ANALOGUE INSTRUMENTS FOR MARINE APPLICATIONS

High quality analogue instruments designed to measure a wide range of electrical parameters. This comprehensive range offers quadratic instruments in different dimensions. Products are available as voltmeters, ammeters, voltmeters and ammeters incorporating a selector switch, power meters, energy meters incorporating a power indicator, process indicators and synchroscopes. To suit the needs of the shipbuilding and associated industries, manufacturing equipment for sea-going vessels, these instruments are CE marked and approved by Bureau Veritas (BV) under certification numbers 38933/A0 BV, 38940/A0 BV, 38941/A0 BV, 38942/A0 BV.

Features
- Extensive range
- Accurate measurement and display of electrical parameters
- Up to four different case sizes
- Wide range of specifications
- Designed for reliable operation in marine and offshore environments

Benefits
- Cost effective
- Local indication
- Easy installation
- Minimal operator training
- Low maintenance level

Applications
- Switchgear
- Distribution systems
- Control panels
- Process control
- Motor control

Approval
- Bureau Veritas

Standards
- CE marked
- BV approved
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MOVING IRON AMMETERS AND VOLTMETERS

Features
- Measures AC current or voltage
- Direct or CT connected ammeters
- Direct or VT connected voltmeters
- Moving iron movement
- RMS measurement
- Scaled down to 15%
- Ammeters available with x2 or x6 overload scale

Benefits
- Easy to operate
- Exchangeable dial
- Terminal cover included

Applications
- AC switchgears, panels and distribution boards
- Motor current supervision

Construction
- Sprung pivot bearing type with silicon oil damping
- Slot in screw fixing

Standards
- CE marked
- BV approved

General Specification
- Accuracy class - 1.5
- Maximum continuous overload - 1.2 x In, 1.2 x Un
- Maximum short duration overload - 10xIn - 9x0.5s+1x5s/60s - 2xUn - 9x0.5s+1x5s/60s
- Ammeter burden - 0.3 ... 1.2 VA
- Voltmeter burden - 1.5 ... 4 VA
- Frequency - 50/60 Hz

Product Codes

<table>
<thead>
<tr>
<th>Bezel size (mm)</th>
<th>48</th>
<th>72</th>
<th>96</th>
<th>144</th>
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</thead>
<tbody>
<tr>
<td>Scale length (mm)</td>
<td>41</td>
<td>62</td>
<td>92</td>
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<table>
<thead>
<tr>
<th>AC ammeter</th>
<th>M242-02A-S</th>
<th>M243-02A-S</th>
<th>M244-02A-S</th>
<th>M246-02A-S</th>
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</thead>
<tbody>
<tr>
<td>X2 AC ammeter</td>
<td>M242-022A-S</td>
<td>M243-022A-S</td>
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<td>M246-022A-S</td>
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<tr>
<td>X6 AC ammeter</td>
<td>M242-026A-S</td>
<td>M243-026A-S</td>
<td>M244-026A-S</td>
<td>M246-026A-S</td>
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<tr>
<td>AC voltmeter</td>
<td>M242-02V-S</td>
<td>M243-02V-S</td>
<td>M244-02V-S</td>
<td>M246-02V-S</td>
</tr>
</tbody>
</table>

Standard input ranges

<table>
<thead>
<tr>
<th>AC ammeter (0/x A)</th>
<th>1, 2, 5, 4, 5, 6, 10, 15, 20, 25, 30, 40, 60 A (M242 limited to 25A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X2 AC ammeter (0/x A)</td>
<td>1/2, 2/4, 2.5/5, 4/8, 5/10, 60/120, 10/20, 15/30, 20/40, 30/60, 40/80, 60/120 A (M242 limited to 25/50A)</td>
</tr>
<tr>
<td>X6 AC ammeter (0/x A)</td>
<td>1/6, 2/12, 2.5/15, 4/24, 5/30, 6/36, 10/60, 15/90, 20/120, 25/150, 30/180, 40/240, 50/300, 60/360 A (M242 limited to 25/150 A)</td>
</tr>
<tr>
<td>AC voltmeter (0/x V)</td>
<td>250V, 300V, 500V, 600V</td>
</tr>
<tr>
<td>AC voltmeter for VT connection (0/x V)</td>
<td>120V (for use with VT’s x/100V), 132V (for use with VT’s x/110V), 144V (for use with VT’s 120V), 125V, 137.5V, 150V (for use with some VT’s having primary voltage less than 1kV)</td>
</tr>
</tbody>
</table>

Connection Diagrams

AC Ammeter
- Direct Connected
- C.T. Connected

AC Voltmeter
- Line-Line Voltage
- Line/Neutral Voltage

Order data/examples

Ammeter
1) Select type: M243-02A-S,
2) Specify input: 0-5A,
3) Specify scaling: 0-100A,
4) Specify frequency: 50/60Hz

Voltmeter
1) Select type: M244-02V-S,
2) Specify input: 0-500V,
3) Specify scaling: 0-500V,
4) Specify frequency: 50/60Hz

Voltmeter, VT connected
1) Select type: M244-02V-S,
2) Specify input: 0-120V,
3) Specify scaling: 0-12kV,
4) Specify frequency: 50/60Hz,
5) Specify VT ratio: 10/0.1 kV
AC AMMETERS AND VOLTMETERS RECTIFIED

General Specification
• Accuracy class - 1.5
• Maximum continuous overload - 1.2 x In, 1.2 x Un
• Maximum short duration overload - 10xIn - 9x0.5s+1x5s/60s - 2xUn - 9x0.5s+1x5s/60s
• Frequency - 50/60 Hz

Product Codes

Bezel size (mm) | 48 | 72 | 96 | 144
---|---|---|---|---
Scale length (mm) | 41 | 62 | 92 | 135

AC ammeter rectified 90° | M242-01B-S | M243-01B-S | M244-01B-S | M246-01B-S
AC voltmeter rectified 90° | M242-01W-S | M243-01W-S | M244-01W-S | M246-01W-S

Bezel size (mm) | 48 | 72 | 96 | 144
---|---|---|---|---
Scale length (mm) | 71 | 113 | 155 | 235

AC ammeter rectified 240° | M242-05B-S | M243-05B-S | M244-05B-S | M246-05B-S
AC voltmeter rectified 240° | M242-05W-S | M243-05W-S | M244-05W-S | M246-05W-S

Standard input ranges
AC ammeter rectified 90° and 240° scaling (O/x A) meter (O/x A) 1, 5 A (M242-05B-S delivered with separated current transformer)
AC voltmeter rectified 90° and 240° scaling (O/x V) 20, 15, 30, 60, 100, 150, 250, 300 (limit at M242). 400, 500, 600 V
AC voltmeter for VT connection (O/x V) 120V (for use with VT’s x/100V), 132V (for use with VT’s x/110V), 144V (for use with VT’s 120V), 125V, 137.5V, 150V (for use with some VT’s having primary voltage less than 1kV)

Connection Diagrams

Order data/examples
Ammeter
1) Select type: M243-01B-S,
2) Specify input: 0-1A,
3) Specify scaling: 0-1kA,
4) Specify frequency: 50/60Hz

