 AMP

### **3** FREQUENCY

- 5** 50/60 Hz
- 6** 400 Hz

### **4** ANALOG OUTPUT

- AAA** None
- AFA** 0 TO 1 mA
- AFB** 0 TO  $\pm 1$  mA
- AHD** 4 TO 20 mA
- AHF** 12  $\pm$  8 mA

### **5** COMMUNICATION

- 0** None
- 1** RS-485

### **6** AUX. POWER SUPPLY

- 1** 120 V 50/60 Hz .....N/C
- 2** 240 V 50/60 Hz .....N/C



### NOTES:

- 1) MAXIMUM SCALING RATIO FOR VOLTAGE IS 1250:1; AND FOR AMPERES IT IS 5000:1.
- 1) WATTS/KILOWATTS/MEGAWATTS LEGEND IS USER SELECTABLE.
- 2) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 3) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.
- 4) CERTIFICATE OF CONFORMANCE: NO CHARGE, BUT SPECIFY WITH ORDER.



2493

# POWER SERIES<sup>Plus</sup>

DIGITAL SWITCHBOARD METER

## 3 in 1 AC WATT / VAR / POWER FACTOR

MODEL FORMAT: 2493



LIST  
PRICE  
AND  
ADDERS

MODEL  
2493

### FUNCTION/CONNECTIONS

- ①
- 34 WATT/VAR/PF 1P2W
  - 35 WATT/VAR/PF 1P3W
  - 36 WATT/VAR/PF 3P3W
  - 37 WATT/VAR/PF 3P4W (2 1/2 ELEMENT)
  - 38 WATT/VAR/PF 3P4W (3 ELEMENT)

### ② VOLT/AMP RATING

- 1 120V/1A AC
- 2 120V/5A AC
- 3 240V/1A AC
- 4 240V/5 A AC

### ③ FREQUENCY

- 1 50/60 Hz
- 2 400 Hz

### ④ ANALOG OUTPUT

- AAA NONE
- AFA 0 TO 1 mA
- AFB 0 TO  $\pm 1$  mA
- AHD 4 TO 20 mA

### ⑤ COMMUNICATION

- 0 NONE
- 1 RS-485
- 2 MODBUS

### ⑥ AUXILIARY POWER

- 1 120V AC
- 2 240V AC
- 3 24V DC
- 4 48V DC
- 5 125V DC



### Notes:

- 1) 120V OR 240V AC AUXILIARY POWER IS STANDARD. CONTACT FACTORY FOR AVAILABILITY OF DC POWER OPTIONS.
- 2) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 3) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.

# POWER SERIES<sup>Plus</sup>

DIGITAL SWITCHBOARD METER



2493

## 3 in 1 AC VOLT OR AMP

**MODEL FORMAT: 2493**

① — ② — ③ — ④ — ⑤

■ ■ ■ ■ ■

### MODEL 2493

#### ① CONNECTIONS / INPUT RATING

01	3P3W 150V AC
02	3P4W 150V AC
03	3P3W 300V AC
04	3P4W 300V AC
05	3 PHASE A, B, C 1A AC
06	3 PHASE A, B, C 5A AC

#### ② FREQUENCY

1	50/60 Hz
2	400 Hz

#### ③ ANALOG OUTPUT

AAA	None
AFA	0 to 1 mA
AHD	4 to 20 mA

#### ④ COMMUNICATION

0	None
1	RS-485
2	MODBUS

#### ⑤ AUXILIARY POWER

1	120V AC
2	240V AC
3	24V DC
4	48V DC
5	125V DC



### Notes:

- 1) 120V OR 240V AC AUXILIARY POWER IS STANDARD. CONTACT FACTORY FOR AVAILABILITY OF DC POWER OPTIONS.
- 2) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 3) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.
- 4) CERTIFICATE OF CONFORMANCE: SPECIFY WITH ORDER, NO CHARGE.



