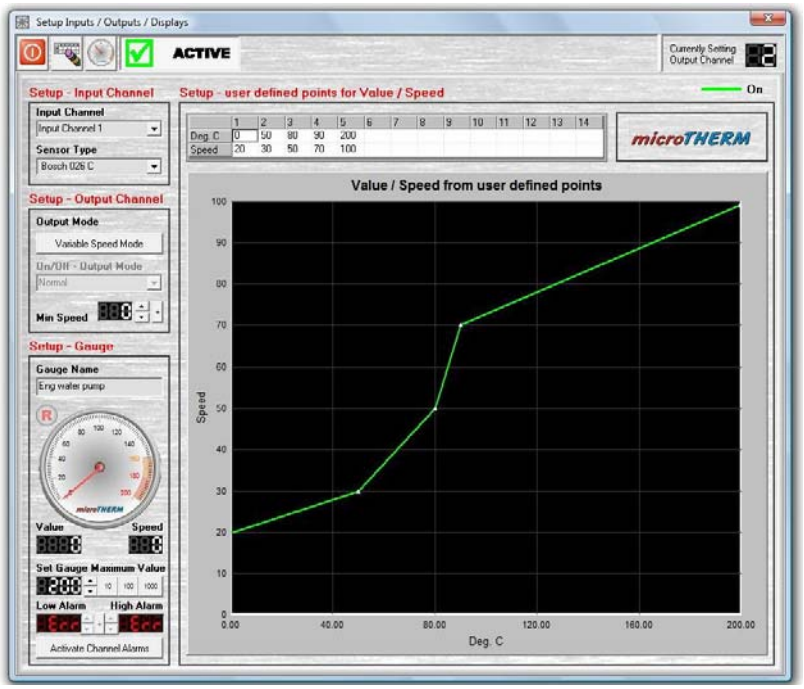
microTHERM

Programmable Thermal Management Controller



Manual version 1.0.0

Table of Contents

PTO

Table of Contents (cont.)

Introduction

MicroTHERM is a fully programmable thermal management controller for multiple electric 'thermo' fans, water pumps, intercooler sprays etc. MicroTHERM can perform functions from switching of relays and blinking warning lamps to sophisticated variable speed motor control.

MicroTHERM is the ultimate temperature controller. There are 16 outputs and 8 inputs available to allocate for any application and the included software ensures quick and easy ‘mapping’. Each output has a 14 ‘site’ table that can be programmed for absolute control regardless of your use.

Any of the 16 outputs can be configured as variable speed, on/off or flashing….you choose. Any output can be set to use any input and this can be from a temperature sensor that already exists or has been added. The input source can also be from any general sensor/voltage.

It can be used as a monitoring device with alarm settings and can even log the data to your PC for analysis and storage.

MicroTHERM’s secret is its flexibility; the uses for this versatile device are limited only by your imagination!

Features-

16 outputs can be configured for basic on/off switching (with separate on and off points to prevent any 'hunting' between on/off), as variable duty cycle (PWM) for motor speed control or as a switching function with flashing for operating warning lamps and alarms.

8 precision analogue inputs for all your sensing needs.

Input voltages are read and the output controlled according to your user lookup table. Each output has a 14 'site' table ('map') allocated to control the output setting for any given input voltage/temperature.

To display the screen scales directly in degrees (not just as sensor voltage) the sensor characteristics need to be known (i.e. what voltage equals what degrees) MicroTHERM comes pre-loaded for some common sensors/inputs-

General,	Voltage input	0 – 5000mV (0-5V) scale	units displayed as mV
Fluid temp,	Bosch	0 280 130 026 (Bosch #)	units displayed as ºC or ºF
Air temp,	Delco	25037388 (GM Holden #)	units displayed as ºC or ºF
Air/fluid temp,	TSO1	TSO1 (DTec part #)	units displayed as ºC or ºF
Hi temperature,	Thermo-Amp	Therm1 (Dtec part #)	units displayed as ºC or ºF

If you wish to calibrate your own sensors to display in units other than voltage then the optional calibration tool (MicroCAL) can be used! Else you can set input as 'General' and work in units of sensor voltage.

Speed control is in 1% increments and interpolation between voltage 'sites' is used to ensure smooth output changes regardless of how coarse the table settings are. A minimum speed can be set so that variable speed devices can shut off without running ineffectively (i.e. running a fan too slow achieves nothing).

Once configured MicroTHERM is designed to operate independently of any PC, but the provided software performs all programming, monitoring and logging functions. Common user settings are recorded and files ('parameters') can be uploaded, viewed or saved for re-applying later.

Outputs switch to ground and can directly drive relays, alarms, lamps (up to 500mA) and can directly connect to DTec's PowerMAX relay's (or other suitable 'drivers') for high current motor speed control.

An output can even be configured to switch MicroTHERM off after a pre-determined temperature is reached, this is ideal for allowing water pumps etc to remain active for as long as required when the engine is shut down (not just using a set time period)

Data can be logged to the PC at various rates. Input voltages and the corresponding output settings are both recorded along with time and date.

Data is displayed 'real time' on a configurable screen. Dial gauges or bar graphs can be chosen with alarm settings and filtering. All dial gauges have digital displays incorporated and controllable 'peak' recording needles to hold the maximum values.

Compact, 87L x 67W x 31H (mm) plus mounting tabs. Rugged, fully encapsulated electronics for the toughest automotive applications.

Wiring harness leads are not terminated; you can hardwire or fit any connector of your choice.

Connects to the PC's serial port (RS232) or use an inexpensive USB to 232 converter if required.

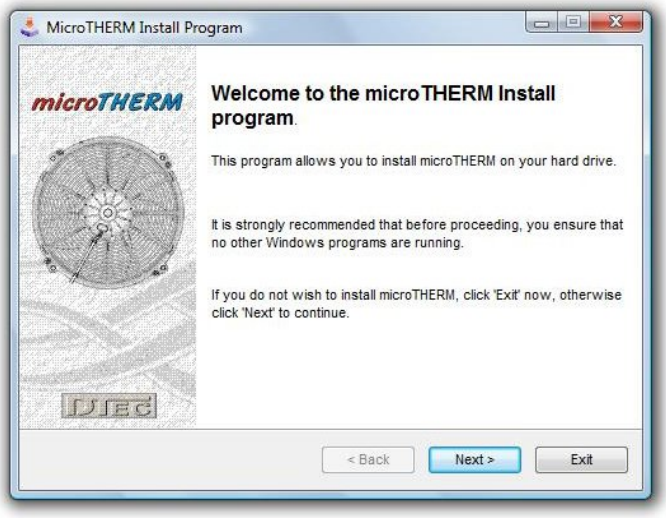
Automatic hardware detection and port setting.

Updates to the basic software will be available FREE to owners as we continually seek to improve our product.

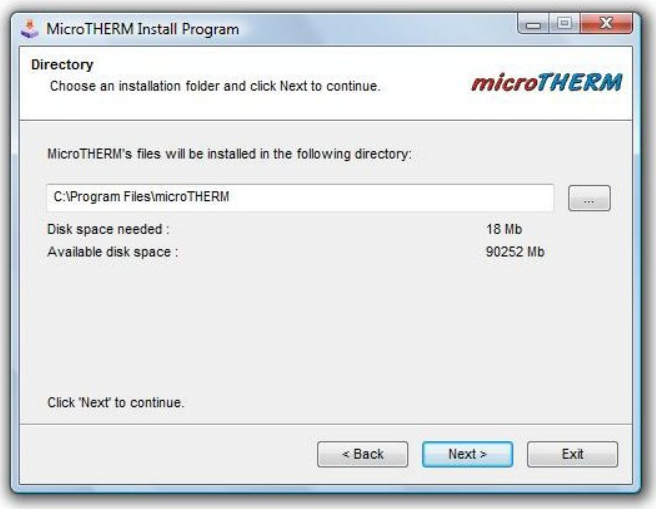
Software Installation

Step 1: DO NOT plug in your hardware, DO close all windows programs.

Step 2: Windows Vista installations require you to read ahead to “Installation notes” first, insert the MicroTHERM software disc and simply execute the program “MicroTHERM Installer.exe” and follow the prompts-



Read and follow the prompts.



You’ll be asked to select a folder in which to copy the files. We recommend you allow the default directory, but feel free to choose any.

Full installation is now complete!

There will be a desktop icon created for you and MicroTHERM will appear in your PC’s program list, along with its uninstalling program that will remove the software from your PC (delete the ‘MicroTHERM’ folder also after running uninstall).

Installation Notes-

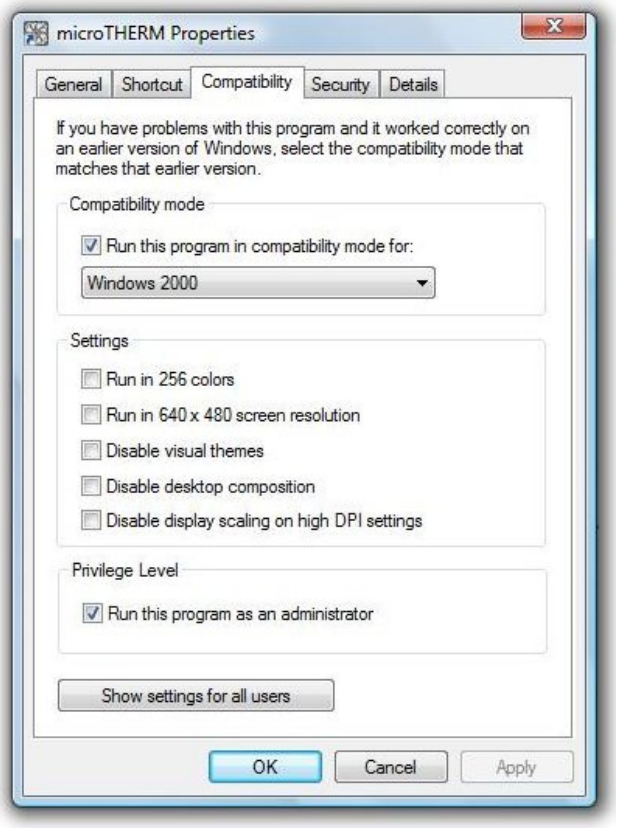
Most issues with the install revolve around the wide variety of PC's in the market and the any versions of Windows and its security settings, Vista operating systems can be particularly troublesome!

Possible Windows Vista errors:

- Installation not allowed by Vista security (messages could relate to administration rights)
- "Error in MicroTHERM Configuration File" warning when opening

A 'configuration' file error appearing the first time MicroTHERM is run can occur as Windows Vista attempts to block MicroTHERM from creating and saving its information files.

