DESCRIPTION

The **UMM** is a unique multifunction micro-computer based interface that can be utilized to solve a variety of signal selection and manipulation applications. The **UMM-1** is furnished in a unique “slim-line” design housing which saves panel space and can be ordered with an optional DIN rail mounting adapter. The **UMM-2** is a snap-track mounted version whose operation is identical to the **UMM-1**. The **UMM** accepts up to four analog inputs, providing a single analog output according to the operating mode selected. This versatile product allows the user to select from the following operating modes.

**USER SELECTABLE OPERATING MODES:**

- **Highest or Lowest Signal Selector** – The highest or lowest of 2, 3, or 4 input signals is selected and passed instantaneously through to the output. Additional signals can be monitored by cascading multiple **UMM** boards.
- **Minimum or Peak Signal Hold Selector** – Monitoring up to three input signals, the **UMM** remembers and outputs the maximum (peak) or minimum input signal received since the last reset of the **UMM**. The peak or minimum can be reset by a remote contact.
- **Signal Averager** – The **UMM** will provide a single analog output which is the average of up to four input signals. Using a second **UMM** up to seven input signals may be averaged.
- **High and Low Limit Control** – Using the individual high and low limit adjustment pots, an upper and lower limit may be set on the output.
- **Action Reversal** – The relationship of input to output is DIP switch selectable for Direct or Reverse acting.
- **Square Root Extractor (SQ Model)** – The **UMM** will provide an output proportional to the square root of an input signal.
- **High/Low Limit Control, Action Reversal and Square Root Extractor (SQ Model)** – Any or all may be combined with either High/Low Signal Selection, or Minimum/Peak Signal Hold or Signal Averaging.

**SPECIFICATIONS**

| Power | 24 VDC ±10% @ 50 mA  
|       | 24 VAC ±10% @ 120 mA |
| Inputs | (4) analog: 0-5 V, 1-5 V, 0-10 V,  
|        | 2-10 V, 0-20 mA, 4-20 mA |
| Input Impedance | mA Input: 250Ω  
|                  | V Input: 70kΩ |
| Output | (1) analog: 0-5 V, 1-5 V, 0-10 V,  
|        | 2-10 V, 0-20 mA, 4-20 mA |
| Output Loading | 5 V range: 500Ω min  
|              | 10 V range: 1000Ω min  
|              | 20 mA range: 650Ω max |
| Action | Direct or Reverse acting;  
|        | DIP switch selectable |
| Accuracy | ±1% of Full Scale (except Square Root)  
|          | Square Root –  
|          | 1% F.S. @ 25%-100% of range  
|          | 1.5% F.S. @ 10%-25% of range  
|          | 2% F.S. @ 5%-10% of range  
|          | 5% F.S. @ 0%-5% of range |
| Operating Temperature | 32° to 150°F (0-70°C) |
| Humidity | 5-95% noncondensing |
| Dimensions | **UMM-1**: 4.8"W x 3.4"H** x 2"D  
|            | (12.4cm x 8.6 cm x 5.1 cm)  
|            | **UMM-2**: 4.63"W x 3.25"H x 1"D  
|            | (11.8 cm x 8.3 cm x 2.45 cm)  
|            | **Add 1.2” (3.0 cm) for mounting tabs** |
**HIGH AND LOW SIGNAL SELECTION**

**OPERATION**

The **UMM** configured for this mode will accept 2, 3, or 4 analog input signals and output the signal which is either the highest or lowest of the input signals. To increase the number of input signals, **UMM's** may be cascaded by wiring the output of one **UMM** to the input of another **UMM**. Two **UMM's** wired in this fashion would allow up to 7 input signals. No calibration is required, however, high and low limits can be set on the output. Refer to the section “High and Low Limit Control” for more details.

**DIPSWITCH SETTINGS AND JUMPER POSITIONS**

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>DIP Switches</th>
<th>Jumper Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Signal Selector</td>
<td>OFF OFF OFF</td>
<td>V</td>
</tr>
<tr>
<td>High Signal Selector</td>
<td>OFF OFF ON</td>
<td>V</td>
</tr>
</tbody>
</table>

**Input/Output Signal Range**

- 0-5V or 0-20 mA: OFF OFF
- 1-5V or 4-20 mA: OFF ON
- 0-10V: ON OFF
- 2-10V: ON ON

**Action & Square Root**

- Square Root Disabled: OFF —
- Square Root Enabled: ON —
- Reverse Action: — OFF
- Direct Action: — ON

* Refer to the sections “Signal Reversal” and “Square Root Extraction” for more details.