2493

# POWER SERIES<sup>Plus</sup>

DIGITAL SWITCHBOARD METER

## 3 in 1 AC VOLT / AMP / HERTZ



MODEL FORMAT: 2493

MODEL  
2493

### ① FUNCTION/CONNECTIONS

- 07 VOLT/AMP/Hz 1P2W
- 08 VOLT/AMP/Hz 3P3W
- 09 VOLT/AMP/Hz 3P4W

### ② VOLT/AMP RATING

- 1 150V/1A AC
- 2 150V/5A AC
- 3 300V/1A AC
- 4 300V/5 A AC

### ③ FREQUENCY

- 1 50/60 Hz
- 2 400 Hz

### ④ ANALOG OUTPUT

- AAA NONE
- AFA 0 TO 1 mA
- AHD 4 TO 20 mA

### ⑤ COMMUNICATION

- 0 NONE
- 1 RS-485
- 2 MODBUS

### ⑥ AUXILIARY POWER

- 1 120V AC
- 2 240V AC
- 3 24V DC
- 4 48V DC
- 5 125V DC



### Notes:

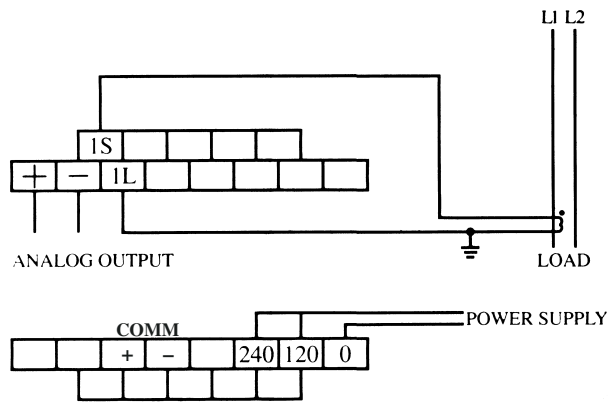
- 1) 120V OR 240V AC AUXILIARY POWER IS STANDARD. CONTACT FACTORY FOR AVAILABILITY OF DC POWER OPTIONS.
- 2) NIST CALIBRATION CERTIFICATE: SPECIFY AND ADD \$50.00 EACH NET PER UNIT.
- 3) NIST CALIBRATION CERTIFICATE WITH TEST DATA: SPECIFY AND ADD \$100.00 EACH NET PER UNIT.
- 4) CERTIFICATE OF CONFORMANCE: SPECIFY WITH ORDER, NO CHARGE.

