



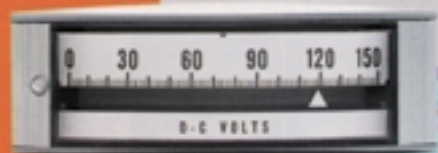
YOKOGAWA

ACCURACY



RELIABILITY

PERFORMANCE



YOKOGAWA

# SWITCHBOARD INSTRUMENTS



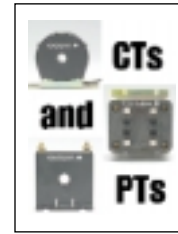
## ADDITIONAL YOKOGAWA PRODUCTS

### POWER TRANSDUCERS



Yokogawa Juxta Power Transducers are featured in this catalog. They are UL recognized and enclosed in a rugged metal case with either 0.2% or 0.5% accuracy. For complete information, including other models and ratings, request catalog BU-JAC-05E.

### CURRENT & POTENTIAL TRANSFORMERS



Yokogawa CT's and PT's are also featured in this catalog and provide high accuracy inputs to our transformer-rated AC switchboard instruments and power transducers. Request bulletin 500CTPT-B for additional models and specifications.

### 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. For information please request bulletin 2302-E.

### 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 available. For more information, request catalog 250260PM-B.

### 2350 POWER SERIES DIGITAL METERS



The 2350 Series Digital Panel meters provide high accuracy readout of AC and DC inputs and are capable of re-transmitting analog signals to remote monitors, recorders and control systems. Available in 1/8 and 1/4 DIN case with single and multifunction capability. Request bulletin 2350PS-C for more information.

### PORTABLE TESTERS



Catalog BU-INST-3E features digital multimeters and clamp-on testers, earth and ground resistance testers, thermometers, insulation testers, digital light meters and tachometers, decade resistance boxes, and wheatstone bridges.

To obtain additional catalogs or bulletins, please use the business reply card inserted in this catalog, or call 1-800-258-2552x575 for immediate assistance and technical support.

## SWITCHBOARD INSTRUMENT SELECTOR GUIDE

| Model Type        | AB/DB40                                | AB/DB40     | AB/DB16 | AB/DB17     | AB/DB14    | T/180              | T/2180     | T/2491      |
|-------------------|----------------------------------------|-------------|---------|-------------|------------|--------------------|------------|-------------|
| Case style        | 4½" Metal                              | 4½" Plastic | 8½"     | Illuminated | High-shock | 6" Edgewise        | Mini-swbd. | 4½" Digital |
|                   | See AB/DB general specifications below |             |         |             |            | See contents below |            |             |
| Input rating      |                                        |             |         |             |            |                    |            |             |
| AC Milliamperes   | X                                      | X           | X       | X†          | X          | X                  | X          | N/A         |
| AC Amperes        | X                                      | X           | X       | X†          | X          | X                  | X          | X           |
| AC Voltage        | X                                      | X           | X       | X†          | X          | X                  | X          | X           |
| DC Microamperes   | X                                      | X           | X       | N/A         | X          | X                  | X          | N/A         |
| DC Milliamperes   | X                                      | X           | X       | X           | X          | X                  | X          | N/A         |
| DC Amperes        | X                                      | X           | X       | X           | X          | X                  | X          | N/A         |
| DC Millivolts     | X                                      | X           | X       | X           | X          | X                  | X          | N/A         |
| DC Voltage        | X                                      | X           | X       | X           | X          | X                  | X          | N/A         |
| Frequency         | X                                      | *           | X       | *           | *          | *                  | X          | X           |
| AC Watts          | X                                      | *           | X       | *           | *          | *                  | *          | X           |
| AC VARS           | X                                      | *           | X       | *           | *          | *                  | *          | X           |
| Power Factor      | X                                      | *           | X       | *           | *          | *                  | X          | X           |
| RTD Temperature   | X                                      | *           | X       | *           | *          | *                  | *          | N/A         |
| AC Synchroscope   | X                                      | N/A         | X       | N/A         | N/A        | N/A                | N/A        | N/A         |
| RPM Indicator     | X                                      | X           | X       | X           | X          | X                  | X          | N/A         |
| Process indicator | X                                      | X           | X       | X           | X          | X                  | X          | N/A         |
| Ground detector   | X                                      | X           | X       | X           | N/A        | X                  | X          | N/A         |

Notes: \* Requires external transducer, X = available, N/A = Not available in this model, † = rectifier type.

### AB/DB Switchboard specifications in accordance with ANSI C39.1

**Accuracy:** ±1.0% of full scale basic accuracy class.

*Specific accuracies:*

*Rectifier type meter-* ±1.5% @ 25°C calibrated to sine wave.

*Expanded Scale Voltmeter-* 0.3% of mid-scale.

*Power factor meter-* ±1% of scale length from 20-100% of rated current on balanced system models; ±3% of scale length on unbalanced system model types.

*Synchroscope-* ±1% of scale length.

*Frequency meters-* ± .15Hz @45-55Hz and 55-65Hz, ±0.093Hz @ 58-62Hz, ±1.5Hz @350-450Hz.

**Position of use:** Vertical (scale)

**Full scale deflection angle:** 250°, except synchroscope is 360°

**Full scale length:**

AB/DB40, AB/DB14, AB/DB17- 6.9 inches.

AB/DB16- 13.8 inches.

**Scale plate:** AB/DB40, AB/DB14 platform type 2 piece scale with graduations on the outer scale; numerals and legends on the inner scale. AB/DB16, has a one piece platform scale, AB/DB17 see page 8.

**Case:** All AB/DB switchboard instruments have drawn steel case with zinc chromate coating except AB/DB40 plastic case which is ABS.

**Cover:** AB/DB14, AB/DB17 metal cover with polycarbonate window. AB/DB16, AB/DB40 polycarbonate-UL94V-0 cover and window.

**Terminal plate:** phenol resin material.

**Mounting studs:** 1/4" x 28 thread.

**Terminal studs:** 10-32 thread.

**Operating temperature range:** 0 to 40°C (32 to 104°F).

**Storage temperature range:** -10 to 50°C (14 to 50°F).

**Extreme temperature range:** -20°C to 65°C (-4 to 149°F).

**Dielectric level:** 2300VAC for 1 minute between the electrical circuit and mounting studs.

**Overload rating:** Voltmeter and potential coils-1.2 x rating (continuous).

AC Ammeters- 2 x rating (continuous), and 10 x rating for one second.

Current coils (other than ammeters) 1.5 x rating (continuous), and 10 x rating for one second.

**Response time:** Approximately 2.5 seconds (except AB/DB16)

### CONTENTS

#### AB/DB Switchboard Instruments

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| Page 4-7   | AC/DC Ammeters, Voltmeters, Tach. indicators.                                    |
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#### Type 180 Edgewise Instruments.

|            |                                                                                     |
|------------|-------------------------------------------------------------------------------------|
| Page 25-27 | General specifications, catalog numbers, Optional features, dimensions and cutouts. |
|------------|-------------------------------------------------------------------------------------|

#### Type 2180 Miniature Switchboard Instruments

|            |                                                                            |
|------------|----------------------------------------------------------------------------|
| Page 28-29 | General specifications, ordering information, dimensions and panel cutout. |
|------------|----------------------------------------------------------------------------|

#### Type 2491 Digital Switchboard Instruments

|            |                                                                                                         |
|------------|---------------------------------------------------------------------------------------------------------|
| Page 30-33 | General specifications, ordering information, outline and panel cutout dimensions, connection diagrams. |
|------------|---------------------------------------------------------------------------------------------------------|

#### Type 2469/2489 Power Transducers

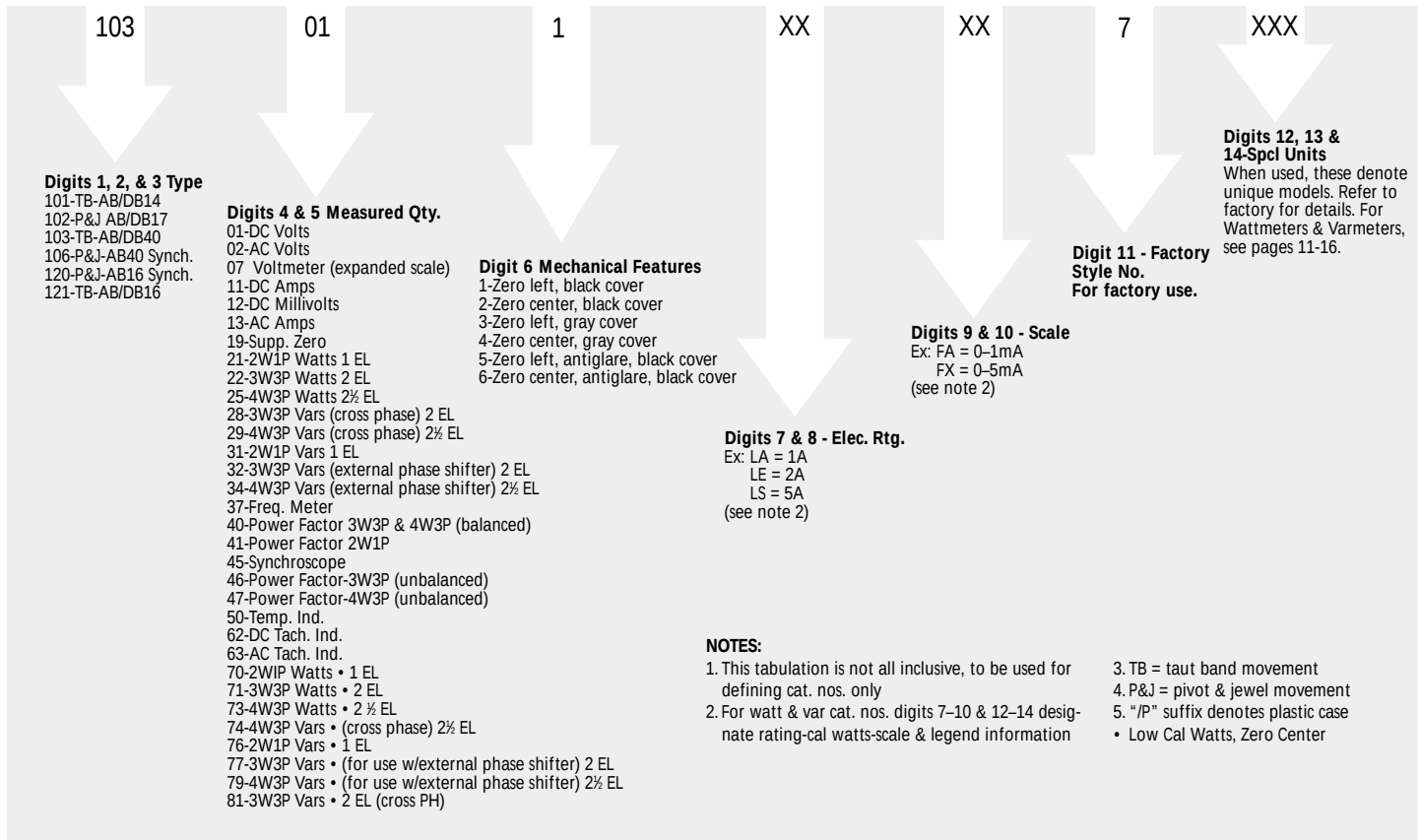
|            |                                             |
|------------|---------------------------------------------|
| Page 34-35 | General specifications and catalog numbers. |
|------------|---------------------------------------------|

#### Current and Potential transformers, DC Shunts, Multipliers

|            |                      |
|------------|----------------------|
| Page 36-37 | Ordering information |
|------------|----------------------|



## Key to AB/DB Switchboard Numbering System (See Notes)



## How to Order — Specify the following:

- Complete catalog number, or;
- Provide significant portion of catalog number with word description for differences (e.g. "Similar to 103111FAFA, except scale 0-100 kilovars"), or
- Provide word description including the following information:  
 Type: AB/DB-14, 16, or 40  
 Rating (Input):.....Amperes AC or DC .....  
 Volts AC or DC .....  
 Frequency: 60 Hz, 50 Hz, 400 Hz.....Hz  
 Scale: Min. Value - Max. Value, Zero left, Zero-center or offset zero  
 Legend: Specify words and/or symbols exactly  
 Potential Transformer Ratio: .....to 120 volts or .....to .....volts  
 Current Transformer Ratio: .....to 5 amperes or .....to .....amperes  
 Circuit: 2-wire/single-phase, 3-wire/3 phase.  
 3-phase/4-wire.....other  
 External Devices; phase Shifting transformers, shunts transducers, etc.....  
 Other Options:.....  
 Special features .....

## Shipping & Storage Weights

| Instrument   | *AD/DB-40 |      |       |      | AD/DB-16 |      |       |      |
|--------------|-----------|------|-------|------|----------|------|-------|------|
|              | Net       |      | Ship  |      | Net      |      | Ship  |      |
|              | (lbs)     | (kg) | (lbs) | (kg) | (lbs)    | (kg) | (lbs) | (kg) |
| DC-A/V       | 1.5       | .70  | 2.4   | 1.1  | 3.0      | 1.4  | 5.0   | 2.2  |
| AC           | V         | 1.7  | .79   | 2.7  | 1.2      | 3.4  | 1.5   | 5.0  |
|              | A         | 1.8  | .84   | 2.7  | 1.2      | 3.4  | 1.5   | 5.0  |
| WATT/<br>VAR | 1Ø        | 2.8  | 1.3   | 3.6  | 1.7      | 4.4  | 2.0   | 6.0  |
|              | 3Ø3W      | 3.0  | 1.4   | 3.9  | 1.8      | 4.6  | 2.1   | 6.3  |
|              | 3Ø4W      |      |       |      |          |      |       |      |
| Power Factor | 2.0       | .95  | 3.0   | 1.4  | 3.6      | 1.7  | 5.3   | 2.4  |
| Frequency    | 1.8       | .82  | 2.7   | 1.2  | 3.3      | 1.5  | 5.0   | 2.3  |
| Temperature  | 2.0       | .95  | 3.0   | 1.4  | 3.6      | 1.7  | 5.3   | 2.4  |
| Tachometer   | 1.6       | .80  | 2.7   | 1.2  | 3.3      | 1.5  | 5.0   | 2.3  |
| Synchroscope | 3.9       | 1.8  | 4.8   | 2.2  | 5.5      | 2.4  | 7.1   | 3.2  |

\*Subtract 0.5 lbs. for plastic case amp & volt.

### Approximate Package Size in Inches / Centimeters

|                                      |                             |
|--------------------------------------|-----------------------------|
| All AB/DB<br>(Except AB-/DB-16)..... | 6 x 6 x 11 / 15 x 15 x 28   |
| Shipping.....                        | 7 x 7 x 13 / 18 x 18 x 33   |
| AB-/DB-16.....                       | 10 x 10 x 11 / 25 x 25 x 28 |
| Shipping.....                        | 11 x 11 x 13 / 28 x 28 x 33 |

## SWITCHBOARD INSTRUMENTS



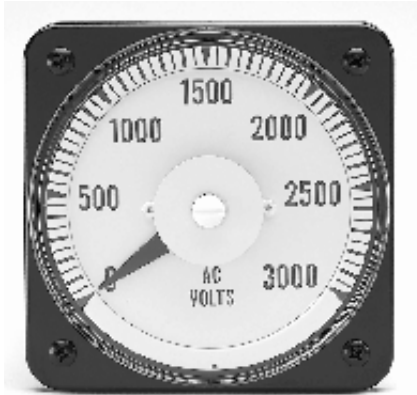
**AB-40  
Metal Case**



**AB-40  
Plastic Case**

### AC Ammeters

| Rating (Amperes)                                                               | Scale (Amperes) | AB-14 Cat. No. | AB-40 Metal Case | AB-40 Plastic Case | AB-16 Cat. No. |
|--------------------------------------------------------------------------------|-----------------|----------------|------------------|--------------------|----------------|
| <b>Self-Contained, 40/70 Hz</b>                                                |                 |                |                  |                    |                |
| 1                                                                              | 0-1             | 101 133 LALA   | 103 131 LALA     | 103 131 LALA7/P    | 121 131 LALA   |
| 1.5                                                                            | 0-1.5           | 101 133 LCLC   | 103 131 LCLC     | 103 131 LCLC7/P    | 121 131 LCLC   |
| 2                                                                              | 0-2             | 101 133 LELE   | 103 131 LELE     | 103 131 LELE7/P    | 121 131 LELE   |
| 3                                                                              | 0-3             | 101 133 LJLJ   | 103 131 LJLJ     | 103 131 LJLJ7/P    | 121 131 LJLJ   |
| 5                                                                              | 0-5             | 101 133 LSLS   | 103 131 LSLS     | 103 131 LSLS7/P    | 121 131 LSLS   |
| 7.5                                                                            | 0-7.5           | 101 133 MFMF   | 103 131 MFMF     | 103 131 MFMF7/P    | 121 131 MFMF   |
| 10                                                                             | 0-10            | 101 133 MTMT   | 103 131 MTMT     | 103 131 MTMT7/P    | 121 131 MTMT   |
| 15                                                                             | 0-15            | 101 133 NDND   | 103 131 NDND     | 103 131 NDND7/P    | 121 131 NDND   |
| 20                                                                             | 0-20            | 101 133 NGNG   | 103 131 NGNG     | 103 131 NGNG7/P    | 121 131 NGNG   |
| 30                                                                             | 0-30            | 101 133 NLNL   | 103 131 NLNL     | 103 131 NLNL7/P    | —              |
| <b>Transformer-Rated, 40/70Hz (see Current Transformers on page 36)</b>        |                 |                |                  |                    |                |
| 5                                                                              | 0-10            | 101 133 LSMT   | 103 131 LSMT     | 103 131 LSMT7/P    | 121 131 LSMT   |
| 5                                                                              | 0-15            | 101 133 LSND   | 103 131 LSND     | 103 131 LSND7/P    | 121 131 LSND   |
| 5                                                                              | 0-20            | 101 133 LSNG   | 103 131 LSNG     | 103 131 LSNG7/P    | 121 131 LSNG   |
| 5                                                                              | 0-25            | 101 133 LSNJ   | 103 131 LSNJ     | 103 131 LSNJ7/P    | 121 131 LSNJ   |
| 5                                                                              | 0-30            | 101 133 LSNL   | 103 131 LSNL     | 103 131 LSNL7/P    | 121 131 LSNL   |
| 5                                                                              | 0-40            | 101 133 LSNP   | 103 131 LSNP     | 103 131 LSNP7/P    | 121 131 LSNP   |
| 5                                                                              | 0-50            | 101 133 LSNT   | 103 131 LSNT     | 103 131 LSNT7/P    | 121 131 LSNT   |
| 5                                                                              | 0-75            | 101 133 LSPB   | 103 131 LSPB     | 103 131 LSPB7/P    | 121 131 LSPB   |
| 5                                                                              | 0-100           | 101 133 LSPK   | 103 131 LSPK     | 103 131 LSPK7/P    | 121 131 LSPK   |
| 5                                                                              | 0-150           | 101 133 LSPZ   | 103 131 LSPZ     | 103 131 LSPZ7/P    | 121 131 LSPZ   |
| 5                                                                              | 0-200           | 101 133 LSRL   | 103 131 LSRL     | 103 131 LSRL7/P    | 121 131 LSRL   |
| 5                                                                              | 0-250           | 101 133 LSRS   | 103 131 LSRS     | 103 131 LSRS7/P    | 121 131 LSRS   |
| 5                                                                              | 0-300           | 101 133 LSRX   | 103 131 LSRX     | 103 131 LSRX7/P    | 121 131 LSRX   |
| 5                                                                              | 0-400           | 101 133 LSSC   | 103 131 LSSC     | 103 131 LSSC7/P    | 121 131 LSSC   |
| 5                                                                              | 0-500           | 101 133 LSSF   | 103 131 LSSF     | 103 131 LSSF7/P    | 121 131 LSSF   |
| 5                                                                              | 0-600           | 101 133 LSSJ   | 103 131 LSSJ     | 103 131 LSSJ7/P    | 121 131 LSSJ   |
| 5                                                                              | 0-800           | 101 133 LSSN   | 103 131 LSSN     | 103 131 LSSN7/P    | 121 131 LSSN   |
| 5                                                                              | 0-1000          | 101 133 LSSS   | 103 131 LSSS     | 103 131 LSSS7/P    | 121 131 LSSS   |
| 5                                                                              | 0-1200          | 101 133 LSSV   | 103 131 LSSV     | 103 131 LSSV7/P    | 121 131 LSSV   |
| 5                                                                              | 0-1500          | 101 133 LSTC   | 103 131 LSTC     | 103 131 LSTC7/P    | 121 131 LSTC   |
| 5                                                                              | 0-2000          | 101 133 LSTM   | 103 131 LSTM     | 103 131 LSTM7/P    | 121 131 LSTM   |
| 5                                                                              | 0-2500          | 101 133 LSTV   | 103 131 LSTV     | 103 131 LSTV7/P    | 121 131 LSTV   |
| 5                                                                              | 0-3000          | 101 133 LSUA   | 103 131 LSUA     | 103 131 LSUA7/P    | 121 131 LSUA   |
| 5                                                                              | 0-4000          | 101 133 LSUE   | 103 131 LSUE     | 103 131 LSUE7/P    | 121 131 LSUE   |
| 5                                                                              | 0-5000          | 101 133 LSUJ   | 103 131 LSUJ     | 103 131 LSUJ7/P    | 121 131 LSUJ   |
| 5                                                                              | 0-6000          | 101 133 LSUP   | 103 131 LSUP     | 103 131 LSUP7/P    | 121 131 LSUP   |
| 5                                                                              | 0-7000          | 101 133 LSUS   | 103 131 LSUS     | 103 131 LSUS7/P    | 121 131 LSUS   |
| 5                                                                              | 0-8000          | 101 133 LSUW   | 103 131 LSUW     | 103 131 LSUW7/P    | 121 131 LSUW   |
| <b>Instruction Book: 4555K10P0701, Outline Dimensions: See pages 23 and 24</b> |                 |                |                  |                    |                |



**AB-40  
Metal Case**



**AB-40  
Expanded Scale**

## AC Voltmeters

| Rating (Volts)                                                                 | Scale (Volts) | AB-14 Cat. No. | AB-40 Metal Case | AB-40 Plastic Case | AB-16 Cat. No. |
|--------------------------------------------------------------------------------|---------------|----------------|------------------|--------------------|----------------|
| <b>Self-Contained, 50/60 Hz</b>                                                |               |                |                  |                    |                |
| 150                                                                            | 0-150         | 101 023 PZPZ   | 103 021 PZPZ     | 103 021 PZPZ7/P    | 121 021 PZPZ   |
| 250                                                                            | 0-250         | 101 023 RSRS   | 103 021 RSRS     | 103 021 RSRS7/P    | 121 021 RSRS   |
| 300                                                                            | 0-300         | 101 023 RXRX   | 103 021 RXRX     | 103 021 RXRX7/P    | 121 021 RXRX   |
| 500                                                                            | 0-500         | 101 023 SFSF   | 103 021 SFSF     | 103 021 SFSF7/P    | 121 021 SFSF   |
| 600                                                                            | 0-600         | 101 023 SJSJ   | 103 021 SJSJ     | 103 021 SJSJ7/P    | 121 021 SJSJ   |
| 750s                                                                           | 0-750         | **             | 103 021 SMSM     | 103 021 SMSM7/P    | 121 021 SMSM   |
| <b>Transformer-Rated, 50/60 Hz (see Potential Transformers on page 37)</b>     |               |                |                  |                    |                |
| 150                                                                            | 0-300         | 101 023 PZRX   | 103 021 PZRX     | 103 021 PZRX7/P    | 121 021 PZRX   |
| 150                                                                            | 0-600         | 101 023 PZSJ   | 103 021 PZSJ     | 103 021 PZSJ7/P    | 121 021 PZSJ   |
| 150                                                                            | 0-750         | 101 023 PZSM   | 103 021 PZSM     | 103 021 PZSM7/P    | 121 021 PZSM   |
| 150                                                                            | 0-3000        | 101 023 PZUA   | 103 021 PZUA     | 103 021 PZUA7/P    | 121 021 PZUA   |
| 150                                                                            | 0-5250        | 101 023 PZUL   | 103 021 PZUL     | 103 021 PZUL7/P    | 121 021 PZUL   |
| 150                                                                            | 0-6000        | 101 023 PZUP   | 103 021 PZUP     | 103 021 PZUP7/P    | 121 021 PZUP   |
| 150                                                                            | 0-9000        | 101 023 PZUY   | 103 021 PZUY     | 103 021 PZUY7/P    | 121 021 PZUY   |
| 150                                                                            | 0-15kV        | 101 023 PZWZ   | 103 021 PZWZ     | 103 021 PZWZ7/P    | 121 021 PZWZ   |
| 150                                                                            | 0-18kV        | 101 023 PZXE   | 103 021 PZXE     | 103 021 PZXE7/P    | 121 021 PZXE   |
| 150                                                                            | 0-45kV        | 101 023 PZXU   | 103 021 PZXU     | 103 021 PZXU7/P    | 121 021 PZXU   |
| 150                                                                            | 0-150kV       | 101 023 PZYR   | 103 021 PZYR     | 103 021 PZYR7/P    | 121 021 PZYR   |
| 250                                                                            | 0-600V        | 101 023 RSSJ   | 103 021 RSSJ     | 103 021 RSSJ7/P    | 121 021 RSSJ   |
| <b>Expanded Scale, Self-Contained, 50/60 HZ</b>                                |               |                |                  |                    |                |
| 110-130                                                                        | 110-130       | **             | 103 071 PNP      | 103 071 PNP7/P     | 121 071 PNP    |
| <b>Expanded Scale, Transformer Rated, 50/60 HZ</b>                             |               |                |                  |                    |                |
| 110-130                                                                        | †             | **             | 103 071 PN . *   | 103 071 PN..7/P*   | 121 071 PN . * |
| <b>Rectifier Type, 1.5% Accuracy, 20 to 3000 Hz</b>                            |               |                |                  |                    |                |
| 15                                                                             | 0-15          | **             | *                | *7/P               | *              |
| 30                                                                             | 0-30          | **             | *                | *7/P               | *              |
| 150                                                                            | 0-150         | **             | *                | *7/P               | *              |
| 150                                                                            | †             | **             | *                | *7/P               | *              |
| 300                                                                            | 0-300         | **             | *                | *7/P               | *              |
| 600                                                                            | 0-600         | **             | *                | *7/P               | *              |
| <b>Ground Detector Type — Single-Phase 50/60 Hz</b>                            |               |                |                  |                    |                |
| 150                                                                            | 0-150         | **             | 103 021 PZPZ     | 103 021 PZPZ7/P    | 121 021 PZPZ   |
| 150                                                                            | †             | **             | 103 021 PZ . *   | 103 021 PZ . *7/P  | 121 021 PZ . * |
| 300                                                                            | 0-300         | **             | 103 021 RXRX     | 103 021 RXRX7/P    | 121 021 RXRX   |
| 600                                                                            | 0-600         | **             | 103 021 SJSJ     | 103 021 SJSJ7/P    | 121 021 SJSJ   |
| <b>Instruction Book: 4555K10P0701, Outline Dimensions: see pages 23 and 24</b> |               |                |                  |                    |                |

s UL version not available.

