MANUFACTURING

Honeywell Hobbs' commitment to the customer in past years and present is what has helped us develop our world-class manufacturing systems. Some of the methods by which we continuously improve our products and processes are as follows:

- Six Sigma methodology is a strategy used to accelerate improvements in our processes, products and services, and to reduce manufacturing costs and improve quality. It achieves this by relentlessly focusing on eliminating waste and reducing defects and variations.
- Continuous Flow Process utilizing "Rabbit Chase" concepts are used in the focused factories in order to achieve the lowest total cost, defect-free product.
- Single Minute Exchange of Die (SMED method) provides reduced time in molding cell.
- Statistical Process Control is used for measuring critical dimensions and controlling manufacturing processes.
- Poke-Yoke method and computerized test equipment are utilized to eliminate scrap and rework.
- Kanban cards are used to pull raw material and piece parts through the factory.
- Bar coding and electronic data interchange (EDI) are available.

QUALITY SYSTEMS

It is the goal of Honeywell Hobbs to meet customer value-needs through continuously improved products and processes. That is the basis by which we work to create a partnership with our customers. Evidence of our commitment is proven by a goal of a Stopped Product Quality Level (SPQL) of 100 ppm. We utilize Advanced Quality Planning and QS9000 based quality systems.

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The Hobbs brand is well known worldwide for the development of quality electro-mechanical products. The invention of the first electrically wound automobile clock in 1938 created what is now known as Honeywell Hobbs. John Weston Hobbs was the inventor that cultivated this electrically-wound vehicle clock into a company that has over the years expanded to include hour meters, pressure and vacuum switches, halogen lamps, transmission shifters, and other custom electro-mechanical products. Honeywells’ broad customer and market base includes industries such as automotive, agricultural, material handling, construction, marine, medical, heavy truck, lawn and garden, recreational, generators, compressors and aviation. Honeywells’ commitment to continuous improvement and total quality management will allow for further expansion of its product lines and customer base while maintaining the highest standards of excellence.

Other AC and DC Meters Available

Round Flush with Retainer Mount

Round Slotted 3 screw

Contact Hobbs for more information and specifications on above meters.

Hour Meter Accessories

Mounting brackets. For mounting hour meters in any location when panel installation is not practical. Multiple holes allow positioning for easy reading. Tool of bracket can be bent where necessary. Part Number M350 (2.13/16 x 4") for meter only. Part Number M586 (4" x 5 1/8") when meter and damper are used together.

Dampener. Protects meter from severe rotation. Use on panel or with Part Number M586 bracket. Part Number M3598 (3.7/8" dia.) for three-screw type DC meters.

Panel mounting bracket. Designed to bolt to a flat surface area 2.13/16" x 8 1/4". Provides easy-to-read meter position. Part Number M488 for three-screw type DC meter only.

Angle bracket. For three-screw flanges AC and DC rectangular meters only when panel mounting is not practical. Part Number 23544.

Custom Instrument Panel Clusters
Let Hobbs custom design your display panel saving you time and money. We can assemble a panel to your specifications that frees up your engineering resources, reduces parts counts and reduces your vendor base.

Warranty and remedy
Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.

While we provide application assistance, personally through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change at any time without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Sales and Service
Honeywell services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or

Warranty Periods:
The products listed are warranted for the periods shown:
98000 Series.............2 years
85000 Series.............2 years
20000 Series.............2 years
28100 Series

Unlike conventional AC hour meters that are limited to one voltage range and frequency, the Hobbs MultiRange Quarter hour meter will operate over a full range of voltages and frequencies. The meters will work accurately from a voltage range of 90 VAC to 264 VAC and frequencies of either 50 Hz or 60 Hz. This unique feature means that one hour meter will work for virtually any application anywhere in the world!

Specifications:
- Operating Voltage: 90 to 264 VAC
- Frequencies: 50 to 60 Hz
- Temperature range: -40°F to +185°F

Features:
- Records time to 99,999.9 hours
- Accuracy ±0.02%
- UL Recognized
- CSA (UL)
- CE Mark
- Tightly sealed from dirt and moisture
- Temperature range: 1/4" spade

Benefits:
- Reduced parts count
- Reduced inventories
- Fewer purchase orders
- Eliminate production line errors
- Reduce service parts

Options:
- Wire leads
- Custom cases
- Terminals (top, down, straight)

WARNING!

Applicable voltage not to exceed 264 VAC RMS. This meter was not intended to be used in applications where excessive transient voltages are present. It is the responsibility of the customer to determine the suitability of this device for use in their system.