# POWER SERIES<sup>Plus</sup>

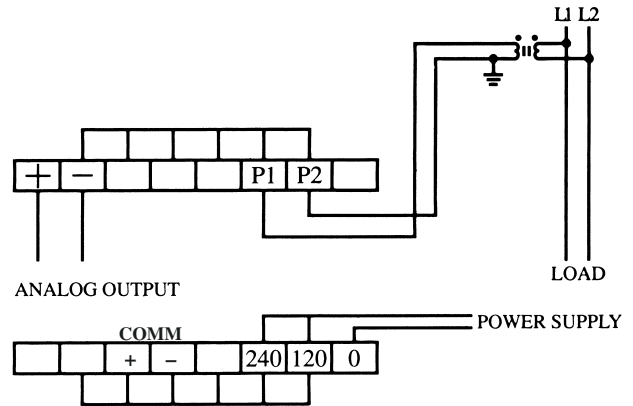
DIGITAL SWITCHBOARD METER



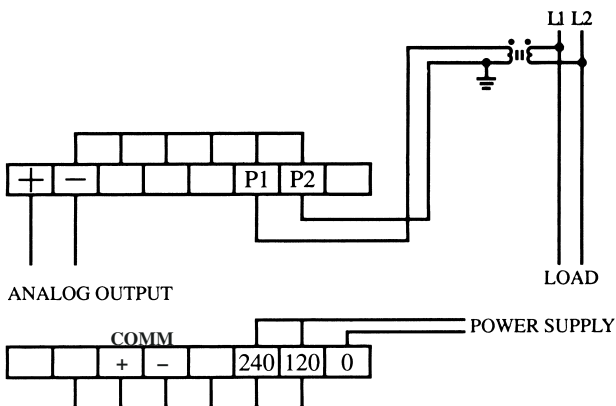
## Terminal Connections



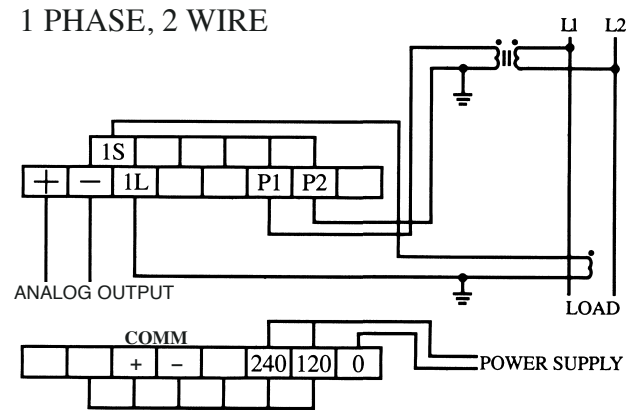
**249111 and 249115 AC Ammeters**



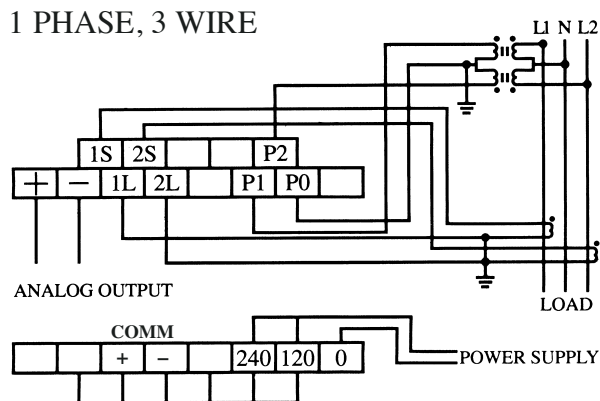
**249121 and 249125 AC Voltmeters**



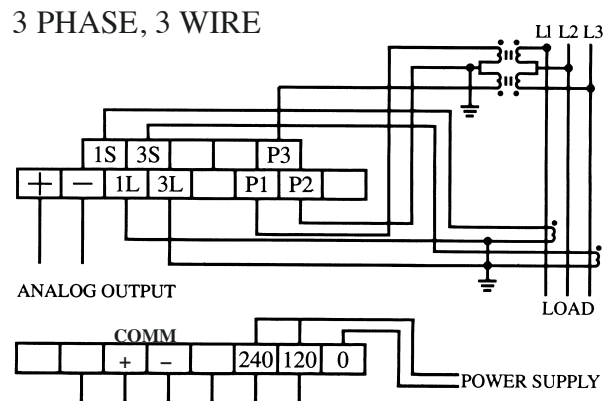
**249181 and 249183 Frequency Meters**



**249151 / 249161 / 249171 / 249191  
Watts / Vars / P.F. / Phase Angle**



**24919152 / 249162 / 249172 / 249192  
Watts / Vars / P.F. / Phase Angle**



**249153 / 249163 / 249173 / 249193  
Watts / Vars / P.F. / Phase Angle**



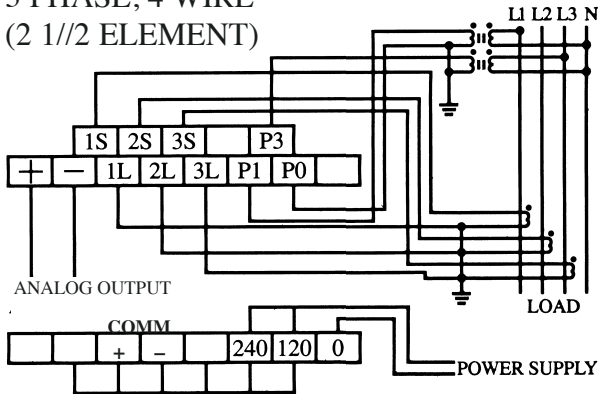