\* Order by description. Specify P.T. (Potential Transformer) ratio if used, and scale desired.

\*\* High shock version not available.

† Scale per requisition. AB/DB models have maximum 4 digits as standard.

## SWITCHBOARD INSTRUMENTS

### DC Ammeters Self-Contained

| Scale and Rating                                                                | DB-14 Cat. No. | DB-40 Metal Case | DB-40 Plastic Case | DB-16 Cat. No. |
|---------------------------------------------------------------------------------|----------------|------------------|--------------------|----------------|
| <b>Microammeters — Zero-Left</b>                                                |                |                  |                    |                |
| 0-200                                                                           | **             | 103 111 EAEA     | 103 111 EAEA7/P    | —              |
| 0-300                                                                           | 101 113 EGEG   | 103 111 EGEG     | 103 111 EGEG7/P    | 121 111 EGEG   |
| 0-500                                                                           | 101 113 EMEM   | 103 111 EMEM     | 103 111 EMEM7/P    | 121 111 EMEM   |
| <b>Milliammeters — Zero-Left</b>                                                |                |                  |                    |                |
| s 0-1                                                                           | 101 113 FAFA   | 103 111 FAFA     | 103 111 FAFA7/P    | 121 111 FAFA   |
| 0-2                                                                             | 101 113 FGFG   | 103 111 FGFG     | 103 111 FGFG7/P    | 121 111 FGFG   |
| 0-5                                                                             | 101 113 FXFX   | 103 111 FXFX     | 103 111 FXFX7/P    | 121 111 FXFX   |
| 0-10                                                                            | 101 113 GZGZ   | 103 111 GZGZ     | 103 111 GZGZ7/P    | 121 111 GZGZ   |
| 0-30                                                                            | 101 113 HMHM   | 103 111 HMHM     | 103 111 HMHM7/P    | 121 111 HMHM   |
| 0-50                                                                            | 101 113 HHHY   | 103 111 HHHY     | 103 111 HHHY7/P    | 121 111 HHHY   |
| 0-100                                                                           | 101 113 JRJR   | 103 111 JRJR     | 103 111 JRJR7/P    | 121 111 JRJR   |
| 0-200                                                                           | 101 113 KAKA   | 103 111 KAKA     | 103 111 KAKA7/P    | 121 111 KAKA   |
| 0-300                                                                           | 101 113 KGKG   | 103 111 KGKG     | 103 111 KGKG7/P    | 121 111 KGKG   |
| 0-500                                                                           | 101 113 KMKM   | 103 111 KMKM     | 103 111 KMKM7/P    | 121 111 KMKM   |
| <b>Milliammeters — Suppressed-Zero (No zero set unless otherwise specified)</b> |                |                  |                    |                |
| 10-50                                                                           | 101 193 HX...† | 103 191 HX...†   | 103 191 HX...†7/P  | 121 191 HX...† |
| s 4-20                                                                          | 101 193 HE...† | 103 191 HE...†   | 103 191 HE...†7/P  | 121 191 HE...† |
| 1-5                                                                             | 101 193 FY...† | 103 191 FY...†   | 103 191 FY...†7/P  | 121 191 FY...† |
| <b>Ammeters — Zero-Left</b>                                                     |                |                  |                    |                |
| 0-1                                                                             | 101 113 LALA   | 103 111 LALA     | 103 111 LALA7/P    | 121 111 LALA   |
| 0-5                                                                             | 101 113 LSLS   | 103 111 LSLS     | 103 111 LSLS7/P    | 121 111 LSLS   |
| 0-10                                                                            | 101 113 MTMT   | 103 111 MTMT     | 103 111 MTMT7/P    | 121 111 MTMT   |
| 0-15                                                                            | 101 113 NDND   | 103 111 NDND     | 103 111 NDND7/P    | 121 111 NDND   |
| 0-20                                                                            | 101 113 NGNG   | 103 111 NGNG     | 103 111 NGNG7/P    | 121 111 NGNG   |
| 0-30                                                                            | 101 113 NLNL   | 103 111 NLNL     | 103 111 NLNL7/P    | 121 111 NLNL   |
| <b>Instruction Book: 4555K10P0701, Outline Dimensions: see pages 23 and 24</b>  |                |                  |                    |                |

s See page 34 and 35 for Matching Power Transducer or Isolator.

† Scale per requisition. (AB/DB-40/16) have a maximum of 4 digits as standard.

\*\* High shock version not available.

**DB-40 Metal Case**



**DB-40 Plastic Case**



### DC Ammeters Shunt-Rated

| Rating (Millivolts)                                                                            | Scale (Amperes) | DB-14 Cat. No. | DB-40 Metal Case | DB-40 Plastic Case | DB-16 Cat. No. |
|------------------------------------------------------------------------------------------------|-----------------|----------------|------------------|--------------------|----------------|
| <b>With Lead Length Compensator, Catalog Number Does Not Include Shunt or Shunt Leads</b>      |                 |                |                  |                    |                |
| 50                                                                                             | *               | **             | 103 121 AB...    | 103 121 AB...7/P   | 121 121 AB...  |
| 50-0-50                                                                                        | *               | 101 124 AB...  | 103 122 AB...    | 103 122 AB...7/P   | 121 122 AB...  |
| 100                                                                                            | *               | 101 123 AE...  | 103 121 AE...    | 103 121 AE...7/P   | 121 121 AE...  |
| 100-0-100                                                                                      | *               | 101 124 AE...  | 103 122 AE...    | 103 122 AE...7/P   | 121 122 AE...  |
| <b>Zero-Left for Use with 50mV Shunts and 0.05-Ohm Shunt Leads, (Standard 5-Foot Leads). s</b> |                 |                |                  |                    |                |
| <b>See page 37 for External Shunts (Shunts and Leads are not included with meter).</b>         |                 |                |                  |                    |                |
| 50                                                                                             | 0-15            | 101 123 CAND   | 103 121 CAND     | 103 121 CAND7/P    | 121 121 ECND   |
| 50                                                                                             | 0-20            | 101 123 CANG   | 103 121 CANG     | 103 121 CANG7/P    | 121 121 ECNG   |
| 50                                                                                             | 0-30            | 101 123 CANL   | 103 121 CANL     | 103 121 CANL7/P    | 121 121 ECNL   |
| 50                                                                                             | 0-40            | 101 123 CANP   | 103 121 CANP     | 103 121 CANP7/P    | 121 121 ECNP   |
| 50                                                                                             | 0-50            | 101 123 CANT   | 103 121 CANT     | 103 121 CANT7/P    | 121 121 ECNT   |
| 50                                                                                             | 0-75            | 101 123 CAPB   | 103 121 CAPB     | 103 121CAPB7/P     | 121 121 ECPB   |
| 50                                                                                             | 0-100           | 101 123 CAPK   | 103 121 CAPK     | 103 121 CAPK7/P    | 121 121 ECPK   |
| 50                                                                                             | 0-150           | 101 123 CAPZ   | 103 121 CAPZ     | 103 121 CAPZ7/P    | 121 121 ECPZ   |
| 50                                                                                             | 0-200           | 101 123 CARL   | 103 121 CARL     | 103 121 CARL7/P    | 121 121 ECRL   |
| 50                                                                                             | 0-300           | 101 123 CARX   | 103 121 CARX     | 103 121 CARX7/P    | 121 121 ECRX   |
| 50                                                                                             | 0-400           | 101 123 CASC   | 103 121 CASC     | 103 121 CASC7/P    | 121 121 ECSC   |
| 50                                                                                             | 0-500           | 101 123 CASF   | 103 121 CASF     | 103 121 CASF7/P    | 121 121 ECSF   |
| 50                                                                                             | 0-750           | 101 123 CASM   | 103 121 CASM     | 103 121 CASM7/P    | 121 121 ECSCM  |
| 50                                                                                             | 0-1000          | 101 123 CASS   | 103 121 CASS     | 103 121 CASS7/P    | 121 121 ECSS   |
| 50                                                                                             | 0-1200          | 101 123 CASV   | 103 121 CASV     | 103 121 CASV7/P    | 121 121 ECSV   |
| 50                                                                                             | 0-1500          | 101 123 CATC   | 103 121 CATC     | 103 121 CATC7/P    | 121 121 ECTC   |
| 50                                                                                             | 0-2000          | 101 123 CATM   | 103 121 CATM     | 103 121 CATM7/P    | 121 121 ECTM   |
| 50                                                                                             | 0-3000          | 101 123 CAUA   | 103 121 CAUA     | 103 121 CAUA7/P    | 121 121 ECUA   |
| <b>Instruction Book: 4555K10P0701, Outline Dimensions: see pages 23 and 24</b>                 |                 |                |                  |                    |                |

\*\* High shock not available

\* Scale marked in terms of shunt current. When ordering specify rating of shunt to be used, scale and legend. AB/DB meter scales have a maximum of 4 digits.

‡ Shunt-rated instruments are normally calibrated for 5-foot shunt leads (0.050 Ohms). They can be calibrated for maximum resistances as follows:  $\frac{50\text{mV}}{2.0 \text{ Ohms}}$   $\frac{100\text{mV}}{5.0 \text{ Ohms}}$

## DC Voltmeters

| Rating and Scale (Volts)                                                                                 | DB-14 Cat. No. | DB-40 Metal Case | DB-40 Plastic Case | DB-16 Cat. No. |
|----------------------------------------------------------------------------------------------------------|----------------|------------------|--------------------|----------------|
| <b>Zero-Left (Sensitivity is 1000 OHMS / Volt)</b>                                                       |                |                  |                    |                |
| 0-15                                                                                                     | 101 013 NDND   | 103 011 NDND     | 103 011 NDND7/P    | 121 011 NDND   |
| 0-30                                                                                                     | 101 013 NLNL   | 103 011 NLNL     | 103 011 NLNL7/P    | 121 011 NLNL   |
| 0-50                                                                                                     | 101 013 NTNT   | 103 011 NTNT     | 103 011 NTNT7/P    | 121 011 NTNT   |
| 0-75                                                                                                     | 101 013 PBPB   | 103 011 PBPB     | 103 011 PBPB7/P    | 121 011 PBPB   |
| 0-150                                                                                                    | 101 013 PZPZ   | 103 011 PZPZ     | 103 011 PZPZ7/P    | 121 011 PZPZ   |
| 0-300                                                                                                    | 101 013 RXRX   | 103 011 RXRX     | 103 011 RXRX7/P    | 121 011 RXRX   |
| 0-400                                                                                                    | 101 013 SCSC   | 103 011 SCSC     | 103 011 SCSC7/P    | 121 011 SCSC   |
| 0-500                                                                                                    | 101 013 SFSF   | 103 011 SFSF     | 103 011 SFSF7/P    | 121 011 SFSF   |
| 0-600                                                                                                    | 101 013 SJSJ   | 103 011 SJSJ     | 103 011 SJSJ7/P    | 121 011 SJSJ   |
| <b>Zero-Center (Sensitivity is 2000 OHMS / Volt)</b>                                                     |                |                  |                    |                |
| 150-0-150                                                                                                | 101 014 PZPZ   | 103 012 PZPZ     | 103 012 PZPZ7/P    | 121 012 PZPZ   |
| 300-0-300                                                                                                | 101 014 RXRX   | 103 012 RXRX     | 103 012 RXRX7/P    | 121 012 RXRX   |
| 500-0-500                                                                                                | 101 014 SFSF   | 103 012 SFSF     | 103 012 SFSF7/P    | 121 012 SFSF   |
| 600-0-600                                                                                                | 101 014 SJSJ   | 103 012 SJSJ     | 103 012 SJSJ7/P    | 121 012 SJSJ   |
| <b>Ground Detector Type — Zero-Center for 2-Wire Circuits (Standard Sensitivity is 1000 OHMS/Volt) ‡</b> |                |                  |                    |                |
| 150-0-150                                                                                                | **             | 103 012 PZ†      | 103 012 PZ†7/P     | 121 012 PZ†    |
| 300-0-300                                                                                                | **             | 103 012 RX†      | 103 012 RX†7/P     | 121 012 RX†    |
| 500-0-500                                                                                                | **             | 103 012 SF†      | 103 012 SF†7/P     | 121 012 SF†    |
| 600-0-600                                                                                                | **             | 103 012 SJ†      | 103 012 SJ†7/P     | 121 012 SJ†    |
| <b>Instruction Book: 4555K10P0701, Outline Dimensions pages 23 and 24</b>                                |                |                  |                    |                |

† Specify scale by order.

‡ Includes (2) 2227 External Resistors.

\*\* High shock version not available.

## Tachometer Indicators

### DC Volts

Select nearest higher rated DC Voltmeter from above and specify requirements.

### AC Volts

Select nearest higher rated rectifier type AC voltmeter from Page 5 and specify requirements.

**Instruction Book 4555K15P0003**

**DB-40 Tachometer**



**DB-40 Metal Case**



**DB-40 Plastic Case**





AB/DB17  
Switchboard  
Meters



These internally illuminated meters are used primarily in railway locomotive applications for load and speed indication. They are suited to all applications where scale lighting and high accuracy is required. The wide radius pivot and jewel movement ensures accuracy and stability in the toughest environments. Standard lamps furnished with AB/DB17 are 2 GE #44 (6VDC) Lamps.

GENERAL SPECIFICATIONS

BASIC SPECIFICATION

In accordance with American National Standards Institute Specifications C39.1

SCALE LENGTH AND ARC

6.9" 250°

Scale Type:

White numerals, black platform scale is standard

NET WEIGHT

Approximately 990 gr. (2.2 lbs)

OVERSHOOT

Approximately 10%

ACCURACY

± 1% of full scale D.C. Meters

± 1.5% of full scale A.C. Meters

RESPONSE TIME

2.5 Seconds Maximum

METER MECHANISM

Moving coil type pivot and sapphire jewel

DIELECTRIC LEVEL

4000 Volts A.C. for 1 minute (case to input terminals)

Outline Dimensions

See page 24

AB/DB17 MODELS AVAILABLE

| Description     | Rating and scale | Model type |
|-----------------|------------------|------------|
| DC Milliammeter | 0-1mA            | 102117FAFA |
| DC Milliammeter | 0-10mA           | 102117GZGZ |
| DC Ammeter      | †                | 102117*    |
| DC Millivolts   | 0-50mV           | 102127ECEC |
| DC Voltmeter    | †                | 102017*    |
| AC Ammeter      | †                | 102117*    |
| AC Voltmeter    | †                | 102117*    |

Note: \*Specify full scale rating, scale color, type, legend, etc.

† Contact factory for minimum / maximum ratings.



**POWER  
FACTOR SCALE  
FOR  
BALANCED  
SYSTEM**

## Power-Factor Meters

| Rating (Amperes)                                                                        | Rating (L-L Volts) | Scale   | AB-40 Cat. No. | AB-16 Cat. No. |
|-----------------------------------------------------------------------------------------|--------------------|---------|----------------|----------------|
| <b>Single-Phase/2-Wire, 60Hz</b>                                                        |                    |         |                |                |
| 5                                                                                       | 120                | .5-1-.5 | 103 412 FCAD   | 121 412 FCAD   |
| <b>3-Phase 3- &amp; 4-Wire, 50/60Hz Balanced System Only</b>                            |                    |         |                |                |
| 5                                                                                       | 120                | .5-1-.5 | 103 402 FCAD   | 121 402 FCAD   |
| 5                                                                                       | 208                | .5-1-.5 | 103 402 FDAD   | —              |
| 5                                                                                       | 240                | .5-1-.5 | 103 402 FEAD   | 121 402 FEAD   |
| 5                                                                                       | 480                | .5-1-.5 | 103 402 FFAD   | —              |
| 5                                                                                       | 600                | .5-1-.5 | 103 402 FGAD   | —              |
| <b>3-Phase 3-Wire, 60Hz Unbalanced Systems</b>                                          |                    |         |                |                |
| 5                                                                                       | 120                | .5-1-.5 | 103 462 FCAD   | —              |
| 5                                                                                       | 240                | .5-1-.5 | 103 462 FEAD   | —              |
| <b>3-Phase 4-Wire, 60Hz Unbalanced Systems</b>                                          |                    |         |                |                |
| 5                                                                                       | 120                | .5-1-.5 | 103 472 FCAD   | —              |
| 5                                                                                       | 208                | .5-1-.5 | 103 472 FDAD   | —              |
| 5                                                                                       | 416*               | .5-1-.5 | 103 472 FEAD   | —              |
| <b>Instruction Book: 4555K35P0701 (For Unbalanced), Outline Dimensions: See page 23</b> |                    |         |                |                |
| <b>Instruction Book: 4555K25P0001 (For Balanced), Outline Dimensions: See page 23</b>   |                    |         |                |                |

\*240 V L-N



## Frequency Meters, 120V

| Scale (Hz)                                                             | Center Frequency (Hz) | Accuracy (Hz) | AB-40 Cat. No. | AB-16 Cat. No. |
|------------------------------------------------------------------------|-----------------------|---------------|----------------|----------------|
| 45-55                                                                  | 50                    | ±0.15         | 103 372 AGAG   | 121 372 AGAG   |
| 45-65                                                                  | 55                    | ±0.25         | 103 372 AJAJ   | 121 372 AJAJ   |
| 48-52                                                                  | 50                    | ±0.093        | 103 372 AKAK   | 121 372 AKAK   |
| 50-70                                                                  | 60                    | ±0.25         | 103 372 ALAL   | 121 372 ALAL   |
| 55-65                                                                  | 60                    | ±0.15         | 103 372 ANAN   | 121 372 ANAN   |
| 58-62                                                                  | 60                    | ±0.093        | 103 372 ATAT   | 121 372 ATAT   |
| 59-61                                                                  | 60                    | ±0.047        | 103 372 ASAS   | 121 372 ASAS   |
| 350-450                                                                | 400                   | ±1.3          | 103 372 BHBH   | 121 372 BHBH   |
| 390-410                                                                | 400                   | ±0.492        | 103 372 BLBL   | 121 372 BLBL   |
| <b>Instruction Book: 4555K24P0001, Outline Dimensions: See page 23</b> |                       |               |                |                |



## Synchrosopes — Pivot & Jewel, 120 Volt

| Scale                                                                  | Normal Frequency | AB-40 Cat. No. | AB-16 Cat. No. |
|------------------------------------------------------------------------|------------------|----------------|----------------|
| "Slow-Fast"                                                            | 50               | 106 452 ABAA   | 120 452 ABAA   |
| "Slow-Fast"                                                            | 60               | 106 452 AAAA   | 120 452 AAAA   |
| "Slow-Fast"                                                            | 400              | 106 452 ACAA   | 120 452 ACAA   |
| <b>Instruction Book: 4555K20P0701, Outline Dimensions: See page 23</b> |                  |                |                |



## Temperature Indicators (Lead Resistance = 0.3 ohms)

| Rating (Volts)                                                                               | Scale     | DB-40 Cat. No. | DB-16 Cat. No. |
|----------------------------------------------------------------------------------------------|-----------|----------------|----------------|
| <b>1-Percent of Span for 10-ohm copper RTDs (Resistance Temperature Detectors) 50-600 Hz</b> |           |                |                |
| 120                                                                                          | 20 -140°C | 103 502 CAAB†  | 121 502 CAAB†  |
| 120                                                                                          | 0-180°F   | 103 502 CDAD†  | 121 502 CDAD†  |
| <b>Instruction Book: 4555K12P0001, Outline Dimensions: See page 23</b>                       |           |                |                |

† Catalog number includes calibrated test resistor

## AC Wattmeters Non-Isolated (cannot be used with external Phase Shifter for Vars)

| Rating (Amperes)                                                                    | Rating (Volts) | Scale | AB-40 Cat. No.   | AB-16 Cat. No.   |
|-------------------------------------------------------------------------------------|----------------|-------|------------------|------------------|
| <b>Single-Phase/2-Wire, 1-Element, Transformer-Rated, 50/60 Hz</b>                  |                |       |                  |                  |
| 5                                                                                   | 120            | †     | 103 21 □ A ..... | 121 21 □ A ..... |
| <b>3-Phase/3-Wire, 2-Element, Transformer-Rated, 50/60Hz ■</b>                      |                |       |                  |                  |
| 5                                                                                   | 120            | †     | 103 22 □ A ..... | 121 22 □ A ..... |
| 5                                                                                   | 240            | †     | 103 22 □ C ..... | 121 22 □ C ..... |
| 5                                                                                   | 480*           | †     | 103 22 □ D ..... | —                |
| 5                                                                                   | 600*           | †     | 103 22 □ E ..... | —                |
| <b>3-Phase/4-Wire, 2½-Element, Transformer-Rated, 50/60Hz, (Voltage balanced) ■</b> |                |       |                  |                  |
| 5                                                                                   | 69             | †     | 103 25 □ F       | 121 25 □ F       |
| 5                                                                                   | 120            | †     | 103 25 □ A ..... | 121 25 □ A ..... |
| 5                                                                                   | 240            | †     | 103 25 □ C ..... | 121 25 □ C ..... |
| <b>Instruction Book: 4555K26P0701, Outline Dimensions: See page 23</b>              |                |       |                  |                  |



- † Order by description. Specify CT (Current Transformer) and/or PT (Potential Transformer) ratios if used and scale desired.  
 \* UL version in short case, non-UL version in long case.  
 □ Sixth digit signifies pointer deflection (1-zero-left, 2-zero-center).

**Varmeters are usually zero-center and scaled for half the scale values of the accompanying wattmeters.**  
**Example: If the Wattmeter is scaled 0-100 Kilowatts, the Varmeter is scaled 50-0-50 Kilovars.**

### ■ NOTE:

See Application Guide and Tables on the following six pages for selection of commonly used Watt and Var Meters.

## Varmeters (voltages must be balanced for all polyphase Varmeters)

| Rating (Amperes)                                                                                             | Rating (Volts) | Scale | AB-40 Cat. No.   | AB-16 Cat. No.   |
|--------------------------------------------------------------------------------------------------------------|----------------|-------|------------------|------------------|
| <b>Single-Phase/2-Wire, 1-Element, Transformer Rated, 60Hz</b>                                               |                |       |                  |                  |
| 5                                                                                                            | 120            | †     | 103 31 □ A ..... | 121 31 □ A ..... |
| 5                                                                                                            | 120            | †     | 103 762 A .....  | 121 762 A.....*  |
| <b>3-Phase/3-Wire, 2-Element, Transformer-Rated, 50/60Hz (Cannot be used with External Phase Shifter) ■</b>  |                |       |                  |                  |
| 5                                                                                                            | 120            | †     | 103 28 □ A       | 121 28 □ A....   |
| 5                                                                                                            | 120            | †     | 103 812 A .....  | 121 812 A.....*  |
| <b>3-Phase/3-Wire, 2-Element, Transformer-Rated, 60Hz For Use With External Phase Shifters</b>               |                |       |                  |                  |
| 5                                                                                                            | 120            | †     | 103 32 □ A ..... | 121 32 □ A       |
| 5                                                                                                            | 120            | †     | 103 772 A .....  | 121 77 2 A*      |
| <b>3-Phase/4-Wire, 2½-Element, Transformer-Rated, 50/60Hz (Cannot be used with External Phase Shifter) ■</b> |                |       |                  |                  |
| 5                                                                                                            | 208 H          | †     | 103 29 □ B....   | 121 29 □ B....   |
| 5                                                                                                            | 208 H          | †     | 103 742 B.... s  | 121 742 B.... s  |
| <b>3-Phase/4-Wire, 2½-Element, Transformer-Rated, 60Hz For Use with External Phase Shifters</b>              |                |       |                  |                  |
| 5                                                                                                            | 120            | †     | 103 34 □ A ..... | 121 34 □ A ..... |
| 5                                                                                                            | 120            | †     | 103 792 A ....*  | 121 792 A ....*  |
| <b>Instruction Book: 4555K27P0701, Outline Dimensions: See page 23</b>                                       |                |       |                  |                  |



- † Order by description. Specify CT (Current Transformer) and/or PT (Potential Transformer) ratios if used and scale desired.  
 \* Used for 0-Center when calibrating watts are less than ±380.  
 • Used for 0-Center when calibrating watts are less than ±658.  
 s Used for 0-Center when calibrating watts are less than ±760.  
 H The 2½-element varmeters used on 4-wire 3-phase 120V L-N systems are rated 208V because they are connected line-to-line.  
 □ Sixth digit signifies pointer deflection (1-zero left, 2-zero center).

## APPLICATION GUIDE FOR SELECTION OF WATTMETERS AND VARMETERS

**1.** For polyphase applications, see Selector Tables II-V. These tables display complete catalog numbers for use with commonly used combinations of CT and PT ratios. For single phase applications, order by description.

For 3-wire 3-phase wattmeters rated 120 volts, 5A see TABLE II on page 13.

For 3-wire 3-phase varmeters rated 120 volts, 5A see TABLE IV on page 15.

For 4-wire 3-phase wattmeters rated 120 volts, 5A see TABLE III on page 14.

For 4-wire 3-phase varmeters rated 208 volts, 5A see TABLE V on page 16.

**2.** If scale is required to be higher or lower than the pre-selected scale shown in the above tables, see TABLE I on page 12. Choose a scale value between the maximum and minimum shown on this table for the combination of CT and PT ratios. Order by description, giving CT and PT ratios

and choice of scale.

**3.** For transformer ratios and/or ratings not shown in the above tables, see Scale Watts Formula on page 12. This table shows minimum and maximum calibrating watts for various applications and ratings.

Minimum scale = CT ratio x PT ratio x minimum CW x K

Maximum scale = CT ratio x PT ratio x maximum CW x K

Choose a scale between the maximum and minimum. Order by description, giving rating, transformer ratios, and choice of scale.

"PT Ratio x CT Ratio" is sometimes expressed as "TR".

Example: If CT Ratio is 400/5 and PT Ratio is 480/120; then TR = 320.

