Midge Systems

Voltage Monitor Unit

Product Specification
Version 2.0
August 2003

1. Product Description

The Voltage Monitor Unit provides monitoring of DC voltages from 10 Volts to 30 Volts in a single self contained microprocessor controlled unit.

The unit provides monitoring of three set points. These are:

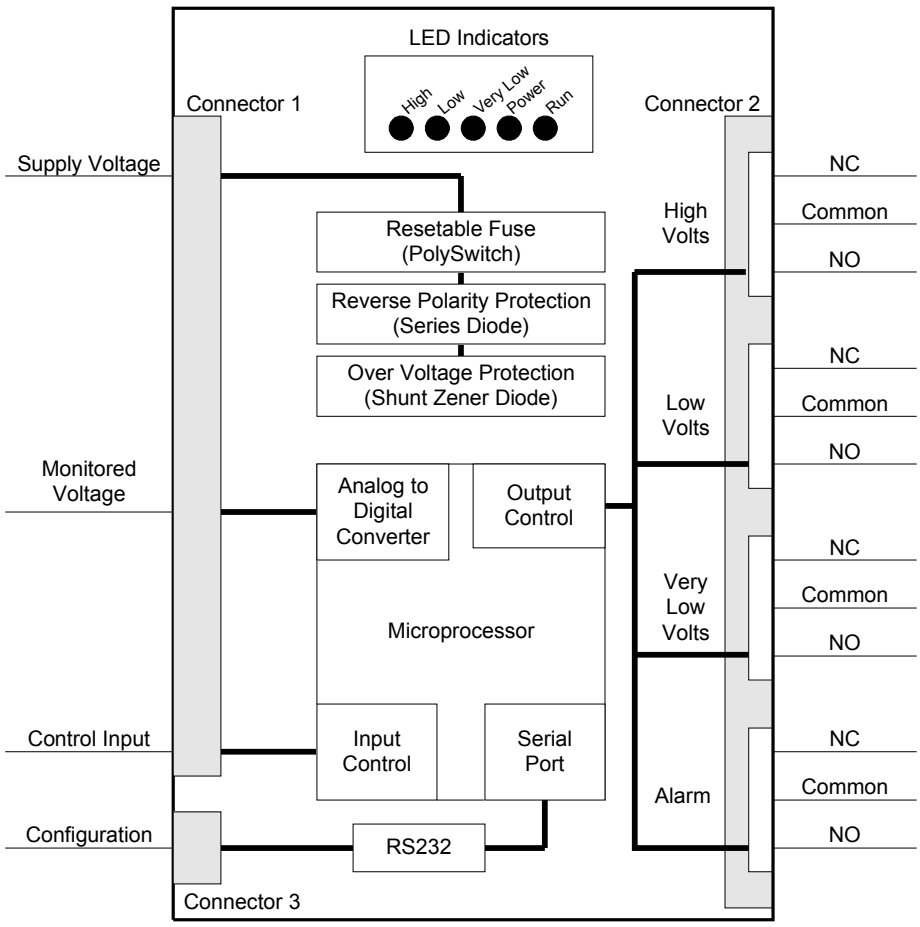
- High Volts
- Low Volts, and
- Very Low Volts

Each set point has a dedicated alarm output, provided by a NC / NO voltage free contact pair.

The unit provides two additional functions so that the central monitoring system can verify the correct operation of the Voltage Monitor Unit

- Alarm output, which indicates that a set point has been breached, and
- Control input, used to toggle all relay outputs.

Configuration is via an RS232 interface.



2. Product Operation

Set Point Monitoring

Set point monitoring involves measuring the monitor voltage input and controlling the alarm outputs alarms according to three factors

- Set point voltage.
- Set point margin, and
- Set point timer period.

Set Point Voltage

This value is used to trigger the alarm condition.

If the input voltage is higher than the “High Volts” set point, then the “High Volts” alarm is triggered.

If the input voltage is lower than the “Low Volts” set point, then the “Low Volts” alarm is triggered.

If the input voltage is lower than the “Very Low Volts” set point, then the “Very Low Volts” alarm is triggered. (The “Low Volts” alarm will also be present.)