Voltmeter
1) Select type: M244-05W-S,
2) Specify input: 0-500V,
3) Specify scaling: 0-500V,
4) Specify frequency: 50/60Hz

Voltmeter, VT connected
1) Select type: M244-05W-S,
2) Specify input: 0-120V,
3) Specify scaling: 0-12kV,
4) Specify frequency: 50/60Hz,
5) Specify VT ratio: 10/0.1 kV

Features
• Measures AC current or voltage
• CT connected ammeters
• Direct and VT connected voltmeters
• Moving iron movement
• Linear scaling
• 90° short scale and 240° long scale versions

Benefits
• Easy to operate
• Exchangeable dial
• Low consumption
• Terminal cover included

Applications
• AC switchgears, panels and distribution boards

Construction
• Mean value measurement of current or voltage
• Containing germanium diodes of low reverse current
• Slot in screw fixing

Standards
• CE marked
• BV approved
DC AMMETERS AND VOLTMETERS

General Specification
• Accuracy class - 1.5
• Maximum continuous overload - 1.2 x In, 1.2 x Un
• Maximum short duration overload -
  10xIn - 9x0.5s+1x5s/60s
  2xUn - 9x0.5s+1x5s/60s

Features
• Measures DC current or voltage
• Direct and shunt connected ammeters
• Direct connected voltmeters
• Live zero ammeters and voltmeters
• Centre zero ammeters and voltmeters
• Moving coil movement
• Linear scaling
• 90° short scale and 240° long scale version

Benefits
• Easy to operate
• Exchangeable dial
• Terminal cover included

Applications
• DC switchgears, panels and distribution boards
• Control boards
• Process indication
• Battery supervision

Construction
• Magnet core none sensitive to external fields
• Slot in screw fixing

Standards
• CE marked
• BV approved
### Product Codes

<table>
<thead>
<tr>
<th>Bezel size (mm)</th>
<th>48</th>
<th>72</th>
<th>96</th>
<th>144</th>
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<tbody>
<tr>
<td>Scale length (mm)</td>
<td>41</td>
<td>62</td>
<td>92</td>
<td>135</td>
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<tr>
<td>DC ammeter 90°</td>
<td>M242-01A-S</td>
<td>M243-01A-S</td>
<td>M244-01A-S</td>
<td>M246-01A-S</td>
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<tr>
<td>DC voltmeter 90°</td>
<td>M242-01V-S</td>
<td>M243-01V-S</td>
<td>M244-01V-S</td>
<td>M246-01V-S</td>
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<tr>
<td>DC ammeter 90° live zero</td>
<td>M242-01R-S</td>
<td>M243-01R-S</td>
<td>M244-01R-S</td>
<td>M246-01R-S</td>
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<tr>
<td>DC voltmeter 90° live zero</td>
<td>M242-01S-S</td>
<td>M243-01S-S</td>
<td>M244-01S-S</td>
<td>M246-01S-S</td>
</tr>
<tr>
<td>DC ammeter 90° centre zero</td>
<td>M242-01C-S</td>
<td>M243-01C-S</td>
<td>M244-01C-S</td>
<td>M246-01C-S</td>
</tr>
<tr>
<td>DC voltmeter 90° centre zero</td>
<td>M242-01N-S</td>
<td>M243-01N-S</td>
<td>M244-01N-S</td>
<td>M246-01N-S</td>
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<tr>
<td>Bezel size (mm)</td>
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<td>Scale length (mm)</td>
<td>71</td>
<td>113</td>
<td>155</td>
<td>235</td>
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<tr>
<td>DC ammeter 240°</td>
<td>M242-05A-S</td>
<td>M243-05A-S</td>
<td>M244-05A-S</td>
<td>M246-05A-S</td>
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<tr>
<td>DC voltmeter 240°</td>
<td>M242-05V-S</td>
<td>M243-05V-S</td>
<td>M244-05V-S</td>
<td>M246-05V-S</td>
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<tr>
<td>DC ammeter 240° live zero</td>
<td>M242-05R-S</td>
<td>M243-05R-S</td>
<td>M244-05R-S</td>
<td>M246-05R-S</td>
</tr>
<tr>
<td>DC voltmeter 240° live zero</td>
<td>M242-05S-S</td>
<td>M243-05S-S</td>
<td>M244-05S-S</td>
<td>M246-05S-S</td>
</tr>
<tr>
<td>DC ammeter 240° centre zero</td>
<td>M242-05C-S</td>
<td>M243-05C-S</td>
<td>M244-05C-S</td>
<td>M246-05C-S</td>
</tr>
<tr>
<td>DC voltmeter 240° centre zero</td>
<td>M242-05N-S</td>
<td>M243-05N-S</td>
<td>M244-05N-S</td>
<td>M246-05N-S</td>
</tr>
</tbody>
</table>

### Standard input ranges

- **DC ammeter 90° and 240° scaling (0/x A)**
  - 1, 1.5, 2.5, 4, 5, 6, 10, 15, 20, 25 (limit on M242), 30, 40, 50, 60 A
  - 0-1, 0-5, 0-10, 0-20, 4-20 mA, 0-50, 0-60, 0-75 mV
  - 1-0-1, 1.5-0-1.5, 2.5-0-2.5, 4-0-4, 5-0-5, 6-0-6, 10-0-10 (limit on M242), 15-0-15, 20-0-20, 25-0-25, 30-0-30 A
  - 10-0-10, 15-0-15, 20-0-20 mA, 50-0-50, 60-0-60, 75-0-75 mV

- **DC ammeter 240° scaling, process and shunt indicators**
  - 0-10, 20-0-20 mA, 30-0-30, 50-0-50, 60-0-60, 75-0-75 mV

- **DC voltmeter 90° and 240° scaling (0/x V)**
  - 10, 15, 20, 30, 60, 100, 150, 250, 300 (limit on M242), 400, 500, 600 V
  - 1-5, 2-10 V

- **DC voltmeter 90° and 240° scaling, centre zero (x-0-x V)**
  - 10-0-10, 15-0-15, 20-0-20 mA, 50-0-50, 60-0-60, 75-0-75 mV
  - 10-0-10, 15-0-15, 20-0-20 mA, 50-0-50, 60-0-60, 75-0-75 mV
  - 20-0-20 mA, 50-0-50, 60-0-60, 75-0-75 mV

### Connection Diagrams

**DC Voltmeter**

**DC Ammeter**

**Transducer Indicator**

### Order data/examples

**Ammeter**

- **Example A**
  1) Select type: M243-01A-S,
  2) Specify input: 0-10 A,
  3) Specify scaling: 0-10 A

- **Example B**
  1) Select type: M244-05R-S,
  2) Specify input: 4-20 mA,
  3) Specify scaling: 0-100 MVA

**Voltmeter**

- **Example A**
  1) Select type: M244-01C-S,
  2) Specify input: 60-0-60 mV,
  3) Specify scaling: 150-0-150 A

- **Example B**
  1) Select type: M244-05S-S,
  2) Specify input: 2-10 V,
  3) Specify scaling: 0-100 %

- **Example C**
  1) Select type: M244-01C-S,
  2) Specify input: 0-15 V,
  3) Specify scaling: 0-15 V