# POWER SERIES<sup>Plus</sup>

## DIGITAL SWITCHBOARD METER

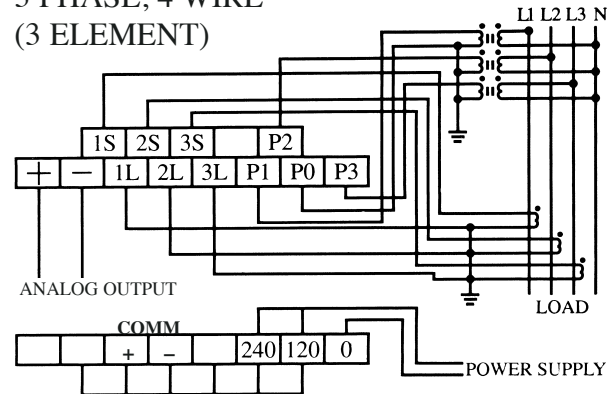
### Terminal Connections

3 PHASE, 4 WIRE  
(2 1/2 ELEMENT)

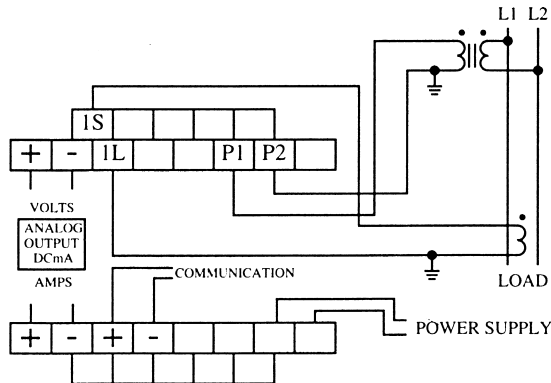


**249154 / 249164 / 249174 / 249194**  
**Watts / Vars / P.F. / Phase Angle**

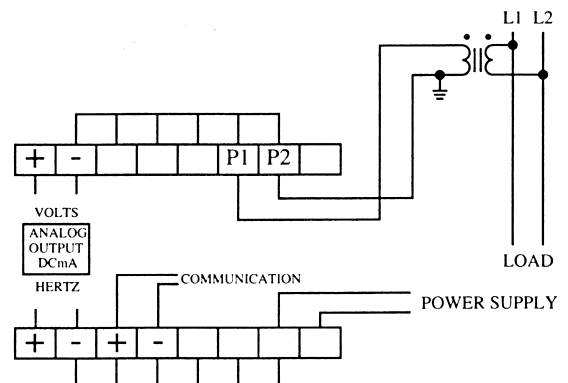
3 PHASE, 4 WIRE  
(3 ELEMENT)



**249155/249165/249175/249195**  
**Watts / Vars / P.F. / Phase Angle**

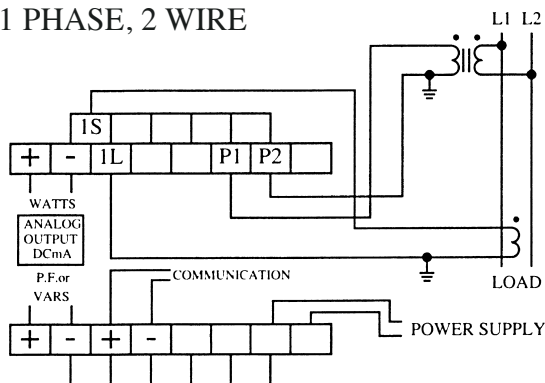


**249212 / 249213 / 249216 / 249217**  
**Dual function Volts / Amps**



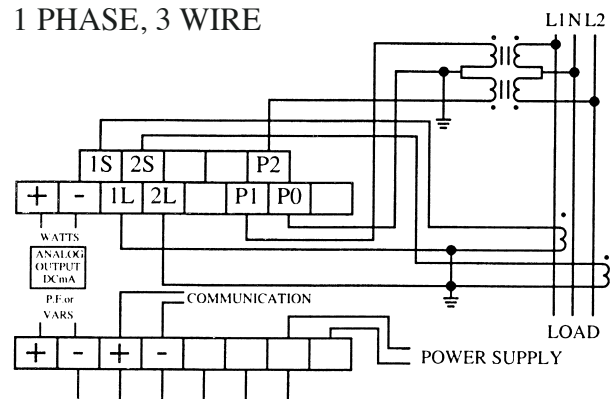
**249222/249223/249226/249227**  
**Dual function Volts / Hertz**