**4.** See tables below for scale and legend keys to catalog number (digits 12, 13, 14).

### Key to Watt/Varmeter Scales

This table shows letter combinations assigned to end-scale values to be used for digits 12 & 13 in Catalog number.

| Cat. Digit<br>12, 13 | Scale | Cat. Digit<br>12, 13 | Scale | Cat. Digit<br>12, 13 | Scale | Cat. Digit<br>12, 13 | Scale | Cat. Digit<br>12, 13 | Scale |
|----------------------|-------|----------------------|-------|----------------------|-------|----------------------|-------|----------------------|-------|
| AA                   | 1     | BA                   | 10    | CA                   | 100   | DA                   | 1000  | EA                   | BLANK |
| AC                   | 1.2   | BC                   | 12    | CC                   | 120   | DC                   | 1200  | EC                   | 1.2   |
| AD                   | 1.4   | BD                   | 14    | CD                   | 140   | DD                   | 1400  | EE                   | 1.6   |
| AE                   | 1.5   | BE                   | 15    | CE                   | 150   | DE                   | 1500  | FC                   | 12.5  |
| AF                   | 1.8   | BF                   | 18    | CF                   | 180   | DF                   | 1800  | FD                   | 13    |
| AG                   | 2     | BG                   | 20    | CG                   | 200   | DG                   | 2000  | FE                   | 16    |
| AH                   | 2.4   | BH                   | 24    | CH                   | 240   | DH                   | 2400  | FG                   | 17.5  |
| AJ                   | 2.5   | BJ                   | 25    | CJ                   | 250   | DJ                   | 2500  | FJ                   | 26    |
| AK                   | 3     | BK                   | 30    | CK                   | 300   | DK                   | 3000  | GB                   | 115   |
| AL                   | 3.2   | BL                   | 32    | CL                   | 320   | DL                   | 3200  | GC                   | 125   |
| AM                   | 3.5   | BM                   | 35    | CM                   | 350   | DM                   | 3500  | GD                   | 130   |
| AN                   | 4     | BN                   | 40    | CN                   | 400   | DN                   | 4000  | GE                   | 160   |
| AP                   | 4.5   | BP                   | 45    | CP                   | 450   | DP                   | 4500  | GG                   | 175   |
| AR                   | 5     | BR                   | 50    | CR                   | 500   | DR                   | 5000  | GH                   | 230   |
| AS                   | 5.5   | BS                   | 55    | CS                   | 550   | DS                   | 5500  | GJ                   | 260   |
| AT                   | 6     | BT                   | 60    | CT                   | 600   | DT                   | 6000  | HC                   | 1250  |
| AU                   | 6.5   | BU                   | 65    | CU                   | 650   | DU                   | 6500  | HD                   | 1300  |
| AW                   | 7     | BW                   | 70    | CW                   | 700   | DW                   | 7000  | HE                   | 1600  |
| AX                   | 7.5   | BX                   | 75    | CX                   | 750   | DX                   | 7500  | HG                   | 1750  |
| AY                   | 8     | BY                   | 80    | CY                   | 800   | DY                   | 8000  |                      |       |
| AZ                   | 9     | BZ                   | 90    | CZ                   | 900   | DZ                   | 9000  |                      |       |

### Key to Watt/Varmeter Legends

This table shows letters assigned to inner scale legends to be used for digit 14 in Catalog number.

| Digit 14 | Wattmeters   | Varmeters | Digit 14 | Wattmeters     | Varmeters | Digit 14 | Wattmeters         | Varmeters |
|----------|--------------|-----------|----------|----------------|-----------|----------|--------------------|-----------|
| A        | None         | None      | D        | AC Megawatts   | Megavars  | G        | AC MW/Var* s       | —         |
| B        | AC Watts     | Vars      | E        | AC Watts/Vars* | —         | T        | Percent Horsepower | —         |
| C        | AC Kilowatts | Kilovars  | F        | AC KW/Var* s   | —         | U        | Horsepower         | —         |

\*For wattmeters that are to be used with phase shifting transformer for measuring vars.

S Standard Legends AC Kilowatts/Kilovars and AC Megawatts/Megavars



TABLE I

# Selection of Wattmeter Scales

(AB/DB-40/16 have a maximum of 4 digits as standard.)

| Scale Selection      | CT Primary Current | PT PRIMARY VOLTAGE   |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|----------------------|--------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                      |                    | 240                  | 480                  | 600                  | 2400                 | 3600                 | 4200                 | 4800                 | 6000                 | 7200                 | 12000                | 14400                |
| Normal<br>Max<br>Min | 25                 | 10<br>15<br>8        | 20<br>30<br>16       | 25<br>35<br>20       | 100<br>150<br>80     | 150<br>200<br>120    | 175<br>250<br>150    | 200<br>300<br>160    | 250<br>350<br>200    | 300<br>450<br>250    | 500<br>750<br>400    | 600<br>900<br>500    |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 50                 | 20<br>30<br>16       | 40<br>60<br>35       | 50<br>75<br>40       | 200<br>300<br>160    | 300<br>450<br>250    | 350<br>500<br>300    | 400<br>600<br>350    | 500<br>750<br>400    | 600<br>900<br>500    | 1000<br>1500<br>800  | 1200<br>1750<br>1000 |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 75                 | 30<br>45<br>25       | 60<br>90<br>50       | 75<br>100<br>60      | 300<br>450<br>250    | 450<br>650<br>350    | 500<br>750<br>400    | 600<br>900<br>500    | 750<br>1000<br>600   | 900<br>1200<br>700   | 1500<br>2000<br>1200 | 1750<br>2500<br>1500 |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 100                | 40<br>60<br>35       | 80<br>120<br>65      | 100<br>150<br>80     | 400<br>600<br>350    | 600<br>900<br>500    | 700<br>1000<br>600   | 800<br>1200<br>650   | 1000<br>1500<br>800  | 1200<br>1750<br>1000 | 2000<br>3000<br>1600 | 2500<br>3500<br>2000 |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 150                | 60<br>90<br>50       | 120<br>175<br>100    | 150<br>200<br>100    | 600<br>900<br>500    | 1000<br>1200<br>700  | 1000<br>1500<br>800  | 1200<br>1750<br>1000 | 1500<br>2000<br>1200 | 1750<br>2500<br>1500 | 3000<br>4500<br>2500 | 3500<br>5000<br>3000 |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 200                | 80<br>120<br>65      | 150<br>200<br>125    | 200<br>300<br>160    | 800<br>1200<br>650   | 1200<br>1750<br>1000 | 1500<br>2000<br>1200 | 1500<br>2000<br>1200 | 2000<br>3000<br>1600 | 2500<br>3500<br>2000 | 4000<br>6000<br>3500 | 5000<br>7000<br>4000 |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 300                | 120<br>175<br>100    | 250<br>350<br>200    | 300<br>450<br>250    | 1200<br>1750<br>1000 | 1750<br>2500<br>1500 | 2000<br>3000<br>1600 | 2500<br>3500<br>2000 | 3000<br>4500<br>2500 | 3500<br>5000<br>3000 | 6000<br>9000<br>5000 | 7500<br>10Mw<br>6000 |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 400                | 150<br>200<br>120    | 300<br>450<br>250    | 400<br>600<br>350    | 1500<br>2000<br>1200 | 2500<br>3500<br>2000 | 3000<br>4000<br>2500 | 3000<br>4500<br>2500 | 4000<br>6000<br>3500 | 5000<br>7000<br>4000 | 8000<br>12Mw<br>6500 | 10Mw<br>14Mw<br>7500 |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 600                | 250<br>350<br>200    | 500<br>700<br>400    | 600<br>900<br>500    | 2500<br>3500<br>2000 | 3500<br>5000<br>3000 | 4000<br>6000<br>3500 | 5000<br>7000<br>4000 | 6000<br>9000<br>5000 | 7500<br>10Mw<br>6000 | 12<br>17.5<br>10     | 15<br>20<br>12       |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 800                | 300<br>450<br>250    | 600<br>900<br>500    | 800<br>1200<br>650   | 3000<br>4500<br>2500 | 5000<br>7000<br>4000 | 5000<br>8000<br>4500 | 6000<br>9000<br>5000 | 8000<br>12Mw<br>6500 | 10Mw<br>12Mw<br>7500 | 15<br>20<br>15       | 20<br>25<br>15       |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 1200               | 500<br>700<br>400    | 1000<br>1200<br>750  | 1200<br>1750<br>1000 | 5000<br>7000<br>4000 | 7500<br>10Mw<br>6000 | 8000<br>12Mw<br>6500 | 10Mw<br>12Mw<br>7500 | 12<br>17.5<br>10     | 15<br>20<br>12       | 25<br>35<br>20       | 30<br>45<br>25       |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 1500               | 600<br>900<br>500    | 1200<br>1750<br>1000 | 1500<br>2000<br>1000 | 6000<br>9000<br>5000 | 10Mw<br>12Mw<br>7000 | 10Mw<br>15Mw<br>8000 | 12<br>17.5<br>10     | 15<br>20<br>10       | 17.5<br>25<br>15     | 30<br>45<br>20       | 35<br>50<br>25       |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 2000               | 800<br>1200<br>650   | 1500<br>2000<br>1400 | 2000<br>3000<br>1600 | 8000<br>12Mw<br>6500 | 12<br>17.5<br>10     | 15<br>20<br>12       | 15<br>20<br>12       | 20<br>30<br>16       | 25<br>35<br>20       | 40<br>60<br>35       | 50<br>70<br>40       |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 3000               | 1200<br>1750<br>1000 | 2500<br>3500<br>2000 | 3000<br>4500<br>2500 | 12<br>17.5<br>10     | 17.5<br>25<br>15     | 20<br>30<br>16       | 25<br>35<br>20       | 30<br>45<br>25       | 35<br>50<br>30       | 60<br>90<br>50       | 75<br>100<br>60      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
| Normal<br>Max<br>Min | 4000               | 1500<br>2000<br>1200 | 3000<br>4500<br>2500 | 4000<br>6000<br>3500 | 15<br>20<br>12       | 25<br>35<br>20       | 30<br>40<br>25       | 30<br>45<br>25       | 40<br>60<br>35       | 50<br>70<br>40       | 80<br>120<br>65      | 100<br>140<br>75     |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|                      |                    |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |

Scale values for 3-wire / 3-phase (120 volts, 5 ampere) For 4-wire / 3-phase multiply by 2. For single-phase divide by 2. **Note:** PT Primary Voltages shown are the line to neutral value for 3-phase / 4-wire circuits.

## Scale Watts Formula:

The limits of full-scale values depend upon the rating of the instrument and the current and potential transformer ratios used. In order to determine whether the desired full-scale value is within limits, the following calibrating-watts formula and table are used. If the calibrating watts value falls within the range shown in the table for the instrument rating, the scale is acceptable.

$$\text{Calibrating Watts/Element} = \frac{\text{Desired full-scale value in watts or vars}}{\text{CW}} \quad \text{CW} = (\text{PT Ratio}) \times (\text{CT Ratio}) \times K$$

Where K = 1 for 1-phase/2-wire circuits  
 K = 2 for 1-phase/3-wire, 2-phase/3-wire, 2-phase/4-wire, 3 phase/3-wire circuits  
 K = 4 for 3-phase/4-wire circuits  
 Except K = 1.1547 for var models (10328 — & 103812 — 10329 — & 103742 —)

## STANDARD CALIBRATING WATT RANGES FOR 5A 120V RATING

| Model                         | Zero Left or Center* | Zero Center * s Low Cal Watts |
|-------------------------------|----------------------|-------------------------------|
| Watt or Var (except below)    | 380 — 760            | 190 — 760                     |
| 2 el. Var 10328 — & 103812 —  | 658 — 1316           | 329 — 1316                    |
| 2½ el. Var 10329 — & 103742 — | 760 — 1520           | 380 — 1520                    |

\* Other Voltage & current ratings will be proportional

s End scale values

Note 1: For 10329 and 103742 (2½ element varmeters only) Catalog Number Digits 8, 9, 10 are one-half (½) the CW (∴ calibration current) as calculated using K = 1.1547

Note 2: The constant K may differ for various "short-cut" methods of metering watts or vars.

TABLE II

Wattmeter Selector

For 3-Wire 3-Phase (2-element) wattmeter 5A 120V (Zero-Left)

AB-40 Cat. No. 103221A..... Find Digits 8-14 & scale at  
AB-16 Cat. No. 121221A..... Intersection of C.T. & P.T. Ratios  
(For zero center change Digit 6 from 1 to 2)

| C.T.<br>RATIO<br>🔌 | P.T. RATIO        |                   |                   |                    |                    |                    |                    |                    |                    |                      |                      |
|--------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|----------------------|
|                    | 240/120<br>(2:1)  | 480/120<br>(4:1)  | 600/120<br>(5:1)  | 2400/120<br>(20:1) | 3600/120<br>(30:1) | 4200/120<br>(35:1) | 4800/120<br>(40:1) | 6000/120<br>(50:1) | 7200/120<br>(60:1) | 12000/120<br>(100:1) | 14400/120<br>(120:1) |
| 25/5<br>(5:1)      | RBU7BAC<br>10KW   | RBU7BGC<br>20KW   | RBU7BJC<br>25KW   | RBU7CAC<br>100KW   | RBU7CEC<br>150KW   | RBU7GGC<br>175KW   | RBU7CGC<br>200KW   | RBU7CJC<br>250KW   | RBU7CKC<br>300KW   | RBU7CRC<br>500KW     | RBU7CTC<br>600KW     |
| 50/5<br>(10:1)     | RBU7BGC<br>20KW   | RBU7BNC<br>40KW   | RBU7BRC<br>50KW   | RBU7CGC<br>200KW   | RBU7CKC<br>300KW   | RBU7CMC<br>350KW   | RBU7CNC<br>400KW   | RBU7CRC<br>500KW   | RBU7CTC<br>600KW   | RBU7DAC<br>1000KW    | RBU7DCC<br>1200KW    |
| 75/5<br>(15:1)     | RBU7BKC<br>30KW   | RBU7BTC<br>60KW   | RBU7BXC<br>75KW   | RBU7CGC<br>300KW   | RBU7CPC<br>450KW   | XGJ7CRC<br>500KW   | RBU7CTC<br>600KW   | RBU7CXC<br>750KW   | RBU7CZC<br>900KW   | RBU7DEC<br>1500KW    | RBU7DFC<br>1800KW    |
| 100/5<br>(20:1)    | RBU7BNC<br>40KW   | RBU7BYC<br>80KW   | RBU7CAC<br>100KW  | RBU7CNC<br>400KW   | RBU7CTC<br>600KW   | RBU7CWC<br>700KW   | RBU7CYC<br>800KW   | RBU7DAC<br>1000KW  | RBU7DCC<br>1200KW  | RBU7DGC<br>2000KW    | RBU7DHC<br>2400KW    |
| 150/5<br>(30:1)    | RBU7BTC<br>60KW   | RBU7CCC<br>120KW  | RBU7CEC<br>150KW  | RBU7CTC<br>600KW   | RBU7CZC<br>900KW   | XGJ7DAC<br>1000KW  | RBU7DCC<br>1200KW  | RBU7DEC<br>1500KW  | RBU7DFC<br>1800KW  | RBU7DKC<br>3000KW    | RAS7DMC<br>3500KW    |
| 200/5<br>(40:1)    | RBU7BYC<br>80KW   | RBU7GEC<br>160KW  | RBU7CGC<br>200KW  | RBU7CYC<br>800KW   | RBU7DCC<br>1200KW  | RBU7DDC<br>1400KW  | RBU7HEC<br>1600KW  | RBU7DGC<br>2000KW  | RBU7DHC<br>2400KW  | RBU7DNC<br>4000KW    | RDR7DRC<br>5000KW    |
| 250/5<br>(50:1)    | RBU7CAC<br>100KW  | RBU7CGC<br>200KW  | RBU7CJC<br>250KW  | RBU7DAC<br>1000KW  | RBU7DEC<br>1500KW  | RBU7HGC<br>1750KW  | RBU7DGC<br>2000KW  | RBU7DJC<br>2500KW  | RBU7DKC<br>3000KW  | RBU7DRC<br>5000KW    | RBU7DTC<br>6000KW    |
| 300/5<br>(60:1)    | RBU7CCC<br>120KW  | RBU7CHC<br>240KW  | RBU7CKC<br>300KW  | RBU7DCC<br>1200KW  | RBU7DFC<br>1800KW  | XGJ7DGC<br>2000KW  | RBU7DHC<br>2400KW  | RBU7DKC<br>3000KW  | RAS7DMC<br>3500KW  | RBU7DTC<br>6000KW    | RAS7DWC<br>7000KW    |
| 400/5<br>(80:1)    | RBU7GEC<br>160KW  | RBU7CLC<br>320KW  | RBU7CNC<br>400KW  | RBU7HEC<br>1600KW  | RBU7DHC<br>2400KW  | RET7DKC<br>3000KW  | RBU7DLC<br>3200KW  | RBU7DNC<br>4000KW  | RDR7DRC<br>5000KW  | RBU7DYC<br>8000KW    | RDR7BAD<br>10MW      |
| 500/5<br>(100:1)   | RBU7CGC<br>200KW  | RBU7CNC<br>400KW  | RBU7CRC<br>500KW  | RBU7DGC<br>2000KW  | RBU7DKC<br>3000KW  | RBU7DMC<br>3500KW  | RBU7DNC<br>4000KW  | RBU7DRC<br>5000KW  | RBU7DTC<br>6000KW  | RBU7BAD<br>10MW      | RBU7BCD<br>12MW      |
| 600/5<br>(120:1)   | RBU7CHC<br>240KW  | RDR7CRC<br>500KW  | RBU7CTC<br>600KW  | RBU7DHC<br>2400KW  | RAS7DMC<br>3500KW  | XGJ7DNC<br>4000KW  | RDR7DRC<br>5000KW  | RBU7DTC<br>6000KW  | RAS7DWC<br>7000KW  | RBU7BCD<br>12MW      | RDR7BED<br>15MW      |
| 800/5<br>(160:1)   | RBU7CLC<br>320KW  | XAG7CTC<br>600KW  | RBU7CYC<br>800KW  | RBU7DLC<br>3200KW  | RDR7DRC<br>5000KW  | RET7DTC<br>6000KW  | XAG7DTC<br>6000KW  | RBU7DYC<br>8000KW  | RDR7BAD<br>10MW    | RBU7FED<br>16MW      | RDR7BGD<br>20MW      |
| 1000/5<br>(200:1)  | RBU7CNC<br>400KW  | RBU7CYC<br>800KW  | RBU7DAC<br>1000KW | RBU7DNC<br>4000KW  | RBU7DTC<br>6000KW  | RBU7DWC<br>7000KW  | RBU7DYC<br>8000KW  | RBU7BAD<br>10MW    | RBU7BCD<br>12MW    | RBU7BGD<br>20MW      | RBU7BHD<br>24MW      |
| 1200/5<br>(240:1)  | RDR7CRC<br>500KW  | RDR7DAC<br>1000KW | RBU7DCC<br>1200KW | RDR7DRC<br>5000KW  | RAS7DWC<br>7000KW  | XGJ7DYC<br>8000KW  | RDR7BAD<br>10KW    | RBU7BCD<br>12MW    | RDR7BED<br>15MW    | RBU7BHD<br>24MW      | RDR7BKD<br>30MW      |
| 1500/5<br>(300:1)  | RBU7CTC<br>600KW  | RBU7DCC<br>1200KW | RBU7DEC<br>1500KW | RBU7DTC<br>6000KW  | RBU7DZC<br>9000KW  | XGJ7BAD<br>10MW    | RBU7BCD<br>12MW    | RBU7BED<br>15MW    | RBU7BFD<br>18MW    | RBU7BKD<br>30MW      | RAS7BMD<br>35MW      |
| 2000/5<br>(400:1)  | RBU7CYC<br>800KW  | RBU7HEC<br>1600KW | RBU7DGC<br>2000KW | RBU7DYC<br>8000KW  | RBU7BDC<br>12MW    | RBU7BDD<br>14MW    | RBU7FED<br>16MW    | RBU7BGD<br>20MW    | RBU7BHD<br>24MW    | RBU7BND<br>40MW      | RDR7BRD<br>50MW      |
| 2500/5<br>(500:1)  | RBU7DAC<br>1000KW | RBU7DGC<br>2000KW | RBU7DJC<br>2500KW | RBU7BAD<br>10MW    | RBU7BED<br>15MW    | RBU7FGD<br>17.5MW  | RBU7BGD<br>20MW    | RBU7BJD<br>25MW    | RBU7BKD<br>30MW    | RBU7BRD<br>50MW      | RBU7BTD<br>60MW      |
| 3000/5<br>(600:1)  | RBU7DCC<br>1200KW | RBU7DHC<br>2400KW | RBU7DKC<br>3000KW | RBU7BCD<br>12MW    | RBU7BFD<br>18MW    | XGJ7BGD<br>20MW    | RBU7BHD<br>24MW    | RBU7BKD<br>30MW    | RAS7BMD<br>35MW    | RBU7BTD<br>60MW      | RAS7BWD<br>70MW      |
| 4000/5<br>(800:1)  | RBU7HEC<br>1600KW | RBU7DLC<br>3200KW | RBU7DNC<br>4000KW | RBU7FED<br>16MW    | RBU7BHD<br>24MW    | RET7BKD<br>30MW    | RBU7BLD<br>32MW    | RBU7BND<br>40MW    | RDR7BRD<br>50MW    | RBU7BYD<br>80MW      | RDR7CAD<br>100MW     |
| 5000/5<br>(1000:1) | RBU7DGC<br>2000KW | RBU7DNC<br>4000KW | RBU7DRC<br>5000KW | RBU7BGD<br>20MW    | RBU7BKD<br>30MW    | RBU7BMD<br>35MW    | RBU7BND<br>40MW    | RBU7BRD<br>50MW    | RBU7BTD<br>60MW    | RBU7CAD<br>100MW     | RBU7CCD<br>120MW     |

TABLE III

Wattmeter Selector

For 4-Wire 3-Phase (2½-element) wattmeter 5A 120V (Zero-Left)

AB-40 Cat. No. 103251A..... Find Digits 8-14 & scale at  
AB-16 Cat. No. 121251A..... Intersection of C.T. & P.T. Ratios  
(For zero center change Digit 6 from 1 to 2)

| C.T.<br>RATIO<br> | P.T. RATIO        |                   |                   |                    |                    |                    |                    |                    |                    |                      |                      |  |
|------------------------------------------------------------------------------------------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|----------------------|--|
|                                                                                                      | 240/120<br>(2:1)  | 480/120<br>(4:1)  | 600/120<br>(5:1)  | 2400/120<br>(20:1) | 3600/120<br>(30:1) | 4200/120<br>(35:1) | 4800/120<br>(40:1) | 6000/120<br>(50:1) | 7200/120<br>(60:1) | 12000/120<br>(100:1) | 14400/120<br>(120:1) |  |
| 25/5<br>(5:1)                                                                                        | RBU7BGC<br>20KW   | RBU7BNC<br>40KW   | RBU7BRC<br>50KW   | RBU7GCG<br>200KW   | RBU7CKC<br>300KW   | RBU7CMC<br>350KW   | RBU7CNC<br>400KW   | RBU7CRC<br>500KW   | RBU7CTC<br>600KW   | RBU7DAC<br>1000KW    | RBU7DCC<br>1200KW    |  |
| 50/5<br>(10:1)                                                                                       | RBU7BNC<br>40KW   | RBU7BYC<br>80KW   | RBU7CAC<br>100KW  | RBU7CNC<br>400KW   | RBU7CTC<br>600KW   | RBU7CWC<br>700KW   | RBU7CYC<br>800KW   | RBU7DAC<br>1000KW  | RBU7DCC<br>1200KW  | RBU7DKC<br>2000KW    | RBU7DHC<br>2400KW    |  |
| 75/5<br>(15:1)                                                                                       | RBU7BTC<br>60KW   | RBU7CCC<br>120KW  | RBU7CEC<br>150KW  | RBU7CTC<br>600KW   | RBU7CZC<br>900KW   | XGJ7DAC<br>1000KW  | RBU7DCC<br>1200KW  | RBU7DEC<br>1500KW  | RBU7DFC<br>1800KW  | RBU7DKC<br>3000KW    | RAS7DMC<br>3500KW    |  |
| 100/5<br>(20:1)                                                                                      | RBU7BYC<br>80KW   | RBU7GEC<br>160KW  | RBU7GCG<br>200KW  | RBU7CYC<br>800KW   | RBU7DCC<br>1200KW  | RBU7DDC<br>1400KW  | RBU7HEC<br>1600KW  | RBU7DGC<br>2000KW  | RBU7DHC<br>2400KW  | RBU7DNC<br>4000KW    | XAG7DPC<br>4500KW    |  |
| 150/5<br>(30:1)                                                                                      | RBU7CCC<br>120KW  | RBU7CHC<br>240KW  | RBU7CKC<br>300KW  | RBU7DCC<br>1200KW  | RBU7DFC<br>1800KW  | XGJDCG<br>2000KW   | RBU7DHC<br>2400KW  | RBU7DKC<br>3000KW  | RAS7DMC<br>3500KW  | RBU7DTC<br>6000KW    | RAS7DWC<br>7000KW    |  |
| 200/5<br>(40:1)                                                                                      | RBU7GEC<br>160KW  | RBU7CLC<br>320KW  | RBU7CNC<br>400KW  | RBU7HEC<br>1600KW  | RBU7DHC<br>2400KW  | UCA7DJC<br>2500KW  | RBU7DLC<br>3200KW  | RBU7DNC<br>4000KW  | XAG7DPC<br>4500KW  | RBU7DYC<br>8000KW    | XAG7DZC<br>9000KW    |  |
| 250/5<br>(50:1)                                                                                      | RBU7GCG<br>200KW  | RBU7CNC<br>400KW  | RBU7CRC<br>500KW  | RBU7DGC<br>2000KW  | RBU7DKC<br>3000KW  | RBU7DMC<br>3500KW  | RBU7DNC<br>4000KW  | RBU7DRC<br>5000KW  | RBU7DTC<br>6000KW  | RBU7BAD<br>10MW      | RBU7BCD<br>12MW      |  |
| 300/5<br>(60:1)                                                                                      | RBU7CHC<br>240KW  | XAG7CPC<br>450KW  | RBU7CTC<br>600KW  | RBU7DHC<br>2400KW  | RAS7DMC<br>3500KW  | XGJ7DNC<br>4000KW  | XAG7DPC<br>4500KW  | RBU7DTC<br>6000KW  | RAS7DWC<br>7000KW  | RBU7BCD<br>12MW      | RAS7BDD<br>14MW      |  |
| 400/5<br>(80:1)                                                                                      | RBU7CLC<br>320KW  | XAG7CTC<br>600KW  | RBU7CYC<br>800KW  | RBU7DLC<br>3200KW  | XAG7DPC<br>4500KW  | UCA7DRC<br>5000KW  | XAG7DTC<br>6000KW  | RBU7DYC<br>8000KW  | XAG7DZC<br>9000KW  | RBU7FED<br>16MW      | XAG7BFD<br>18MW      |  |
| 500/5<br>(100:1)                                                                                     | RBU7CNC<br>400KW  | RBU7CYC<br>800KW  | RBU7DAC<br>1000KW | RBU7DNC<br>4000KW  | RBU7DTC<br>6000KW  | RBU7DWC<br>7000KW  | RBU7DYC<br>8000KW  | RBU7BAD<br>10MW    | RBU7BCD<br>12MW    | RBU7BGD<br>20MW      | RBU7BHD<br>24MW      |  |
| 600/5<br>(120:1)                                                                                     | XAG7CPC<br>450KW  | XAG7CZC<br>900KW  | RBU7DCC<br>1200KW | XAG7DPC<br>4500KW  | RAS7DWC<br>7000KW  | XGJ7DYC<br>8000KW  | XAG7DZC<br>9000KW  | RBU7BCD<br>12MW    | RAS7BDD<br>14MW    | RBU7BHD<br>24MW      | TBH7BJD<br>25MW      |  |
| 800/5<br>(160:1)                                                                                     | XAG7CTC<br>600KW  | XAG7DCC<br>1200KW | RBU7HEC<br>1600KW | XAG7DTC<br>6000KW  | XAG7DZC<br>9000KW  | UCA7BAD<br>10MW    | XAG7BCD<br>12MW    | RBU7FED<br>16MW    | XAG7BFD<br>18MW    | RBU7BLD<br>32MW      | UKJ7BMD<br>35MW      |  |
| 1000/5<br>(200:1)                                                                                    | RBU7CYC<br>800KW  | RBU7HEC<br>1600KW | RBU7DGC<br>2000KW | RBU7DYC<br>8000KW  | RBU7BCD<br>12MW    | RBU7BDD<br>14MW    | RBU7FED<br>16MW    | RBU7BGD<br>20MW    | RBU7BHD<br>24MW    | RBU7BND<br>40MW      | XAG7BPD<br>45MW      |  |
| 1200/5<br>(240:1)                                                                                    | XAG7CZC<br>900KW  | XAG7DFC<br>1800KW | RBU7DHC<br>2400KW | XAG7DZC<br>9000KW  | RAS7BDD<br>14MW    | XGJ7FED<br>16MW    | XAG7BFD<br>18MW    | RBU7BHD<br>24MW    | TBH7BJD<br>25MW    | XAG7BPD<br>45MW      | TBH7BRD<br>50MW      |  |
| 1500/5<br>(300:1)                                                                                    | RBU7DCC<br>1200KW | RBU7DHC<br>2400KW | RBU7DKC<br>3000KW | RBU7BCD<br>12MW    | RBU7BFD<br>18MW    | XGJ7BGD<br>20MW    | RBU7BHD<br>24MW    | RBU7BKD<br>30MW    | RAS7BMD<br>35MW    | RBU7BTD<br>60MW      | RAS7BWD<br>70MW      |  |
| 2000/5<br>(400:1)                                                                                    | RBU7HEC<br>1600KW | RBU7DLC<br>3200KW | RBU7DNC<br>4000KW | RBU7FED<br>16MW    | RBU7BHD<br>24MW    | UCA7BJD<br>25MW    | RBU7BLD<br>32MW    | RBU7BND<br>40MW    | XAG7BPD<br>45MW    | RBU7BYD<br>80MW      | XAG7BZD<br>90MW      |  |
| 2500/5<br>(500:1)                                                                                    | RBU7DGC<br>2000KW | RBU7DNC<br>4000KW | RBU7DRC<br>5000KW | RBU7BGD<br>20MW    | RBU7BKD<br>30MW    | RBU7BMD<br>35MW    | RBU7BND<br>40MW    | RBU7BRD<br>50MW    | RBU7BTD<br>60MW    | RBU7CAD<br>100MW     | RBU7CCD<br>120MW     |  |
| 3000/5<br>(600:1)                                                                                    | RBU7DHC<br>2400KW | XAG7DPC<br>4500KW | RBU7DTC<br>6000KW | RBU7BHD<br>24MW    | RAS7BMD<br>35MW    | XGJ7BND<br>40MW    | XAG7BPD<br>45MW    | RBU7BTD<br>60MW    | RAS7BWD<br>70MW    | RBU7CCD<br>120MW     | RAS7CDD<br>140MW     |  |
| 4000/5<br>(800:1)                                                                                    | RBU7DLC<br>3200KW | XAG7DTC<br>6000KW | RBU7DYC<br>8000KW | RBU7BLD<br>32MW    | XAG7BPD<br>45MW    | UCA7BRD<br>50MW    | RBU7BTD<br>60MW    | RBU7BYD<br>80MW    | XAG7BZD<br>90MW    | RBU7GED<br>160MW     | XAG7CFD<br>180MW     |  |
| 5000/5<br>(1000:1)                                                                                   | RBU7DNC<br>4000KW | RBU7DYC<br>8000KW | RBU7BAD<br>10MW   | RBU7BND<br>40MW    | RBU7BTD<br>60MW    | RBU7BWD<br>70MW    | RBU7BYD<br>80MW    | RBU7CAD<br>100MW   | RBU7CCD<br>120MW   | RBU7CGD<br>200MW     | RBU7CHD<br>240MW     |  |