Vista has many inbuilt security features; here are some handy hints to help you live with Vista:



'Right click' on the MicroTHERM icon (or program), choose "properties", select "compatibility" tab and then set "compatibility mode" to run as Windows 2000, also tick "privilege level" to run as an administrator

Your User Account Control (UAC) can also block programs; 'Left click' the Windows icon for 'start', select "control panel", select "user accounts and family safety" (or "administrative tools" if Vista is set in 'classic view'), choose "user accounts" and turn the user account control off (un-tick the box).

Installation Notes (cont.)-

If all else fails:

An uninstall program is provided in your PC's programs list. If there are any installation issues with MicroTHERM then we suggest you simply uninstall using the "Uninstall MicroTHERM" program and try again (delete the "MicroTHERM" folder from your PC also after running uninstall).

If you have any problems then please contact us for assistance!

System Requirements-

MicroTHERM is a hardware AND software system. One will not fully work without the other. This manual is freely available for download from the DTec website (www.dtec.net.au). The interface unit and software must however must be purchased- once again from DTec.

MicroTHERM is a 'WIN32' application, it should therefore run on Windows 98, ME, 2000, XP and Vista. Earlier operating systems (such as Windows 95) may encounter issues with compatibility as they may not have the required support.

A minimum screen resolution of 1024 x 768 is required to fully fit MicroTHERM. A smaller resolution will result in part of the display being outside the viewable area.

Although MicroTHERM has been tested on older, slower computers you will still encounter issues if you insist on using some 'cobbled together' PC that has an incomplete, modified, non-standard or corrupted operating system. If you are experiencing particular issues then we suggest you try on another PC to confirm the operation.

Hardware

Mounting the Hardware-

MicroTHERM should be mounted inside the vehicle and away from the extremes of engine bay temperature. As with any electronics, it is best to avoid mounting to surfaces that will expose it to excessive vibration and keep the unit away from sources of interference such as ignition components and high current carrying wiring/devices.

MicroTHERM Wiring 'pin out'-

Input Harness (12 wires in total, none are striped in color)-

Red	12V + ignition
Black	12V - ground (battery)
Black	ground connection for any input sensors used
Yellow	5V for supplying input sensors (or 'pull-up' for resistive sensors)
White	12V + battery. Constant power, not ignition!
Brown	1 input
Blue	2 input
Grey	3 input
Green	4 input
Orange	5 input
Pink	6 input
Tan	7 input
Purple	8 input

Output Harness (16 wires in total)-

Orange/blue	1 output
Blue/black	2 output
Red	3 output
Red/green	4 output
Red/blue	5 output
Red/tan	6 output
Red/black	7 output
Red/green	8 output
Yellow	9 output
Yellow/blue	10 output
Yellow/red	11 output
Yellow/green	12 output
White/red	13 output
White/blue	14 output
White	15 output
Grey/blue	16 output

Notes:

- Red of input harness should be ignition as this will prevent MicroTHERM from drawing power continually and eventually discharging the battery.
- All outputs switch to ground when active (ON), they can directly switch 500mA which is enough for most warning lamps and relays.
- Inputs are 0-5V only, if higher voltages are to be measured then a 'resistive divider' is to be used (see input examples)
- Black wires are internally connected. For best performance use the one black wire as a ground for all additional sensors.

To ensure reliability in the harsh automotive environment we recommend all connections are soldered and protected with ‘heatshrink’ or even better; ‘glueshrink’ sleeving.

Power Wiring-

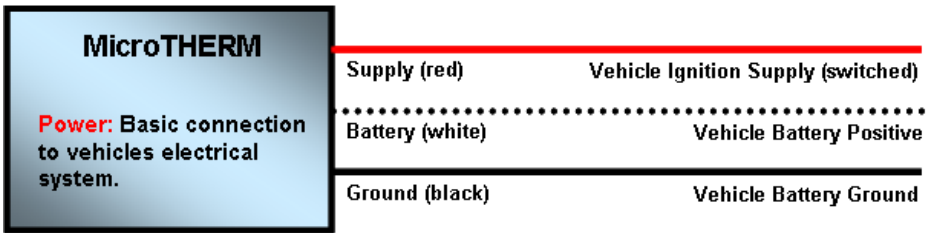
Red wire of the input harness should normally be to a switched ignition power as this will prevent MicroTHERM from drawing current continually and eventually discharging the battery.

Power supply wiring should be fused for protection; we recommend a 5 Amp fuse as a suitable rating.

The white wire should preferably be connected directly to the battery (not switched). This wire is used to protect MicroTHERM from damage and reduce vehicle interference when switching ‘inductive’ loads such as relays.

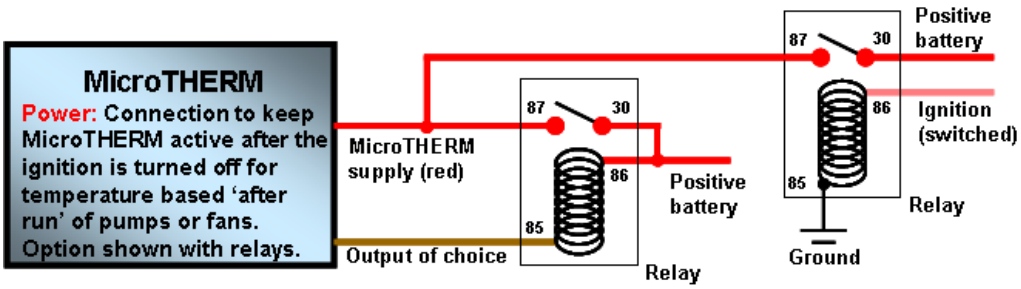
There are 2 black wires, they are internally connected. Use one as the power ground for MicroTHERM and the other as the return for any sensors connected.

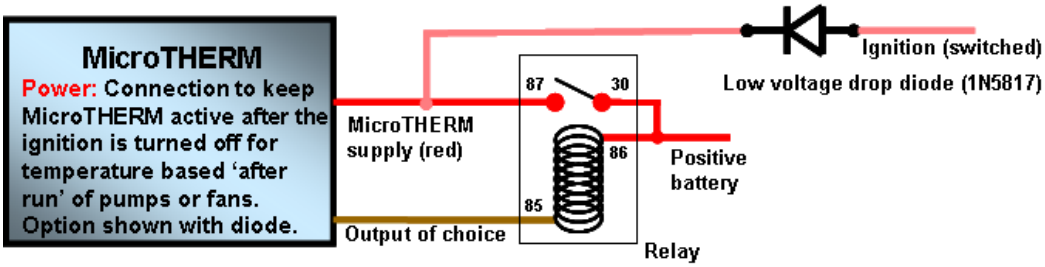
Power connections, standard method:



Alternate connections for power supply (red wire), only for temperature controlled shut down:

The power supply to MicroTHERM can be controlled by one of its outputs; this allows the unit to have control over its own shutdown (not just when ignition is turned off). This wiring concept is useful if you want devices such as water pumps or fans to continue to operate after the vehicle is turned off and until a pre set temperature is reached.





Input Connections-

MicroTHERM operates by reading an input voltage and responding to this based on what has been programmed.

Inputs are 0-5V only, if higher voltages are to be measured then a simple 'resistive divider' is to be used to reduce the input voltage range (see 0-15V example below).

Any source of voltage can be used as an input, but we suggest fitting additional sensors rather than use existing ones. This will help with accuracy (less interference and a stable reference) and will also allow the use of our recommended sensors with their pre-loaded characteristics. To display the screen scales directly in degrees (not just as sensor voltage) these sensor characteristics need to be known (i.e. what voltage equals what degrees)

MicroTHERM recommended and pre-loaded sensors/inputs-

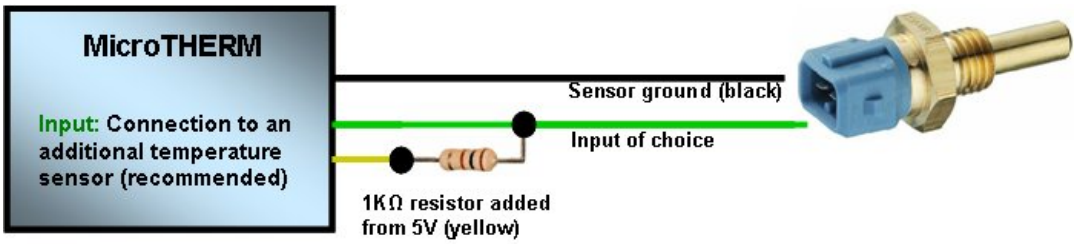
General,	Voltage input	0 – 5000mV (0-5V) scale	units displayed as mV
Fluid temp,	Bosch	0 280 130 026 (Bosch #)	units displayed as ºC or ºF
Air temp,	Delco	25037388 (GM Holden #)	units displayed as ºC or ºF
Air/fluid temp,	TSO1	TSO1 (DTec part #)	units displayed as ºC or ºF
Hi temperature,	Thermo-Amp	Therm1 (Dtec part #)	units displayed as ºC or ºF

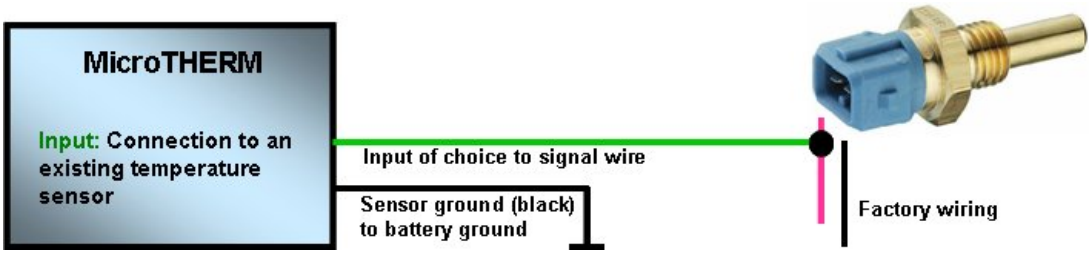
If you wish to calibrate your own sensors to display in units other than voltage then the optional calibration tool (MicroCAL) can be used!

All Input wiring must be carefully routed to avoid interference from ignition components or wiring/devices drawing large currents such as motors. Keep the wiring well clear and if in doubt, shielded (screened) wiring should be used with the 'shield' being earthed at one end.