- **Example B**
  1) Select type: M242-01N-S,
  2) Specify input: 10-0-10 V,
  3) Specify scaling: 20-0-20 A
AC AMMETERS AND VOLTMETERS WITH SELECTOR SWITCH

**Features**
- Measures AC current or voltage
- CT connected ammeters
- Direct and VT connected voltmeters
- Voltmeter available in 72mm x 72mm and 96mm x 96 mm
- Ammeter with moving coil rectified movement
- Voltmeter with moving iron movement

**Benefits**
- Easy to operate
- Exchangeable dial
- Terminal cover included
- Space saving
- Clear link between switch and meter

**Applications**
- AC switchgears, panels and distribution boards
- Control boards

**Construction**
- Ammeter measures mean value of rectified current
- Voltmeter measures true RMS value independent from waveform
- Slot in screw fixing

**Standards**
- CE marked
- BV approved

**Connection Diagrams**

**Order data/examples**

**Ammeter with switch**
1) Select type: M244-02E-S,
2) Specify input: 0-5A,
3) Specify scaling: 0-100A,
4) Specify frequency: 50/60Hz

**Voltmeter, VT connected**
1) Select type: M244-02Q-S,
2) Specify input: 0-120V,
3) Specify scaling: 0-12kV,
4) Specify frequency: 50/60Hz,
5) Specify VT ratio: 10/0.1 kV
FREQUENCY METERS
WITH POINTER OR REEDS

Features
• Measures AC frequencies
• Pointer type available as 90° short scale and 240° long scale version
• Reed type available with
  - 13 reeds (47-53 Hz, 57-63 Hz)
  - 21 reeds (45-55 Hz, 55-65 Hz)
• Direct or VT connected

Benefits
• Easy to operate
• High visibility
• Terminal cover included

Applications
• AC switchgears, panels and distribution boards
• Control board
• Generator sets

Construction
• Pointer type contains internal transducer, powered from input voltage and moving coil meter
• Reed type uses steel reeds in an electromagnetic field. Reeds are calibrated to its individual frequency to vibrate in resonance with the electromagnet and vibrates at full amplitude

Standards
• CE marked
• BV approved

General Specification
• Accuracy class - 0.5 - 1.2 x Un continuously
• Overload - 1.5 x Un for 2 hours (pointer type only) - 2 x Un for 5 seconds - 1 VA at nominal voltage 57-110 V and 230 V
• Burden pointer type - 1.7 VA at nominal voltage 400V - 2VA at nominal voltage 500V
• Burden reed type - 0.7 ... 1.2 VA at nominal voltage 110-230 V - 1.4 ... 2 VA at all other nominal voltages

Product Codes

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<th>96</th>
<th>96</th>
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<tr>
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<td>Scale length (mm)</td>
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<td>Frequency meter 90°</td>
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<tr>
<td>Frequency meter 240°</td>
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<td>M244-41L-S</td>
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<tr>
<td>Frequency meter 13 reeds</td>
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<td>-</td>
<td>M244-41R-S</td>
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<tr>
<td>Frequency meter 21 reeds</td>
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<td>M244-41R-S</td>
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<table>
<thead>
<tr>
<th>Standard input ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pointer type</td>
</tr>
</tbody>
</table>
| 57-110 V, 400V +/- 20%, 500V +/-0%
| Reed type              |
| 100V, 110V, 230V, 400V +/- 20%, 500V +/-0%

<table>
<thead>
<tr>
<th>Scaling</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 reeds on reed type meters with scaling: 45-50-55 Hz, 55-60-65 Hz</td>
</tr>
<tr>
<td>21 reeds on reed type meters with scaling: 45-50-55 Hz, 55-60-65 Hz</td>
</tr>
<tr>
<td>Scaling on 90° and 240° pointer types: 45-50-55 Hz, 55-60-65 Hz, 45-55-65 Hz</td>
</tr>
</tbody>
</table>

Connection Diagrams

Order data/examples

**Pointer type 90°**
1) Select type: M244-41S-S, 2) Specify input voltage: 400V, 3) Specify frequency: 45/55 Hz, 4) Specify scaling: 45-50-55 Hz

**Pointer type 240°**
1) Select type: M244-41L-S, 2) Specify input voltage: 57-110V, 3) Specify frequency: 45/65 Hz, 4) Specify scaling: 45-55-65 Hz

**Reed type 13 reeds**
1) Select type: M244-41R-S, 2) Specify input voltage: 230V, 3) Specify frequency: 47/53 Hz, 4) Specify scaling: 47-50-53 Hz

**Reed type 21 reeds**
1) Select type: M244-41R-S, 2) Specify input voltage: 110V, 3) Specify frequency: 55/65 Hz, 4) Specify scaling: 55-60-65 Hz
PHASE SEQUENCE INDICATOR

Features
- Determines phase sequence in a 3-phase network
- Glow bulbs indicate L1, L2, L3 phase sequence

Benefits
- Easy to operate
- Terminal cover included

Applications
- AC switchgears, panels and distribution boards
- Control board
- Generator sets

Standards
- CE marked
- BV approved

General Specification
- Standard input ranges - 200-500 V, 50/60 Hz

Product Codes

<table>
<thead>
<tr>
<th>Bezel size (mm)</th>
<th>96</th>
<th>-</th>
<th>-</th>
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<tbody>
<tr>
<td>Scale length (mm)</td>
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<tr>
<td>Phase sequence indicator</td>
<td>M244-12P-S</td>
<td>-</td>
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</tr>
</tbody>
</table>

Order data/examples

Phase sequence indicator
1) Select type: M244-12P-S,
2) Specify input voltage: 200-500V,
3) Specify frequency: 50 or 60 Hz

Connection Diagrams
DUAL VOLTMETER AND FREQUENCY METER

Features
- Measures AC frequencies of two independent systems
- Pointer type dual voltmeter and frequency meter with two independent 90° short scale movements
- Reed type available with two independent measuring circuits - 21 reeds (45-55 Hz, 55-65 Hz)
- Direct or VT connected

Benefits
- Easy to operate
- High visibility
- Terminal cover included

Applications
- AC switchgears, panels and distribution boards
- Control board
- Generator sets

Construction
- Pointer type contains internal transducer, powered from input voltage and moving coil meter
- Reed type uses steel reeds in an electromagnetic field. Reeds are calibrated to its individual frequency to vibrate in resonance with the electromagnet and vibrates at full amplitude
- Slot in screw fixing

Standards
- CE marked
- BV approved

General Specification
- Accuracy class dual voltmeter - 1.5
- Accuracy class dual frequency meter - pointer type - 1
- Accuracy class dual frequency meter - reed type - 0.5
- Overload - 10xIn - 9x0.5s+1x5s/60s
- Dual voltmeter - 2xUn - 9x0.5s+1x5s/60s
- Dual frequency meter - pointer type - 1.2 x Un continuously, 1.5 x Un for 2 hours (pointer type only)
- Dual frequency meter - reed type - 2 x Un for 5 seconds
- Burden frequency meter - pointer type - 1 VA at nominal voltage 57-110 V and 230 V - 1.7 VA at nominal voltage 400 V - 2 VA at nominal voltage 500V
- Burden frequency meter - reed type - 0.7 ... 1.2 VA at nominal voltage 110-230 V - 1.4 ... 2 VA at all other nominal voltages