TABLE IV

Varmeter Selector

For 3-Wire 3-Phase (2-element) Varmeter rated 5A 120V (Zero-Center)

AB-40 Cat. No. 103812A.....  
AB-16 Cat. No. 121812A.....

Find Digits 8-14 & scale at  
Intersection of C.T. & P.T. Ratios

| C.T.<br>RATIO<br>⎓ | P.T. RATIO          |                     |                     |                     |                     |                     |                     |                     |                     |                      |                      |
|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|
|                    | 240/120<br>(2:1)    | 480/120<br>(4:1)    | 600/120<br>(5:1)    | 2400/120<br>(20:1)  | 3600/120<br>(30:1)  | 4200/120<br>(35:1)  | 4800/120<br>(40:1)  | 6000/120<br>(50:1)  | 7200/120<br>(60:1)  | 12000/120<br>(100:1) | 14400/120<br>(120:1) |
| 25/5<br>(5:1)      | TAJ7ARC<br>5KVAR    | TAJ7BAC<br>10KVAR   | TAJ7FCC<br>12.5KVAR | TAJ7BRC<br>50KVAR   | TAJ7BXC<br>75KVAR   | NKJ7BYC<br>80KVAR   | TAJ7CAC<br>100KVAR  | TAJ7GCC<br>125KVAR  | TAJ7CEC<br>150KVAR  | TAJ7CJC<br>250KVAR   | TAJ7CKC<br>300KVAR   |
| 50/5<br>(10:1)     | TAJ7BAC<br>10KVAR   | TAJ7BGC<br>20KVAR   | TAJ7BJC<br>25KVAR   | TAJ7CAC<br>100KVAR  | TAJ7CEC<br>150KVAR  | TAJ7GGC<br>175KVAR  | TAJ7GCG<br>200KVAR  | TAJ7CJC<br>250KVAR  | TAJ7CKC<br>300KVAR  | TAJ7CRC<br>500KVAR   | TAJ7CTC<br>600KVAR   |
| 75/5<br>(15:1)     | TAJ7BEC<br>15KVAR   | TAJ7BKC<br>30KVAR   | WEK7BNC<br>40KVAR   | TAJ7CEC<br>150KVAR  | WEK7CHC<br>240KVAR  | RDH7CJC<br>250KVAR  | TAJ7CKC<br>300KVAR  | WEK7CNC<br>400KVAR  | TAJ7CPC<br>450KVAR  | TAJ7CXK<br>750KVAR   | TAJ7CZC<br>900KVAR   |
| 100/5<br>(20:1)    | TAJ7BGC<br>20KVAR   | TAJ7BNC<br>40KVAR   | TAJ7BRC<br>50KVAR   | TAJ7GCG<br>200KVAR  | TAJ7CKC<br>300KVAR  | TAJ7CMC<br>350KVAR  | TAJ7CNC<br>400KVAR  | TAJ7CRC<br>500KVAR  | TAJ7CTC<br>600KVAR  | TAJ7DAC<br>1000KVAR  | TAJ7DCC<br>1200KVAR  |
| 150/5<br>(30:1)    | TAJ7BKC<br>30KVAR   | TAJ7BTC<br>60KVAR   | TAJ7BXC<br>75KVAR   | TAJ7CKC<br>300KVAR  | TAJ7CPC<br>450KVAR  | RDH7CRC<br>500KVAR  | TAJ7CTC<br>600KVAR  | TAJ7CXK<br>750KVAR  | TAJ7CZC<br>900KVAR  | TAJ7DEC<br>1500KVAR  | SAJ7HGC<br>1750KVAR  |
| 200/5<br>(40:1)    | TAJ7BNC<br>40KVAR   | TAJ7BYC<br>80KVAR   | TAJ7CAC<br>100KVAR  | TAJ7CNC<br>400KVAR  | TAJ7CTC<br>600KVAR  | TAJ7CWC<br>700KVAR  | TAJ7CYC<br>800KVAR  | TAJ7DAC<br>1000KVAR | TAJ7DCC<br>1200KVAR | TAJ7DGC<br>2000KVAR  | UFJ7DJC<br>2500KVAR  |
| 250/5<br>(50:1)    | TAJ7BRC<br>50KVAR   | TAJ7CAC<br>100KVAR  | TAJ7GCC<br>125KVAR  | TAJ7CRC<br>500KVAR  | TAJ7CXK<br>750KVAR  | NKJ7CYC<br>800KVAR  | TAJ7DAC<br>1000KVAR | TAJ7HCC<br>1250KVAR | TAJ7DED<br>1500KVAR | TAJ7DJC<br>2500KVAR  | TAJ7DKC<br>3000KVAR  |
| 300/5<br>(60:1)    | TAJ7BTC<br>60KVAR   | TAJ7CCC<br>120KVAR  | TAJ7CEC<br>150KVAR  | TAJ7CTC<br>600KVAR  | TAJ7CZC<br>900KVAR  | RDH7DAC<br>1000KVAR | TAJ7DCC<br>1200KVAR | TAJ7DEC<br>1500KVAR | SAJ7HGC<br>1750KVAR | TAJ7DKC<br>3000KVAR  | SAJ7DMC<br>3500KVAR  |
| 400/5<br>(80:1)    | TAJ7BYC<br>80KVAR   | TAJ7GEC<br>160KVAR  | TAJ7GCG<br>200KVAR  | TAJ7CYC<br>800KVAR  | TAJ7DCC<br>1200KVAR | WGG7DEC<br>1500KVAR | TAJ7HEC<br>1600KVAR | TAJ7DGC<br>2000KVAR | UFJ7DJC<br>2500KVAR | TAJ7DNC<br>4000KVAR  | UFJ7ARD<br>5MVAR     |
| 500/5<br>(100:1)   | TAJ7CAC<br>100KVAR  | TAJ7GCG<br>200KVAR  | TAJ7CJC<br>250KVAR  | TAJ7DAC<br>1000KVAR | TAJ7DEC<br>1500KVAR | TAJ7HGC<br>1750KVAR | TAJ7DGC<br>2000KVAR | TAJ7DJC<br>2500KVAR | TAJ7DKC<br>3000KVAR | TAJ7ARD<br>5MVAR     | TAJ7ATD<br>6MVAR     |
| 600/5<br>(120:1)   | TAJ7CCC<br>120KVAR  | UFJ7CJC<br>250KVAR  | TAJ7CKC<br>300KVAR  | TAJ7DCC<br>1200KVAR | SAJ7HGC<br>1750KVAR | RDH7DGC<br>2000KVAR | TAJ7DHC<br>2400KVAR | TAJ7DKC<br>3000KVAR | SAJ7DMC<br>3500KVAR | TAJ7ATD<br>6MVAR     | UFJ7AXD<br>7.5MVAR   |
| 800/5<br>(160:1)   | TAJ7GEC<br>160KVAR  | PJ87CKC<br>300KVAR  | TAJ7CNC<br>400KVAR  | TAJ7HEC<br>1600KVAR | UFJ7DJC<br>2500KVAR | WGG7DKC<br>3000KVAR | PJ87DKC<br>3000KVAR | TAJ7DNC<br>4000KVAR | UFJ7ARD<br>5MVAR    | TAJ7AYD<br>8MVAR     | UFJ7BAD<br>10MVAR    |
| 1000/5<br>(200:1)  | TAJ7GCG<br>200KVAR  | TAJ7CNC<br>400KVAR  | TAJ7CRC<br>500KVAR  | TAJ7DGC<br>2000KVAR | TAJ7DKC<br>3000KVAR | TAJ7DMC<br>3500KVAR | TAJ7DNC<br>4000KVAR | TAJ7ARD<br>5MVAR    | TAJ7ATD<br>6MVAR    | TAJ7BAD<br>10MVAR    | TAJ7BCD<br>12MVAR    |
| 1200/5<br>(240:1)  | UFJ7CJC<br>250KVAR  | UFJ7CRC<br>500KVAR  | TAJ7CTC<br>600KVAR  | UFJ7DJC<br>2500KVAR | SAJ7DMC<br>3500KVAR | RDH7DNC<br>4000KVAR | UFJ7ARD<br>5MVAR    | TAJ7ATD<br>6MVAR    | UFJ7AXD<br>7.5MVAR  | TAJ7BCD<br>12MVAR    | UFJ7BED<br>15MVAR    |
| 1500/5<br>(300:1)  | TAJ7CKC<br>300KVAR  | TAJ7CTC<br>600KVAR  | TAJ7CXK<br>750KVAR  | TAJ7DKC<br>3000KVAR | TAJ7DPC<br>4500KVAR | RDH7ARD<br>5MVAR    | TAJ7ATD<br>6MVAR    | TAJ7AXD<br>7.5MVAR  | TAJ7AZD<br>9MVAR    | TAJ7BED<br>15MVAR    | SAJ7FGD<br>17.5MVAR  |
| 2000/5<br>(400:1)  | TAJ7CNC<br>400KVAR  | TAJ7CYC<br>800KVAR  | TAJ7DAC<br>1000KVAR | TAJ7DNC<br>4000KVAR | TAJ7ATD<br>6MVAR    | TAJ7AWD<br>7MVAR    | TAJ7AYD<br>8MVAR    | TAJ7BAD<br>10MVAR   | TAJ7BCD<br>12MVAR   | TAJ7BGD<br>20MVAR    | UFJ7BJD<br>25MVAR    |
| 2500/5<br>(500:1)  | TAJ7CRC<br>500KVAR  | TAJ7DAC<br>1000KVAR | TAJ7HCC<br>1250KVAR | TAJ7ARD<br>5MVAR    | TAJ7AXD<br>7.5MVAR  | NKJ7AYD<br>8MVAR    | TAJ7BAD<br>10MVAR   | TAJ7FCD<br>12.5MVAR | TAJ7BED<br>15MVAR   | TAJ7BJD<br>25MVAR    | TAJ7BKD<br>30MVAR    |
| 3000/5<br>(600:1)  | TAJ7CTC<br>600KVAR  | TAJ7DCC<br>1200KVAR | TAJ7DEC<br>1500KVAR | TAJ7ATD<br>6MVAR    | TAJ7AZD<br>9MVAR    | RDH7BAD<br>10MVAR   | TAJ7BCD<br>12MVAR   | TAJ7BED<br>15MVAR   | SAJ7FGD<br>17.5MVAR | TAJ7BKD<br>30MVAR    | SAJ7BMD<br>35MVAR    |
| 4000/5<br>(800:1)  | TAJ7CYC<br>800KVAR  | TAJ7HEC<br>1600KVAR | TAJ7DGC<br>2000KVAR | TAJ7AYD<br>8MVAR    | TAJ7BCD<br>12MVAR   | WGG7BED<br>15MVAR   | TAJ7FED<br>16MVAR   | TAJ7BGD<br>20MVAR   | UFJ7BJD<br>25MVAR   | TAJ7BND<br>40MVAR    | UFJ7BRD<br>50MVAR    |
| 5000/5<br>(1000:1) | TAJ7DAC<br>1000KVAR | TAJ7DGC<br>2000KVAR | TAJ7DJC<br>2500KVAR | TAJ7BAD<br>10MVAR   | TAJ7BED<br>15MVAR   | TAJ7FGD<br>17.5MVAR | TAJ7BGD<br>20MVAR   | TAJ7BJD<br>25MVAR   | TAJ7BKD<br>30MVAR   | TAJ7BRD<br>50MVAR    | TAJ7BTD<br>60MVAR    |

TABLE V

Varmeter Selector (See Notes, Page 3)

For 4-Wire 3-Phase (2½-element) Varmeter rated 5A 208V (Zero-Center)

AB-40 Cat. No. 103742B..... Find Digits 8-14 & scale at  
AB-16 Cat. No. 121742B..... Intersection of C.T. & P.T. Ratios

| C.T.<br>RATIO<br>⌞ | P.T. RATIO          |                     |                     |                     |                     |                     |                     |                     |                      |                      |                      |
|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
|                    | 240/120<br>(2:1)    | 480/120<br>(4:1)    | 600/120<br>(5:1)    | 2400/120<br>(20:1)  | 3600/120<br>(30:1)  | 4200/120<br>(35:1)  | 4800/120<br>(40:1)  | 6000/120<br>(50:1)  | 7200/120<br>(60:1)   | 12000/120<br>(100:1) | 14400/120<br>(120:1) |
| 25/5<br>(5:1)      | AWP7BAC<br>10KVAR   | AWP7BGC<br>20KVAR   | AWP7BJC<br>25KVAR   | AWP7CAC<br>100KVAR  | AWP7CEC<br>150KVAR  | AWP7GGC<br>175KVAR  | AWP7GCG<br>200KVAR  | AWP7CJC<br>250KVAR  | AWP7CKC<br>300KVAR   | AWP7CRC<br>500KVAR   | AWP7CTC<br>600KVAR   |
| 50/5<br>(10:1)     | AWP7BGC<br>20KVAR   | AWP7BNC<br>40KVAR   | AWP7BRC<br>50KVAR   | AWP7CGC<br>200KVAR  | AWP7CKC<br>300KVAR  | AWP7CMC<br>350KVAR  | AWP7CNC<br>400KVAR  | AWP7CRC<br>500KVAR  | AWP7CTC<br>600KVAR   | AWP7DAC<br>1000KVAR  | AWP7DCC<br>1200KVAR  |
| 75/5<br>(15:1)     | AWP7BKC<br>30KVAR   | AWP7BTC<br>60KVAR   | AWP7BXC<br>75KVAR   | AWP7CKC<br>300KVAR  | AWP7CPC<br>450KVAR  | KWE7GRC<br>500KVAR  | AWP7CTC<br>600KVAR  | AWP7CXC<br>750KVAR  | AWP7CZC<br>900KVAR   | AWP7DEC<br>1500KVAR  | AWP7DFC<br>1800KVAR  |
| 100/5<br>(20:1)    | AWP7BNC<br>40KVAR   | AWP7BYC<br>80KVAR   | AWP7CAC<br>100KVAR  | AWP7CNC<br>400KVAR  | AWP7CTC<br>600KVAR  | AWP7CWC<br>700KVAR  | AWP7CYC<br>800KVAR  | AWP7DAC<br>1000KVAR | AWP7DCC<br>12000KVAR | AWP7DGC<br>2000KVAR  | AWP7DHC<br>2400KVAR  |
| 150/5<br>(30:1)    | AWP7BTC<br>60KVAR   | AWP7CCC<br>120KVAR  | AWP7CEC<br>150KVAR  | AWP7CTC<br>600KVAR  | AWP7CZC<br>900KVAR  | KWE7DAC<br>1000KVAR | AWP7DCC<br>1200KVAR | AWP7DEC<br>1500KVAR | AWP7DFC<br>1800KVAR  | AWP7DKC<br>3000KVAR  | ANSTDMC<br>3500KVAR  |
| 200/5<br>(40:1)    | AWP7BYC<br>80KVAR   | AWP7GEC<br>160KVAR  | AWP7GCG<br>200KVAR  | AWP7CYC<br>800KVAR  | AWP7DCC<br>1200KVAR | AWP7DDC<br>1400KVAR | AWP7HEC<br>1600KVAR | AWP7DGC<br>2000KVAR | AWP7DHC<br>2400KVAR  | AWP7DNC<br>4000KVAR  | KSC7DPC<br>4500KVAR  |
| 250/5<br>(50:1)    | AWP7CAC<br>100KVAR  | AWP7GCG<br>200KVAR  | AWP7GCJ<br>250KVAR  | AWP7DAC<br>1000KVAR | AWP7DEC<br>1500KVAR | AWP7HCC<br>1750KVAR | AWP7DGC<br>2000KVAR | AWP7DJC<br>2500KVAR | AWP7DKC<br>3000KVAR  | AWP7DRC<br>5000KVAR  | AWP7DTC<br>6000KVAR  |
| 300/5<br>(60:1)    | AWP7CCC<br>120KVAR  | AWP7CHC<br>240KVAR  | AWP7CKC<br>300KVAR  | AWP7DCC<br>1200KVAR | AWP7DFC<br>1800KVAR | KWE7DGC<br>2000KVAR | AWP7DHC<br>2400KVAR | AWP7DKC<br>3000KVAR | ANSTDMC<br>3500KVAR  | AWP7DTC<br>6000KVAR  | ANSTDWC<br>7000KVAR  |
| 400/5<br>(80:1)    | AWP7GEC<br>160KVAR  | AWP7CLC<br>320KVAR  | AWP7CNC<br>400KVAR  | AWP7HEC<br>1600KVAR | AWP7DHC<br>2400KVAR | JTA7DJC<br>2500KVAR | AWP7DLC<br>3200KVAR | AWP7DNC<br>4000KVAR | KSC7DPC<br>4500KVAR  | AWP7DYC<br>8000KVAR  | KSC7DZC<br>9000KVAR  |
| 500/5<br>(100:1)   | AWP7GCG<br>200KVAR  | AWP7CNC<br>400KVAR  | AWP7CRC<br>500KVAR  | AWP7DGC<br>2000KVAR | AWP7DKC<br>3000KVAR | AWP7DMC<br>3500KVAR | AWP7DNC<br>4000KVAR | AWP7DRC<br>5000KVAR | AWP7DTC<br>6000KVAR  | AWP7BAD<br>10MVAR    | AWP7BCD<br>12MVAR    |
| 600/5<br>(120:1)   | AWP7CHC<br>240KVAR  | KSC7CPC<br>450KVAR  | AWP7CTC<br>600KVAR  | AWP7DHC<br>2400KVAR | ANSTDMC<br>3500KVAR | KWE7DNC<br>4000KVAR | KSC7DPC<br>4500KVAR | AWP7DTC<br>6000KVAR | ANSTDWC<br>7000KVAR  | AWP7BCD<br>12MVAR    | ANSTD8DC<br>14MVAR   |
| 800/5<br>(160:1)   | AWP7GLC<br>320KVAR  | KSC7CTC<br>600KVAR  | AWP7CYC<br>800KVAR  | AWP7DLC<br>3200KVAR | KSC7DPC<br>4500KVAR | JTA7DRC<br>5000KVAR | KSC7DTC<br>6000KVAR | AWP7DYC<br>8000KVAR | KSC7DZC<br>9000KVAR  | AWP7FED<br>16MVAR    | KSC7BFD<br>18MVAR    |
| 1000/5<br>(200:1)  | AWP7CNC<br>400KVAR  | AWP7CYC<br>800KVAR  | AWP7DAC<br>1000KVAR | AWP7DNC<br>4000KVAR | AWP7DTC<br>6000KVAR | AWP7DWC<br>7000KVAR | AWP7DYC<br>8000KVAR | AWP7BAD<br>10MVAR   | AWP7BCD<br>12MVAR    | AWP7BGD<br>20MVAR    | AWP7BHD<br>24MVAR    |
| 1200/5<br>(240:1)  | KSC7CPC<br>450KVAR  | KSC7CZC<br>900KVAR  | AWP7DCC<br>1200KVAR | KSC7DPC<br>4500KVAR | ANSTDWC<br>7000KVAR | KWE7DYC<br>8000KVAR | KSC7DZC<br>9000KVAR | AWP7BCD<br>12MVAR   | ANSTD8DC<br>14MVAR   | AWP7BHD<br>24MVAR    | JLJ7BJD<br>25MVAR    |
| 1500/5<br>(300:1)  | AWP7CTC<br>600KVAR  | AWP7DCC<br>1200KVAR | AWP7DEC<br>1500KVAR | AWP7DTC<br>6000KVAR | AWP7DZC<br>9000KVAR | KWE7BAD<br>10MVAR   | AWP7BCD<br>12MVAR   | AWP7BED<br>15MVAR   | AWP7BFD<br>18MVAR    | AWP7BKD<br>30MVAR    | ANSTD8MD<br>35MVAR   |
| 2000/5<br>(400:1)  | AWP7CYC<br>800KVAR  | AWP7HEC<br>1600KVAR | AWP7DGC<br>2000KVAR | AWP7DYC<br>8000KVAR | AWP7BCD<br>12MVAR   | AWP7BDC<br>14MVAR   | AWP7FED<br>16MVAR   | AWP7BGD<br>20MVAR   | AWP7BHD<br>24MVAR    | AWP7BND<br>40MVAR    | KSC7BPD<br>45MVAR    |
| 2500/5<br>(500:1)  | AWP7DAC<br>1000KVAR | AWP7DGC<br>2000KVAR | AWP7DJC<br>2500KVAR | AWP7BAD<br>10MVAR   | AWP7BED<br>15MVAR   | AWP7FGD<br>17.5MVAR | AWP7BGD<br>20MVAR   | AWP7BJD<br>25MVAR   | AWP7BKD<br>30MVAR    | AWP7BRD<br>50MVAR    | AWP7BTD<br>60MVAR    |
| 3000/5<br>(600:1)  | AWP7DCC<br>1200KVAR | AWP7DHC<br>2400KVAR | AWP7DKC<br>3000KVAR | AWP7BCD<br>12MVAR   | AWP7BED<br>18MVAR   | KWE7BGD<br>20MVAR   | AWP7BHD<br>24MVAR   | AWP7BKD<br>30MVAR   | ANSTD8MD<br>35MVAR   | AWP7BTD<br>60MVAR    | ANSTD8BWD<br>70MVAR  |
| 4000/5<br>(800:1)  | AWP7HEC<br>1600KVAR | AWP7DLC<br>3200KVAR | AWP7DNC<br>4000KVAR | AWP7FED<br>16MVAR   | AWP7BHD<br>24MVAR   | JTA7BJD<br>25MVAR   | AWP7BLD<br>32MVAR   | AWP7BND<br>40MVAR   | KSC7BPD<br>45MVAR    | AWP7BYD<br>80MVAR    | KSC7BZD<br>90MVAR    |
| 5000/5<br>(1000:1) | AWP7DGC<br>2000KVAR | AWP7DNC<br>4000KVAR | AWP7DRC<br>5000KVAR | AWP7BGD<br>20MVAR   | AWP7BKD<br>30MVAR   | AWP7BMD<br>35MVAR   | AWP7BND<br>40MVAR   | AWP7BRD<br>50MVAR   | AWP7BTD<br>60MVAR    | AWP7CAD<br>100MVAR   | AWP7CCD<br>120MVAR   |



## Optional Features for AB/DB 40, AB/DB 16

### Scales

1. Uncalibrated
2. Special marked scales
3. Special legends
4. Colored markings, lines or arcs other than black.
5. Fine line marking (approximately twice the normal calibration marks — maximum 150 calibration marks)
6. Black scale — white markings
7. a) Double set of numbers — Single set of divisions  
b) Triple set of numbers — Single set of divisions
8. a) Double set of numbers — Double set of divisions  
b) Triple set of numbers — Double set of divisions
9. Zero-center scales — DC ammeters, DC milliammeters, DC voltmeters, AC wattmeters and varmeters. Not available for AC ammeters, voltmeters
10. Offset-zero scale — Available for varmeters, AC wattmeters, DC ammeters and DC voltmeters
16. Double-rated voltmeters and ammeters (includes double-marked scale if required). Double ratings should be chosen to allow a single set of divisions whenever possible. AC ammeters can have double rating only when one current is double the other (e.g., 2.5/5 amperes)  
Double-rated DC ammeters are not recommended
17. Wattmeters & varmeters with current coils rated other than 5 amperes.
18. Accuracy other than listed
19. Suppressed zero — Maximum suppression 20% of scale.