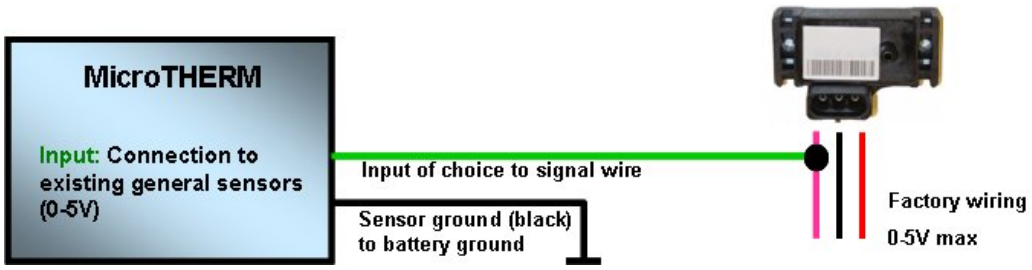
A 5 volt output is provided from MicroTHERM (yellow wire) to be used for powering external sensors or as the 'pull-up' for resistive temperature sensors such as the Bosch or Delco devices.

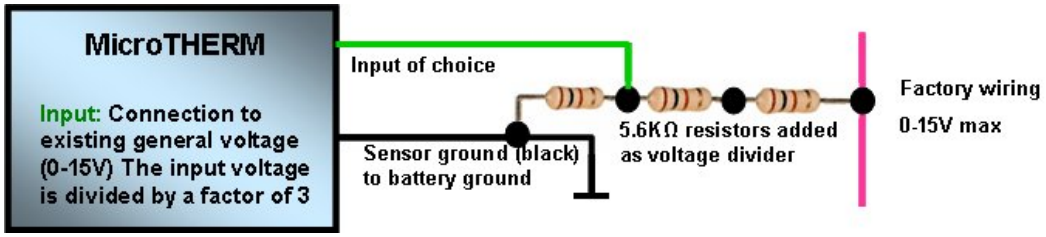
The black wires are internally connected. For best performance use one black wire as a ground for all additional sensors and the other as a battery ground.

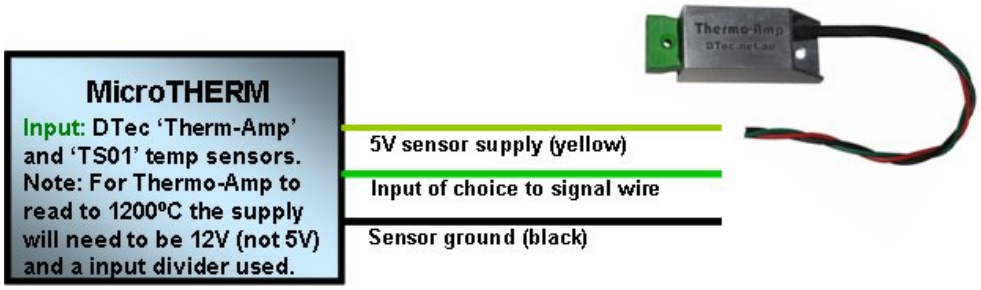




Input connections (cont.)-

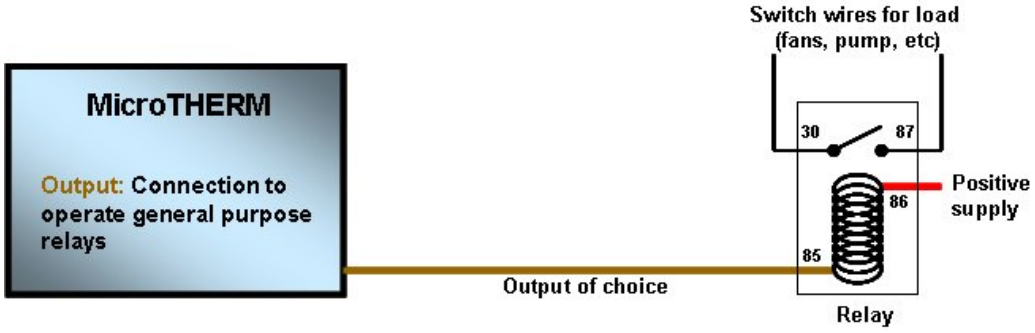




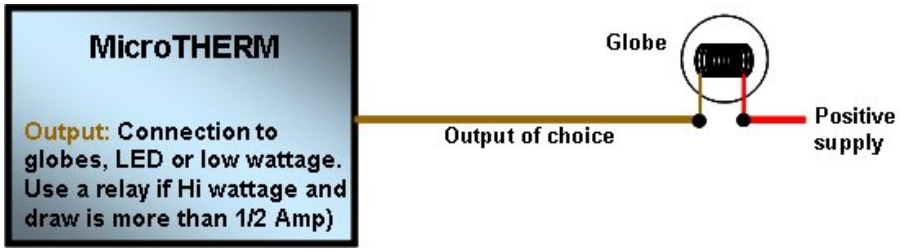


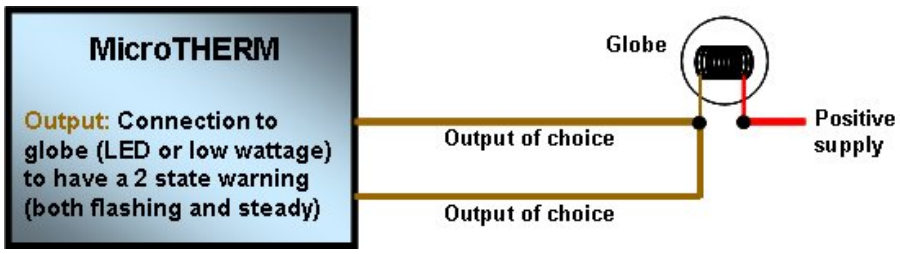
Output Connections-

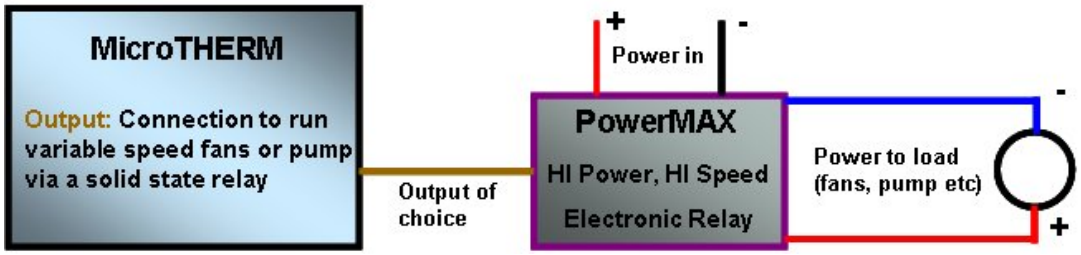
All outputs switch to ground when active (ON), they can directly switch 500mA which is high enough for most warning lamps and relays. Do not directly switch globes greater than 5W, as a guide a typical 3W globe will draw about 210mA at vehicle voltages and this is fine. We strongly suggest you consider running LED's as warning lamps; high brightness versions are available cheaply and in various colours, these draw very little current.



Output Connections (cont.)-

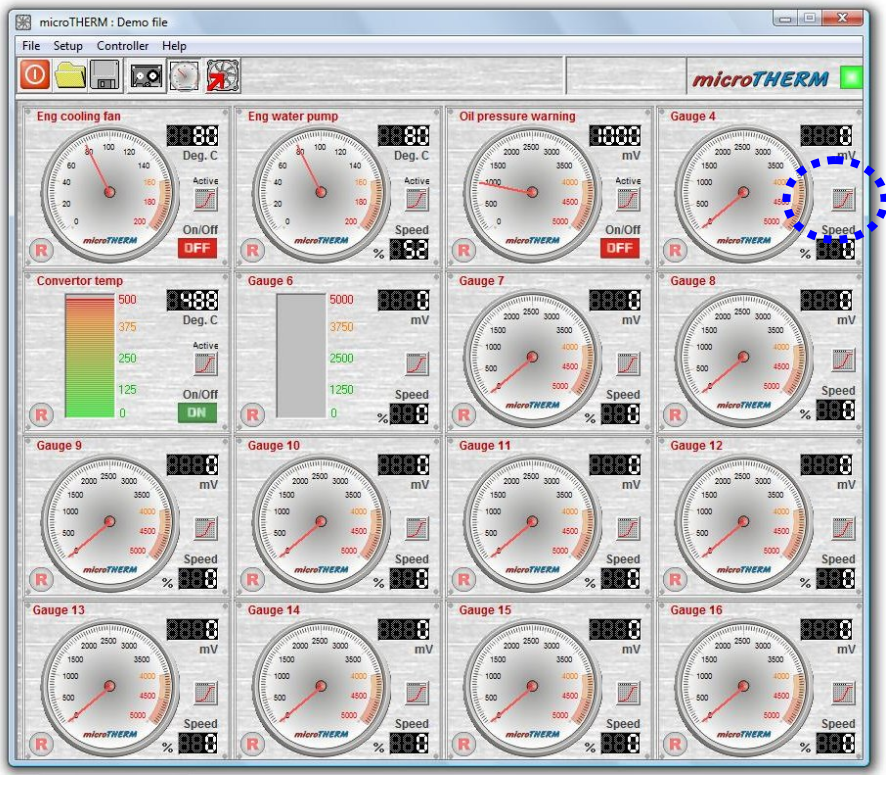






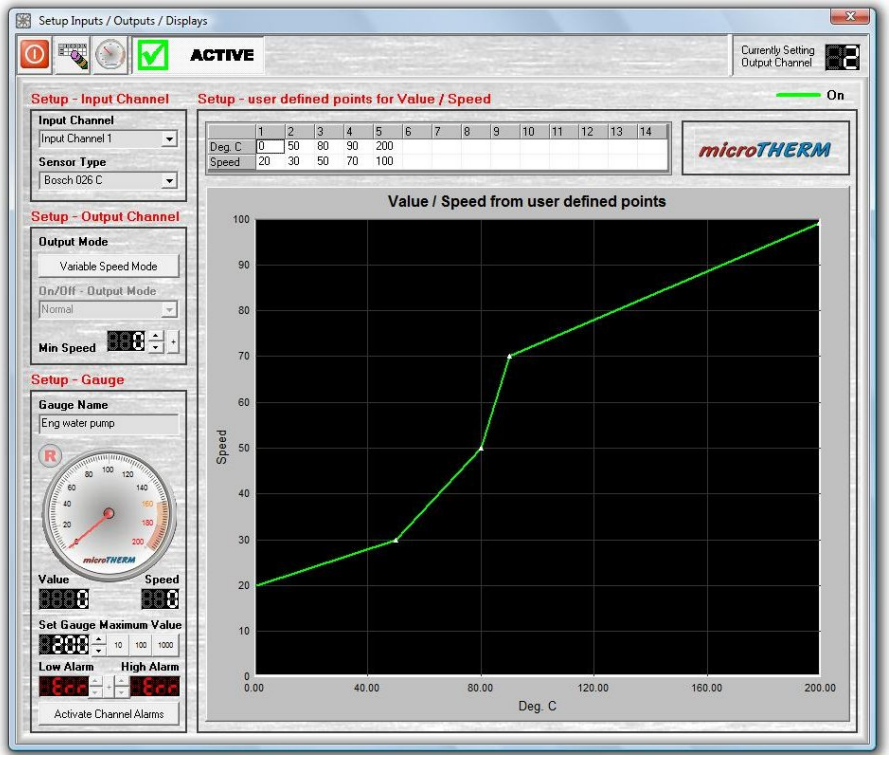
Two Main Screens of MicroTHERM

There are two main screens shown in the software, the '**MONITOR'** screen is used to view live all of the output channel states, input values, alarm status, activate data log (to PC) and to select menu functions.