Examples of Set Point Voltage values are

High Volts:	14.5 Volts
Low Volts:	12.0 Volts
Very Low Volts:	11.0 Volts

Set Point Margin

This value is used to release the alarm condition.

If the input voltage is lower than the “High Volts” margin, then the “High Volts” alarm is removed.

If the input voltage is higher than the “Low Volts” margin, then the “Low Volts” alarm is removed.

If the input voltage is higher than the “Very Low Volts” margin, then the “Very Low Volts” alarm is removed.

Set Point Timer

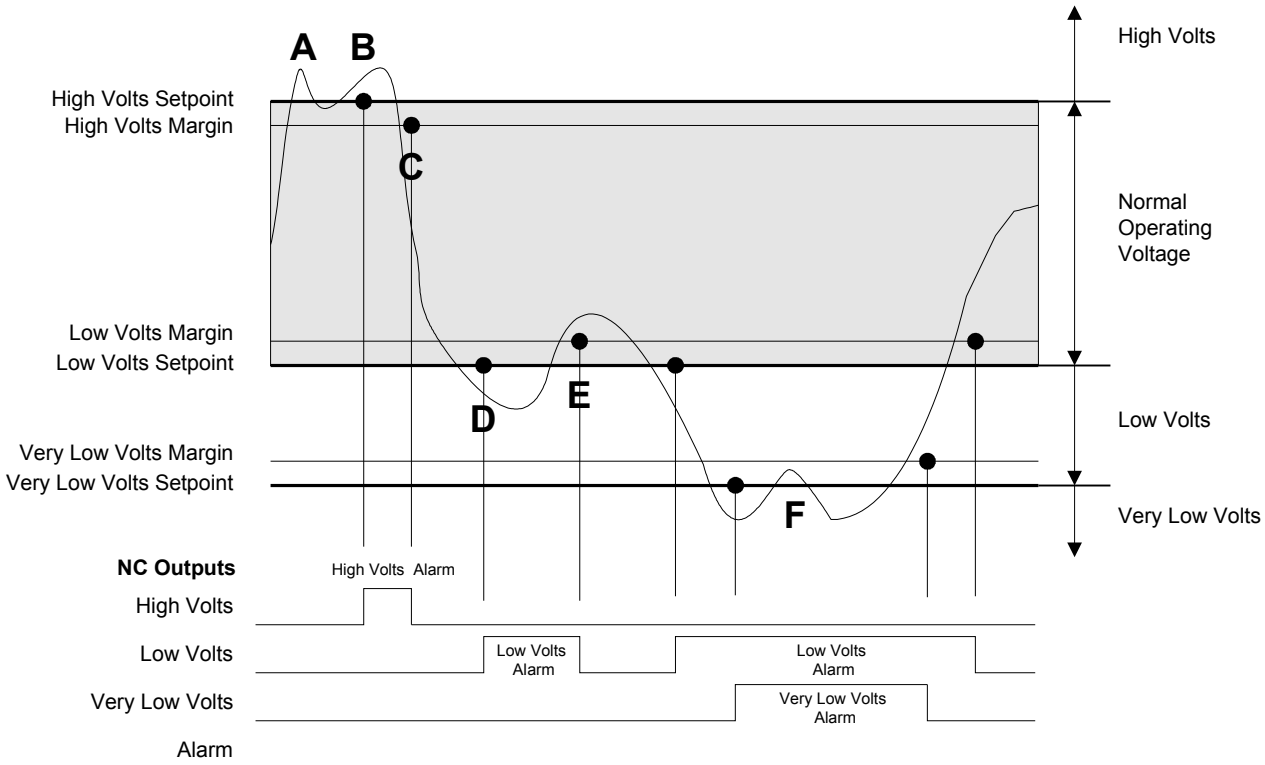
The Set Point Timer value is used in conjunction with both the Set Point Voltage and Set Point Margin values to reduce the number of false alarms.

The timer is used in conjunction with the Set Point Voltage values to delay the triggering of an alarm.