### Construction

20. Weathertight case (standard on metal case AB/DB-40, no adder. Not available on AB/DB-16 models)
21. Red manual-set pointer(s) 1 or 2 (AB/DB-40 only). Adjustable over entire scale from the front of the instrument
22. Anti-glare window AB/DB-40 only
23. Wooden-box packaging for export shipping
24. Tagging Dymotape or Paper
25. Optional extra-short case (overall depth 3.41") for metal case amps and volts only.
26. Component mark for Canada. Add "/CSA" to suffix of catalog number.

### Ratings and Calibration

11. Special calibration in accordance with data supplied by customers
12. Calibration at any angle other than vertical — Specify angle.  
Note: DC instruments can be used up to a 30° tilt from vertical without additional error
13. Terminal resistance and/or tolerance other than standard tolerance ( $\pm 15\%$ )
14. Special sensitivities for DC taut-band voltmeters. Standard sensitivities are:  
zero-left: 1000 ohms/volts  
zero-center: 2000 ohms/volts
15. Special frequency calibration  
a) Any frequency 25 to 400 Hertz.  
b) Over 400 Hertz, consult factory.  
Note: Does not apply to temperature indicators

### Standard Scale Legends

|                                  |      |                      |
|----------------------------------|------|----------------------|
| AC Volts or Kilovolts            | % KW | LBS                  |
| AC Amperes, or Kiloamperes       | Hz   | PSIG                 |
| AC Watts, Kilowatts or Megawatts | FPS  | GPH                  |
| Vars, Kilovars or Megavars       | KPS  | PSIA                 |
| Synchroscope                     | YPS  | IPS                  |
| Power Factor                     | CPM  | PPS                  |
| Hertz                            | FPM  | RPM                  |
| Phase Angle                      | IPM  | GPM                  |
| DC Volts, or Kilovolts           | KPM  | In. H <sub>2</sub> O |
| or Milliamperes                  | RPM  |                      |
| DC Watts or Kilowatts            | YPM  |                      |
| Percent-Motor-Load Current       | CPH  |                      |
| Percent Horsepower               | FPH  |                      |
| Degrees C                        | IPH  |                      |
| Degrees F                        | KPH  |                      |
| Degrees K                        | MPH  |                      |
| Degrees R                        | RPH  |                      |
| Kilo-Ohms                        | YPH  |                      |
| Horsepower                       | PPH  |                      |
| Percent                          | PSI  |                      |
| Percent Load                     |      |                      |
| VA. In HG                        |      |                      |

The words "Spindle," "Table," "Roll," "Motor," "Turbine" can be added to the above at no extra cost. Also, when necessary, the multipliers, "X-10," "X-100," or "X-1000" will be added to these legends.

## SWITCHBOARD INSTRUMENTS

### Minimum and Maximum Ratings For AB/DB 40, AB/DB 16

| Indicator                                                   | Type               | Minimum                                                        | Maximum                                            |
|-------------------------------------------------------------|--------------------|----------------------------------------------------------------|----------------------------------------------------|
| AC Voltmeter                                                | RMS rectifier      | 25 Hertz<br>50 Volts                                           | 1000 Hertz<br>750 Volts                            |
|                                                             | Rectifier          | 25 Hertz<br>8 Volts                                            | 3000 Hertz<br>750 Volts                            |
| AC Ammeter                                                  | RMS rectifier      | 25 Hertz<br>0.3 Ampere                                         | 1000 Hertz<br>30 Amperes                           |
| AC Milliammeter                                             | RMS rectifier      | 25 Hertz<br>300 Milliamperes                                   | 1000 Hertz<br>1000 Milliamperes                    |
|                                                             | Rectifier          | 25 Hertz<br>0.5 Milliamperes                                   | 3000 Hertz<br>100 Milliamperes                     |
| AC Wattmeter<br>1-phase<br>2-wire                           | Single Phase       | 25 Hertz<br>380 CW*†<br>190-0-190 CW*†<br>69 Volts<br>1 Ampere | 1000 Hertz<br>760 CW*†<br>600 Volts<br>10 Amperes  |
| AC Wattmeter<br>3-phase<br>3-wire                           | Polyphase          | 25 Hertz<br>380 CW*†<br>190-0-190 CW*†<br>69 Volts<br>1 Ampere | 1000 Hertz<br>760 CW*†<br>600 Volts<br>10 Amperes  |
|                                                             | Voltage Unbalanced |                                                                |                                                    |
| 3-phase<br>4-wire                                           | Voltage Balanced   |                                                                |                                                    |
| AC Varmeter<br>1-phase<br>2-wire                            | Single Phase       | 25 Hertz<br>380 CW*†<br>190-0-190 CW*†<br>69 Volts<br>1 Ampere | 1000 Hertz<br>760 CW*†<br>600 Volts<br>10 Amperes  |
| AC Varmeter<br>3-phase<br>3-wire                            | Polyphase          | 25 Hertz<br>658 CW*†<br>329-0-329 CW*†<br>69 Volts<br>1 Ampere | 1000 Hertz<br>1316 CW*†<br>600 Volts<br>10 Amperes |
|                                                             | Voltage Balanced   |                                                                |                                                    |
| AC Varmeter<br>3-phase<br>4-wire                            | Polyphase          | 25 Hertz<br>760 CW*†<br>380-0-380 CW*†<br>69 Volts<br>1 Ampere | 1000 Hertz<br>1520 CW*†<br>600 Volts<br>10 Amperes |
|                                                             | Voltage Balanced   |                                                                |                                                    |
| Frequency Meter                                             |                    | 2 Hertz Span                                                   |                                                    |
| Synchroscope                                                |                    | 50 Hertz                                                       | 400 Hertz                                          |
| Power-factor<br>Meter<br>1-phase<br>2-wire                  | Single Phase       | 60 Hertz<br>120 Volts<br>0.1 Amperes                           | 60 Hertz<br>240 Volts<br>5 Amperes                 |
|                                                             |                    |                                                                |                                                    |
| Power-factor<br>Meter<br>3-phase, 3-wire<br>3-phase, 4-wire | Polyphase          | 60 Hertz<br>120 Volts<br>5 Amperes                             | 60 Hertz<br>240 Volts<br>5 Amperes                 |
|                                                             | Unbalanced Systems |                                                                |                                                    |
| Power-factor<br>Meter<br>3-phase, 3-wire<br>3-phase, 4-wire | Polyphase          | 25 Hertz<br>120 Volts<br>0.1 Amperes                           | 400 Hertz<br>600 Volts<br>5 Amperes                |
|                                                             | Balanced System    |                                                                |                                                    |
| AC Ground<br>Detector                                       |                    | 25 Hertz<br>50 Volts                                           | 1000 Hertz<br>750 Volts                            |
| DC Millivoltmeter                                           |                    | 50 Millivolts<br>200 Ohm/Volt                                  | 1000 Millivolts<br>5000 Ohm/Volt                   |
| DC Voltmeter                                                |                    | 1 Volt<br>200 Ohm/Volt                                         | 750 Volts<br>5000 Ohm/Volt                         |
| DC Microammeter                                             |                    | Microamperes:<br>DB-40-200<br>DB-16-300                        | 1000 Microamperes                                  |
| DC Milliammeter                                             |                    | 1 Milliampere                                                  | 1000 Milliamperes                                  |
| DC Ammeter                                                  |                    | 1 Ampere                                                       | 30 Amperes                                         |
|                                                             | Shunt-rated        | 50 Millivolts                                                  | 1000 Millivolts                                    |
| DC Ground<br>Detector                                       |                    | 50 Millivolts<br>200 Ohms/Volts                                | 750 Volts<br>5000 Ohms/Volts                       |
| Temperature<br><br>120 Volts<br>50-600 Hertz                |                    | 180 F } Span<br>100 C }<br>10 Ohms } —100F<br>cu. } — 73 C     | 250 F } Span<br>140 C }<br>+260 F<br>+127 C        |

† Calibrating watts

\*Applies only to 120-volt/5-ampere models; other ratings in proportion.

## Specifications, Burden Data — AC Meters

| Type                                                | Impedance<br>in Ohms | Effective<br>Resistance<br>in Ohms | Inductance<br>in Henries<br>or Capa-<br>citance in<br>Microfarads | Volt-<br>amperes | Watts | Reactive<br>Volt-<br>amperes | Power<br>Factor   |
|-----------------------------------------------------|----------------------|------------------------------------|-------------------------------------------------------------------|------------------|-------|------------------------------|-------------------|
| <b>120-Volt, 60-Hertz Potential Circuit</b>         |                      |                                    |                                                                   |                  |       |                              |                   |
| Voltmeters, AB-16/40 .....                          | 28,100               | 28,100                             | 0                                                                 | 0.51             | 0.51  | 0                            | 1.0               |
| Expanded-scale Voltmeters .....                     | 15,400               | 15,400                             | 0                                                                 | 0.94             | 0.94  | 0                            | 1.0               |
| Single phase Wattmeters*<br>AB-16/40 .....          | 6,920                | 4,460                              | 14H                                                               | 2.08             | 1.34  | 1.59                         | 0.64<br>(Lagging) |
| Polyphase Wattmeters*<br>AB-16/40 .....             | 7,250                | 4,370                              | 15H                                                               | 2.0              | 1.2   | 1.6                          | 0.6<br>(Lagging)  |
| Terminal #6 to #8 on 3W 3P ...                      |                      |                                    |                                                                   |                  |       |                              |                   |
| Terminal #8 to #11 on 4W 3P ...                     |                      |                                    |                                                                   |                  |       |                              |                   |
| Terminal #2 to #8 on 3 W 3P ...                     |                      |                                    |                                                                   |                  |       |                              |                   |
| Terminal #3 to #11 on 4W 3P ...                     | 105,000              | 105,000                            | 0                                                                 | 0.14             | 0.14  | 0                            | 1.0               |
| Power Factor Meters, AB-16/40                       | 18,320               | 4,660                              | 0.15μF                                                            | 0.79             | 0.20  | 0.76                         | 0.26<br>(Leading) |
| Single-phase                                        |                      |                                    |                                                                   |                  |       |                              |                   |
| Three-phase { Terminal                              |                      |                                    |                                                                   |                  |       |                              |                   |
| #2 to #5                                            | above 10MΩ           | above 10MΩ                         | —                                                                 | 0                | 0     | 0                            | —                 |
| #3 to #5                                            | above 10MΩ           | above 10MΩ                         | —                                                                 | 0                | 0     | 0                            | —                 |
| #2 to #3                                            | 21,200               | 21,200                             | 0                                                                 | 0.68             | 0.68  | 0                            | 1.0               |
| Frequency Meters, AB-16/40                          | 9,370                | 9,370                              | 0                                                                 | 1.54             | 1.54  | 0                            | 1.0               |
| 55-65, 50-70, 58-62, 45-55 .....                    |                      |                                    |                                                                   |                  |       |                              |                   |
| 350-450 .....                                       |                      |                                    |                                                                   |                  |       |                              |                   |
| Synchroscope, Running .....                         | 2,750                | 2,690                              | 1.6H                                                              | 5.2              | 5.1   | 0.2                          | 0.98<br>(Lagging) |
| Incoming .....                                      | 2,570                | 2,160                              | 3.7μF                                                             | 5.6              | 4.7   | 3.0                          | 0.84<br>(Leading) |
| <b>5-Ampere, 60-Hertz Current Circuit</b>           |                      |                                    |                                                                   |                  |       |                              |                   |
| Ammeters, AB 16/40 .....                            | 0.013                | 0.013                              | 0                                                                 | 0.32             | 0.32  | 0                            | 1.0               |
| Single and Polyphase Wattmeters*,<br>AB-16/40 ..... | 0.018                | 0.018                              | 0                                                                 | 0.43             | 0.43  | 0                            | 1.0               |
| Single and Polyphase Varmeters*,<br>AB-16/40 .....  | 0.018                | 0.018                              | 0                                                                 | 0.43             | 0.43  | 0                            | 1.0               |
| Single and Polyphase Power Factor<br>Meters .....   | 0.036                | 0.036                              | 0                                                                 | 0.91             | 0.91  | 0                            | 1.0               |

\*Data based on a per-element basis

## Specifications, Burden Data — DC Meters

### DC Voltmeters

| Rating<br>(Volts) | Sensitivity (Ohms Per Volt)          |                                      |
|-------------------|--------------------------------------|--------------------------------------|
|                   | DB-40                                | DB-16                                |
| From 15 To 750    | 1,000 Zero Left<br>2,000 Zero Center | 1,000 Zero Left<br>2,000 Zero Center |

### DC Millivoltmeters

| Rating<br>(mV) | Calibrated for 2-way<br>Lead Resistance<br>of 0.05 Ohms as<br>standard** | Ohms Terminal<br>Resistance ± 15% |       |
|----------------|--------------------------------------------------------------------------|-----------------------------------|-------|
|                |                                                                          | DB-40                             | DB-16 |
| 0-50           | 0.05                                                                     | 25                                | 25    |
| 50-0-50        | 0.05                                                                     | 50                                | 50    |
| 0-100          | 0.05                                                                     | 50                                | 50    |
| 100-0-100      | 0.05                                                                     | 100                               | 100   |

### DC Ammeters

| Rating<br>(Amperes) | Ohms Terminal Resistance ± 15% |        |
|---------------------|--------------------------------|--------|
|                     | DB-40                          | DB-16  |
| 0-1                 | 0.05                           | 0.05   |
| 0-5                 | 0.01                           | 0.01   |
| 0-10                | 0.005                          | 0.005  |
| 0-15                | 0.0033                         | 0.0033 |
| 0-20                | 0.0025                         | 0.0025 |
| 0-30                | 0.0017                         | 0.0017 |

### DC Milliammeters

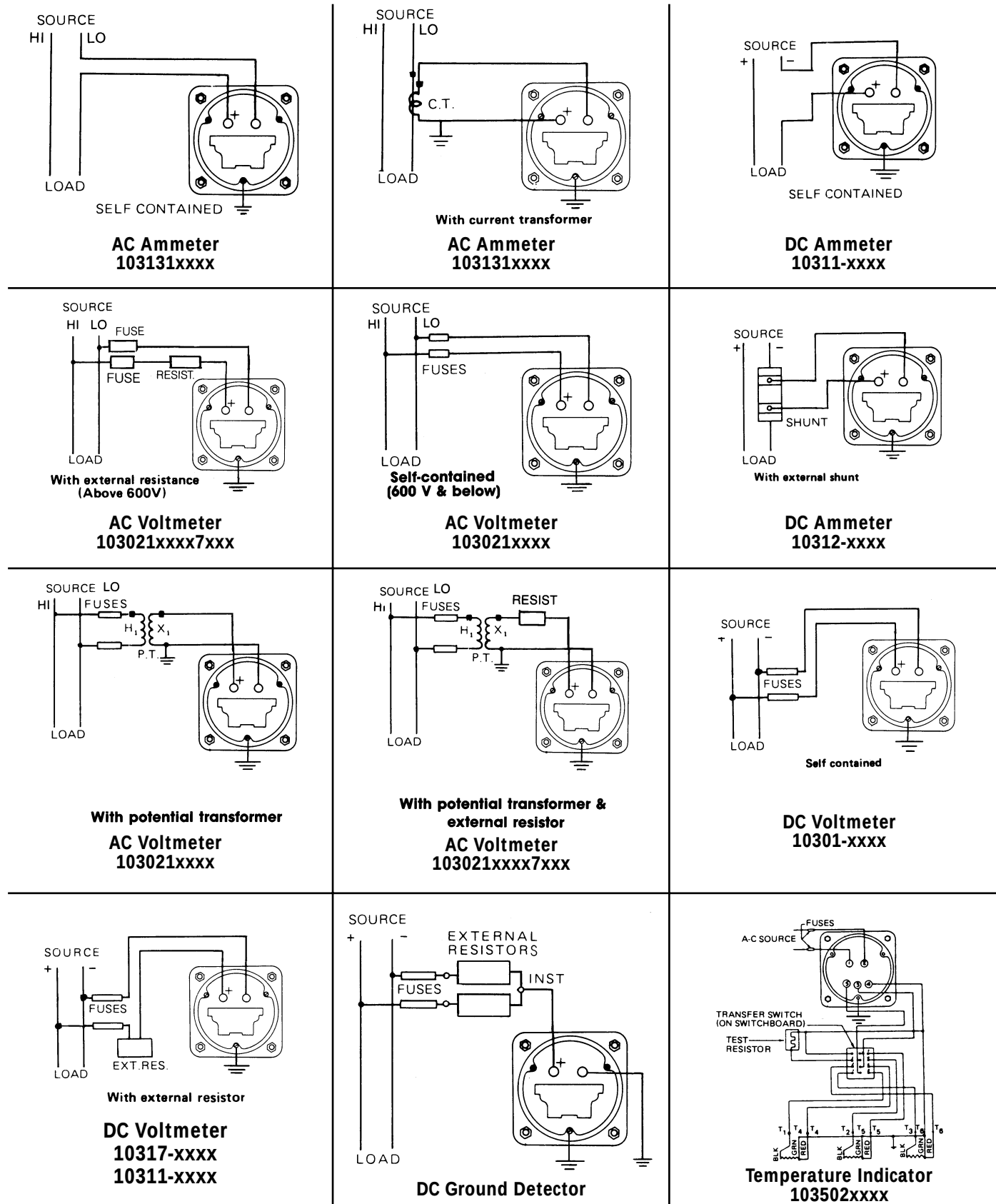
| Rating<br>(mA) | Ohms Terminal Resistance ± 15% |       |
|----------------|--------------------------------|-------|
|                | DB-40                          | DB-16 |
| 0-1            | 185                            | 185   |
| 0-2            | 18                             | 18    |
| 0-5            | 10                             | 10    |
| 0-10           | 5                              | 5     |
| 0-30           | 1.7                            | 1.7   |
| 0-50           | 1                              | 1     |
| 0-100          | 0.5                            | 0.5   |
| 0-200          | 0.25                           | 0.25  |
| 0-300          | 0.17                           | 0.17  |
| 0-500          | 0.1                            | 0.1   |
| 10-50          | 12.5                           | 12.5  |
| 4-20           | 6                              | 6     |
| 1-5            | 26.5                           | 26.5  |

### DC Microammeters

| Rating<br>(uA) | Ohms Terminal Resistance ± 15% |       |
|----------------|--------------------------------|-------|
|                | DB-40                          | DB-16 |
| 0-200          | 1,600                          | 1,600 |
| 0-300          | 1,050                          | 1,050 |
| 0-500          | 630                            | 630   |

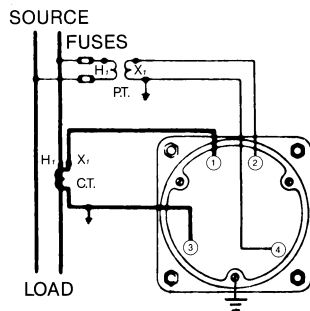
\*\*Internal lead adjustment potentiometer can be adjusted for other lead resistances

## Standard Connections

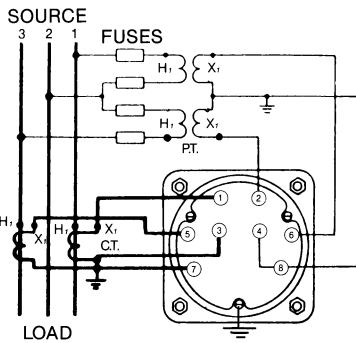


NOTE: UL requires a separate grounding terminal that is provided above a ground symbol (  ).  
Connection diagrams for AB/DB16 and AB/DB14 Ammeters and Voltmeters are same as AB/DB40 depicted above.

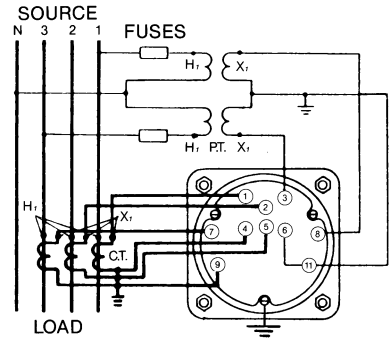
# Standard Connections



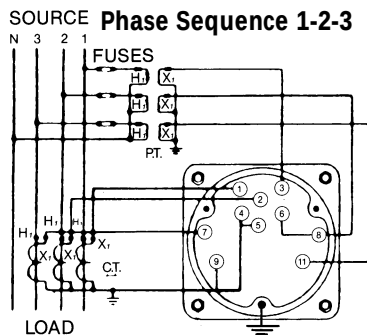
**Single-phase wattmeter and Varmeter with current transformer and potential transformer**  
 10321-xxxx7xxx (watt)  
 103702xxxx7xxx (watt)  
 10331-xxxx7xxx (var)  
 103762xxxx7xxx (var)



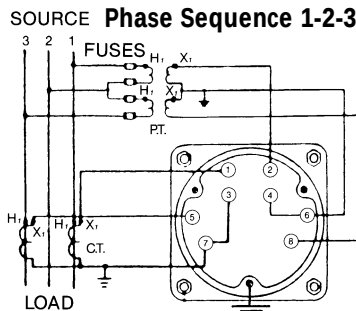
**Three-wire, three-phase wattmeter with current transformer and potential transformer**  
 10322-xxxx7xxx  
 103712xxxx7xxx



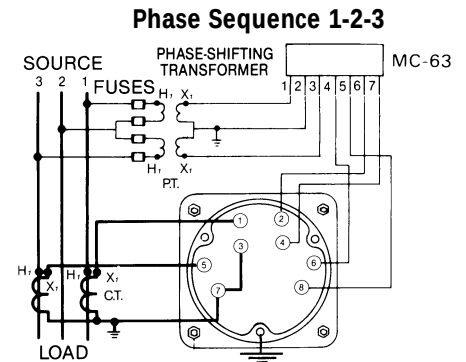
**Four-wire, three-phase wattmeter with current transformer and potential transformer (Balanced V)**  
 10325-xxxx7xxx  
 103732xxxx7xxx



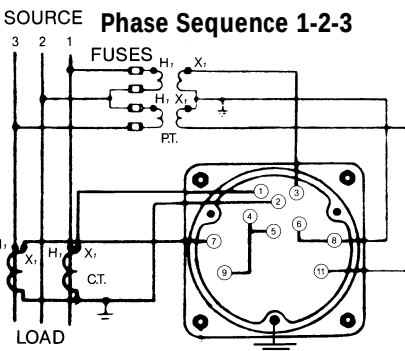
**Connections for 2 1/2 element varmeter, without phase shifting transformer; used to measure vars on 4 wire, 3 phase circuits, with potential transformers (connected yy) and three current transformers: (Balanced V)**  
 10329-xxxx7xxx, K = 1.1547  
 103742xxxx7xxx  
 See Note 1. Page 12



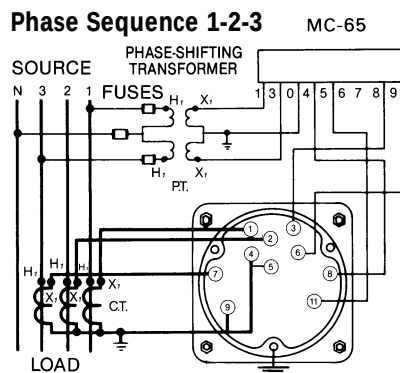
**Connections for polyphase varmeters for 3 wire, 3 phase. (Balanced V)**  
 103812xxxx7xxx  
 10328-xxxx7xxx



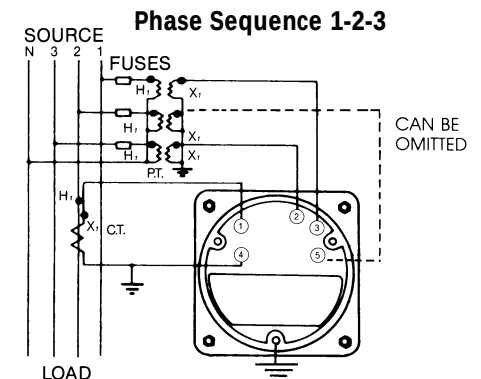
**Connections for 3 wire, 3 phase varmeter with phase shifting transformer. (Balanced V)**  
 10332-xxxx7xxx  
 103772xxxx7xxx



**Connections for 2 1/2 element varmeter used to measure vars on a 3 wire, 3 phase circuit. (Balanced V)**  
 10329-xxxx7xxx K = 1.1547  
 103742xxxx7xxx



**Connections for 4 wire, 3 phase varmeter with phase shifting transformer. (Balanced V)**  
 10334-xxxx7xxx  
 103792xxxx7xxx



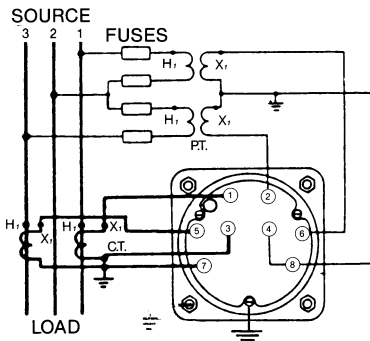
**Connections for power-factor meters with 4 wire 3 phase circuits with current transformer and potential transformers. If transformer secondary voltage is 120, power-factor instrument should be rated 208 volts. (Balanced System)**  
 103402xxxx

NOTE: UL requires a separate grounding terminal that is provided above a ground symbol (  $\equiv$  ).