1 PHASE, 2 WIRE



**249240/249245**  
**Dual function Watts / Vars, Watts / P. F.**

1 PHASE, 3 WIRE



**249241/249246**  
**Dual function Watts / Vars, Watts / P. F.**

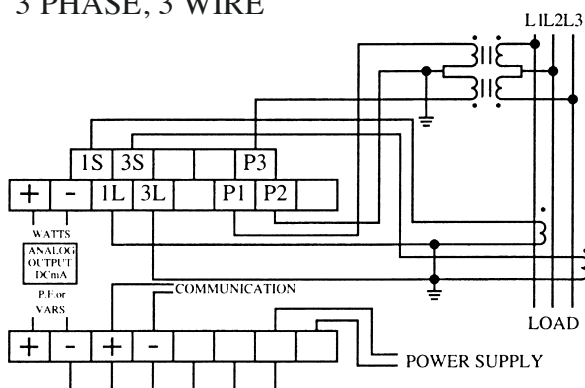
# POWER SERIES<sup>Plus</sup>

DIGITAL SWITCHBOARD METER



## Terminal Connections

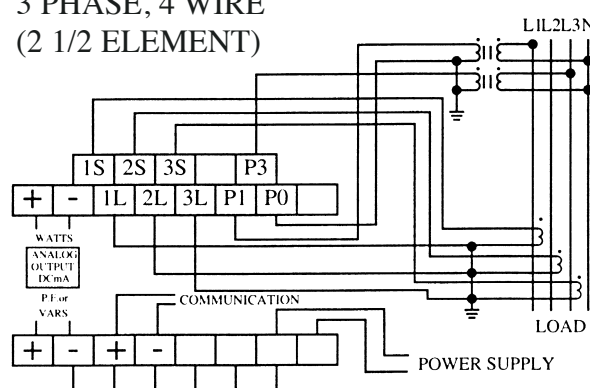
3 PHASE, 3 WIRE



**249242 / 249247**

**Watts / Vars and Watts / Power Factor**

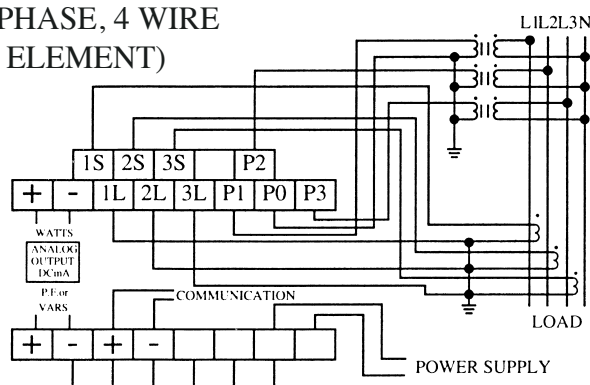
3 PHASE, 4 WIRE  
(2 1/2 ELEMENT)



