



Dual-Axis Inclinometer HMDS1000B-KIT



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Dual-Axis Inclinometer HMDS1000B-KIT

Introduction

Congratulations on your purchase of a Hummingbird Electronics HMDS1000B Dual-Axis Inclinometer. All Hummingbird Electronics products are manufactured to the highest standards of quality and will provide many years of reliable service.

Hummingbird's HMDS1000B Dual-Axis Inclinometer provides highly visible and configurable pitch and roll measurement and display to operators of industrial machinery and comes as standard with two internal relays, internal buzzer and individually-configurable warning and alarm thresholds for maximum versatility.

The unit allows customisation of sensor response times to allow maximum flexibility in various applications. Alarms and warnings can be configured from the integrated menu and saved to integrated memory.

Designed for harsh industrial environments, the module features a tough fascia with integrated buttons and LCD graphics display. An industrial adjustable mount allows for optimum positioning for the operator.

Both pitch and roll can simultaneously be displayed and can optionally be made to invert in the event of an alarm or warning condition. The display is highly visible both at night and in sunlight due to the use of an industrially rated transfective graphics LCD display.

The integrated keypad allows for customisation of the display; in application calibration; warning and alarm setup; minimum and maximum tilt display and sensor customisation.

One HMTS2F0000 2-axis high-accuracy RS485 tilt sensor is included. When used in combination with the command module, accuracy of one degree and customisable frequency response are achievable.

Integrated alarm and warning relays provide normally open, normally closed and common outputs. Both warnings and alarms can be configured to be normally-on or normally-off.

Optional password protection on the setup menu can be configured by the user.

The Inclinometer is supplied in a rugged ABS plastic enclosure with a polycarbonate fascia. A fully adjustable RAM 1" ball mount can be screw mounted to the vehicle, or optional suction mounts are available.

Power, outputs and the sensor are connected through a Deutsch DT12 socket at the rear of the unit. The wiring loom is made from flame-retardant Exane© wire.



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Suggested Applications

Your HMDS1000B Inclinometer may be employed wherever accurate, real-time measurement of pitch and roll is required, including:

- Measuring angles of incline e.g. roads, embankments.
- Rollover prevention.
- Automotive and nautical safety.
- Monitoring angles of heavy equipment e.g. cranes, graders.
- Indicating pitch and roll of vehicles.

Optional Accessories



Suction Mount (HMSS-suction)



Two-Tone Buzzer (HMDS-BUZZ)



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Package Contents



1 x HMDS1000B Dual-Axis Inclinometer



1 x HMTS2F0000 2-Axis Tilt Sensor



1 x wiring loom - Exane wire, male
Deutsch DT12 plug



1 x RAM 1" diameter ball mount



1 x user manual



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Installation

- 1) Ensure that power to the vehicle is isolated;
- 2) Mount the HMDS1000B Inclinometer on your preferred surface (e.g. dashboard) using the supplied ball mount;
- 3) Install the tilt sensor on a level surface with the cable pointing to the rear of the vehicle and the mounting plate down;
- 4) Connect DC power (9-36V) to the RED wire and 0V (ground) to the BLACK wire on the 12 way connector;
- 5) Optionally attach loads or devices to the relay outputs as desired;
- 6) Plug the 12-way connector on the wiring loom into the inclinometer display unit. Plug the inclinometer sensor into the 4-way connector on the wiring loom;
- 7) Restore power to the vehicle and apply power to the inclinometer;
- 8) Press *menu* on the front panel and use the *arrow* and *enter* keys to enter the default password - 00000;
- 9) If, with the vehicle on a level surface, a non-zero pitch or roll are shown, calibrate the sensor (see *Calibration Menu* below);
- 10) If alarm values other than 10 degrees for warning and 15 degrees for alarm are required, configure warning and alarm (see *Alarm And Warning Setup Menus* below).

Navigating the Menu



From the Main Display, the *Menu* key will enter the main menu; from the main menu, *Menu* is used to step back one level, the *arrow keys* to navigate through a menu and *Enter* to select the highlighted item.

Adjusting the Back-light



Pressing the *arrow keys* while on the main display will adjust the brightness of the LCD back-light.



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Display Modes



Numerical display with a pitch warning condition.



Graphical Roll with an Alarm condition.



Graphical Pitch display.