The timer is used in conjunction with the Set Point Margin values to delay the release of an alarm.

3. Operational Example

The following example describes the operation of Set Point Voltages, Margins and Timers.



A: The High Volts Alarm is not activated because the voltage does not remain above the set point for longer than the timer period.

B: The High Volts Alarm is activated because the voltage remains above the set point for longer than the timer period.

C: The High Volts Alarm is released because the voltage remains below the margin for longer than the timer period.

D: The Low Volts Alarm is activated because the voltage remains below the set point for longer than the timer period.

E: The Low Volts Alarm is released because the voltage remains above the margin for longer than the timer period.

F: The Very Low Volts Alarm is not released because the voltage does not move above the margin.

4. Output States

The following table documents the state of the NC/NO output contacts for operational states of the Voltage Monitor Unit.

Output Pin	Function	VMU Power Off	VMU Power On	Normal Voltage	High Voltage	Low Voltage	Very Low Voltage
1	High Volts – NC	Closed	Open	Open	***Closed***	Open	Open
2	High Volts – NO	Open	Closed	Closed	***Open***	Closed	Closed
3	High Volts – Common	-	-	-	-	-	-
4	Low Volts – Common	-	-	-	-	-	-
5	Low Volts – NC	Closed	Open	Open	Open	***Closed***	***Closed***
6	Low Volts – NO	Open	Closed	Closed	Closed	***Open***	***Open***
7	Very Low Volts – Common	-	-	-	-	-	-
8	Very Low Volts – NC	Closed	Open	Open	Open	Open	***Closed***
9	Very Low Volts – NO	Open	Closed	Closed	Closed	Closed	***Open***
10	Alarm – Common	-	-	-	-	-	-
11	Alarm – NO	Open	Closed	Closed	Closed	Closed	Closed
12	Alarm – NC	Closed	Open	Open	Closed	Closed	Closed

Note:

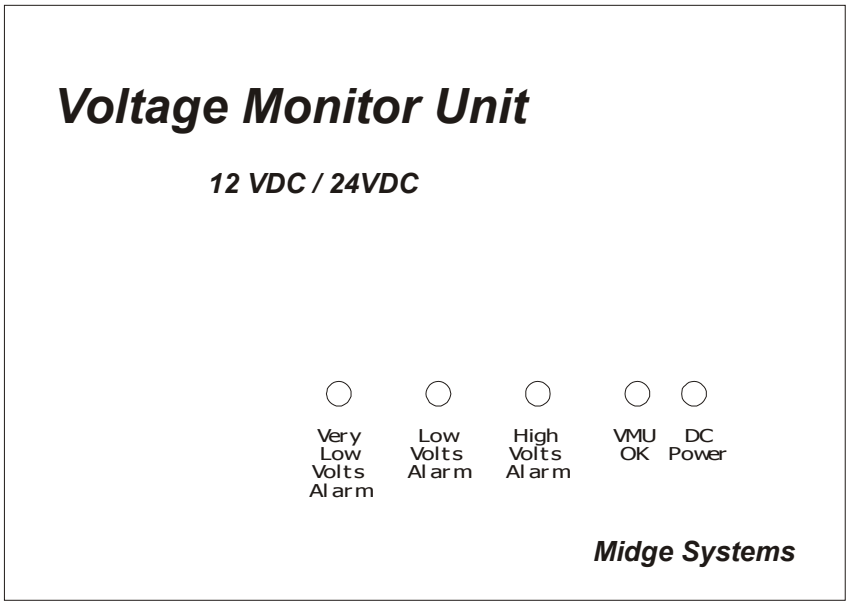
Upon power up of the VMU, the unit remains in the “Power On” state for 10 seconds before setting the contact as per the state of the monitored input voltage.

The assertion of the “Control Input” forces the VMU contacts to the “Power Off” state for 10 seconds, followed by the “Power On” state for 10 seconds. The unit will then assert the contacts as per the state of the monitored input voltage.

5. LED Indicators

The following Green LED indicators are visible.