**249243 / 249248**

**Watts / Vars and Watts / Power Factor**

3 PHASE, 4 WIRE  
(3 ELEMENT)



**249244 / 249249**

**Dual Function Watts / Vars & Watts / P.F.**



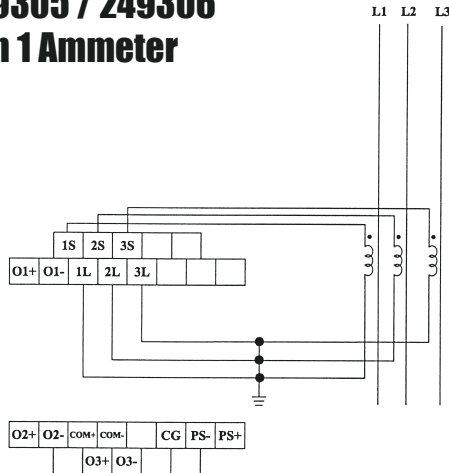
2493

# POWER SERIES<sup>Plus</sup>

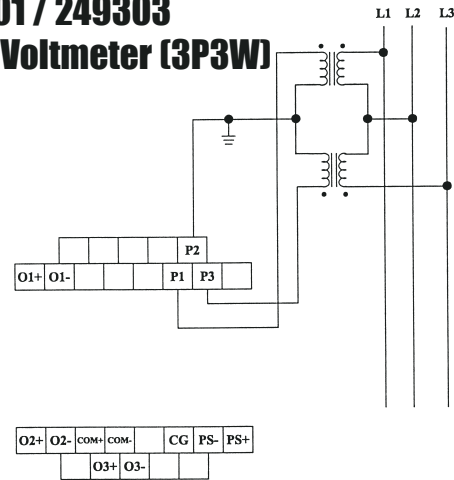
DIGITAL SWITCHBOARD METER

## Terminal Connections (see page 21 for notes)

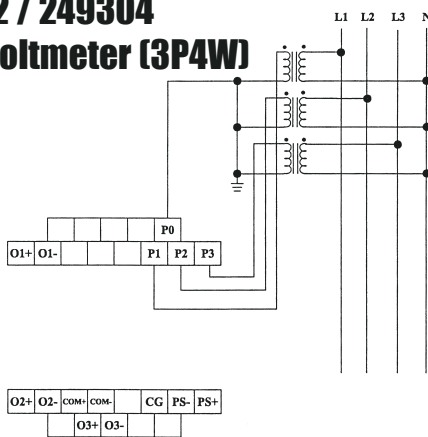
### 249305 / 249306 3 in 1 Ammeter



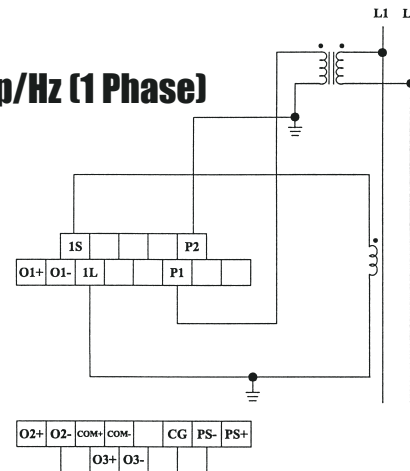
### 249301 / 249303 3 in 1 Voltmeter (3P3W)



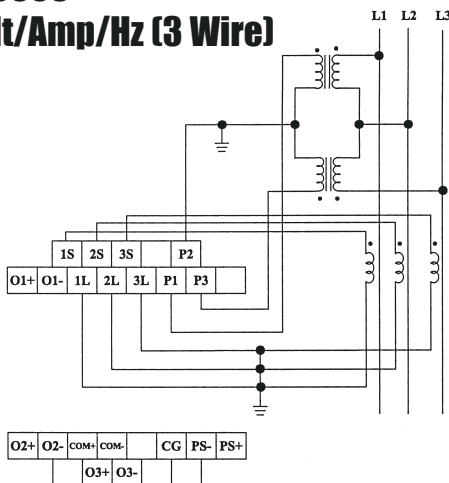
### 249302 / 249304 3 in 1 Voltmeter (3P4W)



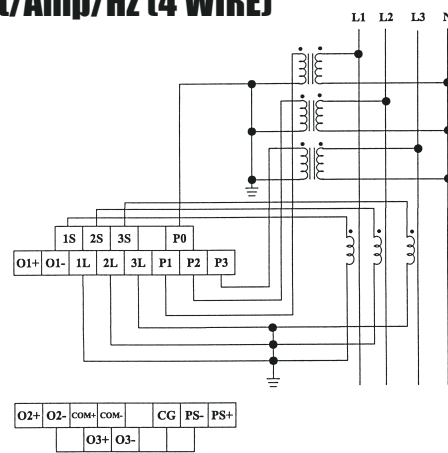
### 249307 Volt/Amp/Hz (1 Phase)



### 249308 Volt/Amp/Hz (3 Wire)



### 249309 Volt/Amp/Hz (4 WIRE)



# POWER SERIES<sup>Plus</sup>

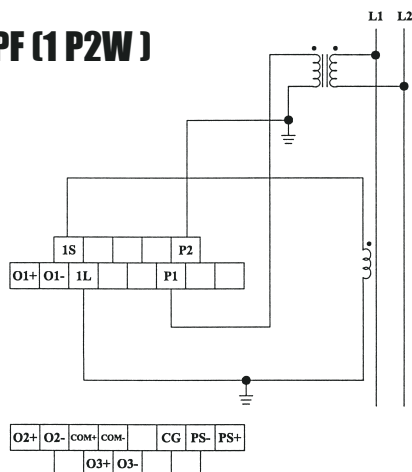
DIGITAL SWITCHBOARD METER



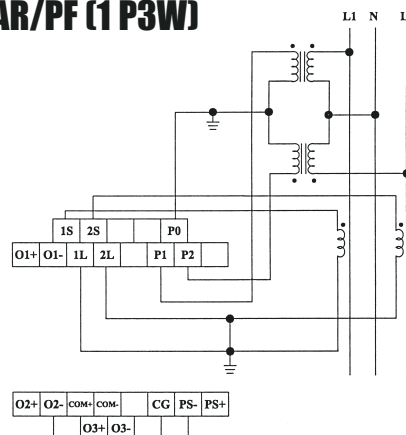
**2493**

## Terminal Connections (see notes below)

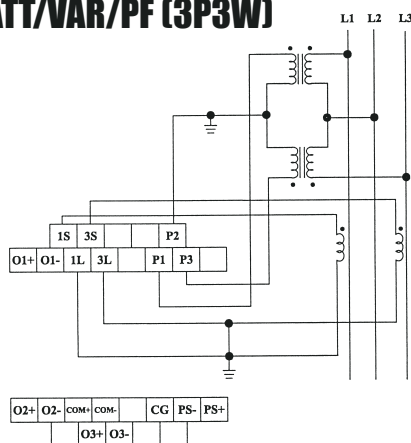
### 249334 W/VAR/PF (1 P2W )



