



**NEW ENGLAND INSTRUMENT CO**

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# Tilt-Switches and Sensors

*When falling over is not an option*

New England Instrument Co can supply a range of rugged, calibration-free electronic tilt-switches and tilt-sensors. The tilt-switches can be used to trigger an event upon a certain angle being achieved. Pre-set and user-settable versions are available. Tilt-sensors provide continuous tilt information to the user or a subsequent system. Both are available as single axis (horizontal only) or dual axis (pitch and roll) sense versions.

## Powerful Performance

Designed for harsh automotive environments, the module features transient voltage protection on the supply and short circuit protected outputs.

The tilt-switch is designed to provide a signal to an external system or to drive an external relay upon a pre-set or user-settable angle being achieved. At this angle, normally low (0V) outputs go high (Vin). In the user-settable version, a multi turn pot is provided to set the desired trigger angle. When turned fully anti-clockwise, an alarm angle of 0 degrees will be set, and when turned fully clockwise a trigger angle of 90 degrees will be set. A red LED gives a visual confirmation when the unit is triggered. Once triggered, the switch will remain on until the tilt angle is reduced below the threshold. The switch is available in either a single axis or dual axis version. The dual axis version differentiates between pitch and roll and will trigger independent outputs as the trigger angle is detected.

Tilt-sensors provide a 0V to 10V output, depending on tilt angle. At 0 degrees (horizontal), 0V will be produced and at 90 degrees, 10V will be produced. As standard, a tilt to the left or right (and front / back) are treated equal and will produce an increase in voltage. Units which differentiate between tilt to the left and right (and front / back) are available on request. The sensor is available in either a single axis or dual axis version. The dual axis version differentiates between pitch and roll and has independent outputs.

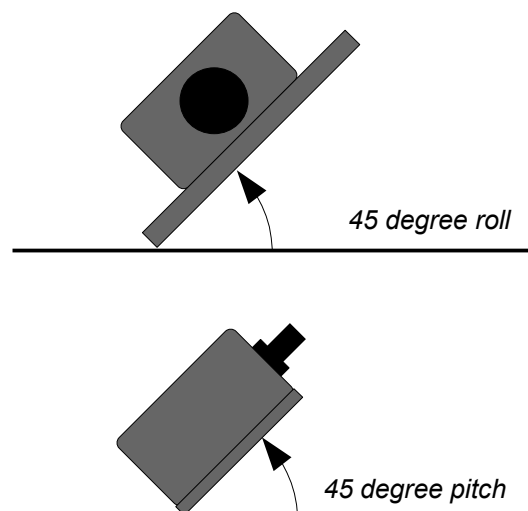


*Dual axis tilt-switch*

## Rugged Hardware

Both the tilt-switch and tilt-sensor are supplied in a rugged ABS plastic enclosure that is splash-proof. Provision for screw mounting when required is provided.

Power to the unit and switch / analog outputs are provided through colour coded wires.



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## Setup Instructions

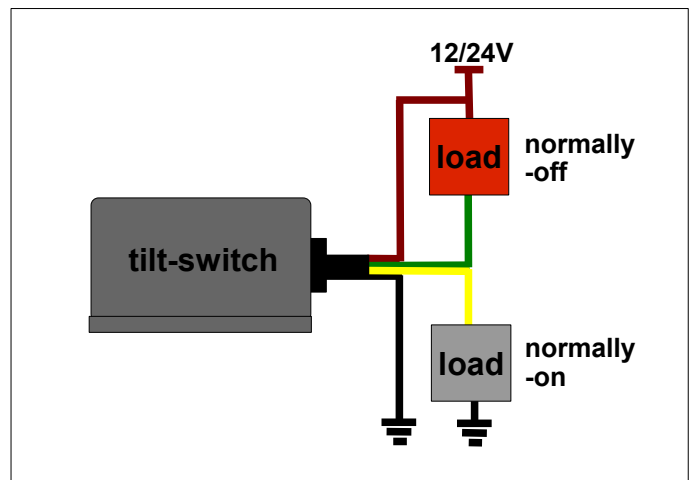
Installation of a tilt-switch or sensor is straightforward as long as a few critical points are noted. Critical items will be highlighted in ***bold italics*** in this document for your quick reference.

1) Connect the ***red wire to 12V or 24V*** power through a fuse rated at a maximum of 500mA and the ***black wire to negative*** (ground). ***Do not connect the load to a voltage that is higher than that provided to the tilt-switch.***

2) ***The green wire is associated with pitch*** (left / right) and the ***yellow wire with roll*** (forward / back). In the case of a tilt-sensor, the outputs would be connected to a gauge or monitoring device. In the case of a tilt switch, a relay or other device can be connected to be normally-on or normally-off as shown.

3) When mounting the unit, ***please ensure that the enclosure is not twisted*** in any way as inaccurate readings or permanent damage may occur.

4) To set the threshold of a tilt switch, remove the back cover. Place the unit at the desired trigger angle and ***turn the screw until trigger is achieved and the red LED lights.*** Clockwise rotation increases the trigger angle and anti-clockwise rotation decreases the trigger angle.



*Loads can be connected as normally-on or normally-off*

## Technical Specifications and Ordering Information

| Part number               | HMTS1W1515   | HMTS2W1515  | HMTS1W3030 | HMTS2W3030 | HMTS1W4545 | HMTS2W4545 | HMTS1W0000 | HMTS2W0000 | HMTS1E0000 | HMTS2E0000  |
|---------------------------|--|-------------|------------|------------|------------|------------|------------|------------|------------|-------------|
|                           | Device type  | tilt switch |            |            |            |            |            |            |            | tilt sensor |
| Number of axis            | single   | dual        | single     | dual       | single     | dual       | single     | dual       | single     | dual        |
| Switch angle              | 15   | 15          | 30         | 30         | 45         | 45         | adjust     | adjust     |            |             |
| Output                    | normally low, goes high (Vin) when triggered                       |             |            |            |            |            |            |            | 0-10V      |             |
| Input voltage             | minimum: 10V (switch), 12V (sensor); maximum 30V                   |             |            |            |            |            |            |            |            |             |
| Current consumption       | 13mA, 156mW at 12V, 312mW at 24V                                   |             |            |            |            |            |            |            |            |             |
| Output current            | 150mA souce or sink, short circuit protected                       |             |            |            |            |            |            |            | 15mA       |             |
| Non-trigger output        | no load, less than 400mV; 100mA sink, less than 800mV              |             |            |            |            |            |            |            |            |             |
| Trigger output            | no load – more than Vin-1.4; 100mA source, more than Vin-2         |             |            |            |            |            |            |            |            |             |
| Output protection         | short circuit protected; internal flyback diodes for coil driving  |             |            |            |            |            |            |            |            |             |
| Precision                 | less than 1 degree   |             |            |            |            |            |            |            |            |             |
| Accuracy                  | 0-30 degrees, 3 degrees; 0-90 degrees, 5 degrees                   |             |            |            |            |            |            |            |            |             |
| Frequency characteristics | sampling frequency, 300Hz, internally damped to 2Hz                |             |            |            |            |            |            |            |            |             |
| Step response             | tilt from 0 to 90 degrees, 1 second to reach 45 degree threshold   |             |            |            |            |            |            |            |            |             |
| Dimensions                | 35mm (width) x 35mm (length) x 20mm (height) – baseplate 51mm wide |             |            |            |            |            |            |            |            |             |