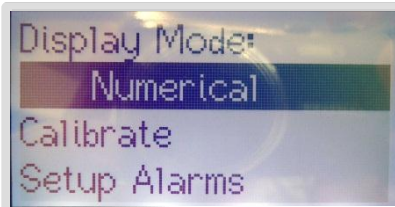
Graphical 'Both' display.



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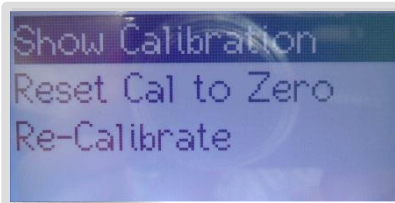
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Main Menu



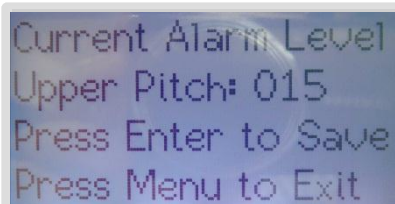
Display Mode	Changes what is shown on the main display.
Calibrate	Opens the calibration menu.
Setup Alarms	Opens the alarm setup menu.
Setup Warnings	Opens the warning setup menu.
Setup Outputs	Opens the output setup menu.
Setup Sensor	Opens the sensor setup menu.
Setup Passwords	Opens the password setup menu.

Calibration Menu



Show Calibration	Shows the current adjustment made to the sensor.
Reset Cal to Zero	Deletes the current calibration configuration.
Re-Calibrate	Sets the current pitch and roll to zero.

Alarm and Warning Setup Menus



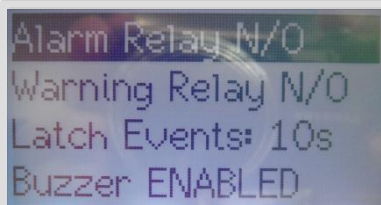
Set Up Pitch Warning and Set Low Pitch Warning	Allows the user to set the upper and lower pitches that will trigger a warning.
Set Up Roll Warning and Set Low Roll Warning	Allows the user to set the upper and lower rolls that will trigger a warning.
Set Up Pitch Alarm and Set Low Pitch Alarm	Allows the user to set the upper and lower pitches that will trigger an alarm.
Set Up Roll Alarm and Set Low Roll Alarm	Allows the user to set the upper and lower rolls that will trigger an alarm.



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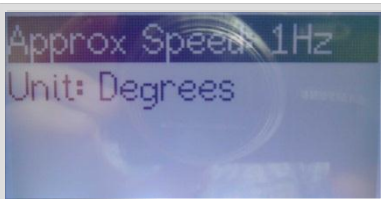
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Output Setup Menu



Alarm Relay	Sets whether or not the relay on output pins 7-9 is normally open or normally closed.
Warning Relay	Sets whether or not the relay on output pins 4-6 is normally open or normally closed.
Latch Events	Sets whether or not warning and alarm conditions are held 'on' for 10 seconds after they occur.
Buzzer	Enables or disables the internal buzzer.

Sensor Setup Menu



Approx Speed	Sets the approximate frequency at which the sensor will update pitch and roll. Note: The speed achieved in graphical display modes is notably less than that in the numerical display.
Unit	Sets the incline unit. Pitch and roll can be measured in either degrees or percent-grade.



Limitations on Measurement Units

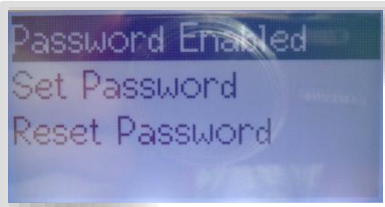
Although the device will display inclines measured in degrees between -90° and $+90^\circ$, when percent-grade is selected, only inclines between -99% and $+99\%$ (-45° and $+45^\circ$ respectively) will be displayed.



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Password Setup Menu



Password	Enables or disables the main menu password.
Set Password	Allows the main menu password to be changed.
Reset Password	Allows the main menu password to be reset to 00000.