**Input Notes:** Install each input jumper for the type of signal wired to the corresponding “SIG IN” terminals. The input signal jumpers (IN1, IN2, IN3, IN4) must correspond to the signal type (V or mA) selected with DIP switches 4 and 5. All input signals wired to the “SIG IN” terminals must be of the same type and range.

**Exceptions:** Input signals of 1-5V and 4-20 mA may be mixed or input signals of 0-5V and 0-20 mA may be mixed.

**Important:** Always disable (jumper in DIS position) any input that is not to be used.

**Output Notes:** The output signal from the “SIG OUT” terminal must be of the same type and range as the input signals.

**Exceptions:** With inputs of 0-5V and/or 0-20 mA, the **UMM** may be jumpered for an output of either 0-5V or 0-20 mA. With inputs of 1-5V and/or 4-20 mA, the **UMM** may be jumpered for an output of either 1-5V or 4-20 mA.

**WIREF (TYPICAL)**

* In place of a V or mA transmitter, the signal output from another **UMM** can be wired to this input allowing selection from up to seven input signals.

**LED INDICATION**

- **STAT LED (Green)** - turns on when 24V is applied to **UMM**
- **HI LIM LED (Yellow)** - Turns on if output reaches the setting of the HI LIM pot. Otherwise the LED is off.
- **SEL SIG LED (Red)** - Number of blinks between pauses indicates which input signal is the currently selected signal for output.
- **LO LIM LED (Yellow)** - Turns on if output reaches the setting of the LO LIM pot. Otherwise the LED is off.

**APPLICATION**

This operating mode is useful for applications requiring decision making such as multipoint temperature, flow, pressure or level monitoring.
MINIMUM AND PEAK HOLD SIGNAL SELECTION

OPERATION

In the peak hold operating mode, up to 3 analog inputs are monitored. The highest peak input signal is “remembered” and the corresponding output is held until a higher input signal level occurs. In the minimum hold mode, up to 3 inputs are monitored. The lowest input signal is “remembered” and the corresponding output is held until a lower input signal level occurs. A contact closure will reset the output signal.

DIPSWITCH SETTINGS AND JUMPER POSITIONS

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>DIP Switches</th>
<th>Input Signal Type &amp; Range</th>
<th>Input Jumper Position</th>
<th>Output Jumper Position</th>
<th>Jumpers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Hold Selector</td>
<td>OFF ON OFF</td>
<td>0-5V, 1-5V, 2-10V</td>
<td>V</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Peak Hold Selector</td>
<td>OFF ON ON</td>
<td>0-20 mA, 4-20 mA</td>
<td>MA</td>
<td>MA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input/Output Signal Range</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5V or 0-20 mA</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>1-5V or 4-20 mA</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>0-10V</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>2-10V</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action &amp; Square Root *</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square Root Disabled (-SQ Option)</td>
<td>OFF</td>
<td>—</td>
</tr>
<tr>
<td>Square Root Enabled (-SQ Option)</td>
<td>ON</td>
<td>—</td>
</tr>
<tr>
<td>Reverse Action</td>
<td>—</td>
<td>OFF</td>
</tr>
<tr>
<td>Direct Action</td>
<td>—</td>
<td>ON</td>
</tr>
</tbody>
</table>

Exceptions:
- Input signals of 1-5V and 4-20 mA may be mixed or input signals of 0-5V and 0-20 mA may be mixed.
- Input “SIG IN4” is used to reset the output. Jumper “IN4” should be set to “V” and the reset switch wired as shown in the wiring diagram. Important: Always disable (jumper in DIS position) any input that is not to be used.

Exceptions:
- With inputs of 0-5V and/or 0-20 mA, the UMM may be jumpered for an output of either 0-5V or 0-20 mA. With inputs of 1-5V and/or 4-20 mA, the UMM may be jumpered for an output of either 1-5V or 4-20 mA.

WIRING (TYPICAL)

LED INDICATION

- **STAT LED (Green)** - turns on when 24V is applied to UMM
- **HI LIM LED (Yellow)** - Turns on if output reaches the setting of the HI LIM pot. Otherwise the LED is off.
- **SEL SIG LED (Red)** - Number of blinks between pauses indicates which input signal the current peak or minimum occurred on.
- **LO LIM LED (Yellow)** - Turns on if output reaches the setting of the LO LIM pot. Otherwise the LED is off.

APPLICATION

This operating mode is useful for monitoring peak electrical or energy demands or capturing process conditions such as flow rates.
**OPERATION**

The **UMM** configured for this operating mode will accept 2, 3, or 4 analog input signals and output a signal that is the average of the input signals. To average up to 7 inputs, the “primary” **UMM** accepts four inputs and its output is wired to the first input of the “secondary” **UMM**. The output of the “secondary” **UMM** is the average of up to 7 inputs.