Pressing any output channels 'setup' button (highlighted) will open the 'setup' screen for the selected channel.

The '**SETUP'** screen displays each output channels settings. It shows the input channel that's allocated and if a pre-defined sensor is connected (or just the voltage input) and can display the live reading to assist setup. The output channels mode (switched or variable speed), its control settings and display options are performed in this screen.



STOP !!!

Important notice

The following ‘quick start’ operating example is designed to save you time in ensuring that you get the most out of MicroTHERM.

By giving a very brief overview of some main operations we hope to provide a basic concept that will allow easy understanding of the detailed features explained later.

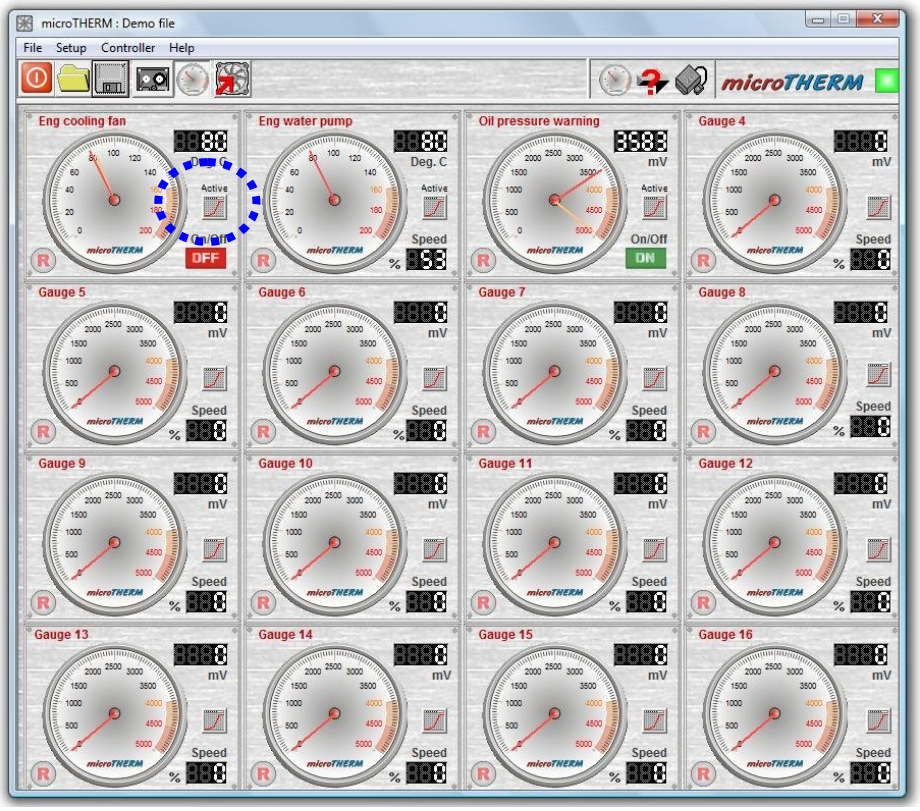
Read this manual fully before operation!

After the example pages this manual will take you through the functions of the two main screens, ‘Monitor’ & ‘Setup’. Next you will be guided, in the order that they appear, through the selections that are available in the various menu options.

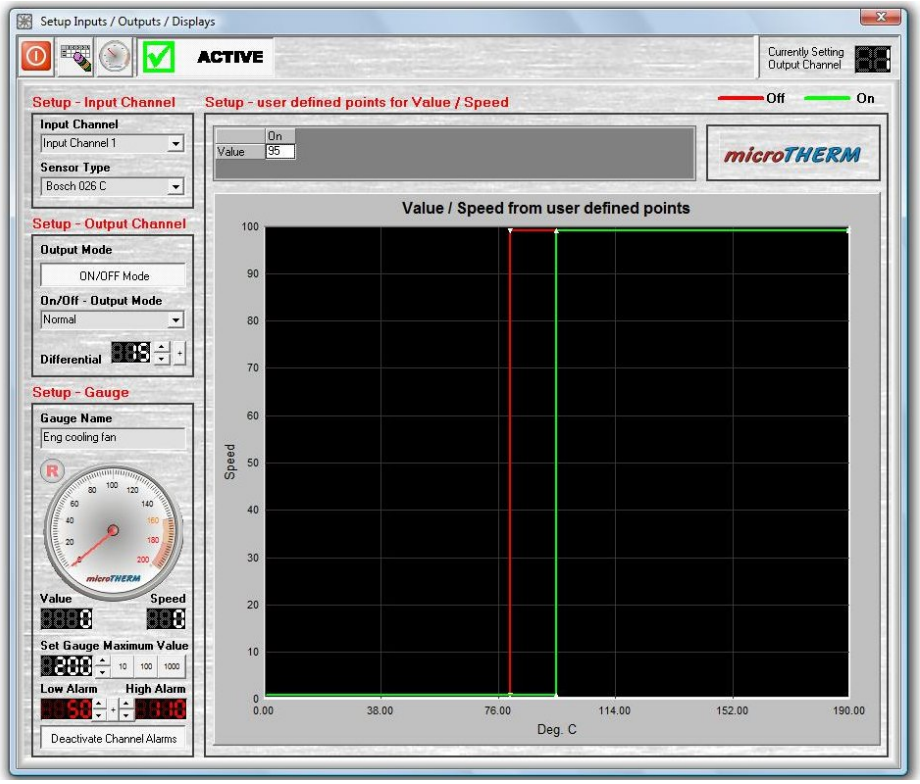
'Quick Start' Example

We will outline the basics to set up the software and program MicroTHERM to do the following tasks-

- Output 1 to operate a cooling fan via a relay, input from Bosch 026 coolant sensor connected to input 1
- Output 2 to operate a variable speed water pump, input from Bosch 026 coolant sensor connected to input 1
- Output 3 to operate a 'Hi pressure' flashing warning lamp, input from a oil pressure sensor connected to input 2



To setup any output channel click on its 'setup' button. This will open the 'Setup' screen as shown below. We will start with channel 1



In our example we wish to tell it to use input channel 1 as the signal source and that a Bosch 026 temperature sensor is connected to this.

The output will be simply on or off ("normal" rather than flashing) and the output will turn off 15 ºC below when it turns on (this stops the fan cycling rapidly at the switching point).

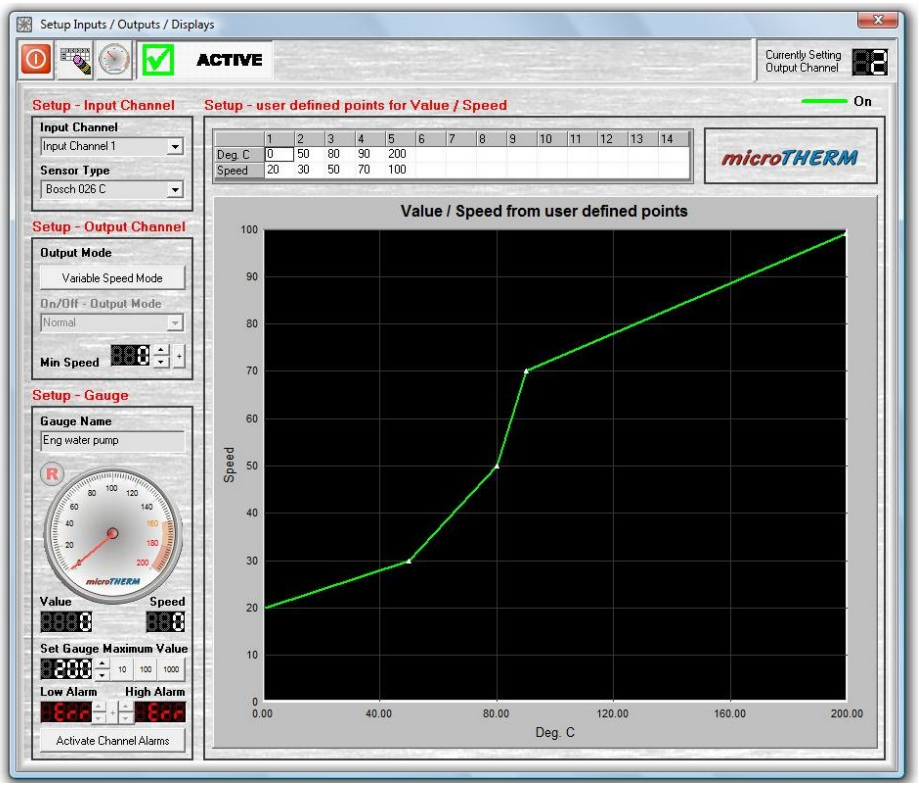
We will label the gauge "Eng cooling fan" so it is meaningful when we monitor it later.

We will set the fan to turn on at 95 ºC in the 'table' (as it's only on/off there is only 1 'site' available)

Press the "ACTIVE" button to turn on our channel now it's configured.

Close the screen to return to 'monitor'

'Quick Start' Example (cont.)



We will now setup channel 2. In our example we wish to tell it to also use input channel 1 as the signal source (the Bosch 026 temperature sensor).