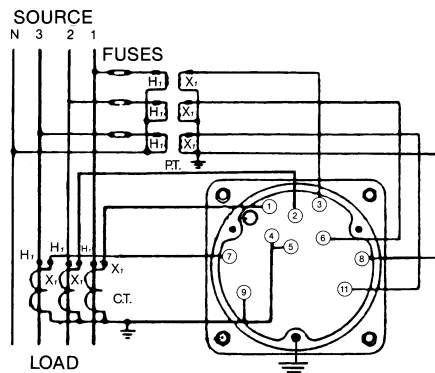
## Standard Connections

### Phase Sequence 1-2-3

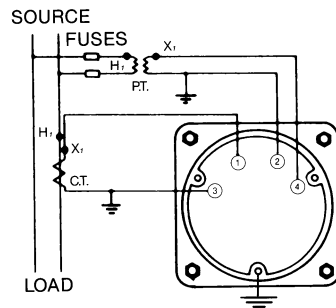


**Three-wire, Three-phase Power Factor meter with current transformers and potential transformers. (Unbalanced system)**  
103462xxxx

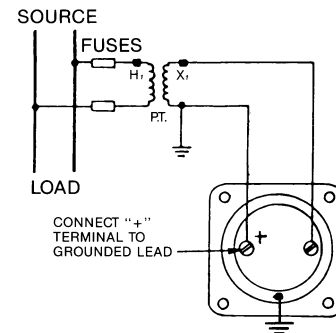
### Phase Sequence 1-2-3



**Four wire, three phase power factor meter with current transformers and potential transformers (Unbalanced System)**  
103472xxxx

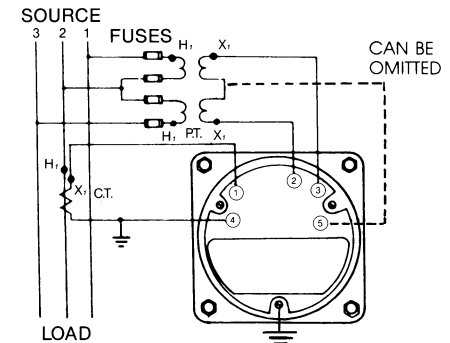


**Single-phase power-factor meter with current transformer and potential transformer**  
103412xxxx

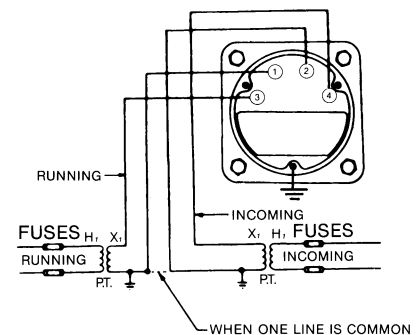


**Frequency Meter with potential transformer**  
103372xxxx

### Phase Sequence 1-2-3



**Three-wire, three-phase power-factor meter with current transformer and potential transformers (Balanced System)**  
103402xxxx

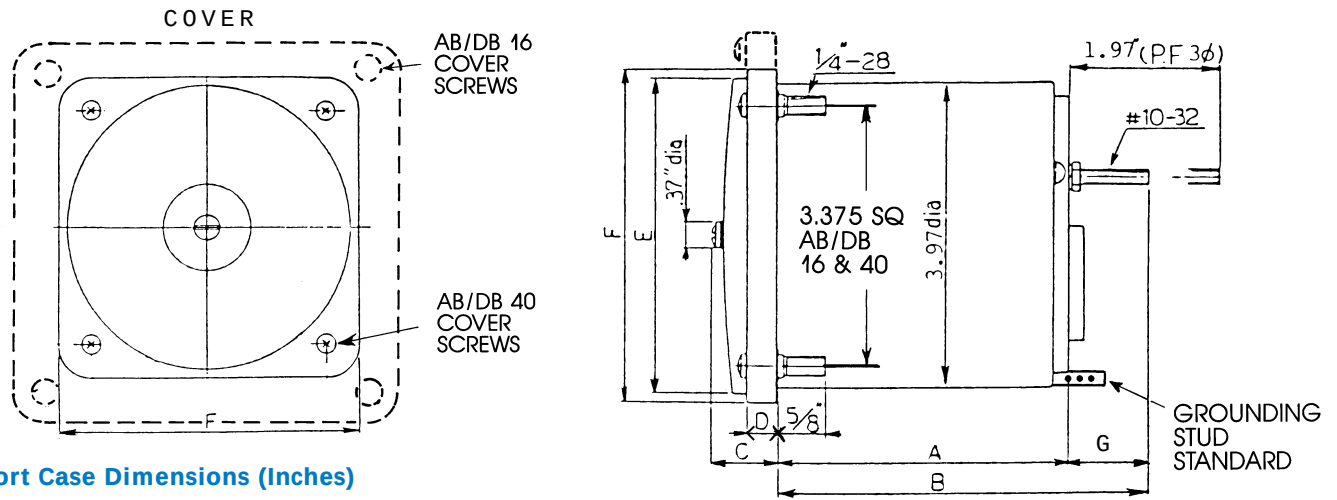


**Synchroscope with potential transformers**  
106452xxxx

NOTE: UL requires a separate grounding terminal that is provided above a ground symbol (  ).

# Dimensions and Panel Drilling For AB/DB 16 & AB/DB 40 (Metal Case)

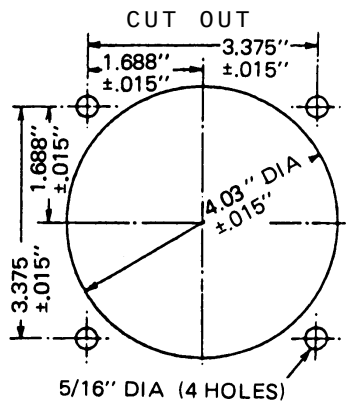
Short Case



Short Case Dimensions (Inches)

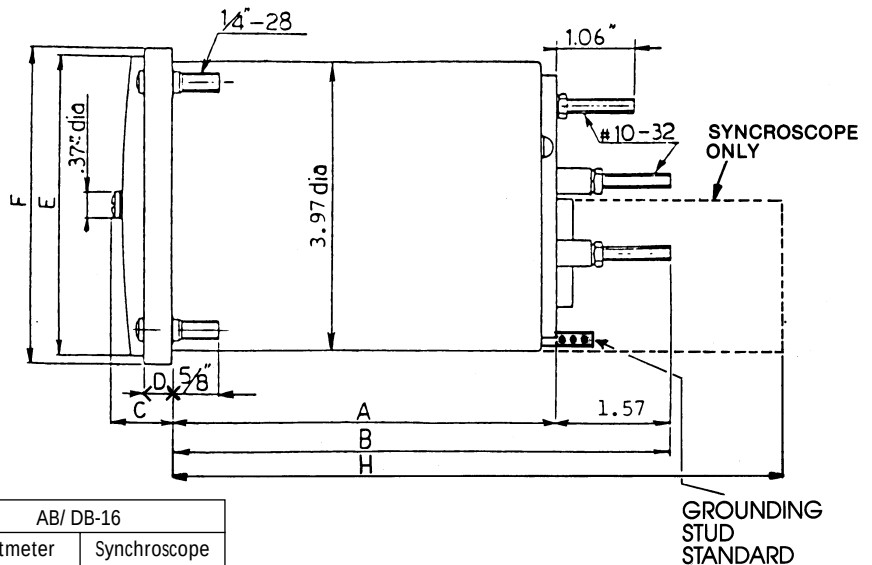
|   | AB / DB-40                                              |                                         |                                 | AB / DB-16                                              |                                 |
|---|---------------------------------------------------------|-----------------------------------------|---------------------------------|---------------------------------------------------------|---------------------------------|
|   | AC V/A—DC V/A<br>Frequency<br>Temperature<br>Tachometer | AC V/A—DC V/A<br>Extra<br>Short<br>Case | Power Factor<br>1φ<br>(3φ3w/4w) | AC V/A—DC V/A<br>Frequency<br>Temperature<br>Tachometer | Power Factor<br>1φ<br>(3φ3w/4w) |
| A | 3.79                                                    | 2.89                                    | 3.79                            | 3.75                                                    | 3.75                            |
| B | 4.85                                                    | 3.41                                    | 4.85 (5.76)                     | 4.81                                                    | 4.81 (5.72)                     |
| C | 0.86                                                    | 0.86                                    | 0.86                            | 0.88                                                    | 0.88                            |
| D | 0.32                                                    | 0.32                                    | 0.32                            | 0.38                                                    | 0.38                            |
| E | 4.09                                                    | 4.09                                    | 4.09                            | 8.20                                                    | 8.20                            |
| F | 4.33                                                    | 4.33                                    | 4.33                            | 8.69                                                    | 8.69                            |
| G | 1.06                                                    | 0.52                                    | 1.06                            | 1.06                                                    | 1.06                            |

Long Case



Cut-out and Panel Drilling Dimensions.  
AB/DB 40 & 16

Long Case Dimensions (Inches)

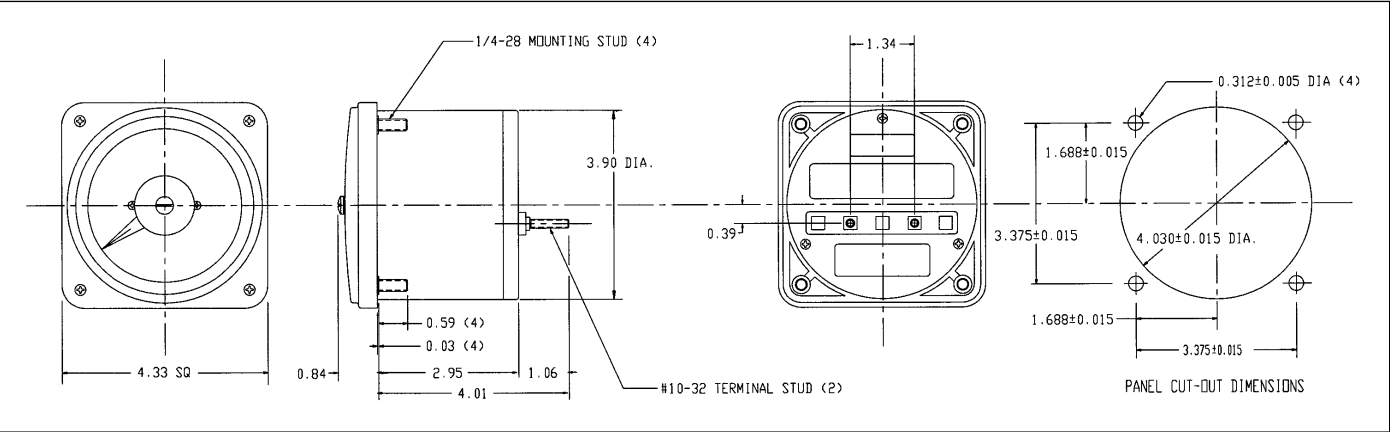


|   | AB / DB-40             |              | AB / DB-16            |              |
|---|------------------------|--------------|-----------------------|--------------|
|   | Wattmeter<br>Varmeter* | Synchroscope | Wattmeter<br>Varmeter | Synchroscope |
| A | 5.22                   | 5.22         | 5.19                  | 5.19         |
| B | 6.79                   | 6.29         | 6.76                  | 6.25         |
| C | 0.86                   | 0.86         | 0.88                  | 0.88         |
| D | 0.32                   | 0.32         | 0.38                  | 0.38         |
| E | 4.09                   | 4.09         | 8.20                  | 8.20         |
| F | 4.33                   | 4.33         | 8.69                  | 8.69         |
| H | —                      | 8.06         | —                     | 8.03         |

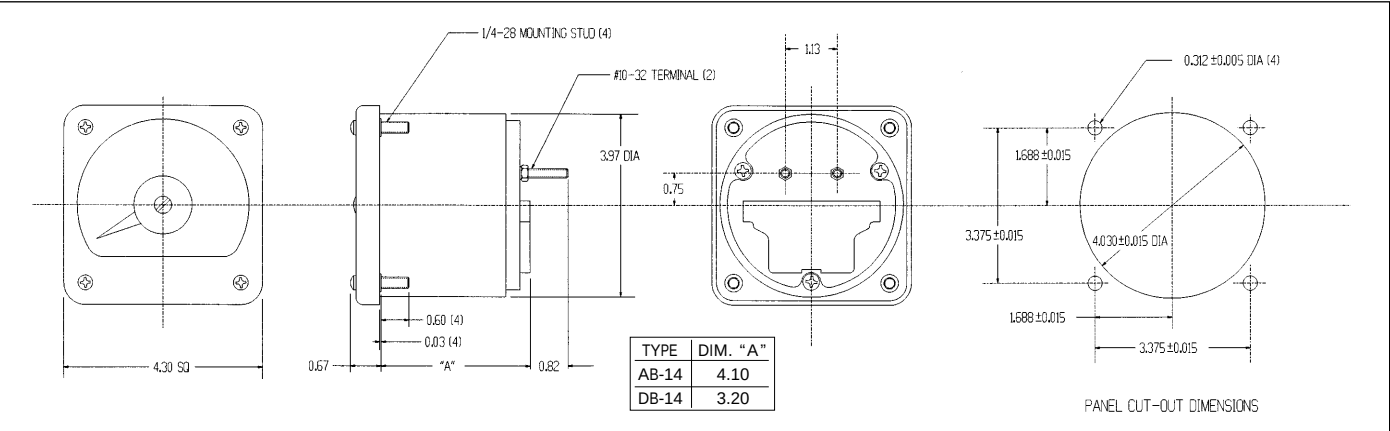
\*Short case dimensions in first column above apply to varmeter for use with external phase shifters (10332—, 10377—, 10334—, 10379—.)

DIMENSIONS AND PANEL DRILLING

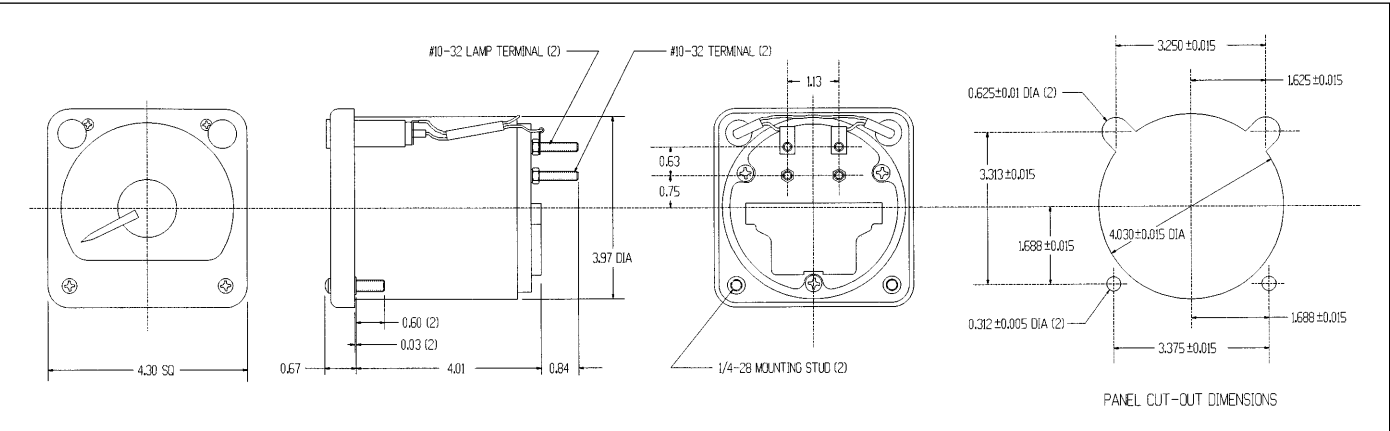
Plastic case AB / DB40 Ammeters and Voltmeters



High shock AB / DB14 Ammeters and Voltmeters



Illuminated AB / DB17 Railroad type Ammeters and Voltmeters



## TYPE 180 SINGLE EDGEWISE



**UL RECOGNIZED:  
FILE E91703**

## Specifications

### Accuracy Class:

Standard —  $\pm 1.5\%$  of full-scale span for DC horizontal and vertical and AC horizontal.  
 $\pm 2\%$  for AC vertical.

Suppressed zero (mechanical) —  $\pm 2\%$  of full scale span.

AC Rectifier-type Ammeters and Voltmeters—  
Standard  $\pm 2.5\%$  on 60-Hertz sine wave at 25° C.

### Scales (Standard):

Ranges — (see following page)

Length — 4.448 inches

Degrees rotation 60 degrees

Color — Background - White

Numerals - Black

Legend - Black

Scale Divisions - Black

Numeral Height —  $\frac{3}{4}$  inch

Illumination — Refer to factory

Number of scale divisions — 100 maximum

Scale linearity — DC - linear

AC - non-linear

Maximum number of letters (counting spaces as letters) on vertical meters, 25; on horizontal meters, 30.

**Repeatability:**  $\pm 2\%$  of full scale

### Overload:

Sustained — 120% for AC and DC voltmeters.  
120% for 8 hours for AC and DC ammeters.

Momentary — 10 times rated current applied for 10 consecutive intervals of  $\frac{1}{2}$  second with one-minute intervals between successive applications for AC and DC ammeters.  
Mechanical overload same as momentary overload for ammeters.

### Response Time:

AC — 4 seconds maximum

DC — 2.5 seconds maximum  $\geq 1$  mA  
4 seconds maximum  $< 1$  mA

### Overshoot:

40% full scale angle maximum

### Insulation Level:

Operating — 600 volts

Hi-pot — 5000 volts rms terminals to case for one minute

### Mounting Position For Both Horizontal and Vertical Meters:

Mounting to a Vertical Panel is standard. If other mounting angle is necessary, then angle must be specified and instrument calibrated for the specified angle.

### Operating Environment:

Temperature (Standard) — ( -4° to +150°F)  
( -20°C to +65°C)

Pressure — Atmospheric

Shock — 50 G's

Corrosive fumes, salt-spray (Refer to factory)

Maximum magnetic field without external shielding —

(Standard) - DC or AC, 1 gauss for 3% accuracy

(Optional) - Refer to factory for recommendations to minimize errors

### Case:

Material — Base Polycarbonate

Finish — Spray painted

Color — (Standard) - Aluminum  
(Optional) - Black

Pointer color — White

Window and Case — Polycarbonate

Magnetic Shielding — DC, self-shielding

AC, soft iron shielding

Gasketed cover (weather resistant) standard

Type Terminals — Stud type

### Movement:

AC — Iron vane pivot and jewel

DC — D'Arsonval type taut-band

## Burden Data

| Type | Impedance<br>in<br>Ohms | Effective<br>Resistance<br>in Ohms | Inductance<br>in<br>Henries | Volt-<br>amperes | Watts | Reactive<br>Volt-<br>amperes | Power<br>Factor |
|------|-------------------------|------------------------------------|-----------------------------|------------------|-------|------------------------------|-----------------|
|------|-------------------------|------------------------------------|-----------------------------|------------------|-------|------------------------------|-----------------|

### 120-VOLT, 60-HERTZ POTENTIAL CIRCUIT

|            |        |        |       |       |       |        |        |
|------------|--------|--------|-------|-------|-------|--------|--------|
| Voltmeters | 18,667 | 18,658 | 1.546 | 1.205 | 1.204 | 0.0545 | 0.9993 |
|------------|--------|--------|-------|-------|-------|--------|--------|

### 5-AMPERE, 60-HERTZ CURRENT CIRCUIT

|          |         |         |                       |       |        |       |        |
|----------|---------|---------|-----------------------|-------|--------|-------|--------|
| Ammeters | 0.00832 | 0.00792 | $6.75 \times 10^{-6}$ | 0.208 | 0.1978 | 0.064 | 0.9520 |
|----------|---------|---------|-----------------------|-------|--------|-------|--------|

## SWITCHBOARD INSTRUMENTS

### DC AMMETERS D'ARSONVAL TYPE

| Scale and Rating | Terminal Resistance, Ohms | ±1.5% Accuracy Vertical | ±1.5% Accuracy Horizontal |
|------------------|---------------------------|-------------------------|---------------------------|
|------------------|---------------------------|-------------------------|---------------------------|

### DC AMMETERS — SELF-CONTAINED

|          |         |              |              |
|----------|---------|--------------|--------------|
| 0–50µA   | 4735    | 180 113 CYCY | 180 111 CYCY |
| 0–100µA  | 1480    | 180 113 DRDR | 180 111 DRDR |
| 0–200µA  | 650     | 180 113 EAEA | 180 111 EAEA |
| 0–500µA  | 226     | 180 113 EMEM | 180 111 EMEM |
| 0–800µA  | 562     | 180 113 EWEW | 180 111 EWEW |
| 0–1 mA   | 40      | 180 113 FAFA | 180 111 FAFA |
| 0–2 mA   | 20      | 180 113 FGFG | 180 111 FGFG |
| 0–5 mA   | 10      | 180 113 FXFX | 180 111 FXFX |
| 0–10 mA  | 5.0     | 180 113 GZGZ | 180 111 GZGZ |
| 0–50 mA  | 1.0     | 180 113 HYHY | 180 111 HYHY |
| 0–100 mA | 0.5     | 180 113 JRJR | 180 111 JRJR |
| 0–200 mA | 0.25    | 180 113 KAKA | 180 111 KAKA |
| 0–500 mA | 0.10    | 180 113 KMKM | 180 111 KMKM |
| 0–800 mA | 0.062   | 180 113 KWKW | 180 111 KWKW |
| 0–1 A    | 0.05    | 180 113 LALA | 180 111 LALA |
| 0–2 A    | 0.025   | 180 113 LELE | 180 111 LELE |
| 0–5 A    | 0.010   | 180 113 LSLS | 180 111 LSLS |
| 0–10 A   | 0.005   | 180 113 MTMT | 180 111 MTMT |
| 0–15 A   | 0.003   | 180 113 NDND | 180 111 NDND |
| 0–20 A   | 0.0025  | 180 113 NGNG | 180 111 NGNG |
| 0–30 A   | 0.00167 | 180 113 NLNL | 180 111 NLNL |
| 0–40 A   | 0.00125 | 180 113 NPNP | 180 111 NPNP |
| 0–50 A   | 0.001   | 180 113 NTNT | 180 111 NTNT |

### DC AMMETERS — SHUNT-RATED 50 MV

(Lead Resistance = .05Ω–.07Ω)

|            |      |              |              |
|------------|------|--------------|--------------|
| 0–10 A     | 12.5 | 180 123 ECMT | 180 121 ECMT |
| 0–20 A     | 12.5 | 180 123 ECNG | 180 121 ECNG |
| 0–30 A     | 12.5 | 180 123 ECNL | 180 121 ECNL |
| 0–40 A     | 12.5 | 180 123 ECNP | 180 121 ECNP |
| 0–60 A     | 12.5 | 180 123 ECNW | 180 121 ECNW |
| 0–80 A     | 12.5 | 180 123 ECPD | 180 121 ECPD |
| 0–100 A    | 12.5 | 180 123 ECPK | 180 121 ECPK |
| 0–200 A    | 12.5 | 180 123 ECRL | 180 121 ECRL |
| 0–300 A    | 12.5 | 180 123 ECRX | 180 121 ECRX |
| 0–400 A    | 12.5 | 180 123 ECSC | 180 121 ECSC |
| 0–500 A    | 12.5 | 180 123 ECSF | 180 121 ECSF |
| 0–600 A    | 12.5 | 180 123 ECSJ | 180 121 ECSJ |
| 0–800 A    | 12.5 | 180 123 ECSN | 180 121 ECSN |
| 0–1 kA     | 12.5 | 180 123 ECVA | 180 121 ECVA |
| 0–50 mV    | 12.5 | 180 123 EC†  | 180 121 EC†  |
| 50–0–50 mV | 25   | 180 124 EC†  | 180 122 EC†  |

† Order by Description.

### DC AMMETERS — SHUNT-RATED 100 MV

(Lead Resistance = .04Ω–.08Ω)

|             |    |             |             |
|-------------|----|-------------|-------------|
| 0–100mV     | 25 | 180 123 GB† | 180 121 GB† |
| 100–0–100mV | 50 | 180 124 GB† | 180 122 GB† |

† Order by Description.