Product Codes

<table>
<thead>
<tr>
<th>Bezels (mm)</th>
<th>96</th>
<th>96</th>
<th>96</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale length (mm)</td>
<td>41</td>
<td>41</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Voltmeter meter 2 x 90°</td>
<td>M244-80L-S</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Frequency meter 2 x 90°</td>
<td>-</td>
<td>M244-41D-S</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Frequency meter 2 x 21 reeds</td>
<td>-</td>
<td>-</td>
<td>M244-41E-S</td>
<td>-</td>
</tr>
</tbody>
</table>

Standard input ranges

- Dual voltmeter (direct connected) 300V, 500V
- Dual voltmeter (VT connected) 120V (for use with VT’s x/100V), 132V (for use with VT’s x/110V), 144V (for use with VT’s 120V), 125V, 137.5V, 150V (for use with some VT’s having primary voltage less than 1kV)
- Dual frequency meter - pointer type 57-110 V, 400V +/- 20%, 500 V +/-20%
- Dual frequency meter - reed type 100V, 110V, 230V, 400V +/- 20%, 500 V +/-20%

Scaling

- Dual voltmeter Specify to suit application
- Dual frequency meter - pointer type 45-50-55 Hz, 55-60-55 Hz, 45-55-65 Hz
- Dual frequency meter - reed type 45-50-55 Hz, 55-60-65 Hz

Connection Diagrams

Order data/examples

- Dual voltmeter - LV direct connected
  1) Select type: M244-80L-S,
  2) Specify input voltage: 500V,
  3) Specify scaling: 0-500V,
  4) Specify frequency: 50 Hz

- Dual voltmeter - VT connected
  1) Select type: M244-80L-S,
  2) Specify input: 0-120V,
  3) Specify scaling: 0-12kV,
  4) Specify frequency: 50Hz,
  5) Specify VT ratio: 10/0.1 kV

- Dual frequency meter - pointer type
  1) Select type: M244-41D-S,
  2) Specify input voltage: 400V,
  3) Specify frequency: 45/65 Hz,
  4) Specify scaling: 45-55-65 Hz

- Dual frequency meter - reed type
  1) Select type: M244-41E-S,
  2) Specify input voltage: 110V,
  3) Specify frequency: 55/65 Hz,
  4) Specify scaling: 55-60-65 Hz
POWER FACTOR Meters

Features
- Indicates Power factor of electrical systems
- Several voltage ranges available
- Current connection via “through hole” CT on the instrument. No need to interrupt wiring from CT

Benefits
- Easy to operate
- High visibility
- Terminal cover included
- Low self consumption
- Internal power supply from voltage input

Applications
- AC switchgears, panels and distribution boards
- Control boards
- Generator sets

Construction
- Instruments operate on a fast sampling method of input quantities (current and voltage) of the connected phases
- Meters include “through hole” CT connection, voltage dividers, internal microprocessor and power supply unit
- Slot in screw fixing

Standards
- CE marked
- BV approved

General Specification
- Accuracy class - 1.5
- Maximum continuous overload - 3 x In, 1.5 x Un
- Maximum short duration overload - 25 x In for 30 seconds, 50 x In for 1 second, 2 x Un for 10 seconds
- Voltage burden - <0.1VA per phase
- Current burden - <0.1VA per phase
- Frequency - 50/60 Hz

Product Codes

| Bezel size (mm) | 96 | 96 | 96 | 96 | 96 |
| Scale length (mm) | 95 | 95 | 95 | 95 | 95 |
| Power factor meter 90° | M244-420-S Single-phase | M244-421-S 3P/3W balanced | M244-422-S 3P/4W balanced | M244-423-S 3P/3W unbalanced | M244-424-S 3P/4W unbalanced |
| Bezel size (mm) | 96 | 96 | 96 | 96 | 96 |
| Scale Length (mm) | 135 | 135 | 135 | 135 | 135 |
| Power factor meter 240° | M244-135-S Single-phase | M244-136-S 3P/3W balanced | M244-13D-S 3P/4W balanced | M244-13S-S 3P/3W unbalanced | M244-139-S 3P/4W unbalanced |

Standard input ranges

| Single-phase, 3P/4W balanced, 3P/4W unbalanced | 57.7V L-N/1A, 57.7V L-N/5A, 63.5V L-N/1A, 63.5V L-N/5A, 69.3V L-N/1A, 9.3V L-N/5A, 230V L-N/1A, 230V L-N/5A, 240V L-N/1A, 254V L-N/5A, 100V L-L/1A, 100V L-L/5A, 110V L-L/1A, 110V L-L/5A, 400V L-L/1A, 400V L-L/5A, 415V L-L/1A, 415V L-L/5A, 440V L-L/1A, 440V L-L/5A |

Scaling 0.5/1/0.5 CAP/IND or 0.8/1/0.2 CAP/IND

Connection Diagrams

Order data/examples

Single-phase
1) Select type: M244-420-S, 2) Specify input voltage and current: 230V L-N/5A, 3) Specify scaling: 0.5/1/0.5 CAP/IND, 4) Specify frequency: 50/60 Hz

3-phase 4-wire balanced
1) Select type: M244-13D-S, 2) Specify input voltage and current: 230V L-N/5A, 3) Specify scaling: 0.8/1/0.2 CAP/IND, 4) Specify frequency: 50/60 Hz

3-phase 4-wire unbalanced
1) Select type: M244-13B-S, 2) Specify input voltage and current: 415V L-L/1A, 3) Specify scaling: 0.5/1/0.5 CAP/IND, 4) Specify frequency: 50/60 Hz

3-phase 3-wire balanced
1) Select type: M244-136-S, 2) Specify input voltage and current: 110V L-L/5A, 3) Specify scaling: 0.5/1/0.5 CAP/IND, 4) Specify frequency: 50/60 Hz

3-phase 3-wire unbalanced
1) Select type: M244-138-S, 2) Specify input voltage and current: 415V L-L/1A, 3) Specify scaling: 0.5/1/0.5 CAP/IND, 4) Specify frequency: 50/60 Hz
WATTMETERS

Features
- Indicates active power of electrical systems
- Several voltage ranges available
- Current connection via “through hole” CT on the instrument. No need to interrupt wiring from CT

Benefits
- Easy to operate
- High visibility
- Terminal cover included
- Low self consumption
- Internal power supply from voltage input

Applications
- AC switchgears, panels and distribution boards
- Control boards
- Generator sets

Construction
- Instruments operate on a fast sampling method of input quantities (current and voltage) of the connected phases
- Meters include “through hole” CT connection, voltage dividers, internal microprocessor and power supply unit
- Slot in screw fixing

Standards
- CE marked
- BV approved

Calculation of end scale value
End scale value is calculated using the formula below, where correct voltage must be selected (either L-N or L-L), depending on the electrical system and the type of meter used. Scale factor, e.g. the relation between end scale value and nominal apparent power (cos-phi = 1) must be between 0.6 to 1.2. It is recommended selecting the scale value from 1 - 1.2 - 1.25 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 – 8 (and their decades) closest to the calculated result.