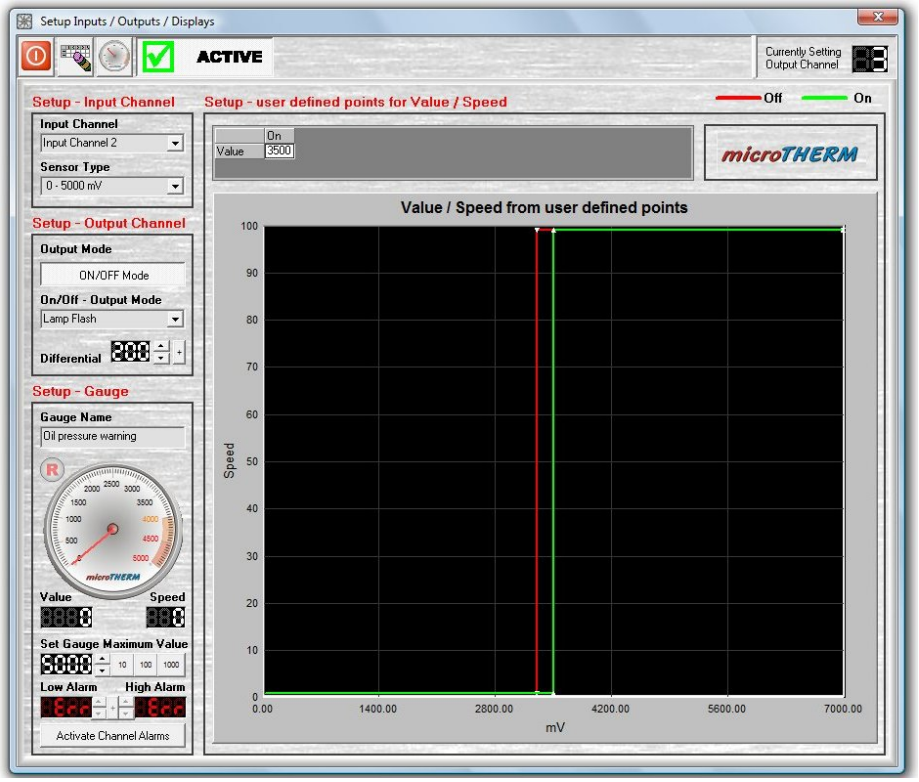
The output will be mapped to vary the water pumps speed based on temperature, so select "Variable Speed Mode". We are happy for the pump to run down to any min speed (the lowest set here is 20% so no mater how cold it won't go slower anyway)

We will label the gauge "Eng water pump" so it is meaningful when we monitor it later.

We will fill in the 'table' sites so our pump runs at our desired speed vs ºC.

Press the "ACTIVE" button to turn on our channel now it's configured.

Close the screen to return to 'monitor'



We will now setup channel 3. In our example we wish to tell it to use input channel 2 as the signal source and that's it's a 0-5 volt (5000mV) input.

The output will be on or off and set to "Lamp Flash" as a warning indicator. The output will turn off 200mV below when it turns on (this stops the lamp cycling rapidly at the switching point).

We will label the gauge "Oil pressure warning" so it is meaningful when we monitor it later.

We will set the warning to occur when the oil pressure sensor voltage is at 3500mV in the 'table' (as it's only on/off there is only 1 'site' available)

Press the "ACTIVE" button to turn on our channel now it's configured.

Close the screen to return to 'monitor'

This message icon in the 'monitor' screen reminds us to now press the 'program' button (we have made changes!) so that our settings are loaded into MicroTHERM's memory. It can now follow our settings in the vehicle and no longer requires a PC, unless re-setting again or monitoring/logging data.

If you want to store your settings and gauge labels on the PC then press the 'Save' button..

Frequently Asked Questions (FAQ's)

The answers to some commonly asked questions that may increase your understanding of MicroTHERM:

Q- I have altered my desired settings but the ECU isn't reacting to these changes?

A- After any changes you must 'program' the ECU with this new information, just press the button. There is even a warning symbol in the menu bar to remind you changes have been made and to re-program!

Q- I can't upload from my ECU?

A- Ensure the ECU is powered up and the PC port settings are correct first. The software will 'upload' when first started so it will be necessary to have it connected and set up before running MicroTHERM software on the PC.

Q- I only have one input; can I control multiple output functions?

A- Yes, all 16 outputs can be allocated against the 1 input if you wish.

Q- Can I join outputs together?

A- Yes, this is called an 'OR' connection as one 'or' the other will control the device. An example of this is you might want a warning lamp to both flash or remain lit depending on the temperature. One output can be set to flash it and then at a higher temperature the other output holds it on constantly.

Q- Can I measure input voltages greater than 5V?

A- Yes, but you must use some resistors to divide the voltage down to the 0-5V range. These cost only a few cents from an electronic supplier and there is an example in the 'hardware' section of this manual. The voltage scale displayed in MicroTHERM will remain at 0 – 5000mV range.

Q- Can I use a relay for variable speed motor control?

A- No, an electronic solid state relay ('driver') is needed. DC motor speed control is done with a technique called 'PWM'; this involves pulsing current to the motor at high speed and varying the pulse widths to control the effective current. Relays are too slow to open and close at high speed. DTec's 'PowerMAX' is one suitable driver option.

Q- Can I fit super bright warning lamps?

A- Yes, but ensure they draw less than 500mA if being directly switched be MicroTHERM (3W globe will draw about 210mA). We strongly suggest you consider running LED's as warning lamps; high brightness versions (and clusters) are available in various colours, these are very efficient, cheap, reliable (more so than globes in a vibrating environment!) and draw very little current.

Q- Can I easily add 'redundancy' into my system so that if there is a circuit failure my water pump and fans still operate?

A- Yes, if your application requires this extreme approach then a 'normally closed' relay can be wired in parallel to MicroTHERM, one output can be used to turn this relay off during normal operation. This will allow MicroTHERM to control the device as usual but if there is a failure the parallel relay would take over and supply full current.

Q- My PC has no serial port, can I use MicroTHERM?

A- Yes, cheap serial to USB converters are readily available and work fine.

Q- What is stored on my PC and what is stored in the MicroTHERM ECU?

A- The ECU stores the data for it to operate the outputs based on your settings, but it also stores some additional channel information not needed to actually operate in the vehicle (sensors used, gauge scales, alarm settings). This is so that when later connected to a PC it still allows the software to display the settings effectively. However, it does not store 'text' such as any name given to the channel gauge, additional comments or monitor screen layout configurations, these are saved in a 'parameter' file on the PC.

Q- Can I plug my PC into any MicroTHERM and upload/read the settings?

A- Yes, but any 'text' associated with naming the channel gauge or additional comments won't be available; these are only saved in a 'parameter' file on the PC.

Q- Can I use my own sensors?

A- Yes, there are 2 approaches here; you can use our optional 'MicroCAL' software to generate a characteristic for your sensor (what voltage = what temperature), this will allow the sensor readings to be in degrees and not just voltage. The other option is jus to leave the sensor units in voltage, as an example you might set your cooling fan to operate at a certain sensor voltage that you know i.e. when engines to your desired temperature observe the displayed voltage and use this as your switch point.

Q- What is the resistor for in the temperature sensor diagram?

A- The 1000 ohm resistor connected to the 5 volt wire is called a 'pull up' resistor. It is required for resistive style sensors (such as typical temperature sensors); it converts the changing sensor resistance into a voltage the ECU can read. By not building it into the ECU it allows the input to also be used for other sensor types.

Monitor Screen Overview

Output Channel Display–

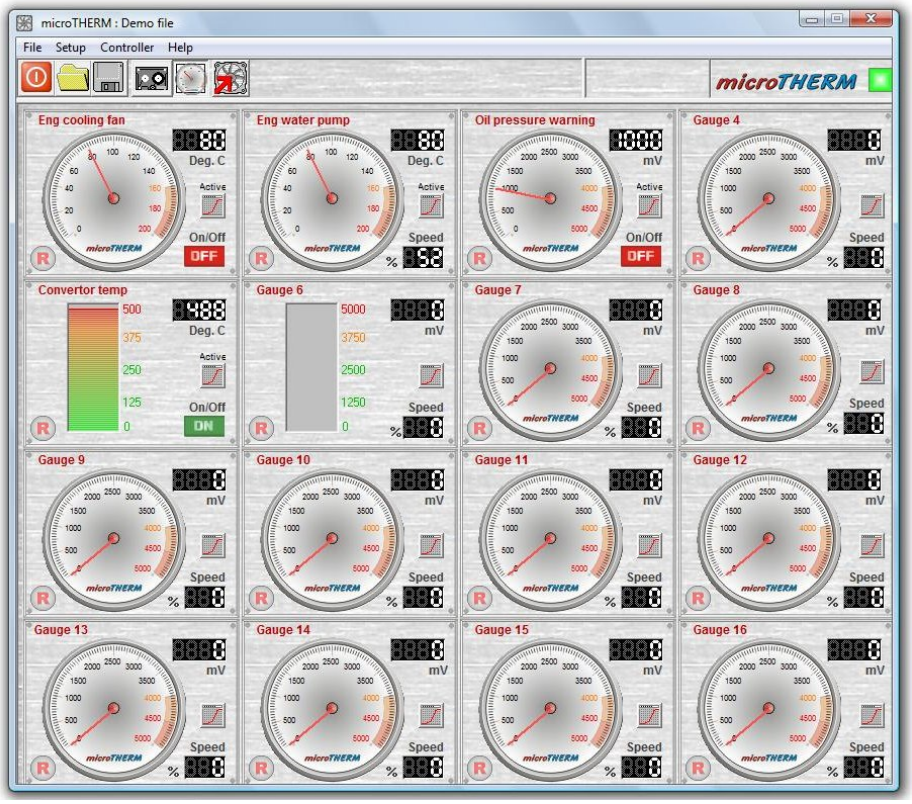
All of the 16 output channels can be viewed live on this screen, or the screen can be customised to show only those channels that you are actually using (via the menu option “Setup/Customise Gauge Layout”).

A live display is only shown when the tool bar icon “show live display” is active.

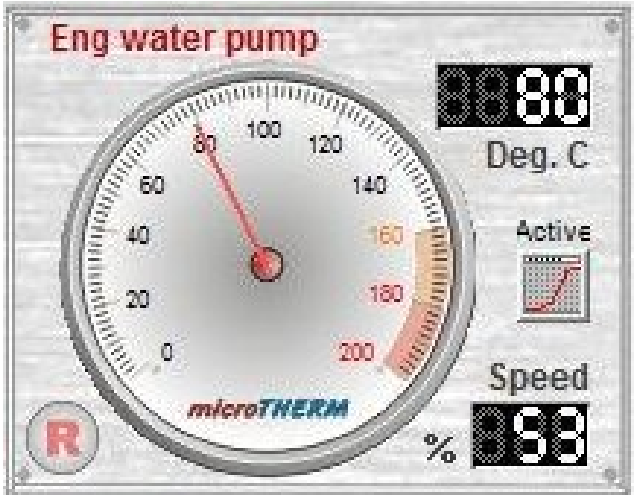
A ‘dial gauge’ or ‘bar graph’ style of gauge can be selected (via the menu option “Setup/Customise Gauge Layout”).