AC Multi-Range Meters

2 Screw Standard Bezel

Operating Voltage: 90 to 264 VAC
Part #: 28101

90 to 264 VAC
Part #: 28100

90 to 264 VAC
Part #: 28103

90 to 264 VAC
Part #: 28104

1 Screw Deluxe Bezel

Operating Voltage: 90 to 264 VAC
Part #: 28105

90 to 264 VAC
Part #: 28108

90 to 264 VAC
Part #: 28109

90 to 264 VAC
Part #: 28110

LCD Hour Meters

98000 Series

The Hobbs 98000 Series LCD hour meters provide a large easy-to-read display in a conventional size package. The hour meters are available in a variety of mounting styles and voltage ranges that will fit virtually any application.

Specifications:
- Run Accuracy ±0.02%
- Start Time: maximum 1 second
- 6 Digit Display
- Digit Height: 6 mm
- Power draw: 8 mA at 12 VDC
- Power terminals
- Termination: 1/4" blade
- Temperature range: -40°C to +85°C
- Vibration: 20 g's per SAE J1378
- Shock: 65 g's per SAE J1378
- Operating range: 9 to 64 VDC
- Protective Factory
- Display: 0.1 to 99,999.9 Hours
- 60 to 99,999 Counter
- Transistor Voltage Protection
- Load Dump
- Inductive: EMI
- Reverse Polarity

Features:
- Totally isolated from moisture and dust
- Direct replacement for current hour meter
- No battery backup needed
- Fits in existing panel openings
- Custom bezels
- Various bezel styles available
- Snap-in retainer mount
- Combination easy installation with dual design
- Compact design
- Rugged design
- Pulse Counter Option
- Reset Option
- Run Indicator

Round Black Bezel

Operating Voltage: 90 to 264 VAC
Part #: 28104

3 Screw Deluxe Bezel

Operating Voltage: 90 to 264 VAC
Part #: 28105

90 to 264 VAC
Part #: 28108

90 to 264 VAC
Part #: 28109

90 to 264 VAC
Part #: 28110

2 Screw Standard Bezel

Panel cutout: 1.45 x .95 rectangular opening
Part #: 99310

9 to 64 VDC
2 terminal

9 to 64 VDC
3 terminal

9 to 64 VDC
4 terminal

2 Screw Deluxe Bezel

Panel cutout: 1.45 x .95 rectangular opening
Part #: 99323

9 to 64 VDC
3 terminal

9 to 64 VDC
4 terminal

3 Screw Deluxe Bezel

Panel cutout: 2.00 standard opening
Part #: 99303

9 to 64 VDC
2 terminal

9 to 64 VDC
3 terminal

9 to 64 VDC
4 terminal
98000 Series

LCD Hour Meters

20000 Series Deluxe AC Hour Meters

**LCD Meter APPLICATIONS**
- Garden Tractors
- Generators
- Utility Vehicles
- Construction Equipment
- Material Handling Equipment
- Recreational Vehicles
- Medical
- Electronic Panels
- Rental Equipment
- Boom Lifts
- Pressure Washers
- Sweepers
- Test Equipment

**Operating Voltage**

<table>
<thead>
<tr>
<th>Round Chrome Bezel</th>
<th>Round Black Bezel</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 64 VDC</td>
<td>5 to 64 VDC</td>
</tr>
<tr>
<td>2 terminal</td>
<td>2 terminal</td>
</tr>
<tr>
<td>98314</td>
<td>98312</td>
</tr>
<tr>
<td>8 to 64 VDC</td>
<td>8 to 64 VDC</td>
</tr>
<tr>
<td>2 terminal with enable</td>
<td>2 terminal with enable</td>
</tr>
<tr>
<td>98324</td>
<td>98322</td>
</tr>
<tr>
<td>9 to 64 VDC</td>
<td>9 to 64 VDC</td>
</tr>
<tr>
<td>2 terminal</td>
<td>4 terminal</td>
</tr>
<tr>
<td>98304</td>
<td>98302</td>
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</table>

**Rectangular Retainer Mount**

<table>
<thead>
<tr>
<th>Rectangular Retainer Mount</th>
<th>Rectangular Retainer Mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>108-132 VAC 50 Screw**</td>
<td>216-264 VAC 50 Screw**</td>
</tr>
<tr>
<td>108-132 VAC 60 Blade**</td>
<td>216-264 VAC 60 Blade**</td>
</tr>
<tr>
<td>108-132 VAC 60 Screw**</td>
<td>216-264 VAC 60 Screw**</td>
</tr>
<tr>
<td>216-264 VAC 50 Screw**</td>
<td>216-264 VAC 60 Screw**</td>
</tr>
<tr>
<td>216-264 VAC 60 Screw**</td>
<td>216-264 VAC 60 Screw**</td>
</tr>
</tbody>
</table>