Electrical system Formula Example End scale value to choose (considering 0.6 to 1.2 x S)

Single-phase, direct voltage connection
P = U(L-N) x Ip x cos φ
P = 230V x 50A x 0.9 = 10350 W = 10.35 kW
10 kW

3-phase 4-wire, direct voltage connection (balanced or unbalanced)
P = 3 x U(L-N) x Ip x cos φ
P = 3 x 230V x 400A x 0.95 = 262200 W = 262.2 kW
250 kW

3-phase 3-wire, direct voltage connection via VT (balanced or unbalanced)
P = 3 x U(L-L) x Ip x cos φ
P = 3 x 380V x 100A x 0.9 = 348000 W = 34.8 kW
600 kW

3-phase 3-wire, voltage connection via VT (balanced or unbalanced)
P = 3 x Up(L-L) x Ip x cos φ
P = 3 x 23000V x 50A x 0.9 = 3435000 W = 34.35 MW
1.5 MW

Order data/examples

Single-phase
1) Select type: M244-210-S,
2) Specify input voltage and CT ratio: 230V L-N, 50/5A,
3) Specify scaling: 0-10 kW,
4) Specify frequency: 50/60 Hz.

3-phase 4-wire balanced or 3-phase 4-wire unbalanced
1) Select type: M244-213-S,
2) Specify input voltage and CT ratio: 400V L-L, 100/5A,
3) Specify scaling: 0-600 kW,
4) Specify frequency: 50/60 Hz.

3-phase 3-wire balanced or unbalanced
1) Select type: M244-214-S,
2) Specify input VT ratio and CT ratio: 5770/57.7V L-N, 100/5A,
3) Specify scaling: 0-1.5 MW,
4) Specify frequency: 50/60 Hz.
1) Select type: M244-310-S, Single-phase
2) Specify input voltage and CT ratio:
   Single-phase, 3P/4W balanced
   Single-phase, 3P/4W unbalanced
   3-phase 3-wire balanced
   3-phase 3-wire unbalanced
   3-phase 4-wire balanced
   3-phase 4-wire unbalanced
3) Specify scaling: 0-6 kvar
4) Specify frequency: 50/60 Hz

**Features**
- Indicates reactive power of electrical systems
- Several voltage ranges available
- Current connection via “through hole” CT on the instrument. No need to interrupt wiring from CT.

**Benefits**
- Easy to operate
- High visibility
- Terminal cover included
- Low self consumption
- Internal power supply from voltage input

**Applications**
- AC switchgears, panels and distribution boards
- Control boards
- Generator sets

**Construction**
- Instruments operate on a fast sampling method of input quantities (current and voltage) of the connected phases.
- Meters include “through hole” CT connection, voltage dividers, internal microprocessor and power supply unit.
- Slot in screw fixing

**Standards**
- CE marked
- BV approved

### General Specification
- Accuracy class - 1.5
- Maximum continuous overload - 3 x In, 1.5 x Un
- Maximum short duration overload - 25 x In for 30 seconds, 50 x In for 1 second, 2 x Un for 10 seconds
- Voltage burden - <0.1VA per phase
- Current burden - <0.1VA per phase
- Frequency - 50/60 Hz

**Product Codes**

| Bezel size (mm) | 96 | 96 | 96 | 96 | 96 |
| Scale length (mm) | 95 | 95 | 95 | 95 | 95 |
| Varmeter 90° | M244-310-S Single-phase | M244-311-S 3P/3W balanced | M244-313-S 3P/3W unbalanced | M244-314-S 3P/4W unbalanced |
| Bezel size (mm) | 96 | 96 | 96 | 96 |
| Scale length (mm) | 135 | 135 | 135 | 135 |
| Varmeter 240° | M244-315-S Single-phase | M244-316-S 3P/3W balanced | M244-318-S 3P/3W unbalanced | M244-319-S 3P/4W unbalanced |

**Standard input ranges**
- Single-phase, 3P/4W balanced, 3P/4W unbalanced: 57.7V L-N/1A, 57.7V L-N/5A, 63.5V L-N/1A, 63.5V L-N/5A, 230V L-N/1A, 230V L-N/5A, 240V L-N/1A, 240V L-N/5A, 254V L-N/1A, 254V L-N/5A,
- 3P/3W balanced, 3P/3W unbalanced: 100V L-L/1A, 100V L-L/5A, 110V L-L/1A, 110V L-L/5A, 400V L-L/1A, 400V L-L/5A, 415V L-L/1A, 415V L-L/5A, 440V L-L/1A, 440V L-L/5A

**Calculation of end scale value**
End scale value is calculated using the formula below, where correct voltage must be selected (either L-N or L-L), depending on the electrical system and the type of meter used. Scale factor, e.g. the relation between end scale value and nominal apparent power (cos-phi = 1), must be between 0.6 to 1.2.

\[
\varphi = \text{power factor}
\]

\[
\text{Ip} = \text{CT primary current}, \quad \text{Up} = \text{VT primary voltage}, \quad U = \text{direct connected voltage},
\]

\[
q = 1,14312 \text{ Mvar}
\]

\[
50A \times 0,44 = 1143120
\]

\[
P = 1.732 \times 30000\text{V} \times \text{Ip} \times \text{sin} \varphi
\]

\[
344469 \text{ kvar}
\]

\[
Q = 1,732 \times \text{Up(L-L)} \times \text{Ip} \times \text{sin} \varphi
\]

\[
344469 \text{ kvar}
\]

\[
P = 3 x 5770\text{V} \times 100\text{A} \times 0,44 = 344469 \text{ kvar}
\]

\[
Q = 3 x 230\text{V} \times 50\text{A} \times 0,44
\]

\[
304832 \text{ var} = 304,8 \text{ kvar}
\]

\[
Q = 230\text{V} \times 50\text{A} \times 0,44
\]

\[
5060 \text{ var} = 5,06 \text{ kvar}
\]

\[
Q = 1.732 \times \text{Up(L-N)} \times \text{Ip} \times \text{sin} \varphi
\]

\[
1143120 \text{ var} = 1,14312 \text{ Mvar}
\]

**Order data/examples**

**Single-phase**
1) Select type: M244-310-S,
2) Specify input voltage and CT ratio: 230V L-N, 50/5A,
3) Specify scaling: G-6 kvar,
4) Specify frequency: 50/60 Hz,

**3-phase 4-wire balanced or 3-phase 4-wire unbalanced**
1) Select type: M244-31D-S,
2) Specify input voltage and CT ratio: 230 V L-N, 400/5A,
3) Specify scaling: 0-200 kvar,
4) Specify frequency: 50/60 Hz

**3-phase 3-wire balanced or unbalanced**
1) Select type: M244-313-S,
2) Specify input voltage and CT ratio: 400V L-L, 1000/1A,
3) Specify scaling: 0-500 kvar,
4) Specify frequency: 50/60 Hz