All gauges have a peak ‘tell tale’ needle that can be reset by clicking on “**R**” symbol next to each one.

The range on the scales shown can be set in the ‘Setup’ screen. The default scale is based on the input type selected in the ‘Setup’ screen.



By default each gauge is numbered according to its output wire e.g. “gauge1” is output channel 1’s gauge. The gauge title can be renamed to a more meaningful name of your choice e.g. “gauge1” might be renamed to “coolant temp”, this is done in the ‘Setup’ screen



The display in the upper right corner shows the current reading from the allocated input channel. Either the input voltage or a temperature is shown depending on the input type selected in the ‘Setup’ screen.

Pressing any output channels ‘setup’ button will open the ‘setup’ screen for the selected channel. The word “**Active**” above the icon shows that the output channel is being used (it was activated).

The display in the lower right corner shows the state of the output, if in variable speed mode the current ‘duty cycle’ being output is shown, if in on/off mode then display will indicate either “on” or “off” depending on output

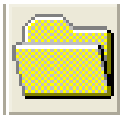
If an alarm event is triggered (enabled in the ‘Setup’ screen) then the display will change from white to bright red!

All of the gauge configurations (and actual data values entered for each channel) can be saved as a file called a ‘parameter’ file. This is explain next as it’s a tool bar button function.

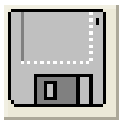
Monitor Screen Overview (cont.)

Tool Bar Button Functions-

Exit: Saves and exits MicroTHERM.



Load a parameter file: Allows you to select a 'parameter' file to load. A parameter file contains your previously saved channel data and gauge configuration information.

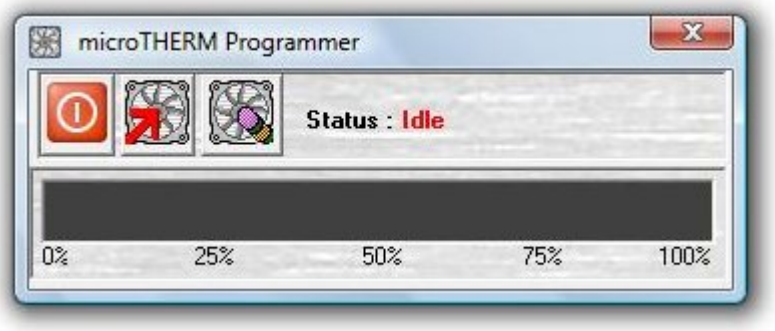


Save a parameter file: Allows you to save the current data and gauge configurations as a 'parameter' file for future use. The ECU does not save 'text' such as gauge names, comments and gauge configurations, which is the function of this 'parameter file'!

Log data to PC: Will start logging to the file specified in the menu option "Setup/Set Logging File". Only output channels that are active will be logged. The settings for the logging rate are in the menu option "Setup / System". Files are saved as a text file (.TXT).

Show live displays: Enables the monitor screen to show live channel information, if not active then the monitor screen will not update its display. This function is included as continually updating the display uses much computer resources and may slow down functions such as the graph display and the response to mouse clicks.

Program MicroTHERM: Screen below will appear; the current data that has been set for the output channels (in the setup screen) is sent to MicroTHERM to be stored and subsequently used by it at all times.



From within the programming screen you can erase all settings from MicroTHERM's memory.

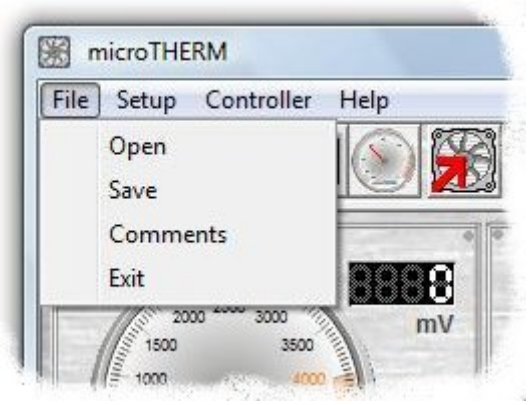
The progress bar will show the status of the programming or erasing.

NOTE: Do not disconnect or turn off MicroTHERM during programming!

Program MicroTHERM Warning: Channel data has been altered (in the setup screen) but the MicroTHERM control unit has not yet been reprogrammed with this new data. This programming must be done to update MicroTHERM or it cannot carry out the control as you require!

MicroTHERM Hardware Lamp: Lamp is green when hardware has been detected and communication established, red if not. If this is the case, firstly check that the unit is plugged into the computer correctly and then confirm that the "Setup/System" menu has the correct port configuration.

Monitor Screen, Menu Options 'File'



Open-

Menu option allows you to select a 'parameter' file to load. A parameter file contains your previously saved channel data and gauge configuration information (option also available from a tool bar button).

Save-

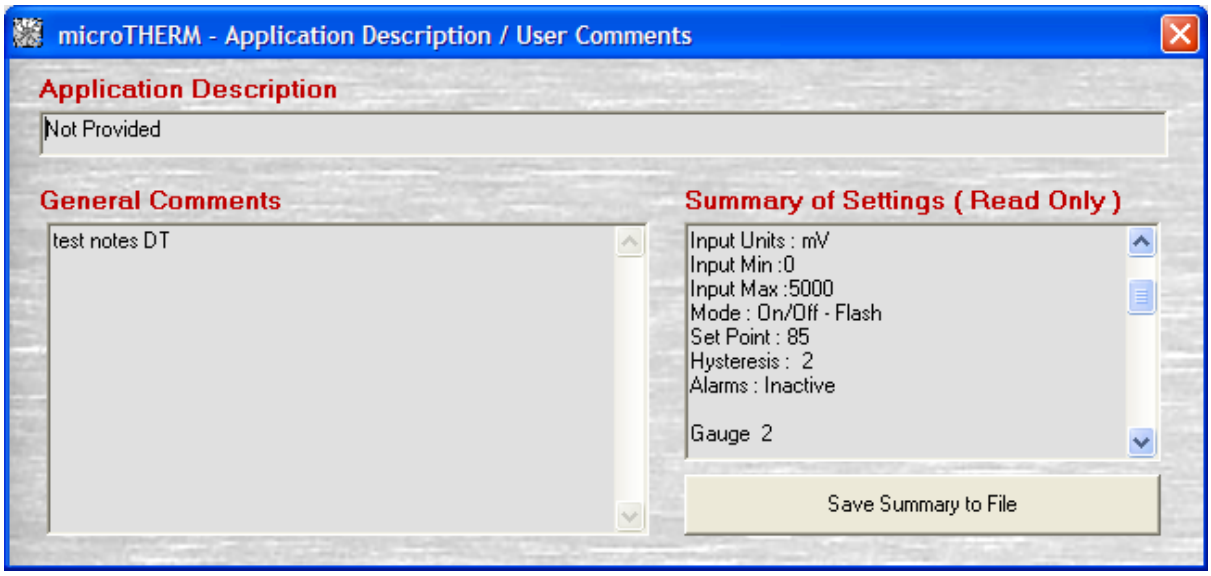
Menu option allows you to save the current data and gauge configurations as a parameter file for future use (option also available from a tool bar button).

Comments-

Menu option allows you to store any comments about the setup or vehicle application that you wish for future reference. The notes are saved along with the 'parameter file' (.uT) that is currently being used, therefore a saved parameter file must be open (or at least the current setup is to be saved to create one).

Any entered comments are saved automatically when the 'form' is closed, there is no need to press any buttons. Any saved comments are visible for any open parameter file when the menu option "File/Comments" is selected again.

The right hand side has a section called "Summary of Settings", this has a different function to the comments. It allows a method of recording all of the data and settings that have been applied. The information is saved as a text file (.TXT) in the selected directory and this can be viewed or printed for reference with any text editor such as Microsoft 'Word' or 'Notepad'. The summary is created and saved only when the "save Summary to File" button is pressed.

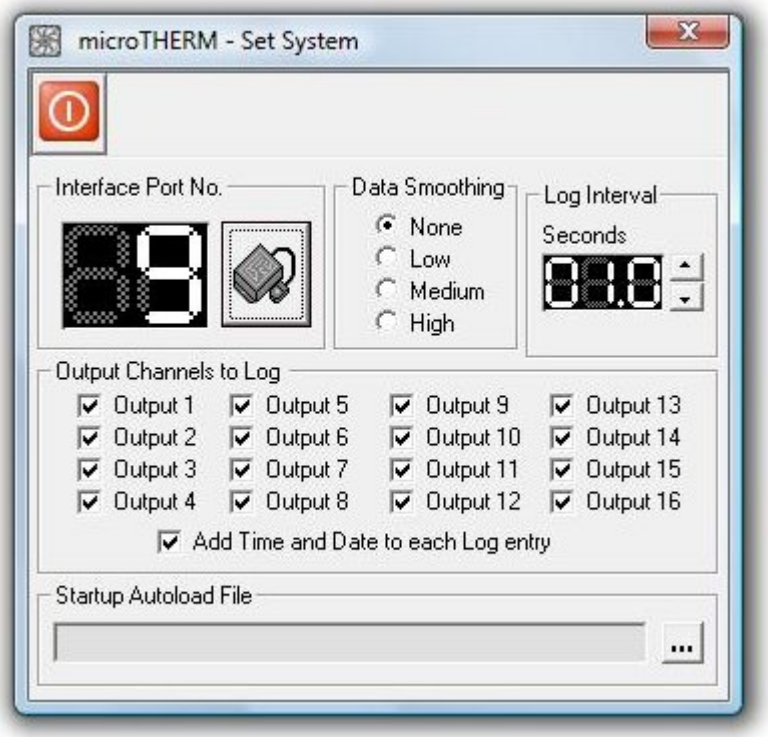


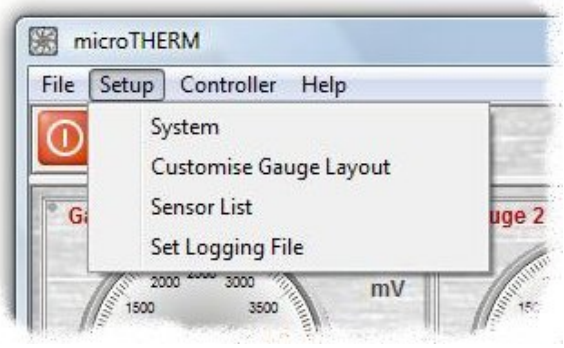
Tip- Summary settings are related only to the active channels, so if you want to record the settings for only certain channels then simply enter the setup for each of the unwanted channels and de-activate temporarily.