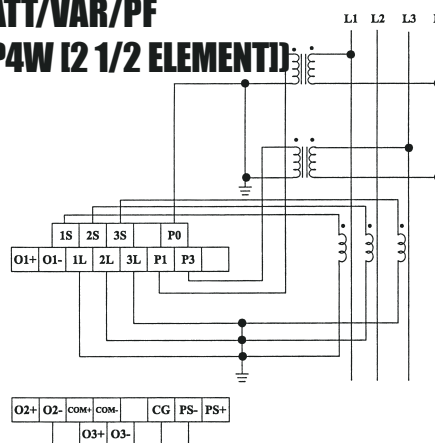
### 249335 W/VAR/PF (1 P3W)



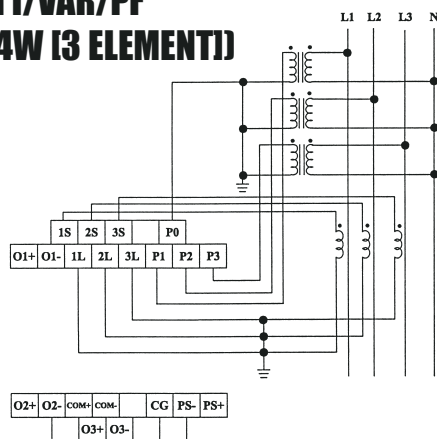
### 249336 WATT/VAR/PF (3P3W)



### 249337 WATT/VAR/PF (3P4W [2 1/2 ELEMENT])



### 249338 WATT/VAR/PF (3P4W [3 ELEMENT])



## NOTES FOR 2493 CONNECTION DRAWINGS:

PS+ is positive Power Supply connection (line voltage for AC supplies).

PS- is negative Power Supply connection (neutral for AC supplies).

CG is chassis ground. This connection must be made for 125VDC units only.

O1, O2, O3 are analog outputs corresponding to Top Display (O1), Middle Display (O2), Bottom Display (O3).



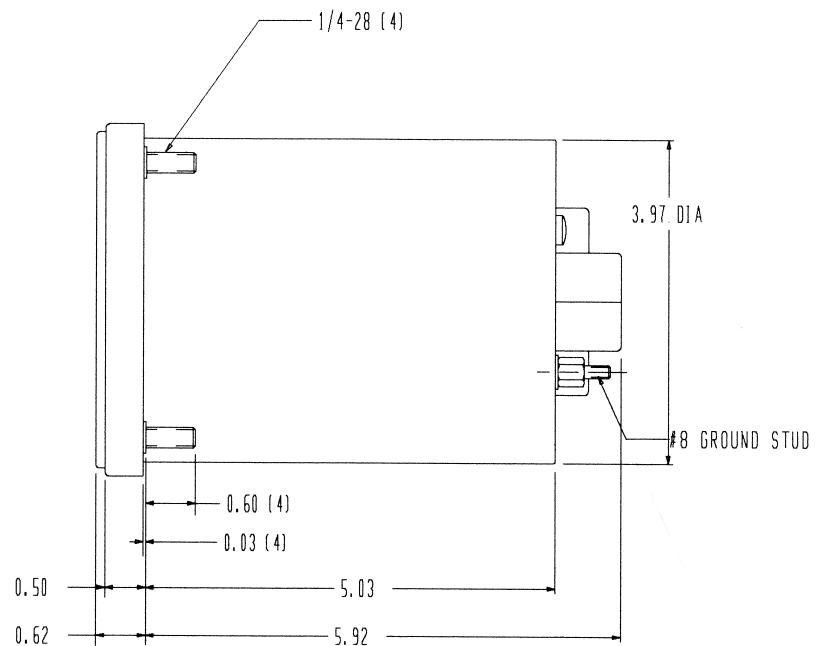
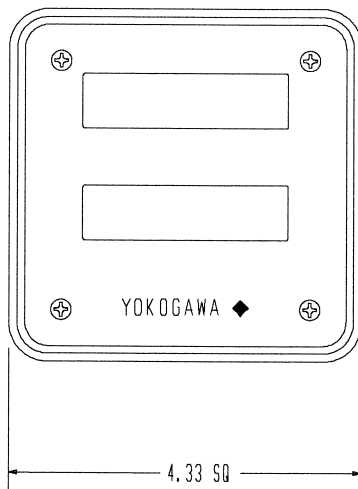
# POWER SERIES<sup>Plus</sup>