**3-phase 4-wire balanced or unbalanced, VT connected**
1) Select type: M244-314-S,
2) Specify VT ratio and CT ratio: 5770/57.7V L-N, 100/5A,
3) Specify scaling: 0-1 Mvar,
4) Specify frequency: 50/60 Hz
Wiring Diagrams of Wattmeters and Varmeters

Single-phase, direct or VT voltage connection

- Wattmeter M244-210-S
- Wattmeter M244-215-S
- Varmeter M244-310-S
- Varmeter M244-315-S

3-phase 3-wire balanced, direct or VT voltage connection

- Wattmeter M244-211-S
- Wattmeter M244-216-S
- Varmeter M244-311-S
- Varmeter M244-316-S

3-phase 4-wire balanced, direct or VT voltage

- Wattmeter M244-21C-S
- Wattmeter M244-21D-S
- Varmeter M244-31C-S
- Varmeter M244-31D-S

3-phase 3-wire unbalanced, direct or VT voltage connection

- Wattmeter M244-213-S
- Wattmeter M244-218-S
- Varmeter M244-313-S
- Varmeter M244-318-S

3-phase 4-wire unbalanced, direct or VT voltage connection

- Wattmeter M244-214-S
- Wattmeter M244-219-S
- Varmeter M244-314-S
- Varmeter M244-319-S
**Active Energy Meter**  
**With Power Indicator**

### Features
- Counts electrical active energy and indicates active power of electrical systems
- Several voltage ranges available
- Current connection via "through hole” CT on the instrument. No need to interrupt wiring from CT
- Pulsed output as standard

### Benefits
- High visibility
- Terminal cover included
- Low self consumption
- Separated power supply

### Applications
- AC switchgears, panels and distribution boards
- Control boards
- Generator sets

### Construction
- Instruments operate on a fast sampling method of input quantities (current and voltage) of the connected phases
- Meters include “through hole” CT connection, voltage dividers, internal microprocessor and power supply unit
- Slot in screw fixing

### Standards
- CE marked
- BV approved

### General Specification
- **Accuracy class active power meter - 1.5**
- **Accuracy class active energy meter**
- - 1 to EN 62053-21
- **Maximum continuous overload**
- - 2 x In, 1.2 x Un
- **Nominal frequency** - 50/60 Hz
- **Voltage burden** - <0.1VA per phase
- **Current burden** - <0.1VA per phase
- **Power supply** - 20-300 VDC/48-276 VAC
- **Frequency** - 40-65 Hz
- **Voltage burden** - <3 VA
- **Pulsed output** - 1 SO pulsed output with 1p/10kWh, 1p/100kWh, 1p/10MWh, 1p/100MWh. Maximum pulse rate may not exceed 33 pulses per second (1980 pulses per minute). If in doubt choose next higher value, e.g. 1p/100kWh instead of 1p/10kWh

### Product Codes

<table>
<thead>
<tr>
<th>Bezel size (mm)</th>
<th>96</th>
<th>96</th>
<th>96</th>
<th>96</th>
<th>96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale length (mm)</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Active energy meter with Wattmeter 50°</td>
<td>M244-HW-S Single-phase</td>
<td>M244-HWS-S 3P/3W balanced</td>
<td>M244-HWS-V-S 3P/4W balanced</td>
<td>M244-HUS-S 3P/3W unbalanced</td>
<td>M244-HWS-V-S 3P/4W unbalanced</td>
</tr>
<tr>
<td>Bezel size (mm)</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
</tr>
<tr>
<td>Active energy meter with Wattmeter 240°</td>
<td>M244-HWS-S Single-phase</td>
<td>M244-HWS-C-S 3P/3W balanced</td>
<td>M244-HWS-U-S 3P/4W balanced</td>
<td>M244-HUS-S 3P/3W unbalanced</td>
<td>M244-HWS-U-S 3P/4W unbalanced</td>
</tr>
</tbody>
</table>

### Calculation of end scale value

End scale value is calculated using the formula below, where correct voltage must be selected (either L-N or L-L), depending on the electrical system and the type of meter used. Scale factor, e.g. the relation between end scale value and nominal apparent power (cos-phi = 1) must be between 0.6 to 1.2.

It is recommended selecting the scale value from 1 - 1.2 - 1.25 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 – 8 (and their decades) closest to the calculated result.

\[
\text{P} = U(L-N) \times Ip \times \cos \phi
\]

1. **P** = CT primary current, **U** = VT primary voltage, **U** = direct connected voltage, **cos \phi** = power factor

### Order data/examples

**Single-phase**

1. Select type: M244-HWG-S,
2. Specify input voltage and CT ratio: 230V L-N, 50/5A,
3. Spec. scaling: 0-10 kW,
4. Spec. frequency: 50/60 Hz,
5. Select pulse rate: 1p/10kWh,
6. Select output: 1 pulses. a/p

**3-phase 3-wire balanced or unbalanced**

1. Select type: M244-HWJ-S,
2. Specify input voltage and CT ratio: 400V L-L, 1A, 400V L-L/5A, 415V L-L/1A, 415V L-L/5A, 440V L-L/1A, 440V L-L/5A
3. Spec. scaling: 0-600 kW,
4. Spec. frequency: 50/60 Hz,
5. Select pulse rate: 1p/10kWh,
6. Select output: 1 pulses. a/p

**Product Codes**

<table>
<thead>
<tr>
<th>General Specification</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy class active power meter - 1.5</td>
<td>-</td>
</tr>
<tr>
<td>Accuracy class active energy meter</td>
<td>-</td>
</tr>
<tr>
<td>Maximum continuous overload</td>
<td>- 1 to EN 62053-21</td>
</tr>
<tr>
<td>Nominal frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Voltage burden</td>
<td>&lt;0.1VA per phase</td>
</tr>
<tr>
<td>Current burden</td>
<td>&lt;0.1VA per phase</td>
</tr>
<tr>
<td>Power supply</td>
<td>20-300 VDC/48-276 VAC</td>
</tr>
<tr>
<td>Frequency</td>
<td>40-65 Hz</td>
</tr>
<tr>
<td>Voltage burden</td>
<td>&lt;3 VA</td>
</tr>
<tr>
<td>Pulsed output</td>
<td>1 SO pulsed output with 1p/10kWh, 1p/100kWh, 1p/10MWh, 1p/100MWh</td>
</tr>
</tbody>
</table>

### Standards

- Voltage burden - <3 VA
- Power supply - 20-300 VDC/48-276 VAC
- Current burden - <3 VA
- Nominal frequency - 50/60 Hz
- Maximum continuous overload - 2 x In, 1.2 x Un
- Separated power supply
- Low self consumption
- Through hole CT on the instrument. No need to interrupt wiring from CT
- Slot in screw fixing

### Calculation of end scale value

End scale value is calculated using the formula below, where correct voltage must be selected (either L-N or L-L), depending on the electrical system and the type of meter used. Scale factor, e.g. the relation between end scale value and nominal apparent power (cos-phi = 1) must be between 0.6 to 1.2. It is recommended selecting the scale value from 1 - 1.2 - 1.25 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 – 8 (and their decades) closest to the calculated result.

\[
\text{P} = U(L-N) \times Ip \times \cos \phi
\]