**Square Retainer Mount**

<table>
<thead>
<tr>
<th>Square Retainer Mount</th>
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<tr>
<td>108-132 VAC 50 Screw**</td>
<td>216-264 VAC 60 Screw**</td>
</tr>
<tr>
<td>108-132 VAC 60 Screw**</td>
<td>216-264 VAC 60 Screw**</td>
</tr>
<tr>
<td>216-264 VAC 50 Screw**</td>
<td>216-264 VAC 60 Screw**</td>
</tr>
</tbody>
</table>

**Rectangular Reel**

- Panel cutout: 1.45 x .95 rectangular opening

**Square Reel**

- Panel cutout: 1.45 x .95 rectangular opening

**20000 Series Wiring Diagrams**

- Single phase, 2 wires:
  - 120V system: Connect power wire to one terminal and neutral wire to opposite terminal.
  - 240V system: Correct any one of the two accessible power wires to one terminal of the meter and the neutral wire to the opposite terminal.

- Three phase, 4 wires:
  - 120/240V system: Correct any one or two accessible power wires to one terminal of the meter and the neutral wire to the opposite terminal.

**CAUTION:** Always make sure power is removed from equipment before working on electrical circuits. Only qualified persons should make electrical connections. Damages to equipment and/or serious bodily injury can result from improper made electrical corrections, or a failure to adhere to normal electrical safety guidelines.
20000 Series

When there's a need to keep track of run time, quality-minded companies choose Hobbs! Whether it's for testing purposes, leasing applications, maintenance reasons, or for warranty programs, you want an accurate and reliable hour meter. The Hobbs 20000 Series hour meter delivers!

To ensure our high standards of quality, all parts are in-process inspected. Every meter must pass 100% function and timing accuracy tests before shipping. These "Deluxe" AC meters are also totally sealed and benefit from uncommon design which integrates the motor and frame into one structure.

Specifications
- Records up to 99,999 hours
- Automatic reset to zero
- 24,120 and 240 VAC models available (Range ±10%)
- 50 and 60 Hz versions
- 3.digit power rating
- Operating temperature: -65°F to +154°F
(−54°C to +68°C)
- Accuracy: ±0.02%
- Weight: 1 oz
- Screws termination or 1.750 in long wires
- Lens material: Lexan Mount: 1/4 square rectangular opening, two 1/56 holes spaced 1.125 in.

Rectangular 2 Screw

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>Hz</th>
<th>Termination</th>
<th>Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>108 to 132 VAC</td>
<td>50</td>
<td>Screw *</td>
<td>20024</td>
</tr>
<tr>
<td>108 to 132 VAC</td>
<td>50</td>
<td>7/8&quot; #</td>
<td>20025</td>
</tr>
<tr>
<td>108 to 132 VAC</td>
<td>60</td>
<td>Screw *</td>
<td>20061</td>
</tr>
<tr>
<td>108 to 132 VAC</td>
<td>60</td>
<td>7/8&quot; #</td>
<td>20052</td>
</tr>
<tr>
<td>108 to 132 VAC</td>
<td>60</td>
<td>Screw *</td>
<td>20029</td>
</tr>
<tr>
<td>108 to 132 VAC</td>
<td>60</td>
<td>7/8&quot; #</td>
<td>20036</td>
</tr>
<tr>
<td>216 to 264 VAC</td>
<td>50</td>
<td>Screw *</td>
<td>20070</td>
</tr>
<tr>
<td>216 to 264 VAC</td>
<td>50</td>
<td>7/8&quot; #</td>
<td>20071</td>
</tr>
<tr>
<td>216 to 264 VAC</td>
<td>60</td>
<td>Screw *</td>
<td>20027</td>
</tr>
<tr>
<td>216 to 264 VAC</td>
<td>60</td>
<td>7/8&quot; #</td>
<td>20027</td>
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</table>

Round 3 Screw

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>Hz</th>
<th>Termination</th>
<th>Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>108 to 132 VAC</td>
<td>50</td>
<td>Screw *</td>
<td>20016</td>
</tr>
<tr>
<td>108 to 132 VAC</td>
<td>50</td>
<td>7/8&quot; #</td>
<td>20027</td>
</tr>
<tr>
<td>108 to 132 VAC</td>
<td>60</td>
<td>Screw *</td>
<td>20021</td>
</tr>
<tr>
<td>108 to 132 VAC</td>
<td>60</td>
<td>7/8&quot; #</td>
<td>20043</td>
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<tr>
<td>108 to 132 VAC</td>
<td>60</td>
<td>Screw *</td>
<td>20028</td>
</tr>
<tr>
<td>216 to 264 VAC</td>
<td>50</td>
<td>Screw *</td>
<td>20061</td>
</tr>
<tr>
<td>216 to 264 VAC</td>
<td>50</td>
<td>7/8&quot; #</td>
<td>20061</td>
</tr>
<tr>
<td>216 to 264 VAC</td>
<td>60</td>
<td>Screw *</td>
<td>20019</td>
</tr>
<tr>
<td>216 to 264 VAC</td>
<td>60</td>
<td>7/8&quot; #</td>
<td>20064</td>
</tr>
</tbody>
</table>

Deluxe AC Hour Meters

LCD Hour Meter Module

The Hobbs LCD hour meter module is a custom engineered elapsed time meter designed to be mounted directly to your printed circuit board (PCB). It can be used in a variety of AC or DC applications that require an hour meter, counter or odometer for preventive maintenance, warranty verification, renting and leasing.