**DIPSWITCH SETTINGS AND JUMPER POSITIONS**

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>DIP Switches 1 2 3</th>
<th>Input Jumper Position</th>
<th>Output Jumper Position</th>
<th>Jumper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Averager (Primary Unit)</td>
<td>ON OFF OFF</td>
<td>V</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Averager (Secondary Unit)</td>
<td>ON OFF ON</td>
<td>MA</td>
<td>MA</td>
<td></td>
</tr>
</tbody>
</table>

**Input/Output Signal Range**

0-5V or 0-20 mA
1-5V or 4-20 mA
0-10V
2-10V

**Action & Square Root**

Square Root Disabled (-SQ Option)
Square Root Enabled (-SQ Option)
Reverse Action
Direct Action

**LED INDICATION**

- **STAT LED (Green)** - turns on when 24V is applied to **UMM**
- **HI LIM LED (Yellow)** - Turns on if output reaches the setting of the HI LIM pot. Otherwise the LED is off.
- **SEL SIG LED (Red)** - Cycles through all inputs that are enabled. Blinks once for INPUT 1, twice for INPUT 2, three times for INPUT 3, etc.
- **LO LIM LED (Yellow)** - Turns on if output reaches the setting of the LO LIM pot. Otherwise the LED is off.

**APPLICATION**

This operating mode is useful for applications requiring the average of multiple temperature, flow or pressure sensors.
SQUARE ROOT EXTRACTION

OPERATION

When the UMM is ordered with the optional square root function (SQ Option), it may be used as a single input square root extractor, providing an output proportional to the square root of the input signal. The square root function can also be combined with other operating modes such as High/Low Signal Selection or Peak/Minimum Hold Selection or Signal Averaging.

DIPSWITCH SETTINGS AND JUMPER POSITIONS

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>DIP Switches</th>
<th>Input Signal Type &amp; Range</th>
<th>Input Jumper Position</th>
<th>Output Jumper Position</th>
<th>Jumppers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square Root Combined w/ Other Operating Modes</td>
<td>1 2 3</td>
<td>0-5V, 1-5V 0-10V, 2-10V</td>
<td>V</td>
<td>V</td>
<td>SET FOR REQUIRED OPERATING MODE*</td>
</tr>
<tr>
<td>Single Input Square Root Extractor</td>
<td>OFF OFF ON</td>
<td>0-20 mA 4-20 mA</td>
<td>MA</td>
<td>MA</td>
<td></td>
</tr>
<tr>
<td>Action &amp; Square Root</td>
<td>6 7</td>
<td>Unused “SIG IN” Terminals</td>
<td>DIS</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

* Refer to the sections “High/Low Signal Selection”, “Minimum/Peak Hold” or “Signal Averaging”.

Input/Output Signal Range

- 0-5V or 0-20 mA: OFF OFF
- 1-5V or 4-20 mA: OFF ON
- 0-10V: ON OFF
- 2-10V: ON ON

Action & Square Root

- Square Root Disabled (-SQ Option): OFF —
- Square Root Enabled (-SQ Option): ON —
- Reverse Action: — OFF
- Direct Action: — ON

Input Notes: When used as a single input extractor install the input jumper “IN1” for the type of signal wired to the corresponding “SIG IN1” terminal. The input signal jumper (IN1) must correspond to the signal type (V or mA) selected with DIP switches 4 and 5.

When combined with the Averaging mode, each input is square rooted before the average is computed. When combined with any other operating mode, a single input is selected before the square root is taken.

Important: Always disable (jumper in DIS position) any input that is not to be used.

Output Notes: The output signal from the “SIG OUT” terminal must be of the same type and range as the input signal.

Exceptions: With an input of 0-5V or 0-20 mA, the UMM may be jumpered for an output of either 0-5V or 0-20 mA. With an input of 1-5V or 4-20 mA, the UMM may be jumpered for an output of either 1-5V or 4-20 mA.

WIRING (TYPICAL)

- **INPUT JUMPERS (IN1, IN2, IN3, IN4)**
- **OUTPUT JUMPER (OUT)**

LED INDICATION

- **STAT LED (Green)** - turns on when 24V is applied to UMM
- **HI LIM LED (Yellow)** - Turns on if output reaches the setting of the HI LIM pot. Otherwise the LED is off.
- **SEL SIG LED (Red)** - Blinks continuously with a single signal input to terminal “SIG IN1”.
- **LO LIM LED (Yellow)** - Turns on if output reaches the setting of the LO LIM pot. Otherwise the LED is off.