DIGITAL SWITCHBOARD METER

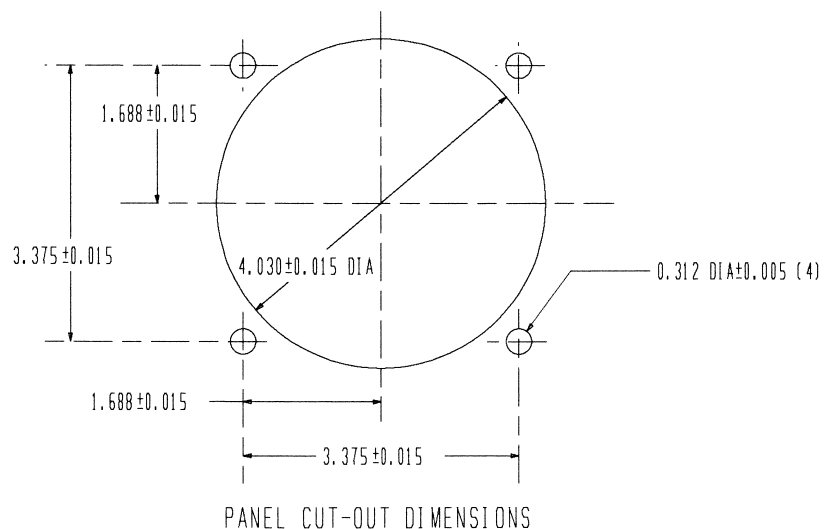
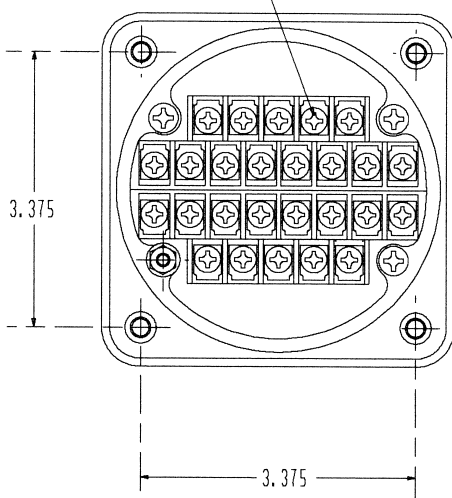
## OUTLINE DIMENSIONS

The POWER SERIES<sup>Plus</sup> is enclosed in a rugged steel case treated with zinc chromate to resist corrosion. The cover assembly and faceplate are constructed of high temperature polycarbonate material and have several gaskets which seal out dust and moisture from the front cover. The 26 position terminal board is a glass-filled polycarbonate material with #8 nickel-plated brass terminals inserted per the connection drawings for the model selected.

front view of 2492



#8 TERMINAL (26 MAX)





## **A Commitment to Innovation**

Since our establishment in the United States in 1957, Yokogawa Corporation of America (YCA) has become a leading North American manufacturer and supplier of Test and Measurement, Field Instrumentation (Flow, Pressure and Analytical Products), Process Control Equipment, Information Products

Headquartered just south of Atlanta, Georgia, YCA has sales offices across the United States. Our commitment to our customers is our number one priority, and we back it up with a network of representatives and distributors that reflect this commitment. Our 132 manufacturing and service locations give us a presence on every major continent, which means we have the global resources to support all your application needs.

Our parent company, Yokogawa Electric Corporation, is dedicated to developing the most advanced control and instrumentation products and systems in the world. As a major global player, the company anticipates the needs of the times, continually tackling new challenges and exploring new markets in order to provide the best solutions in the world.

Yokogawa's commitment to innovation is reflected in our extraordinary investments in R&D, which ensure development of the most advanced products and services. As a result, we have secured more than 4,500 patents and registrations, representing a number of important innovations, including the world's first distributed control system and the first digital sensors for flow and pressure measurement.

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<http://www.yca.com>

**Represented By:**