Exit- Saves and exits MicroTHERM (option also available from a tool bar button).

Monitor Screen, Menu Options 'Setup'

System-





Interface Port Number: MicroTHERM software needs to know which PC serial port is being used. If you are using a 'USB to serial' converter the allocated port must also be known.

Unfortunately, when installing particular USB devices, modern PC's allocate them to almost any port number and will even change this depending on what USB socket is being plugged into.

The easiest way to set the "port No." is to plug in the hardware and press the 'AutoFind' Hardware button. It will step through all of the port options and try to establish communication with the hardware, be patient as 99 different options are catered for and this can take some time. When found, the port setting is automatically saved and should remain valid for the USB socket you have plugged into, if you use another socket you may need to search again.

Tip- The communication port can also be manually chosen if it is known. Those with good computer skills can go into windows 'device manager' and view the hardware settings for ports (com & LPT) to check what the PC has done.

NOTE: MicroTHERM 'uploads' data from a controller when the PC software is started, therefore it is important to have the hardware powered up and connected to the PC. If you have just had to setup the port then you should restart the software again for it to now 'upload' data from the hardware!

Data Smoothing: The selected setting determines the level of smoothing applied to the data. This has the effect of displaying data that is not wildly changing due to small variations and electrical interference. Too large a number and variations that may be of interest can be hidden.

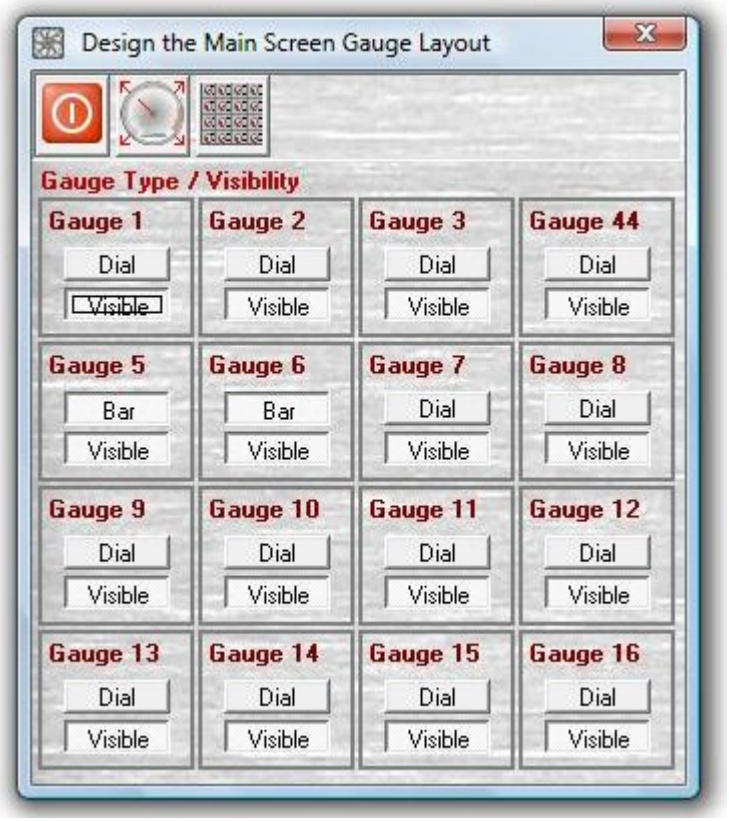
Log Interval: Sets the rate at which values are recorded to the hard drive when logging to the PC. If the time interval is set too small then the amount of data saved will be unnecessarily large. If just logging temperature changes then consider the rate at which the sensors can actually respond.

Output Channels to Log: Sets the actual channels that are logged to the PC's hard drive. If channels of no interest are logged then the amount of data saved will be unnecessarily large.

Startup Autoload File: Sets a parameter file that will be loaded each time MicroTHERM is opened. This is useful if you are loading the same file into multiple MicroTHERM units regularly, it is a time saving feature.

Monitor Screen, Menu Options 'Setup' (cont.)

Customise Gauge Layout-

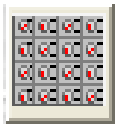


The gauge layout displayed on the monitor screen can be customised to your preference. Generally this is done to remove any excess displays that are not being used.

Dial/Bar: Button toggles between a bar graph display or a dial gauge format.

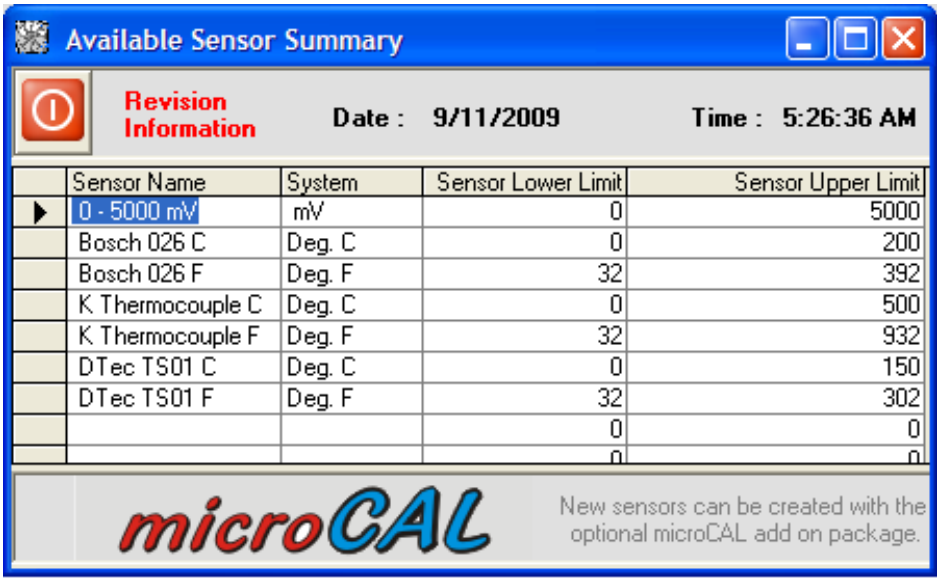
Visible/Hidden: Button toggles between displaying or hiding a channel.

Allow gauges to be relocated: Allows you to drag gauges around to position them in the monitor screen when button is activated. To relocate the gauges- position the mouse cursor on the gauge and hold the left mouse button down, after a couple of seconds you will be able to move the gauge box to any location. To 'let go' of the gauge box release the left mouse button.



Restore default gauge layout: Returns all channels to be displayed simultaneously and restores their positions and size.

Sensor List-



Any pre-loaded sensor calibrations can be viewed here.

MicroTHERM comes with some common sensor characteristics already loaded, if you wish to create your own sensor calibrations then DTec's optional 'MicroCAL' software can be used.

If you do not use sensors with characteristics then it simply means their output will be displayed in Volts (mV) and not a unit such as ºC.

NOTE: Please see the 'MicroCAL' manual for a full explanation of how sensor calibrations can created.

Set Logging File-

Sets the location and name of the text file (.TXT) that is used to save data to when logging is active. Logging is activated by a button on the tool bar.

Monitor Screen, Menu Options 'Controller'

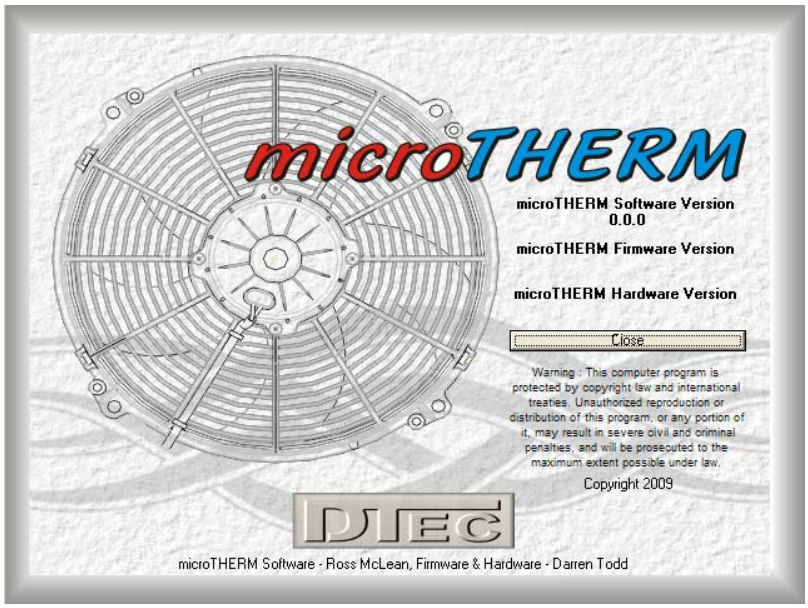
Outputs are Inactive / Active –

Setting allows all of the outputs to be deactivated in one step rather than needing to go into each channel individually, deactivate and program. This allows you to temporarily shut off the outputs during setup and commissioning. When Inactive, the display will freeze 'live' display (you can turn this back on with the 'Show Live Display' icon) and the 'hardware lamp' will flash red and green, this is to warn you that the outputs are inactive and not malfunctioning. Don't forget to turn them back on again!

Monitor Screen, Menu Options 'Help'

About –

Displays Firmware version, hardware version and copyright information.



Open MicroTHERM Manual –

Opens the MicroTHERM manual, the manual must be in the 'MicroTHERM' directory for this function to operate. We suggest you download the latest manual version from the DTec web site (www.dtec.net.au) and simply save it in the MicroTHERM directory (default directory location is C:\Program Files\MicroTHERM).

Of course, you can just download the manual from our website, save it where you please and view as any other document!

