

# Manual Switches

## Miniature Manual Line

MML Series



### FEATURES

- Breadth of line offers complete selection of pushbuttons, rockers, and indicators to accommodate different functions and promote operator efficiency.
- Printed wiring board (PWB) or panel mounted switches, plus multi-unit strip mounting, and single level termination for cost-effective installation.
- Tactile feedback imparts a definite feel of switching action.
- Coordinated appearance enhances panel harmony.
- Illumination by long-life LED's and incandescent lamps—for lighted display versatility.
- Solid state, electronic control and power duty switching—for electrical versatility.
- Temperature range: -18° to 65°C (0° to 149°F).

### DESIGN FREEDOM

Rocker switches are available in the MICRO SWITCH MML Miniature Manual Line. They complement AML pushbuttons and indicators, providing you flexibility and design freedom to answer all your miniature manual control requirements. You can choose the actuator option that matches the switch function and natural habit pattern reflex of the operator. You no longer need to compromise quality, appearance, or human factors considerations, because of size constraints.

The MML pushbutton and indicator offering has also been expanded to include new square forms which are small enough to fit in the tightest places.

### MOUNTING FLEXIBILITY

Printed wiring board (PWB) mounted switches can be arranged in individual panel openings or multi-unit strips, in a common panel cutout. Optional support brackets provide added rigidity for stand-alone PWB mounted devices. Units with bezels and mounting clips can be snap-in mounted from the panel front.

Single level PWB or solder/quick-connect termination throughout makes wiring faster, easier, and more economical. Housings are designed to accommodate washing, before and after wave soldering, to help prevent contamination during printed wiring board installation.

### LIGHTED DISPLAY OPTIONS

Pushbuttons and indicators can be full-face illuminated by LED's or incandescent lamps for high visibility of colors and legends. Inherently rugged, long-life LED's reduce service and maintenance costs. Also, their low drive and inrush current (30 mA or less) reduces costs of drive circuitry.

Rockers can be furnished with colored lenses for illumination by LED's or incandescent lamps.

### CONTROL VERSATILITY

Solid state pushbutton switches with Hall effect integrated circuits interface directly with microprocessors and other logic level devices. Time-proven for billions of cycles, Hall effect IC's provide the ultimate in reliability.

Electronic control pushbutton or rocker switches, with gold or silver contacts, handle up to 1 amp; power duty switches, up to 6 amps.

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### MML ENHANCES PANEL HARMONY

The attractive clean line design of the total MML offering is coordinated to work in harmony and enhance the visual qualities of your product. MML will help make a good first impression with your customers by blending with other panel components. And also work hard over the long run to maintain operator satisfaction.

### HOW TO ORDER

To specify MML catalog listings, refer to the order guides. They are based on a modular cataloging system which gives you the flexibility to choose the combination of feature options that best answers the requirements of your application.

### ORDER GUIDES

|                                                        |       |
|--------------------------------------------------------|-------|
| <b>Solid State Switches</b>                            |       |
| MML11 Pushbutton Switches .....                        | 70    |
| <b>Electronic Control Switches</b>                     |       |
| MML21 Pushbutton Switches .....                        | 72    |
| MML24 Rocker Switches .....                            | 74    |
| <b>Power Duty Switches</b>                             |       |
| MML31 Pushbutton Switches .....                        | 76    |
| <b>Indicators</b>                                      |       |
| MML41 Indicators/LED or Incandescent Display .....     | 78    |
| MML46 Indicators/LED or Incandescent Display .....     | 78    |
| <b>Lenses and Buttons</b>                              |       |
| MML51 Lenses/Incandescent or Non-lighted Display ..... | 80    |
| MML52 Lenses/LED or Neon Display .....                 | 80    |
| <b>Mounting Hardware</b>                               |       |
| MML61 Strip Mounting Frames .....                      | 83    |
| MML72/73 Bezels and Mounting Clips .....               | 84    |
| MML74 PWB Mount Support Brackets .....                 | 84    |
| <b>LED's, Lamps, Receptacles</b>                       |       |
| MML92/93 LED's/Receptacles .....                       | 85/88 |
| MML91/93 Incandescent Lamps/Receptacles .....          | 87/88 |



**MML medical application.** Intranavenous fluid flow controller automatically dispenses fluids for medications, therapy, and nutrition.