Specifications
- 6 digit/6mm display
- ±0.02% Accuracy
- Interlock rated per BE-M-39710 at 10 g/s and SAE J1378 at 20 g/s
- Shock tested per BE-M-39710 at 35 g/s and SAE J1378 at 55 g/s
- Operating temp. range -40°C to +85°C
- Operating voltage range 0 to 64 VDC (optional 4.5 to 16 VDC)
- Breakout Voltage Protected

D.C. Version

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>Termination</th>
<th>Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 64 VDC</td>
<td>4 pin</td>
<td>98706</td>
</tr>
<tr>
<td>4.5 to 16 VDC</td>
<td>4 pin</td>
<td>98707</td>
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</table>

Counter Version

<table>
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<th>Operating Voltage</th>
<th>Termination</th>
<th>Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 64 VDC</td>
<td>4 terminal</td>
<td>98704</td>
</tr>
<tr>
<td>0 to 64 VDC</td>
<td>3 terminal</td>
<td>98705</td>
</tr>
</tbody>
</table>

Options
- 4.5 to 16 VDC

LCD Module APPLICATIONS
- Medical
- Vending Machines
- Floor Cleaning Equip.
- Electronic Panels
- Instrument Panels
- Recreational
- Office Equipment

AC APPLICATIONS
- Business machines
- Control panels
- Lighting systems
- Generators
- Compressors & pumps
- Refrigeration
- Air conditioning
- Furnaces
- Lab test equipment
- Sun testing equipment
- Oxygen concentrators
- Many more!

* Panel cutout dimensions are a .010 tolerance. All dimensions shown in inches and brackets.

Options
- Panel cutout dimensions are a .010 tolerance. All dimensions shown in inches and brackets.

All specifications subject to change without notice.

Hobbs

AC Hour Meters
85000 Series Quartz Plus DC Hour Meters

The 85000 Series provides legendary Hobbs performance and reliability in a technically-advanced quartz package. Each Quartz Plus meter features a highly reliable drive mechanism, an improved mechanically integrated chassis. The case fits into a stock-proof, totally-sealed case made of an engineered plastic that is impervious to acids and solvents.

To ensure our high standards of quality, all parts are in-process inspected. Every Quartz Plus meter must pass 100% function, burn-in, and timing accuracy test before shipping.

Specifications:
- 10,000 hour version standard
- With automatic reset to zero
- Temperature range: -40°F to +185°F
- -40°C to +85°C
- Quartz accuracy: ±0.0002% per hour
- Voltage range: 1500 VDC
- Temperature range: 50°F to 100°F
- Precision built relay-driven circuit
- Excellent vibration & shock resistance
- Vibration: 20 g's for 10kHz (SAE J1337)
- Shock: 10 g's for 0.001s (IEC 68-2-26)
- 50 g's for 0.001s (IEC 68-2-26)
- 75 g's for 0.001s (IEC 68-2-26)
- Transient voltage protection: Alternator load dump: 1500V
- EMR (electromagnetic interference): +240V or 500V per IEC 61000-3-4
- Inductive switching and reverse polarity
- Standard terminals: 1/4" male bleeder
- Lens material: Glass
- Case material: Polyester
- Number size: 0.12" (3mm)

Features:
- Custom CMOS integrated circuit
- Indicates operating time in hours and tenths, plus has a reporting indicator
- Electromagnetic interference: ±240V or 500V
- Battery system voltages: 6, 12, 24, 30, 40, 60, 75, and 90 VDC
- UL Recognized (File number E17774)
- CSA Certified (File number E22455-12)
- Complies with MIL-M-3971

Options:
- Custom logos, polycarbonate lenses, and various bezels.
- PN: 82000, 82001, 82002, 82003, 82004
- 2-terminal and filtered versions available too.

85000 Series Wiring Diagrams (Polarity Sensitive)

CAUTION: Always make sure power is removed from equipment before working on electrical systems. Over-voltage protection should be used to protect equipment. Damage to equipment and/or serious bodily injury can result from improperly made electrical connections, or a failure to adhere to normal electrical safety guidelines.