- High Volts
- Low Volts
- Very Low Volts
- Power
- Run



For the alarm LEDs

- ON indicates a non alarm state : A Green LED means no alarm
  with the NC contact Open & NO contact Closed

- OFF indicates an alarm state
  with the NC contact Closed & NO contact Open.

For the Power LED

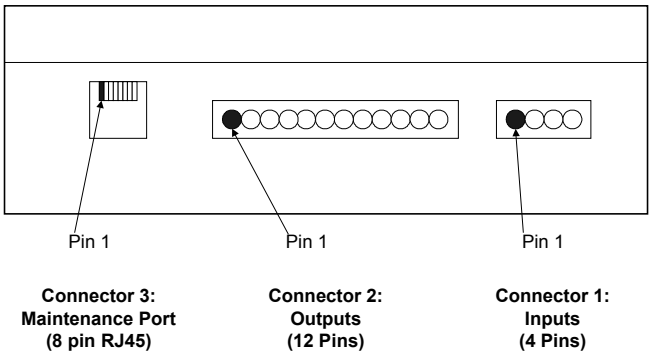
- ON indicates power is supplied to the unit
- OFF indicates that the is no power is supplied to the unit

For the Run LED

- Flashing indicates power is operating correctly
- Steady ON or steady OFF indicates not operating correctly.

Note: When the maintenance menus are being accessed the Run LED will stop flashing, indicating that voltage monitoring has stopped. Exiting the menus will restart the voltage monitoring process.

6. Connections



Connector 1 - Inputs

Pin	Function
1	Supply Voltage
2	Ground
3	Control Input
4	Monitor Voltage

Connector 2 - Outputs

Pin	Function
1	Very Low Volts – NC
2	Very Low Volts – NO
3	Very Low Volts – Common
4	Low Volts – Common
5	Low Volts – NC
6	Low Volts – NO
7	High Volts – Common
8	High Volts – NC
9	High Volts – NO
10	Alarm – Common
11	Alarm - Open when ALL in alarm state - Closed when ANY in alarm state
12	Alarm - Open when NO alarm states - Closed when ANY in alarm state

Connector 3 - Maintenance

Pin	Function
1	No connection
2	Transmit Data (output)
3	No connection
4	Receive Data (input)
5	No connection
6	No connection
7	No connection
8	Ground

7. Configuration

Maintenance Screen

The maintenance screen of the Voltage Monitor Unit is view by

- attaching a serial cable to the maintenance connector (Connector 3),
- running a serial terminal program configured to
    - 9600 baud,
    - 8 bits
    - No parity
    - 1 stop bit
    - No flow control

Upon connection, a line similar to the following will be written to the screen approximately once per second.

```
<16.5 volts> H On 30  L Off 30  VL Off 30

The information is as follows

<16.5>      => the current value of the monitored voltage.
H On 30     => High Volts alarm
                    Alarm is On.
                    Timer period value for the High Volts set point.

L Off 30          => Low Volts alarm state
                    Alarm is Off.
                    Timer period value for the Low Volts set point

VL Off 30 => Very Low Volts alarm state
                    Alarm is Off.
                    Timer period value for the Low Volts set point
```

The timer period value is read as follows:

- Normally the configured timer value is displayed
- If the alarm is Off and the set point value is breached, the value begins reducing. When the value reaches 0, the alarm is triggered.
- If the alarm is On and the margin value is breached, the value begins reducing. When the value reaches 0, the alarm is triggered.

Maintenance Screen Options

Main Menu

- Press ? to display the Main Menu

```
Voltage Monitor Maintenance Page     V1.0

 M  for manual mode
 P  set parameters
 C  calibrate
 E  to exit
 ?  for this message
```

Manual mode

- Press M (from the Main Menu) to enter the Manual Menu.
- This menu allows all alarm contacts and LEDs to be manually toggled.
- This mode can be used for fault diagnosis and system commissioning.

```
Manual Mode
 H  to toggle High Volts
 L  to toggle Low Volts
 V  to toggle Very Low Volts
 A  to toggle Activity LED
 E  to exit
 ?  for this message
```