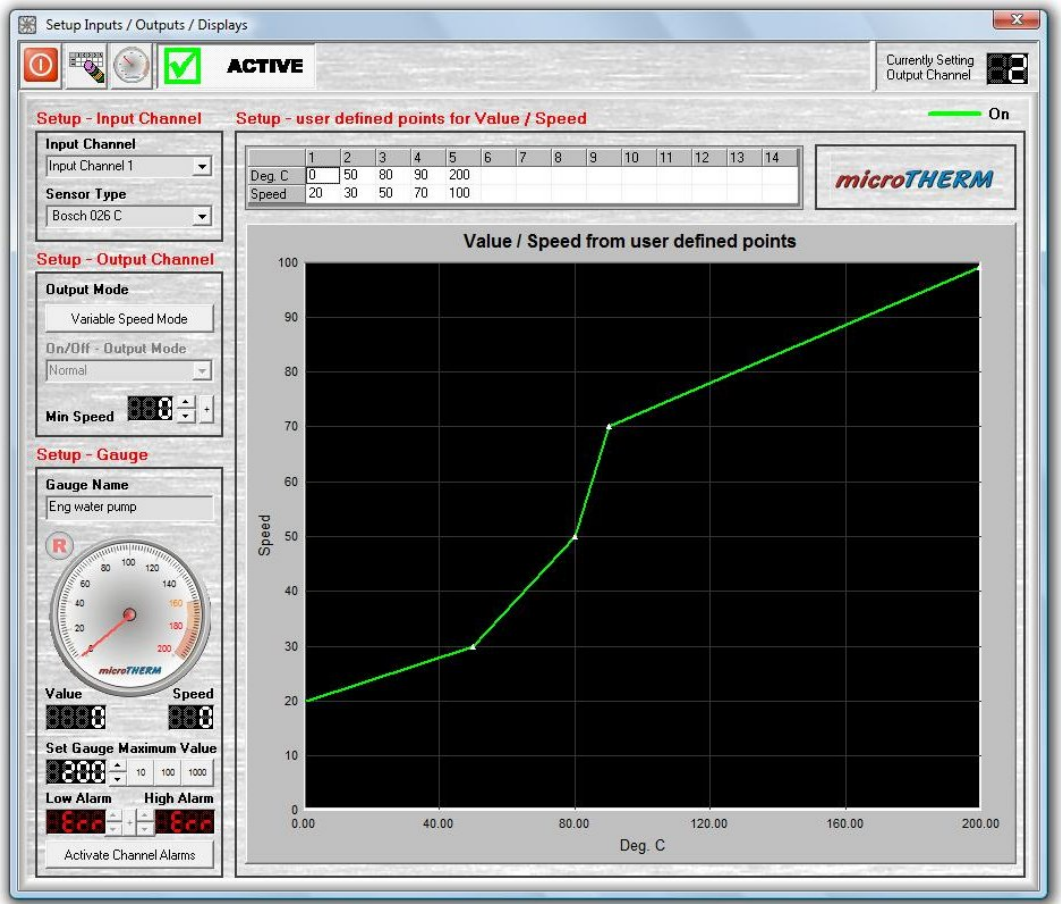
www.DTec.net.au –

Direct link to the DTec web site, access to the user manual and software information.

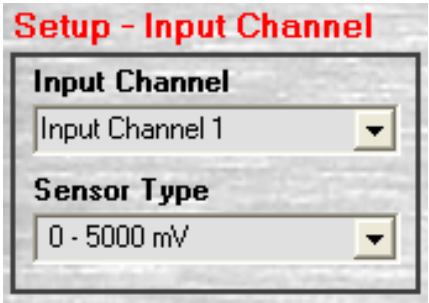
Setup Screen Overview

Having pressed a particular output channels 'setup' button will have opened this screen!

From this setup screen the behaviour of the output is defined, the input channel it will use is selected and any alarm functions for the monitor screen are set.



Setup Input Channel–



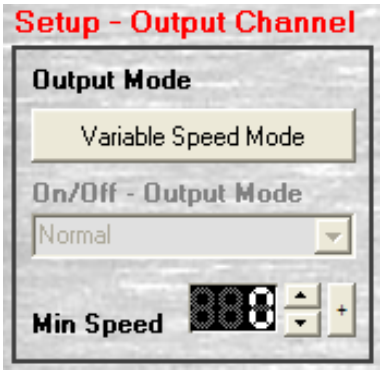
Input Channel: The Input channel that you wish to use (1 to 8) to control this output channel is selected from the drop down menu.

Sensor Type: The Input sensor type is chosen for the selected input channel. Voltage (0-5000mV) can be selected as the input source and used if suitable or if your sensor type is not available in the selection.
MicroTHERM comes with some common sensor types already loaded, if you wish to create your own sensor calibrations then DTec's optional 'MicroCAL' software can be used.

NOTE: Please see the 'MicroCAL' manual for a full explanation of how sensor calibrations can created of required.

Setup Screen Overview (cont.)

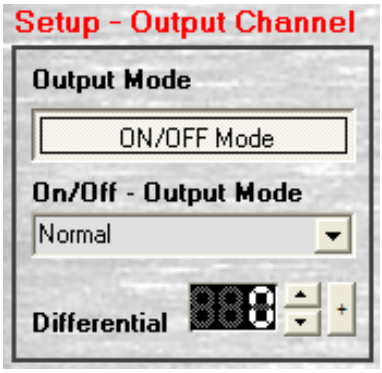
Setup Output Channel–



Variable Speed Mode: It is used to control motor speeds, solenoid positions and lamp brightness by varying the average current supplied to the devices.

The output will be Pulse Width Modulated (PWM), also known as variable 'duty cycle' (a fixed frequency is used; the ON to OFF ratio is varied).

When selected a choice of **"Min Speed"** is available, this allows you to select the minimum percentage of PWM that will be supplied. This is available as often devices such as cooling fans will not flow sufficient air at low speed to be useful, therefore it is no value running them all the way down to zero speed.



ON/OFF Mode: The output will be either on or off, not variable speed.

It can be also selected so that the output will be set to **"Lamp Flash"** so that if connected to a warning lamp it will automatically blink the lamp to get the drivers attention, rather than just illuminate it constantly when triggered as **"Normal"**.

When selected a **"Differential"** setting is available, this allows the output to be turned off at a lower setting than it was turned on at. This provides a form of 'hysteresis' that is important to prevent the output from wildly switching between on and off states at your set switching voltage. E.g. if setting the output to operate at 2500mV you would perhaps set the differential at 100mV, this would allow the output to turn on at 2500mV but it would turn off at 2400mV (2500-100=2400)

Tip- Clicking on the "+" button causes the 'scroll' buttons to increment by units of 10 (not 1) for faster setting!

Setup User Defined Points for Value/Speed–

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Deg. C	30	50	80	100	150									
Speed	10	15	40	60	85									

If the output mode selected is "variable speed mode" then a table will appear with 14 data points allowing entry of any input and a corresponding output speed ('duty cycle').

All 14 points do not need to be filled in but the voltage sites used do need to be consecutive values with no blank sites left in between entries. MicroTHERM uses linear interpolation between the voltage and speed values of the sites to give smooth control.

The last speed value in the table will be speed maintained as the input exceeds the last temperature site value (i.e. in above example a temperature of 160 ºC would still be 85% speed).

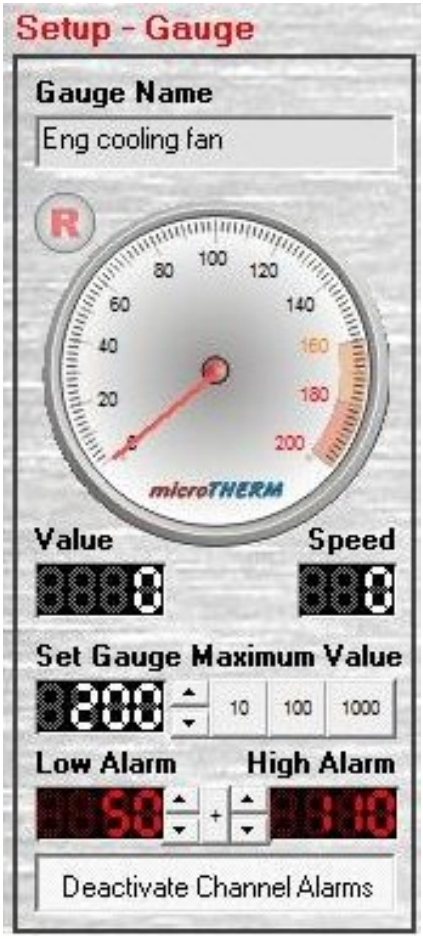
The first speed value in the table will be speed maintained as the input falls below the first temperature site value (i.e. in above example a temperature of 20ºC would still be 10% speed).

	On
Value	95

If the output mode selected is "ON/OFF Mode" then a table will appear with only a single data point and that controls the point at which the output is activated.

Setup Screen Overview (cont.)

Setup Gauge–



The gauges on the monitor screen get their settings from here. The gauge can also be viewed live on this screen to assist with monitoring input/output operation and setting up the control functions to achieve your goals. A live display is only shown when the tool bar icon “show live display” is active.

Gauge name: By default each gauge is named its output wire e.g. “gauge1” is output channel 1’s gauge name. The gauge title can be renamed to a more meaningful name of your choice e.g. “gauge1” might be renamed to “Eng coolant fan”, this is done by ‘clicking’ in the box and typing your text of choice.

Value: The display to the lower left of the gauge shows the current reading from the allocated input channel. Either the input voltage or a temperature is shown depending on the input type selected in the ‘Setup’ screen.

Speed: The display to the lower right of the gauge shows the state of the output, if in variable speed mode the current ‘duty cycle’ being output is shown, if in on/off mode then display will indicate either “on” or “off” depending on output

Set Gauge Maximum Value: Sets the gauges full scale range from the default. The “10,100,1000” button between the scroll bar allows fast incrementing of the entries.

Alarms: Sets a Low and High level to activate the alarm conditions in the monitor screen and enables/disables the function. The “+” button between the scroll bar allows fast incrementing of the entries.

If an alarm event is triggered then the display will change from white to bright red!

The alarms can be deactivated with the lower button.

Gauges have a peak ‘tell tale’ needle that can be reset by clicking on “**R**” symbol next to each one.

Tool Bar Button Functions-

Exit: Saves and exits MicroTHERM.

Clear Table: Clears all of the data tables previous entries

Show live display file: Enables the dial gauge to show the live channel information, if not active then the gauge will not update its display. This function is included as continually updating the display uses much computer resources and may slow down functions such as the graph display and the response to mouse clicks.

Activate: The individual output channels operation can be turned on or off with this button.

Specifications

Supply voltage	6V to 18V DC
Input Channels	8 analogue inputs, common ground
Input resolution	4.88mV (10 bit analogue to digital conversion)
Input voltage	0-5 Volts (resistive divider easily extends range if required!)
Input impedance	Greater than 10KΩ
Input rate	Scan of all 8 inputs in approx 79ms (rate based on active channel count)
Output channels	16 active low outputs (switched to ground, open collector)
Output current	500mA continuous, 600mA peak
Output protection	Internally diode clamped (via white wire to +ve), 50V max when in off state
Output states	Switched or PWM (100Hz, 1% steps)
Output table	14 sites, linear interpolation, min/max values held
Technology	Digital, microprocessor based, 48MHz
Operating temperature	-10ºC to +65ºC
Current draw	Approx 42mA with outputs in off state
Communications	Serial (RS232) for PC interface, 115200 baud, 8 bits no parity
Dimensions	Approximately 87L x 67W x 31H (mm) plus mounting tabs