1. **P** = CT primary current, **U** = VT primary voltage, **U** = direct connected voltage, **cos \phi** = power factor

### Electrical system

<table>
<thead>
<tr>
<th>Electrical system</th>
<th>Formula</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-phase, direct voltage connection</td>
<td>P = U(L-N) \times Ip \times \cos \phi</td>
<td>P = 230V x 50A x 0.9 = 10350 W = 10.35 kW</td>
</tr>
<tr>
<td>3-phase 4-wire, direct voltage connection (balanced or unbalanced)</td>
<td>P = 3 x U(L-N) \times Ip \times \cos \phi</td>
<td>P = 3 x 230V x 400A x 0.95 = 262200 W = 262.2 kW</td>
</tr>
<tr>
<td>3-phase 3-wire, direct voltage connection (balanced or unbalanced)</td>
<td>P = 1.732 x U(L-L) \times Ip \times \cos \phi</td>
<td>P = 1.732 x 230V x 50A x 0.95 = 623200 W = 623.2 kW</td>
</tr>
<tr>
<td>3-phase 4-wire, voltage connection via VT (balanced or unbalanced)</td>
<td>P = 3 x U(L-N) \times Ip \times \cos \phi</td>
<td>P = 3 x 5770V x 100A x 0.95 = 1644450 W = 1644.5 kW</td>
</tr>
<tr>
<td>3-phase 3-wire, voltage connection via VT (balanced or unbalanced)</td>
<td>P = 1.732 x U(L-L) \times Ip \times \cos \phi</td>
<td>P = 1.732 x 30000V x 50A x 0.9 = 2338200 W = 2.338 MW</td>
</tr>
</tbody>
</table>
General Specification

- Accuracy class reactive power meter - 1.5
- Accuracy class reactive energy meter - 2 to EN 62053-23
- Maximum continuous overload - 2 x In, 1.2 x Un
- Nominal frequency - 50/60 Hz
- Voltage burden - <0.1VA per phase
- Current burden - <0.1VA per phase
- Power supply - 20-300 VDC / 48-276 VAC

Features

- Counts electrical reactive energy and indicates reactive power of electrical systems
- Several voltage ranges available
- Current connection via “through hole” CT on the instrument. No need to interrupt wiring from CT
- Pulsed output as standard

Benefits

- High visibility
- Terminal cover included
- Low self consumption
- Separated power supply

Applications

- AC switchgears, panels and distribution boards
- Control boards
- Generator sets

Construction

- Instruments operate on a fast sampling method of input quantities (current and voltage) of the connected phases
- Meters include “through hole” CT connection, voltage dividers, internal microprocessor and power supply unit
- Slot in screw fixing

Standards

- CE marked
- BV approved

Order data/examples

Single-phase
1) Select type: M244-HXG-S, Single-phase
2) Specify input voltage and CT ratio: 230V L-N, 50/5A
3) Spec. frequency: 50/60 Hz
4) Spec. scaling: 0-6kvar, 100A x 0.44 = 44000 var = 44000 var

3-phase 4-wire balanced
1) Select type: M244-HXH-S, 3P/3W balanced
2) Specify input voltage and CT ratio: 400V L-L, 1000A/5A
3) Spec. scaling: 0-5Mvar

Calculation of end scale value

End scale value is calculated using the formula below, where correct voltage must be selected (either L-N or L-L), depending on the electrical system and the type of meter used. Scale factor, e.g. the relation between end scale value and nominal apparent power (cos-phi = 1) must be between 0.6 to 1.2.

It is recommended selecting the scale value from 1 - 1.2 - 1.25 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 – 8 (and their decades) closest to the calculated result.

ip = CT primary current, Up = VT primary voltage, U = direct connected voltage, sin φ = power factor

End scale value to choose (considering 0.6 to 1.2 x S)

<table>
<thead>
<tr>
<th>Electrical system</th>
<th>Formula</th>
<th>Example</th>
<th>End scale value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-phase, direct voltage connection</td>
<td>P = U(L-N) x Ip x sin φ</td>
<td>Q = 230V x 50A x 0.44</td>
<td>6 kvar</td>
</tr>
<tr>
<td>3-phase 4-wire, direct voltage connection</td>
<td>P = 3 x U(L-N) x Ip x sin φ</td>
<td>P = 3 x 330V x 400A x 0.31 = 3860 var</td>
<td>1000 kvar</td>
</tr>
<tr>
<td>3-phase 3-wire, direct voltage connection</td>
<td>P = 1.732 x U(L-L) x Ip x sin φ</td>
<td>P = 1.732 x 400V x 1000A x 0.44 = 304832 var</td>
<td>500 kvar</td>
</tr>
<tr>
<td>3-phase 4-wire, voltage connection</td>
<td>P = 3 x U(L-N) x Ip x sin φ</td>
<td>P = 3 x 5770V x 100A x 0.199 = 344469 var</td>
<td>1 Mvar</td>
</tr>
<tr>
<td>3-phase 3-wire, voltage connection</td>
<td>P = 1.732 x U(L-L) x Ip x sin φ</td>
<td>P = 1.732 x 30000V x 50A x 0.44 = 1143120 var</td>
<td>2 Mvar</td>
</tr>
</tbody>
</table>
Wiring Diagrams Energy Meters

**Single-phase, direct or VT voltage connection**

- Active Energy Meter M244-HWG-S
- Active Energy Meter M244-HWB-S
- Reactive Energy Meter M244-HXG-S
- Reactive Energy Meter M244-HXB-S

Power supply: Terminal 13 and 14
Pulsed output: Terminal 15 and 16

**3-phase 3-wire balanced, direct or VT voltage connection**

- Active Energy Meter M244-HWH-S
- Active Energy Meter M244-HWC-S
- Reactive Energy Meter M244-HXH-S
- Reactive Energy Meter M244-HXC-S

Power supply: Terminal 13 and 14
Pulsed output: Terminal 15 and 16

**3-phase 4-wire balanced, direct or VT voltage connection**

- Active Energy Meter M244-HWV-S
- Active Energy Meter M244-HWU-S
- Reactive Energy Meter M244-HXV-S
- Reactive Energy Meter M244-HXU-S

Power supply: Terminal 13 and 14
Pulsed output: Terminal 15 and 16

**3-phase 3-wire unbalanced, direct or VT voltage connection**

- Active Energy Meter M244-HWJ-S
- Active Energy Meter M244-HWD-S
- Reactive Energy Meter M244-HXJ-S
- Reactive Energy Meter M244-HXD-S

Power supply: Terminal 13 and 14
Pulsed output: Terminal 15 and 16

**3-phase 4-wire unbalanced, direct or VT voltage connection**

- Active Energy Meter M244-HWK-S
- Active Energy Meter M244-HWE-S
- Reactive Energy Meter M244-HXK-S
- Reactive Energy Meter M244-HXE-S

Power supply: Terminal 13 and 14
Pulsed output: Terminal 15 and 16
SYNCHROSPECT

General Specification

Synchronising functions
- Voltage difference setting (ΔU) - 1.5
- Accuracy - +/- 2.5%
- Phase difference setting - 2…20° el.
- Accuracy - +/- 3° el.
- Time delay synchronisation
  - 0.1…1 s.
- Accuracy - +/- 10%
- Synchronisation pulse duration - 300 ms
- Accuracy - +/- 30 ms
- Nominal frequency range
  - 45/65 Hz
- Output relay specification
  - 250V, 6A, 50 Hz, 1500 VA
- Voltage burden - <4 VA
- Overload - 1.2 x Un permanently, 2 x Un for 3s

LED functions
- Resolution Δφ display - 20° el.
- Magnified resolution range - +/- 15° el.
- Magnified resolution - 5° el.
- Accuracy at Δφ = 0 - +/- 3° el.