Calibrate

- Press C (from the Main Menu) to enter the Calibration mode.
- Follow the instructions to calibrate the unit.

```
Do you really want to calibrate the unit?
 Press 'Y' to calibrate; <esc> to abort calibration

Calibrate

Set Input voltage to 10.00 Volts, then Hit <enter>

Set Input voltage to 30.00 Volts, then Hit <enter>
```

Set Parameters

- Press P (from the Main Menu) to set the units parameters.
- Follow the instructions to calibrate the unit.
- Enter a value and press enter.
- If a value is accepted, the word changed is written to the screen
- If no numeric value is entered, the internal value is not changed.

```
Set Parameters

High Point     <25.4 volts> = 22   Changed
High Margin    <0.5  volts> = 0.7   Changed
Low Point      <15.1 volts> = 16.4   Changed
Low Margin     <0.5  volts> = 0.4   Changed
Very Low Point <10.0 volts> = 9   Changed
Holdoff        <  2 seconds>= 5   Changed
```

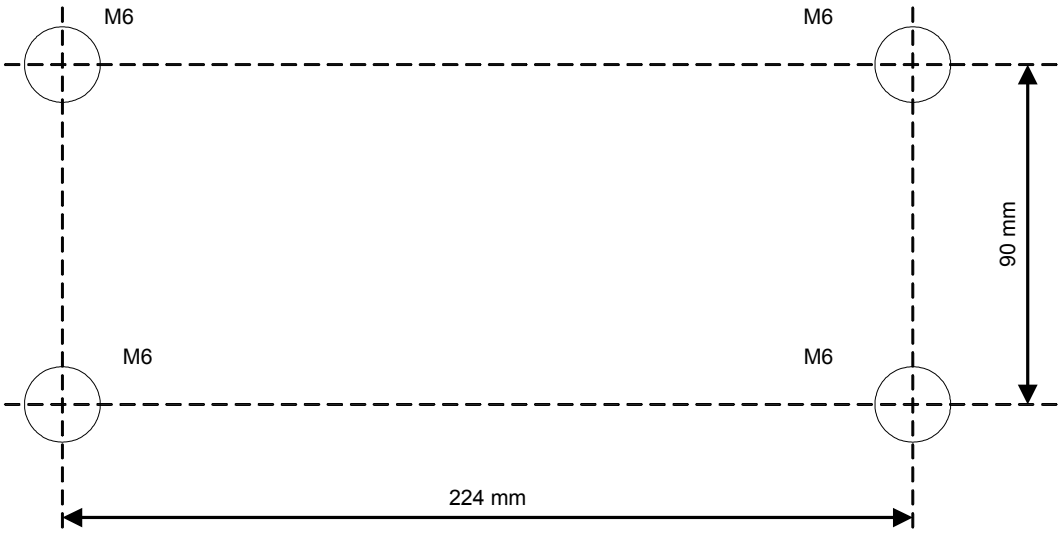
- To view the current value press enter. (Do not enter a new value).

```
Set Parameters

High Point     <25.4 volts> = No Change
High Margin    <0.5  volts> = No Change
Low Point      <15.1 volts> = No Change
Low Margin     <0.5  volts> = No Change
Very Low Point <10.0 volts> = No Change
Holdoff        <  2 seconds>= No Change
```

8. Installation Template

The Voltage Monitor Unit should be mounted using four (4) M6 screws. The following template illustrates the relative position of the mounting holes.



9. Specification

Features:

- Microprocessor Controlled monitoring
- Simple multi point calibration process
- Terminal interface for configuration

Environmental:

Temperature	0°C to 60°C
Humidity	0 to 95% Non-condensing

Mechanical:

Width	175mm
Height	45mm
Depth	125mm
Weight	0.5 kg

Power Requirements:

Input power	10 VDC to 30 VDC @ 110mA
Set point voltage range	10 to 30 VDC @ 0.1V increments
Set point margin range	0 to 5.0 volts @ 0.1V increments
Timer range	1 to 3600 seconds

Interfaces:

Maintenance Port	V.24, Three wire, (Txd, Rxd, Gnd)
Port Speed	9600 bps, 8, 1, N, No flow control

Order information:

Part number	VMU-200-100