Pin-out and Wire Colours



1	Ground	Black
2	Sensor Ground	Black
3	RS485-A	Green
4	'Alarm' Relay Common	Brown
5	'Alarm' Relay Open	Blue
6	'Alarm' Relay Closed	Orange
7	'Warning' Relay Closed	White
8	'Warning' Relay Open	Green
9	'Warning' Relay Common	Yellow
10	RS485-B	Yellow
11	Sensor Supply	Red
12	9-36V Supply	Red



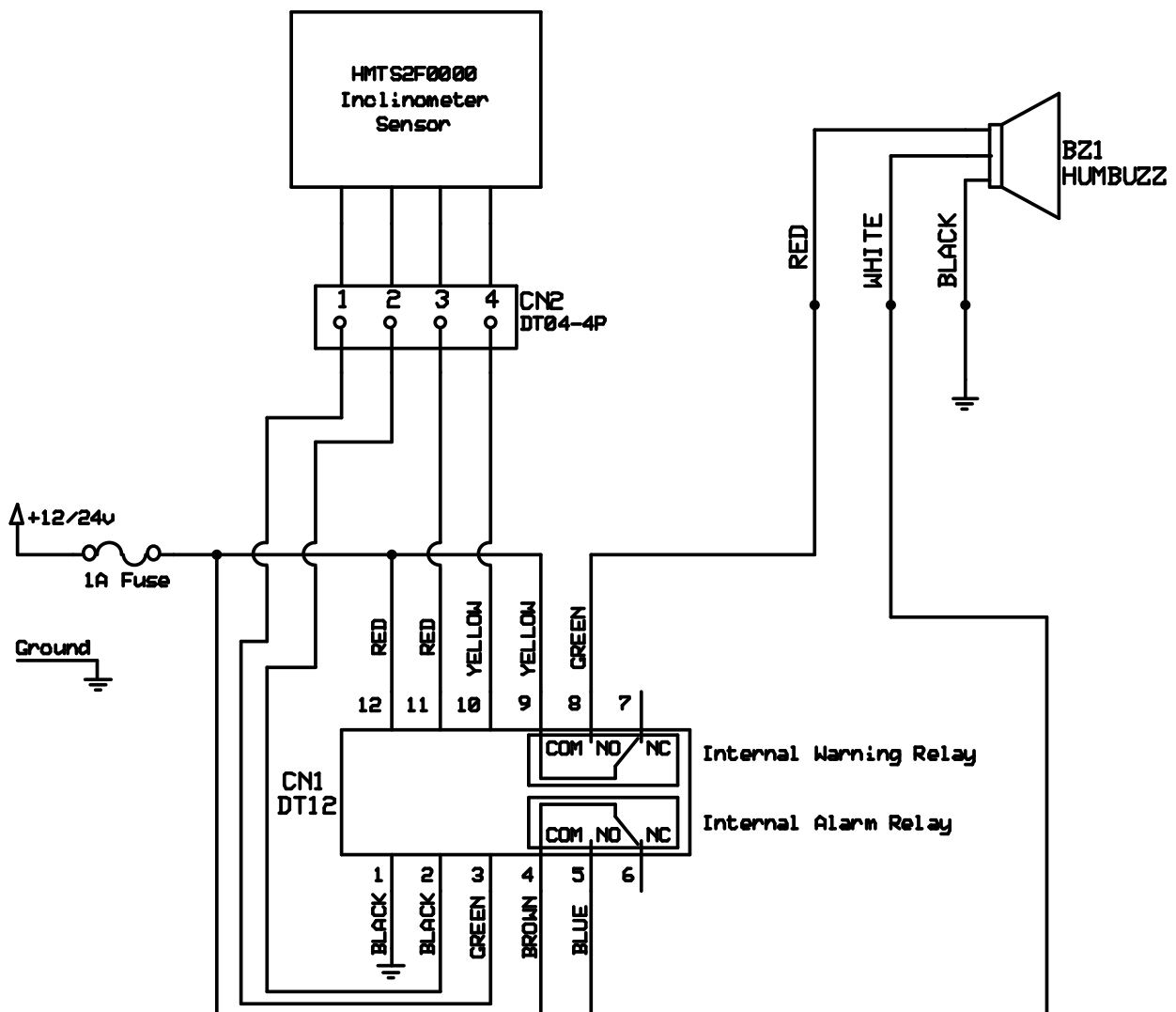
In the wiring loom provided, the RS485 wires, one 9-36V wire and one ground wire (4 in total) are grouped together - these are to be connected to the matching wires on a Hummingbird Electronics 2 Axis Tilt Sensor.