LCD functions
- Accuracy voltage display - +/- 1.5%
- Accuracy frequency display - +/- 0.5%
- Phase difference accuracy Ugen to Ubb - +/- 3° el.

Features
- Typically used to measure between Busbar and Generator
- Available as LED indicator only, LED indicator with LCD display, LED indicator with synchro check relay, LED indicator with LCD display and synchro check relay

Benefits
- Supports damage prevention on expensive assets
- Simple synchronisation conditions setting
- High visibility
- Terminal cover included
- Low self consumption
- Up to five meters in one unit

Applications
- Used on manual and semi-automatic synchronising applications
- AC switchgears, panels and distribution boards
- Generator sets

Construction
- Instruments are microprocessor based
- Slot in screw fixing

Standards
- CE marked
- BV approved

Product Codes

<table>
<thead>
<tr>
<th>Bezel size (mm)</th>
<th>96</th>
<th>96</th>
<th>96</th>
</tr>
</thead>
<tbody>
<tr>
<td>M244-14A-S LED only</td>
<td>M244-14L-S LED &amp; synchro check relay</td>
<td>M244-14D-S LED &amp; synchro check relay with deadbus option</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bezel size (mm)</th>
<th>96</th>
<th>96</th>
<th>96</th>
</tr>
</thead>
<tbody>
<tr>
<td>M244- 4M-S LED &amp; synchro check relay &amp; LCD</td>
<td>M244-14E-S LED &amp; synchro check relay with deadbus option &amp; LCD display</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standard input ranges

| Voltage | 100V L/L, 110V L/L, 400V L/L, 415 V L/L, 440V L/L |

Order data/examples
1) Select type: M244-14M-S,
2) Specify input voltage: 415V,
3) Specify display or output: Relay output,
4) Specify frequency: 45-65 Hz,
5) Specify functional description: Output duration 300ms

Connection Diagrams
Product Dimensions

<table>
<thead>
<tr>
<th>Description</th>
<th>M242-01*, M242-02*, M242-05*</th>
<th>M243-01*, M243-02*, M243-05*</th>
<th>M244-01*, M244-02*, M244-05*, M244-41R*, M244-41E*, M244-41L*, M244-41D*, M244-41S*, M244-80*, M244-12*</th>
<th>M246-01*, M246-02*, M246-05*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bezel (mm)</td>
<td>a</td>
<td>48</td>
<td>72</td>
<td>96</td>
</tr>
<tr>
<td>Panel cut out (mm)</td>
<td>b</td>
<td>45 (+0.6)</td>
<td>68 (+0.8)</td>
<td>92 (+0.8)</td>
</tr>
<tr>
<td>Bezel height (mm)</td>
<td>c</td>
<td>5.0</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Terminal cover (mm)</td>
<td>d</td>
<td>42.5</td>
<td>66.5</td>
<td>90</td>
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</table>

2) 59 mm on current ratings 30 to 60A

<table>
<thead>
<tr>
<th>Description</th>
<th>M244-13*, M244-42*, M244-31*</th>
<th>M244-HW*, M244-HX*</th>
<th>M244-14*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bezel (mm)</td>
<td>a</td>
<td>96</td>
<td>96</td>
</tr>
<tr>
<td>Panel cut out (mm)</td>
<td>b</td>
<td>92 (+0.8)</td>
<td>92 (+0.8)</td>
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<td>Bezel height (mm)</td>
<td>c</td>
<td>5.5</td>
<td>5.5</td>
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### Technical Details

<table>
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</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>0.14</td>
<td>0.18</td>
<td>0.2</td>
<td>0.4</td>
<td>0.15</td>
<td>0.19</td>
<td>0.25</td>
<td>0.28</td>
<td>0.28</td>
<td>0.39</td>
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<table>
<thead>
<tr>
<th>Type</th>
<th>M244-1S*</th>
<th>M244-1L*</th>
<th>M244-1E*</th>
<th>M244-31*</th>
<th>M244-HX<em>M244-14</em></th>
<th>M244-HW<em>M244-14</em></th>
<th>M244-21*</th>
<th>M244-241*</th>
<th>M244-241*</th>
<th>M244-241*</th>
<th>M244-241*</th>
<th>M244-241*</th>
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<td>Terminals M4</td>
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</tbody>
</table>

* denotes an abbreviation of the catalogue number as shown on previous pages, ** without terminal cover.
### Technical Details

<table>
<thead>
<tr>
<th>Type</th>
<th>M242-01* M242-02*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting position</td>
<td>Vertical Vertical Vertical Vertical Vertical Vertical Vertical Vertical Vertical Vertical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>M244-41S* M244-41L* M244-41R* M244-41E*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting position</td>
<td>Vertical Vertical Vertical Vertical Vertical Vertical Vertical Vertical Vertical Vertical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>M242-02* M242-01V* M243-01V* M244-01V* M246-01V* M242-05V* M243-05V* M244-05V* M246-05V* M242-02E<em>S M243-02P</em>S M244-02P<em>S M246-02P</em>S</th>
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</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>M244-42* M244-13* M244-21* M244-31* M244-42* M244-13* M244-21* M244-31*</th>
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</thead>
<tbody>
<tr>
<td>Mounting position</td>
<td>Vertical Vertical Vertical Vertical Vertical Vertical Vertical Vertical Vertical Vertical</td>
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</table>

### Applicable Standards

<table>
<thead>
<tr>
<th>Type</th>
<th>EN 60051-1 EN 60051-2 EN 60051-3 EN 60051-4</th>
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<tbody>
<tr>
<td>Standards</td>
<td>EN 60051-1 EN 60051-2 EN 60051-3 EN 60051-4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>M244-21* M244-31* M244-42* M244-HW* M244-HX* M244-14* M244-80L*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards</td>
<td>EN 60051-1 EN 60051-2 EN 60051-3 EN 60051-4</td>
</tr>
</tbody>
</table>

### BV Approvals

<table>
<thead>
<tr>
<th>Type</th>
<th>Certificate number</th>
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</thead>
<tbody>
<tr>
<td>M244-41R<em>S M244-41E</em>S M244-41L<em>S M244-41D</em>S</td>
<td>38933/A0 BV</td>
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<tr>
<td>M244-14*S</td>
<td>38940/A0 BV</td>
</tr>
<tr>
<td>M244-14*</td>
<td>38941/A0 BV</td>
</tr>
<tr>
<td>M244-40*</td>
<td>38942/A0 BV</td>
</tr>
</tbody>
</table>

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