APPLICATION

This operating mode is useful when square root extraction is required to perform a flow calculation from a velocity pressure transmitter in air ducts or water pipes.
HIGH / LOW LIMIT CONTROL AND SIGNAL REVERSAL

OPERATION

The UMM may be used as a single input limit control, allowing the output to be limited to an adjustable upper and/or lower limit. When the input signal reaches the upper or lower limit setting, the output will remain at that particular limit setting. The high/low limit function can also be combined with other operating modes such as High/Low Signal Selection or Peak/Minimum Hold Selection or Signal Averaging. The output of the UMM can be selected to increase as the input increases (direct action) or the output can be reversed to decrease as the input increases (reverse action).

DIPSWITCH SETTINGS AND JUMPER POSITIONS

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>DIP Switches 1 2 3</th>
<th>Input Signal Type &amp; Range</th>
<th>Input Jumper Position</th>
<th>Output Jumper Position</th>
<th>Jumper Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>High/Low Limit w/ Other</td>
<td>SET FOR REQUIRED</td>
<td>0-5V, 1-5V</td>
<td>V</td>
<td>V</td>
<td>COM</td>
</tr>
<tr>
<td>Operating Modes</td>
<td>OPERATING MODE*</td>
<td>0-10V, 2-10V</td>
<td>DIS</td>
<td>DIS</td>
<td>COM</td>
</tr>
<tr>
<td>Single Input High/Low Limit</td>
<td>OFF OFF ON</td>
<td>0-20 mA</td>
<td>MA</td>
<td>MA</td>
<td>COM</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td>4-20 mA</td>
<td>DIS</td>
<td>DIS</td>
<td>COM</td>
</tr>
<tr>
<td>Input/Output Signal Range</td>
<td>4 5</td>
<td>Unavailable</td>
<td>DIS</td>
<td>DIS</td>
<td>COM</td>
</tr>
</tbody>
</table>

Input Notes: Install each input jumper “IN1” for the type of signal wired to the “SIG IN1” terminal. The input signal jumper (IN1) must correspond to the signal type (V or mA) selected with DIP switches 4 and 5. *Input Notes: Always disable (jumper in DIS position) any input that is not to be used.

Output Notes: The output signal from the “SIG OUT” terminal must be of the same type and range as the input signal. Exceptions: With an input of 0-5V or 0-20 mA, the UMM may be jumpered for an output of either 0-5V or 0-20 mA. With an input of 1-5V or 4-20 mA, the UMM may be jumpered for an output of either 1-5V or 4-20 mA.

High/Low Limit Adjustments: To set a low limit on the output, set DIP switches 1 = ON, 2 = ON, 3 = OFF. The “LO LIM” LED will blink. With a multimeter on the “SIG OUT” and “COM” terminals, the “LO LIM” pot should be turned until the required limit setting is displayed on the meter. DIP switches 1, 2, 3 should be returned to the required operating mode settings. To set a high limit, set the DIP switches 1 = ON, 2 = ON, 3 = ON. The “HI LIM” LED will blink. The same procedure is used with the “HI LIM” pot to set the high limit. To eliminate any limit settings, the “HI LIM” pot should be turned 25 times clockwise and the “LO LIM” pot 25 times counter-clockwise.

INPUT JUMPERS (IN1, IN2, IN3, IN4)

0-5V or 0-20 mA

ON OFF

0-10V, 2-10V

V V

Unused

SIG IN1 Terminals

DIS —

6 7

Action & Square Root

Square Root Disabled (-SQ Option)

ON —

Square Root Enabled (-SQ Option)

OFF —

Reverse Action

— OFF

Direct Action

— ON

* Refer to the sections “High/Low Signal Selection”, “Minimum/Peak Hold” or “Signal Averaging”.

APPLICATION

When combining the high/low limit functions with another operating mode, refer to the appropriate section for wiring details for that operating mode.

LED INDICATION

- **STAT LED (Green)** - turns on when 24V is applied to UMM
- **HI LIM LED (Yellow)** - Turns on if output reaches the setting of the HI LIM pot. Blinks when DIP switches are in the “SET HIGH LIMIT” mode. Otherwise the LED is off.
- **SEL SIG LED (Red)** - Blinks continuously with a single signal input to terminal “SIG IN1”.
- **LO LIM LED (Yellow)** - Turns on if output reaches the setting of the LO LIM pot. Blinks when DIP switches are in the “SET LOW LIMIT” mode. Otherwise the LED is off.

These operating modes are useful when a control signal must be limited such as for minimum positioning in damper applications or when signal reversal is required.