### DC MILLIAMMETERS — MECHANICALLY ZERO-SUPPRESSED, LIVE-ZERO, SELF-CONTAINED

(To read output of process transmitters, blank legend)

| Rating  | Scale | ±2% Accuracy Vertical | ±2% Accuracy Horizontal |
|---------|-------|-----------------------|-------------------------|
| 1–5 mA  | §     | 180 183 FYAA 8ABA     | 180 181 FYAA 8ABA       |
| 4–20mA  | §     | 180 183 HEAA 8ABA     | 180 181 HEAA 8ABA       |
| 10–50mA | §     | 180 183 HXAA 8ABA     | 180 181 HXAA 8ABA       |

§ Pencil calibrated points at .25%, 50%, 75%, 100% of full-scale position

### DC VOLTMETERS — SELF CONTAINED

| Scale and Rating | Terminal Resistance, Ohms | ±1.5% Accuracy Vertical | ±1.5% Accuracy Horizontal |
|------------------|---------------------------|-------------------------|---------------------------|
| 0–1 V            | 1000                      | 180 013 LALA            | 180 011 LALA              |
| 0–5 V            | 5000                      | 180 013 LSLS            | 180 011 LSLS              |
| 0–15 V           | 15000                     | 180 013 NDND            | 180 011 NDND              |
| 0–30 V           | 30000                     | 180 013 NLNL            | 180 011 NLNL              |
| 0–50 V           | 50000                     | 180 013 NTNT            | 180 011 NTNT              |
| 0–80 V           | 80000                     | 180 013 PDPD            | 180 011 PDPD              |
| 0–150 V          | 150000                    | 180 013 PZPZ            | 180 011 PZPZ              |
| 0–300 V          | 300000                    | 180 013 RXRX            | 180 011 RXRX              |
| 0–600 V          | 600000                    | 180 013 SJSJ            | 180 011 SJSJ              |
| 150–0–150 V      | 150000                    | 180 014 PZPZ            | 180 012 PZPZ              |
| 300–0–300V       | 300000                    | 180 014 RXRX            | 180 012 RXRX              |

### AC AMMETERS — 40/70 HZ, IRON-VANE TYPE

| Scale  | Transformer Rating | ±2% Accuracy Vertical | ±1.5% Accuracy Horizontal |
|--------|--------------------|-----------------------|---------------------------|
| 0–1 A  | Self-Contained     | 180 143 LALA          | 180 141 LALA              |
| 0–3 A  |                    | 180 143 LJJJ          | 180 141 LJJJ              |
| 0–5 A  |                    | 180 143 LSLS          | 180 141 LSLS              |
| 0–10 A |                    | 180 143 MTMT          | 180 141 MTMT              |
| 0–15 A |                    | 180 143 NDND          | 180 141 NDND              |
| 0–20 A |                    | 180 143 NGNG          | 180 141 NGNG              |
| 0–30 A |                    | 180 143 NLNL          | 180 141 NLNL              |
| 0–50 A |                    | 180 143 NTNT          | 180 141 NTNT              |

### AC AMMETERS — TRANSFORMER-RATED - 5 AMP

|          |        |              |              |
|----------|--------|--------------|--------------|
| 0–10 A   | 10/5   | 180 143 LSMT | 180 141 LSMT |
| 0–15 A   | 15/5   | 180 143 LSND | 180 141 LSND |
| 0–20 A   | 20/5   | 180 143 LSNG | 180 141 LSNG |
| 0–25 A   | 25/5   | 180 143 LSNJ | 180 141 LSNJ |
| 0–30 A   | 30/5   | 180 143 LSNL | 180 141 LSNL |
| 0–40 A   | 40/5   | 180 143 LSNP | 180 141 LSNP |
| 0–50 A   | 50/5   | 180 143 LSNT | 180 141 LSNT |
| 0–75 A   | 75/5   | 180 143 LSPB | 180 141 LSPB |
| 0–100 A  | 100/5  | 180 143 LSPK | 180 141 LSPK |
| 0–150 A  | 150/5  | 180 143 LSPZ | 180 141 LSPZ |
| 0–200 A  | 200/5  | 180 143 LSRL | 180 141 LSRL |
| 0–300 A  | 300/5  | 180 143 LSRX | 180 141 LSRX |
| 0–400 A  | 400/5  | 180 143 LSSC | 180 141 LSSC |
| 0–500 A  | 500/5  | 180 143 LSSF | 180 141 LSSF |
| 0–600 A  | 600/5  | 180 143 LSSJ | 180 141 LSSJ |
| 0–800 A  | 800/5  | 180 143 LSSN | 180 141 LSSN |
| 0–1 kA   | 1000/5 | 180 143 LSVA | 180 141 LSVA |
| 0–1.2 kA | 1200/5 | 180 143 LSVB | 180 141 LSVB |
| 0–1.5 kA | 1500/5 | 180 143 LSVC | 180 141 LSVC |
| 0–2 kA   | 2000/5 | 180 143 LSVE | 180 141 LSVE |
| 0–3 kA   | 3000/5 | 180 143 LSVJ | 180 141 LSVJ |
| 0–4 kA   | 4000/5 | 180 143 LSVN | 180 141 LSVN |

### AC VOLTMETERS — 60 HZ, IRON-VANE

|         |                |              |              |
|---------|----------------|--------------|--------------|
| 0–150 V | Self-Contained | 180 033 PZPZ | 180 031 PZPZ |
| 0–300 V |                | 180 033 RXRX | 180 031 RXRX |
| 0–500 V |                | 180 033 SFSF | 180 031 SFSF |
| 0–600 V |                | 180 033 SJSJ | 180 031 SJSJ |

### AC VOLTMETERS — TRANSFORMER RATED 150 V

|           |           |              |              |
|-----------|-----------|--------------|--------------|
| 0–300 V   | 240/120   | 180 033 PZRX | 180 031 PZRX |
| 0–600 V   | 480/120   | 180 033 PZSJ | 180 031 PZSJ |
| 0–750 V   | 600/120   | 180 033 PZSM | 180 031 PZSM |
| 0–3 kV    | 2400/120  | 180 033 PZVJ | 180 031 PZVJ |
| 0–5.25 kV | 4200/120  | 180 033 PZVV | 180 031 PZVV |
| 0–6 kV    | 4800/120  | 180 033 PZVX | 180 031 PZVX |
| 0–9 kV    | 7200/120  | 180 033 PZWJ | 180 031 PZWJ |
| 0–15 kV   | 12000/120 | 180 033 PZWZ | 180 031 PZWZ |
| 0–18 kV   | 14400/120 | 180 033 PZXE | 180 031 PZXE |

## Type 180 Optional Features

### Scale Variations

1. Blank Scales
2. Special marked scales (maximum 100 divisions; Ref. Notes 3 and 4)
3. Special Legends (Ref. Notes 3 and 4)
4. Colored markings, lines, bars, etc.
5. Black scale with white markings
6. Zero-center Scale DC instruments

### Ratings and Calibration

7. Unlisted ratings. Contact factory for other than listed ratings.
8. Offset-zero scale (DC meters only)
9. Special calibrations in accordance with data supplied by customer
10. Calibration for use on other than vertical panel
11. Calibration for use on 400 Hertz or other unlisted frequency.
12. High-sensitivity voltmeters (See Note 2)
13. Special-terminal resistance
14. Internal mounted rheostat
15. Rectifier-type voltmeters 2.5 percent.
16. 1 percent accuracy (DC only)
17. Suppressed zero with operable zero set (DC only) (See Note 1)

### Construction

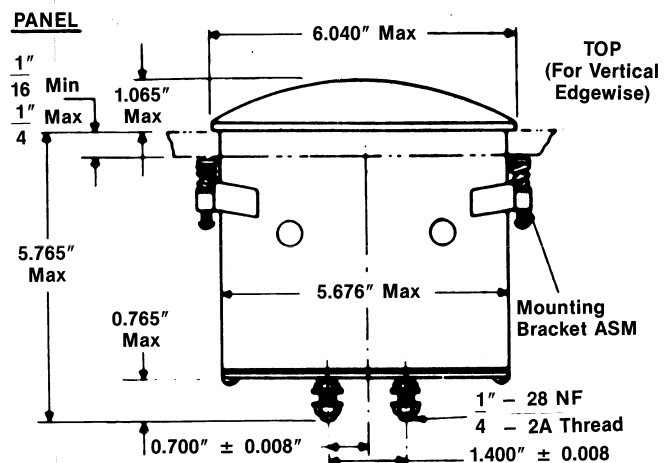
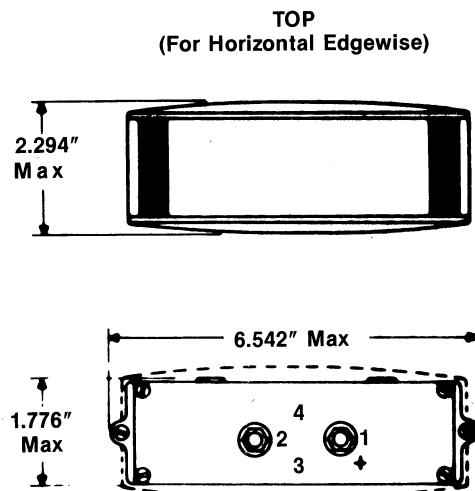
18. Internal illumination
19. Red pointer (Day-glo)
20. Anti-glare window
21. Black trim case
22. Component mark for Canada. Add "/CSA" to suffix of catalog number.

4. Type 180 scales and legends are individual parts separated by a space for the pointer. Only one set of divisions can be marked on a scale.
5. No charge for electrical legends.

### Notes:

1. Suppressed zero — Available only on DC models up to a maximum suppression of 20 percent of full-scale value. Note: Accuracy is affected on suppressed-zero instruments.
2. High-sensitivity voltmeters — DC voltmeters can be offered up to 20,000 ohms/volt. Voltmeters of high sensitivity draw less current from the circuit and are used on applications where the circuit current is so low that instrument resistance will appreciably affect circuit operation.
3. Special legends and/or scales may be obtained by special order. Maximum number of letters (counting spaces as letters) on vertical instruments is 25; on horizontal instruments, 30. Exact wording must be clearly indicated as to spelling, abbreviation, spacing, etc.

## Dimensions and Panel Cutout



## DIMENSIONS FOR TYPE 180 INSTRUMENTS DWG B3147K22





## Miniature Switchboard Instruments — 2180 Series

### GENERAL SPECIFICATIONS

Full Scale Deflection: 250° taut band movement  
 Full Scale Length: Approx. 140mm (5.5")  
 Pointer: Sword type, black  
 Scale Plate: Platform type, white  
 Case: ABS resin, black  
 Cover: Methacrylic acid resin with antistatic processing on both sides.  
 Standard color . . . Black (Munsell N. 1.5/0) or jade green  
 (Munsell 7.5 BG4/1.5)

Terminal Plate: Phenol resin, black  
 Mounting Screw: 5mm dia.  
 Measuring Terminal: 5mm dia (nut type)  
 Operating Temperature Range: 0 to 40° C (32 to 104° F)  
 Storage Temperature Range: -10 to 50° C (14 to 122° F)  
 Dielectric Strength: 2,600 V AC for one minute between electric circuit  
 and case  
 Watts, Vars, Unbalanced Power Factor supplied with external transducer.

| Model Type |            | Ranges Available | Standard Ratings and Scales | Catalog Number | Operating Principle            | Accuracy                     |
|------------|------------|------------------|-----------------------------|----------------|--------------------------------|------------------------------|
| DC         | Ammeters   | 500μA ~ 30A      | See Table On<br>Next Page   | 218100         | Moving<br>coil type            | ±1.5% of full<br>scale value |
|            | Voltmeters | 30V ~ 300V       |                             | 218100         |                                |                              |
| AC         | Ammeters   | 500μA ~ 30A      |                             | 218200         | RMS sensing<br>transducer type | ±1.5% of full<br>scale value |
|            | Voltmeters | 3V ~ 600V        |                             | 218200         |                                |                              |

| Type             |                | Rating                                                                                            | Connection         | Voltage      | Elements | Catalog Number                    | Operating Principle                           | Accuracy                  |
|------------------|----------------|---------------------------------------------------------------------------------------------------|--------------------|--------------|----------|-----------------------------------|-----------------------------------------------|---------------------------|
|                  |                |                                                                                                   |                    | Load Current |          |                                   |                                               |                           |
| AC               | Wattmeters     | Specify 120V/5A or 240V/5A input, full scale watt or var value, frequency rating, PT and CT Ratio | Single-phase       |              | 1        | 218531                            | Feedback Time Division Multiplier Transducer* | ±1.5% of full scale value |
|                  |                |                                                                                                   | 3-phase 3-wire     | Unrestricted | 2        | 218535                            |                                               |                           |
|                  |                |                                                                                                   |                    | Unrestricted |          |                                   |                                               |                           |
|                  |                |                                                                                                   | 3-phase 4-wire     | Balanced     | 2-1/2    | 218534                            |                                               |                           |
|                  |                |                                                                                                   |                    | Unrestricted |          |                                   |                                               |                           |
|                  |                |                                                                                                   | 3-phase 4-wire     | Unrestricted | 3        | 218536                            |                                               |                           |
|                  | Unrestricted   |                                                                                                   |                    |              |          |                                   |                                               |                           |
|                  | Varmeters      |                                                                                                   | Single-phase       |              | 1        | 218631                            |                                               | ±1.5% of full scale value |
|                  |                |                                                                                                   | 3-phase 3-wire     | Balanced     | 2        | 218633                            |                                               |                           |
|                  |                |                                                                                                   |                    | Unrestricted |          |                                   |                                               |                           |
|                  |                |                                                                                                   | 3-phase 3-wire     | Unrestricted | 2        | 218635                            |                                               |                           |
|                  |                |                                                                                                   |                    | Unrestricted |          |                                   |                                               |                           |
|                  |                | 3-phase 4-wire                                                                                    | Balanced           | 2-1/2        | 218634   |                                   |                                               |                           |
|                  |                |                                                                                                   | Unrestricted       |              |          |                                   |                                               |                           |
|                  |                | 3-phase 4-wire                                                                                    | Unrestricted       | 3            | 218636   |                                   |                                               |                           |
|                  |                |                                                                                                   | Unrestricted       |              |          |                                   |                                               |                           |
|                  |                | Power Factor Meters                                                                               | 120V/5A or 240V/5A | Single-phase |          | 1                                 | 218731                                        |                           |
|                  | 3-phase 3-wire |                                                                                                   |                    | Balanced     | 1        | 218733                            |                                               |                           |
|                  |                |                                                                                                   |                    | Balanced     |          |                                   |                                               |                           |
|                  | 3-phase 3 wire |                                                                                                   |                    | Unrestricted | 2        | 218735                            |                                               |                           |
| Unrestricted     |                |                                                                                                   |                    |              |          |                                   |                                               |                           |
| 3-phase 4-wire   | Unrestricted   |                                                                                                   |                    | 3            | 218736   |                                   |                                               |                           |
|                  | Unrestricted   |                                                                                                   |                    |              |          |                                   |                                               |                           |
| Frequency Meters | 115V or 230V   | 45-55 Hz, 55-65 Hz<br>45-66 Hz Rating Available                                                   |                    |              | 218830   | Frequency sensing transducer type | ±0.5% of center frequency                     |                           |

\*Instrument is furnished with external transducer. Contact Yokogawa for transducer outline and connection drawings.

## 2180 SERIES STANDARD RATINGS AND SCALES

Example: 218100-AFA-BL is a 0-1mA rating & scale with black cover

### DC Ammeters and Voltmeters

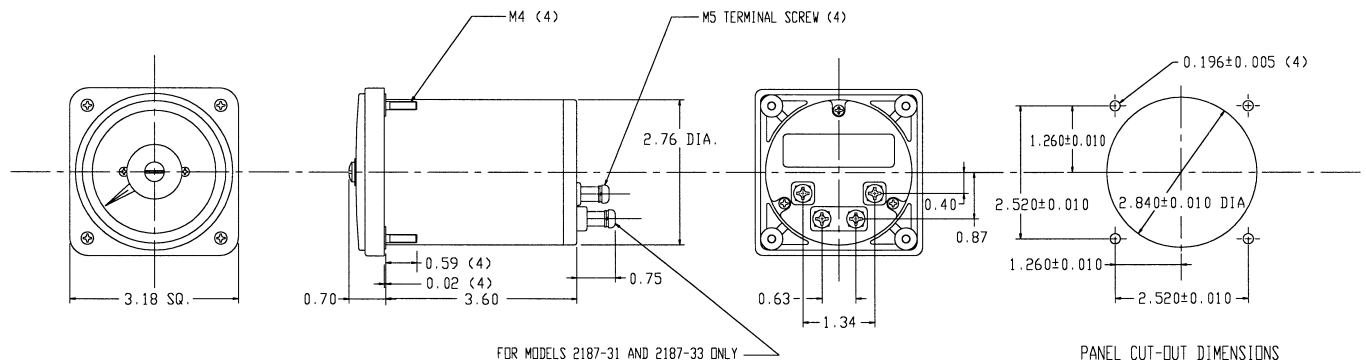
| Model Number                 | Suffix                                                                                                                                               | Rating and scale                                                                                                                                                                                                                            |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>2181 00-</b>              |                                                                                                                                                      |                                                                                                                                                                                                                                             |
| Full scale value (zero left) | AEM-<br>AFA-<br>AFG-<br>AHF-<br>AKM-<br>ALA-<br>ALS-<br>AMT-<br>AND-<br>ANG-<br>ANL-<br>A01-<br>A05-<br>VNL-<br>VNT-<br>VPK-<br>VPZ-<br>VRX-<br>V01- | 500 $\mu$ ADC<br>1mADC<br>2mADC<br>20mADC<br>500mADC<br>1ADC<br>5ADC<br>10ADC<br>15ADC<br>20ADC<br>30ADC<br>50mVDC (shunt-rated)*<br>100mVDC (shunt-rated)*<br>30VDC<br>50VDC<br>100VDC<br>150VDC<br>300VDC<br>1mADC (external multiplier)* |
| 2181<br>Suppressed zero      | 35-<br>36-<br>37-                                                                                                                                    | 10 to 50mADC*<br>4 to 20mADC*<br>1-5VDC*                                                                                                                                                                                                    |
| Cover assembly               | BG<br>BL                                                                                                                                             | Munsell green<br>Munsell black                                                                                                                                                                                                              |

### AC Ammeters and Voltmeters

| Model Number                 | Suffix                                                                                                                                                                       | Rating and scale                                                                                                                                                                                                                                                                                |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>2182 00-</b>              |                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                 |
| Full scale value (zero left) | AEM-<br>AFA-<br>AFG-<br>AHF-<br>AKM-<br>ALA-<br>ALC-<br>ALS-<br>A42-<br>AMF-<br>AMT-<br>ANL-<br>VNL-<br>VNT-<br>VPB-<br>VPK-<br>VPZ-<br>V12-<br>VRX-<br>VSI-<br>V20-<br>V21- | 500 $\mu$ AAC<br>1mAAC<br>2mAAC<br>20mAAC<br>500mAAC<br>1AAC<br>1.5AAC<br>5AAC<br>5AAC (for external CT)*<br>7.5AAC<br>10AAC<br>30AAC<br>30VAC<br>50VAC<br>75VAC<br>100VAC<br>150VAC<br>150VAC (for external PT)*<br>300VAC<br>600VAC<br>70-130VAC (expanded scl.)*<br>140-260VAC (exp. scale)* |
| Cover assembly               | BG<br>BL                                                                                                                                                                     | Munsell green<br>Munsell black                                                                                                                                                                                                                                                                  |

Note: \* For ratings and/or scales not listed, please specify as similar to closest rating above and describe in detail.

## DIMENSIONS AND PANEL DRILLING



## POWER SERIES<sup>Plus</sup> DIGITAL SWITCHBOARD METER

POWER SERIES<sup>Plus</sup> fills the need for a high accuracy digital switchboard meter and transducer that 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 rat-

ings. Our rugged metal case fits standard panel cutouts for switchboard meters and makes it a perfect replacement for less versatile instruments. POWER SERIES<sup>Plus</sup> can also replace separate power transducers and meters in new equipment designs. An overall good solution for reduced wiring, panel space reduction, improved accuracy, and lower system cost.



### POWER SERIES<sup>Plus</sup> MODEL TYPES AND RATED INPUTS

#### Features:

- PT scaling ratio to 1250:1
- CT scaling ratio to 5000:1 or 25kA
- Adjustable transducer output
- Non-volatile memory
- 0.2% accuracy
- 4½ digit display
- True RMS current and voltage
- Field-settable electrical legends
- Display average setting capability reduces volatile “digit bounce”.

| Measuring Capability | Model Number                                   | Available Connections                                         | Maximum Input Rating                                                             | Electrical Legend               | Output Options                       |
|----------------------|------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------|--------------------------------------|
| AC Amperes           | 249111<br>249115                               | 1 Phase                                                       | 0-1 A AC<br>0-5A AC                                                              | Amps AC<br>Kiloamps AC          | 0-1mA<br>4-20mA                      |
| AC Voltage           | 249121<br>249125                               | 1 Phase                                                       | 0-150V AC<br>0-300V AC                                                           | Volts AC<br>Kilovolts AC        | 0-1mA<br>4-20mA                      |
| Frequency            | 249181<br>249183                               | 1 Phase                                                       | 150V AC<br>300V AC                                                               | Hertz                           | ±1mA<br>0-1mA<br>12 ± 8mA            |
| Watts                | 249151<br>249152<br>249153<br>249154<br>249155 | 1P2W<br>1P3W<br>3P3W<br>3P4W (2½ Element)<br>3P4W (3 Element) | (select one)<br>120V AC-1 AMP<br>240V AC-1 AMP<br>120V AC-5 AMP<br>240V AC-5 AMP | Watts<br>Kilowatts<br>Megawatts | ± 1mA<br>0-1mA<br>4-20mA<br>12 ± 8mA |
| Vars                 | 249161<br>249162<br>249163<br>249164<br>249165 | 1P2W<br>1P3W<br>3P3W<br>3P4W (2½ Element)<br>3P4W (3 Element) | (select one)<br>120V AC-1 AMP<br>240V AC-1 AMP<br>120V AC-5 AMP<br>240V AC-5 AMP | Vars<br>Kilovars<br>Megavars    |                                      |
| Power Factor         | 249171<br>249172<br>249173<br>249174<br>249175 | 1P2W<br>1P3W<br>3P3W<br>3P4W (2½ Element)<br>3P4W (3 Element) | (select one)<br>120V AC-1 AMP<br>240V AC-1 AMP<br>120V AC-5 AMP<br>240V AC-5 AMP | Power Factor<br>Lag<br>Lead     |                                      |
| Phase Angle          | 249191<br>249192<br>249193<br>249194<br>249195 | 1P2W<br>1P3W<br>3P3W<br>3P4W (2½ Element)<br>3P4W (3 Element) | (select one)<br>120V AC-1 AMP<br>240V AC-1 AMP<br>120V AC-5 AMP<br>240V AC-5 AMP | Phase Angle<br>Lag<br>Lead      |                                      |

See general specifications and selector guide on following pages for complete ordering information.

## GENERAL SPECIFICATIONS — POWER SERIES<sup>Plus</sup>

|                                                  |                                                                                          |                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DISPLAY</b>                                   | Type:<br>Digit height:<br>Decimal points:<br>Out of range indication:<br>Response time:  | 3½ digit Red LED for Power Factor and Phase Angle<br>4½ digit Red LED for Amps/ Volts/ Watts/ VARS/ Frequency<br>0.56 inch or 14mm<br>3 or 4 position selectable during scaling setup<br>Flashing display "HHHH" for high and "LLLL" for low<br>200 millisecond maximum update time |
| <b>AUXILIARY POWER</b>                           | Choice of inputs at rear terminal board                                                  | 120 or 240 VAC (±15%), 45-65Hz<br>Power consumption-4.5 VA maximum                                                                                                                                                                                                                  |
| <b>INPUT RATING</b>                              | Current:<br>Voltage:<br>Frequency:                                                       | 0 to 1 AAC; 0 to 5AAC<br>0-120VAC, 0-240 VAC (W/VAR/PF/PA); 0-150VAC, 0-300VAC (Volt / Freq)<br>50/60 Hz and 400 Hz                                                                                                                                                                 |
| <b>INPUT RANGE</b>                               | Rated current:<br>Rated voltage:                                                         | A / W / VAR: 0-200% ; PF / PA: 20-200%<br>V / W / VAR: 0-120% ; PF / PA: 50-120%; Frequency: 20-120%                                                                                                                                                                                |
| <b>SUSTAINED INPUT</b>                           | Rated current:<br>Rated voltage:                                                         | A / W / VAR / PF / PA: 200% continuous, 10 x rating for 5 seconds<br>V / W / VAR / FREQ: 120% continuous; PF / PA: 150% continuous                                                                                                                                                  |
| <b>BURDEN</b>                                    | Current:<br>Voltage:                                                                     | <0.2 VA per element<br>120V: <0.2VA per element; 240V: <0.4 VA per element                                                                                                                                                                                                          |
| <b>ACCURACY</b>                                  | Reference condition:<br>25°C, 45-74%RH, at rated input 60Hz sine wave, 30 min. warmup    | Voltage<br>Current<br>Watt/VAR<br>± 0.2% of reading ± 0.1% of full scale                                                                                                                                                                                                            |
|                                                  |                                                                                          | Power Factor<br>Phase Angle<br>Frequency<br>± 0.05 Power factor<br>± 0.5° Phase Angle<br>± 0.01Hz @ 40-70Hz, ±0.1 Hz @ 300-500 Hz                                                                                                                                                   |
| <b>ANALOG OUTPUT AND RESPONSE TIME</b>           | 0 to 1mA, 0 to ± 1mA:<br>4 to 20mA, 12 ± 8mA:                                            | 10VDC compliance into 10k ohm load maximum<br>15VDC compliance into 750 ohm load maximum<br>1 second maximum response time within ±1% of final value                                                                                                                                |
| <b>OUTPUT RIPPLE</b>                             |                                                                                          | 0.5% peak-to-peak maximum of output span                                                                                                                                                                                                                                            |
| <b>ISOLATION VOLTAGE / INSULATION RESISTANCE</b> | Input to output/case:<br>Aux. power to case:<br>Aux. power to output:<br>Output to case: | 2500 VAC for 1 minute / more than 10 Megohm @ 500VDC<br>2000 VAC to 1 minute / more than 10 Megohm @ 500VDC<br>2000 VAC for 1 minute / more than 10 Megohm @500VDC<br>1000 VAC for 1 minute / more than 10 Megohm @ 500VDC                                                          |
| <b>TEMPERATURE RANGE</b>                         | Operating:<br>Storage:                                                                   | -20 to +60° C at 90% RH maximum (non-condensing)<br>-40 to +85° C                                                                                                                                                                                                                   |
| <b>TEMPERATURE COEFFICIENT</b>                   |                                                                                          | 150 PPM / °C maximum of full scale                                                                                                                                                                                                                                                  |
| <b>EXTERNAL INFLUENCE</b>                        | Magnetic field:<br>Shock / vibration:                                                    | 0.5% maximum at 400 ampere turns/meter<br><0.2% after: 50G x 3axis x 6 repetitions / 16.7Hz, 4 mm p-p for 1 hour                                                                                                                                                                    |
| <b>SURGE WITH-STAND VOLTAGE</b>                  | SWC tests:                                                                               | Meets IEEE 472 / ANSI C37.90a<br>Meets JIS C1111 (5kV 1.2 x 50 microseconds)                                                                                                                                                                                                        |
| <b>DIMENSIONS</b>                                | Reference Page 32                                                                        | W x D x H = 4.33 x 6.54 x 4.33 inches                                                                                                                                                                                                                                               |
| <b>WEIGHT</b>                                    |                                                                                          | Approximately 1000 grams (2.2 lbs)                                                                                                                                                                                                                                                  |
| <b>DESIGN STANDARDS</b>                          |                                                                                          | ANSI C39.1<br>UL Recognition (pending)                                                                                                                                                                                                                                              |

NOTE: POWER SERIES<sup>Plus</sup> Digital Switchboard capability is continually being expanded. Now available: Dual function & communications. Please call 1-800-258-2552 ext 575 for the latest catalog information.