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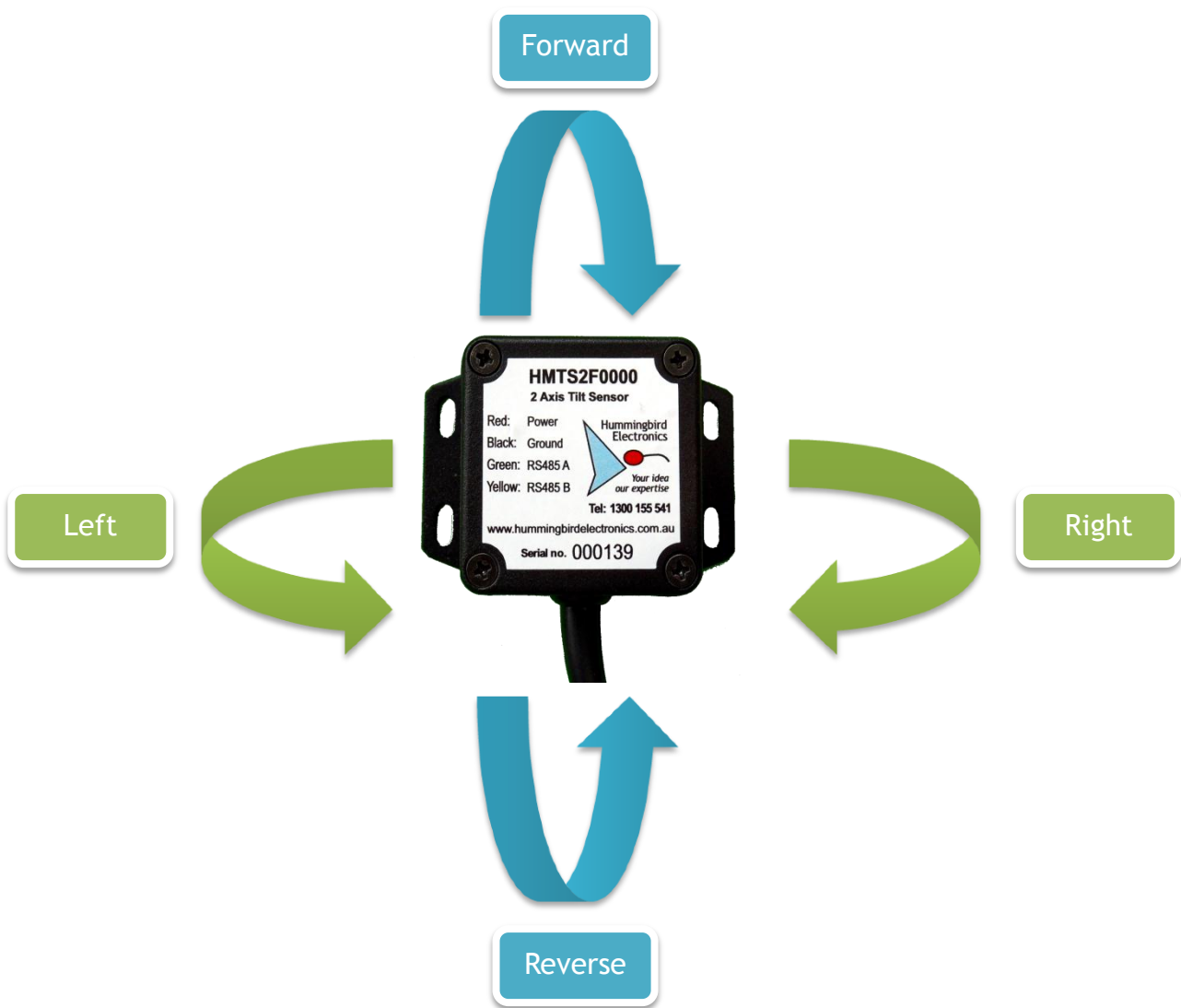
Typical Connection





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Sensor Orientation



The depicted orientation will result in a positive pitch in the forward direction, negative pitch in reverse, positive roll to the right and negative roll to the left.



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Technical Specifications

Input voltage	Minimum 9V; maximum 36V
Power consumption (W)	Maximum 2W (165mA @ 12V) - includes dual axis tilt sensor
Warning relay output	Normally open or normally closed, 36V max, 1A max, internally fused
Alarm relay output	Normally open or normally closed, 36V max, 1A max, internally fused
Maximum tilt	-90 to 90 degrees, recommended use -60 to 60 degrees
Maximum tilt	-90 to 90 degrees, recommended use -60 to 60 degrees
Accuracy	1 degree from 0 to 30 degrees, 2 degrees from 30-60 degrees
Refresh rate	10 updates per second
Frequency response	10Hz to 0.1Hz, user settable
Communications protocol	Enhanced RS485 - differential, will operate with one broken connection