**MML communications application.** Mobile radio control keeps businesses in touch with employees on the road.



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### MML CHARACTERISTICS

|                        | MML 10 Series | MML 20 Series | MML 30 Series | MML 40 Series |
|------------------------|---------------|---------------|---------------|---------------|
| Mechanical Lifetime*   |               |               |               | N/A           |
| Pushbuttons–Momentary  | 1,000,000     | 250,000       | 100,000       | ---           |
| Pushbuttons–Alternate  | 100,000       | 100,000       | 100,000       | ---           |
| Rockers                | 100,000       | 250,000       | 100,000       | ---           |
| Electrical Lifetime*** |               |               |               | N/A           |
| Pushbuttons–Momentary  | 1,000,000     | 25,000        | 25,000        | ---           |
| Pushbuttons–Alternate  | 100,000       | 25,000        | 25,000        | ---           |
| Rockers                | 100,000       | 25,000        | 25,000        | ---           |
| Agency Ratings         |               |               |               |               |
| UL                     | File E53576   | File E12252   | File E12252   | File E58932   |
| CSA                    | File L R4442  | File LR4442   | File LR4442   | File LR4442   |

\*95% Survival  
\*\* Lifetime at Full Rated Load

### MML ELECTRICAL DATA

#### MML10 SERIES

|                            |                                           |                                                                            |
|----------------------------|-------------------------------------------|----------------------------------------------------------------------------|
| Electrical Characteristics | Integrated Circuit Function               | 5-24 VDC Sinking                                                           |
|                            | Supply Current (Max.)                     | 7 mA (Released)<br>8 mA (Operated no load)                                 |
|                            | Output Voltage (Operated)                 | 0.3 Volt (Sinking 10 mA)                                                   |
|                            | Output Leakage Current<br>Max. (Released) | 5.0 $\mu$ A                                                                |
|                            | Switching Time Max.                       |                                                                            |
|                            | Rise 10% to 90%                           | 1.5 $\mu$ sec (Sinking 10 mA)                                              |
|                            | Fall 90% to 10%                           | 0.5 $\mu$ sec (Sinking 10 mA)                                              |
|                            | Rated Output Current                      | 10 mA Sinking                                                              |
| Absolute Maximum Ratings   | Supply Voltage (V <sub>s</sub> )          | –28 to +28 VDC                                                             |
|                            | Voltage Externally Applied<br>to Output   | –0.5 Volt min.<br>+28 Volts max.<br>(Off condition)                        |
|                            | Loads to Output                           | 20 mA (Sinking)                                                            |
|                            | Storage Temperature                       | –40° to +85°C<br>(–40° to +185°F)                                          |
|                            | Operating Temperature                     | –18° to +65°C<br>(0° to +149°F)<br>and supply voltage of 4.5<br>to 5.5 VDC |

As with all solid state components, performance can be expected to deteriorate as rating limits are approached; however, they will not be damaged unless the limits are exceeded.

# Manual Switches

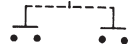
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### MML20 SERIES

|                                        |                                                                                                             |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Electrical Rating<br>(silver contacts) | <b>Standard buttons</b><br>Up to 1 amp, 125 VAC                                                             |
|                                        | <b>1 piece plunger/lens cap buttons:</b><br>Black—Up to 1 amp, 125 VAC<br>All others—Up to 0.5 amp, 125 VAC |
| Electrical Rating<br>Gold Contacts     | <b>All button styles:</b><br>Up to 0.25 amp, 30 VDC<br>UL rating—0.10 amp, 30 VDC                           |
|                                        | One pole Form C<br>        |

### MML30 SERIES

|                            |                                                                                                           |
|----------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>MML31:</b>              |                                                                                                           |
| <b>Electrical Rating</b>   | 6A @ 125 VAC, 250 VAC; 2A @ 30 VDC;                                                                       |
| Silver Contacts            | 1A @ 125 VDC "L"; 1/10 hp @ 125 VAC                                                                       |
| <b>Contact Arrangement</b> | 1 or 2 poles Form X<br> |

# Mouser Electronics

Authorized Distributor

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[MML51E10W](#)