POWER SERIES<sup>Plus</sup> SELECTOR GUIDE

AC WATTS, VARS, POWER FACTOR AND PHASE ANGLE

MODEL FORMAT: 2491   -   -   -  

| 1     |                       | 2                      |                 | 3                 |           | 4        |               |           |
|-------|-----------------------|------------------------|-----------------|-------------------|-----------|----------|---------------|-----------|
| MODEL | FUNCTION/CONNECTIONS  |                        | AC INPUT RATING |                   | FREQUENCY |          | ANALOG OUTPUT |           |
| 2491  | 51                    | WATT 1P2W              | 11              | 120 VOLT-1 AMP    | 5         | 50/60 Hz | AAA           | No output |
|       | 52                    | WATT 1P3W              | 15              | 120 VOLT-5 AMP    | 6         | 400 Hz   | AFA           | 0 to 1 mA |
|       | 53                    | WATT 3P3W              | 21              | 240 VOLT-1 AMP    | 8         | Special  | AFB           | 0 to ±1mA |
|       | 54                    | WATT 3P4W (2½ element) | 25              | 240 VOLT-5 AMP    |           |          | AHD           | 4 to 20mA |
|       | 55                    | WATT 3P4W (3 element)  | 33              | Special(describe) |           |          | AHF           | 12 ± 8mA  |
|       | 61                    | VARs 1P2W              |                 |                   |           |          |               |           |
|       | 62                    | VARs 1P3W              |                 |                   |           |          |               |           |
|       | 63                    | VARs 3P3W              |                 |                   |           |          |               |           |
|       | 64                    | VARs 3P4W (2½ element) |                 |                   |           |          |               |           |
|       | 65                    | VARs 3P4W (3 element)  |                 |                   |           |          |               |           |
|       | 71                    | POWER FACTOR 1P2W      |                 |                   |           |          |               |           |
|       | 72                    | POWER FACTOR 1P3W      |                 |                   |           |          |               |           |
|       | 73                    | POWER FACTOR 3P3W      |                 |                   |           |          |               |           |
|       | 74                    | P.F. 3P4W (2½ element) |                 |                   |           |          |               |           |
|       | 75                    | P.F. 3P4W (3 element)  |                 |                   |           |          |               |           |
|       | 91                    | PHASE ANGLE 1P2W       |                 |                   |           |          |               |           |
|       | 92                    | PHASE ANGLE 1P3W       |                 |                   |           |          |               |           |
|       | 93                    | PHASE ANGLE 3P3W       |                 |                   |           |          |               |           |
|       | 94                    | P.A. 3P4W (2½ element) |                 |                   |           |          |               |           |
| 95    | P.A. 3P4W (3 element) |                        |                 |                   |           |          |               |           |

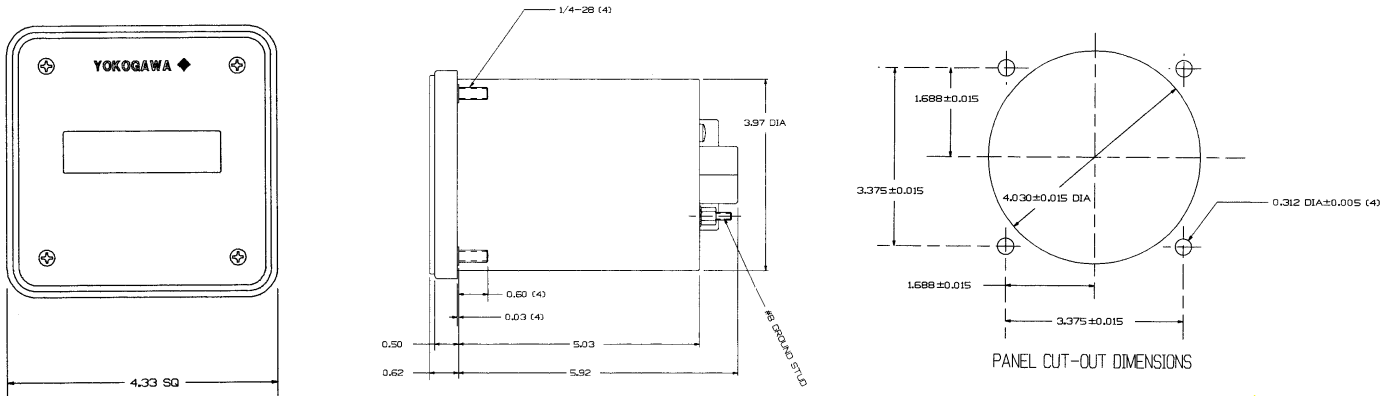
AC AMPS/VOLTS/FREQUENCY

MODEL FORMAT: 2491   -   -  

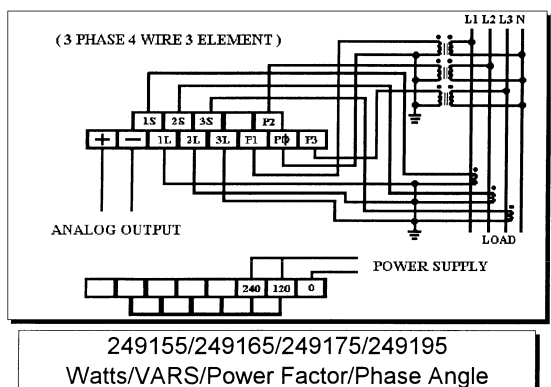
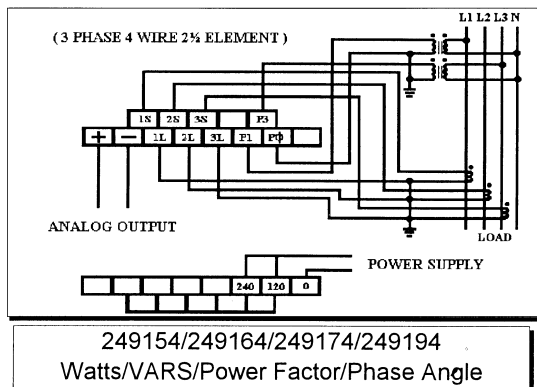
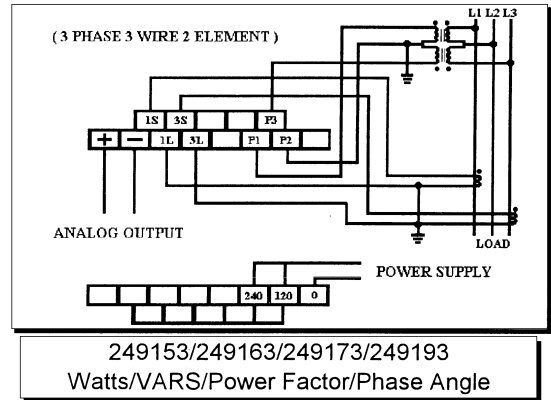
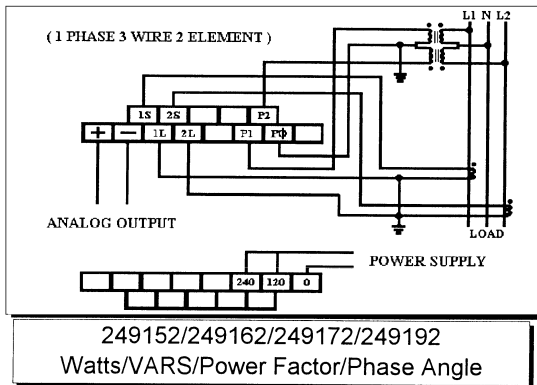
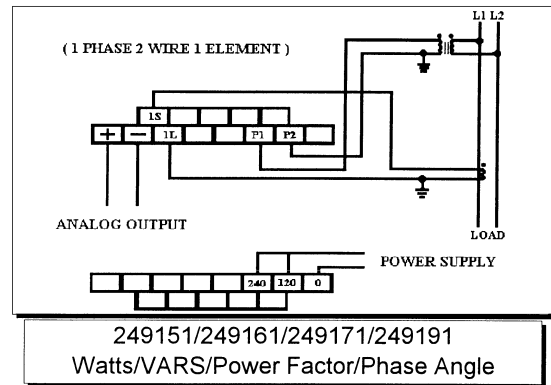
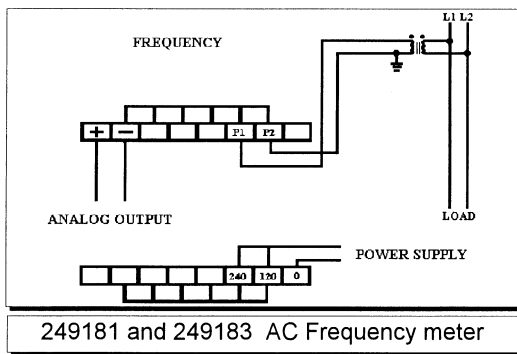
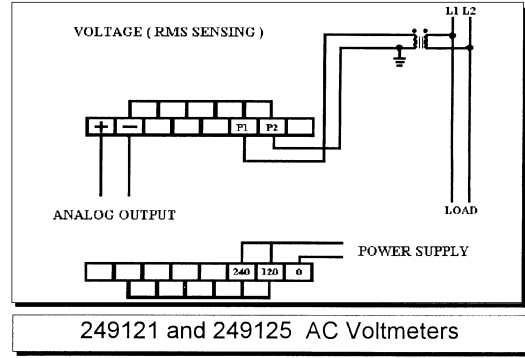
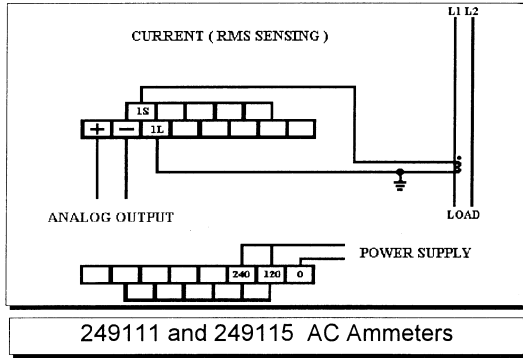
| 1     |              | 2          |           | 3        |               |            |
|-------|--------------|------------|-----------|----------|---------------|------------|
| MODEL | INPUT RATING |            | FREQUENCY |          | ANALOG OUTPUT |            |
| 2491  | 11           | 1 AMP AC   | 1         | 50/60 Hz | AAA           | No output  |
|       | 15           | 5 AMP AC   | 2         | 400 Hz   | AFA           | 0 to 1mA   |
|       | 21           | 150 V AC   | 3         | Special  | AFB           | 0 to ±1mA* |
|       | 25           | 300 V AC   |           |          | AHD           | 4 to 20mA  |
|       | 81           | 150V FREQ. |           |          |               |            |
|       | 83           | 300V FREQ. |           |          |               |            |

\* Only for frequency

OUTLINE DIMENSIONS AND PANEL CUTOUT



# POWER SERIES<sup>Plus</sup> TERMINAL CONNECTIONS





## JUXTA POWER TRANSDUCERS

Yokogawa's JUXTA "AC POWER SERIES" transducers (2469 & 2489) are rugged metal case designs for utility and industrial applications. Most models are UL recognized under File E60579 and exceed IEEE472/ANSI C37.90.1 Surge Withstand Capability test. The "SWC" test assures maximum protection from damaging line transients caused by switchgear operation or lightning strikes upstream on the system.

Power transducers provide an analog DC Voltage or Current output proportional to an AC input. The input typically comes from the secondary of potential and/or current transformers such as

150V and 5A AC. The output is linked to remote monitoring equipment such as meters, recorders, PLC's, SCADA or Energy Management systems. For most industrial monitoring needs, 0.5% accuracy is acceptable, and our 2469 Series exceeds this requirement. Most power utilities require a higher level of accuracy; and our 2489 series is a superior choice for those applications.

Below, are the most popular models of both the 2469 and 2489 Power Transducers. For other input and output combinations, connection drawings, specifications and other models, please request catalog BU-JAC-05E.

|                                                          | Standard transducer inputs / outputs            | Model type                  | Model type                  |
|----------------------------------------------------------|-------------------------------------------------|-----------------------------|-----------------------------|
| <b>C<br/>U<br/>R<br/>R<br/>E<br/>N<br/>T</b>             | <b>Input 0-5 Amp AC, 60 Hz</b>                  | <b>2469 (0.5% Accuracy)</b> | <b>2489 (0.2% Accuracy)</b> |
|                                                          | 0-1 mA output / self-powered/60 Hz              | 246921-380-AFA-0            | 248921-380-AFA-0            |
|                                                          | 0-1 mA output / self-powered / rated 50/60 Hz   | 246921-382-AFA-0            | 248921-382-AFA-0            |
|                                                          | True rms / 0-1mA output / 120V auxiliary power  | 246931-380-AFA-1            | 248931-380-AFA-1            |
|                                                          | 4-20mA output / 120V auxiliary power            | 246921-380-AHD-1            | 248921-380-AHD-1            |
|                                                          | True rms / 4-20mA output / 120V auxiliary power | 246931-380-AHD-1            | 248931-380-AHD-1            |
|                                                          | 3 in 1 transducer, 0-1mA output / self-powered  | 246923-380-AFA-0            | 248923-380-AFA-0            |
| <b>V<br/>O<br/>L<br/>T<br/>A<br/>G<br/>E</b>             | <b>Input 0-150 VAC, 60 Hz</b>                   | <b>2469 (0.5% Accuracy)</b> | <b>2489 (0.2% Accuracy)</b> |
|                                                          | 0-1 mA output / self-powered/rated 60 Hz        | 246922-330-AFA-0            | 248922-330-AFA-0            |
|                                                          | 0-1 mA output / self-powered / rated 50/60 Hz   | 246922-332-AFA-0            | 248922-332-AFA-0            |
|                                                          | True rms / 0-1mA output / 120V auxiliary power  | 246932-330-AFA-1            | 248932-330-AFA-1            |
|                                                          | 4-20mA output / 120V auxiliary power            | 246922-330-AHD-1            | 248922-330-AHD-1            |
|                                                          | True rms / 4-20mA output / 120V auxiliary power | 246932-330-AHD-1            | 248932-330-AHD-1            |
|                                                          | 3 in 1 transducer, 0-1mA output / self-powered  | 246924-330-AFA-0            | 248924-330-AFA-0            |
| <b>F<br/>R<br/>E<br/>Q<br/>U<br/>E<br/>N<br/>C<br/>Y</b> | <b>Input 120VAC, 60 Hz, self-powered</b>        | <b>2469 (±2% Span)</b>      | <b>2489 (±0.2% Span)</b>    |
|                                                          | Frequency ± 1.0 Hz deviation, 0-1mA output      | 246982-320-AFA-0            | 248982-320-AFA-0            |
|                                                          | Frequency ± 1.0 Hz deviation, 4-20mA output     | 246982-320-AHD-0            | 248982-320-AHD-0            |
|                                                          | Frequency ± 2.0 Hz deviation, 0-1mA output      | 246983-320-AFA-0            | 248983-320-AFA-0            |
|                                                          | Frequency ± 2.0 Hz deviation, 4-20mA output     | 246983-320-AHD-0            | 248983-320-AHD-0            |
|                                                          | Frequency ± 5.0 Hz deviation, 0-1mA output      | 246984-320-AFA-0            | 248984-320-AFA-0            |
|                                                          | Frequency ± 5.0 Hz deviation, 4-20mA output     | 246984-320-AHD-0            | 248984-320-AHD-0            |
|                                                          | Frequency ± 10 Hz deviation, 0-1mA output       | 246985-320-AFA-0            | 248985-320-AFA-0            |
|                                                          | Frequency ± 10 Hz deviation, 4-20mA output      | 246985-320-AHD-0            | 248985-320-AHD-0            |
| <b>W<br/>A<br/>T<br/>T<br/>S<br/>*</b>                   | <b>Input 120V, 5A AC, 60 Hz, self-powered</b>   | <b>2469 (0.5% Accuracy)</b> | <b>2489 (0.2% Accuracy)</b> |
|                                                          | Watt 1P2W, 0-1mA output (1 Element)             | 246951-540-AFA-0            | 248951-540-AFA-0            |
|                                                          | Watt 1P2W, 4-20mA output (1 Element)            | 246951-540-AHD-0            | 248951-540-AHD-0            |
|                                                          | Watt 3P3W, 0-1mA output (2 Element)             | 246953-540-AFA-0            | 248953-540-AFA-0            |
|                                                          | Watt 3P3W, 4-20mA output (2 Element)            | 246953-540-AHD-0            | 248953-540-AHD-0            |
|                                                          | Watt 3P4W, 0-1mA output (2½ Element)            | 246954-540-AFA-0            | 248954-540-AFA-0            |
|                                                          | Watt 3P4W, 4-20mA output (2½ Element)           | 246954-540-AHD-0            | 248954-540-AHD-0            |
|                                                          | Watt 3P4W, 0-1mA output (3 Element)             | 246955-540-AFA-0            | 248955-540-AFA-0            |
|                                                          | Watt 3P4W, 4-20mA output (3 Element)            | 246955-540-AHD-0            | 248955-540-AHD-0            |
| <b>V<br/>A<br/>R<br/>S<br/>*</b>                         | <b>Input 120V, 5A AC, 60 Hz, self-powered</b>   | <b>2469 (0.5% Accuracy)</b> | <b>2489 (0.2% Accuracy)</b> |
|                                                          | VAR 1P2W, 0-1mA output (1 Element)              | 246961-540-AFB-0-M          | 248961-540-AFB-0-M          |
|                                                          | VAR 1P2W, 12±8mA output (1 Element)             | 246961-540-AHF-0-M          | 248961-540-AHF-0-M          |
|                                                          | VAR 3P3W, 0-1mA output (2 Element)              | 246963-540-AFB-0-M          | 248963-540-AFB-0-M          |
|                                                          | VAR 3P3W, 12±8mA output (2 Element)             | 246963-540-AHF-0-M          | 248963-540-AHF-0-M          |
|                                                          | VAR 3P4W, 0-1mA output (2½ Element)             | 246964-540-AFB-0-M          | 248964-540-AFB-0-M          |
|                                                          | VAR 3P4W, 12±8mA output (2½ Element)            | 246964-540-AHF-0-M          | 248964-540-AHF-0-M          |
|                                                          | VAR 3P4W, 0-1mA output (3 Element)              | 246965-540-AFB-0-M          | 248965-540-AFB-0-M          |
|                                                          | VAR 3P4W, 12±8mA output (3 Element)             | 246965-540-AHF-0-M          | 248965-540-AHF-0-M          |

**\*Note: Standard calibration is 500W or VARs per element. Otherwise, specify CT/PT ratios and primary WATTS/VARS relative to desired output for a particular model.**

## JUXTA POWER TRANSDUCERS



|                                                     | Standard transducer inputs / outputs              | Model type                  | Model type                  |
|-----------------------------------------------------|---------------------------------------------------|-----------------------------|-----------------------------|
| W<br>A<br>T<br>T<br>-<br>V<br>A<br>R                | <b>120V, 5A AC, 60 Hz, Input powered</b>          | <b>2469 (0.5% Accuracy)</b> | <b>2489 (0.2% Accuracy)</b> |
|                                                     | Watt/Var 1P2W, 0 ± 1mA output (1 Element)         | 246941-540-AFB-0-M          | 248941-540-AFB-0-M          |
|                                                     | Watt/Var 1P2W, 4 - 20mA output (1 Element)*       | 246941-540-AHD-0-M          | 248941-540-AHD-0-M          |
|                                                     | Watt/Var 3P3W, 0 ± 1mA output (2 Element)         | 246943-540-AFB-0-M          | 248943-540-AFB-0-M          |
|                                                     | Watt/Var 3P3W, 4 - 20mA output (2 Element)*       | 246943-540-AHD-0-M          | 248943-540-AHD-0-M          |
|                                                     | Watt/Var 3P4W, 0 ± 1mA output (2½ Element)        | 246944-540-AFB-0-M          | 248944-540-AFB-0-M          |
|                                                     | Watt/Var 3P4W, 4 - 20mA output (2½ Element)*      | 246944-540-AHD-0-M          | 248944-540-AHD-0-M          |
|                                                     | Watt/Var 3P4W, 0 ± 1mA output (3 Element)         | 246945-540-AFB-0-M          | 248945-540-AFB-0-M          |
|                                                     | Watt/Var 3P4W, 4 - 20mA output (3 Element)*       | 246945-540-AHD-0-M          | 248945-540-AHD-0-M          |
| P<br>O<br>W<br>E<br>R<br>F<br>A<br>C<br>T<br>O<br>R | <b>120V, 5A AC, 60 Hz, 0-1- OPF Input powered</b> | <b>2469 (± 0.01PF)</b>      | <b>2489 (± 0.01PF)</b>      |
|                                                     | Power Factor - Single phase / ±1mA output         | 246971-540-AFB-0-P          | 248971-540-AFB-0-P          |
|                                                     | Power Factor - Single phase / 12±8mA output       | 246971-540-AHF-0-P          | 248971-540-AHF-0-P          |
|                                                     | Power Factor - 3P3W balanced / ±1mA output        | 246973-540-AFB-0-P          | 248973-540-AFB-0-P          |
|                                                     | Power Factor - 3P3W balanced / 12±8mA output      | 246973-540-AHF-0-P          | 248973-540-AHF-0-P          |
|                                                     | Power Factor - 3P4W balanced / ±1mA output        | 246974-540-AFB-0-P          | 248974-540-AFB-0-P          |
|                                                     | Power Factor - 3P4W balanced / 12±8mA output      | 246974-540-AHF-0-P          | 248974-540-AHF-0-P          |
| P<br>H<br>A<br>S<br>E<br>A<br>N<br>G<br>L<br>E      | <b>120V, 5A AC, 60 Hz, ±90° PA, Input powered</b> | <b>2469 (± 2° Accuracy)</b> | <b>2489 (± 1° Accuracy)</b> |
|                                                     | Phase Angle - Single phase / ±1mA output          | 246976-540-AFB-0-P          | 248976-540-AFB-0-P          |
|                                                     | Phase Angle - Single phase / 12±8mA output        | 246976-540-AHF-0-P          | 248976-540-AHF-0-P          |
|                                                     | Phase Angle - 3P3W balanced / ±1mA output         | 246977-540-AFB-0-P          | 248977-540-AFB-0-P          |
|                                                     | Phase Angle - 3P3W balanced / 12±8mA output       | 246977-540-AHF-0-P          | 248977-540-AHF-0-P          |
|                                                     | Phase Angle - 3P4W balanced / ±1mA output         | 246978-540-AFB-0-P          | 248978-540-AFB-0-P          |
|                                                     | Phase Angle - 3P4W balanced / 12±8mA output       | 246978-540-AHF-0-P          | 248978-540-AHF-0-P          |
| *<br>I<br>S<br>O<br>L<br>A<br>T<br>O<br>R           | <b>DC Input / Output, 115V AC Aux. powered</b>    | <b>2469 (±0.5%)</b>         |                             |
|                                                     | 0-50mVDC / 0-1mADC                                | 246911-001-AFA-1            |                             |
|                                                     | 0-50mVDC / 4-20mADC                               | 246911-001-AHD-1            |                             |
|                                                     | 0-50mVDC / 0-10VDC                                | 246911-001-VMT-1            |                             |
|                                                     | 0-1mADC / 0-1mADC                                 | 246912-101-AFA-1            |                             |
|                                                     | 0-1mADC / 4-20mADC                                | 246912-101-AHD-1            |                             |
|                                                     | 0-1mADC / 0-10VDC                                 | 246912-101-VMT-1            |                             |
|                                                     |                                                   |                             |                             |
|                                                     |                                                   |                             |                             |

\* Note: VAR outputs are 12±8mA

\*\*Not UL

| General Specifications:    | 2469                                                                                                  | 2489                                    |
|----------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Accuracy:                  | 0.5% of span                                                                                          | 0.2% of reading                         |
| Sustained input overrange: | Voltage: 120% continuous, 150% for 5 seconds<br>Current: 200% continuous, 1000% for 5 seconds         |                                         |
| Outputs:                   | 0 to ±1mA DC into 10kOhm max., 10V DC compliance<br>4 to 20mA DC into 750 Ohm max., 15V DC compliance |                                         |
| Output adjust:             | zero ± 1% minimum<br>span ± 2% minimum                                                                | zero ± 5% minimum<br>span ± 10% minimum |
| Output ripple:             | <0.3% fullscale peak to peak                                                                          | <0.5% fullscale peak to peak            |
| Response time:             | <400 milliseconds 0-99% of full scale                                                                 |                                         |

## CURRENT TRANSFORMERS WITH 5 AMP SECONDARIES

To construct a catalog number select from following tables: [Table One]-[Table Two]-[Table Three]-[Table Four]  
 Example: Model 5SFT - 501 is a CT with a 1.56" hole diameter, square body with mounting plate and terminal studs and a ratio of 500:5 amperes.

[Table One] MODEL TYPE

| Model Code | Exception:   | Hole Diameter (inches) | Primary Amperes | Accuracy                      | Burden (VA) | Approx. Weight (lbs) |
|------------|--------------|------------------------|-----------------|-------------------------------|-------------|----------------------|
|            |              |                        | Min/Max         | Varies with Transformer Ratio |             |                      |
| 2          | RBL, RBT, RT | 1.0 to 1.13            | 50-300A         | 1 - 3%                        | 1.5 - 15.0  | 0.5                  |
| 5          | —            | 1.56                   | 50-1200A        | 1 - 2%                        | 1.0 - 30.0  | 1.0                  |
| 7          | —            | 2.50                   | 150-1600A       | 1%                            | 2.5 - 45.0  | 1.5                  |
| 14         | SHT, SHL     | 0.50                   | 50-100A         | 1.0 - 1.5%                    | 2.5 - 3.0   | 0.9                  |
| 15         | SHT, SHL     | 0.94                   | 50-200A         | 1.0 - 1.5%                    | 2.0 - 12.5  | 0.9                  |
| 16         | SHT, SHL     | 1.25                   | 50-400A         | 1%                            | 1.0 - 15.0  | 0.9                  |
| 56         | SHT, SHL     | 2.06                   | 75-1200A        | 1%                            | 0.5 - 15.0  | 0.6                  |
| 76         | SHT, SHL     | 3.00                   | 200-2000A       | 1%                            | 5.0 - 15.0  | 0.9                  |

[Table Two] MOUNTING/CASE STYLE

| Case Code | Description                                   |
|-----------|-----------------------------------------------|
| SH        | Square Body without Integral Mounting Plate   |
| SF        | Square Body with Integral Mounting Plate      |
| R         | Round Body without Removable Mounting Bracket |
| RB        | Round Body with Removable Mounting Bracket    |

[Table Three] CONNECTIONS

| Connection Code | Description                                     |
|-----------------|-------------------------------------------------|
| T               | 8-32 Brass Terminal Studs with Nut & Flatwasher |
| L               | #16 AWG, 24 inches long (UL1015 - 105°C)        |

[Table Four] CURRENT RATIO

| Insert First 2 Digits of Primary Current Rating                                                                                                                                                                                                                                                                                                                               | Insert Multiplier | Result   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------|
| Example: 50                                                                                                                                                                                                                                                                                                                                                                   | $0 = \times 10^0$ | 50 : 5   |
|                                                                                                                                                                                                                                                                                                                                                                               | $1 = \times 10^1$ | 500 : 5  |
|                                                                                                                                                                                                                                                                                                                                                                               | $2 = \times 10^2$ | 5000 : 5 |
| To select the transformer ratio, the first 2 digits in Table 4 equal the 2 most significant digits (MSD) of the transformer fullscale current. The last digit is the multiplier, it is equal to the number of zeros of the primary current. Some transformers will have 3 MSD (ex. 125:5). The multiplier will go after the third digit. An example of a 125:5 CT is 2RL-1250 |                   |          |

**Notes:**

- (1) Yokogawa Current and Potential Transformers are component recognized under UL E93779 and CSA LR89403
- (2) All CT's are insulation class 0.6kV, BIL 10kV full wave. Frequency 50 - 400 Hz.
- (3) For complete information please request catalog 500CTPT-B.



RT



SFT



RL



RBL



RBT