



Home Energy and Water Efficiency Kit Guide

In partnership with:



Welcome

Welcome to the Alpine Shire Council's Home Energy and Water Efficiency Kit.

Congratulations on taking this first step to improve the energy and water efficiency of your home. Implementing just a few small changes can save the environment and your hip pocket.

This kit is intended to be used by everyone, whether you own or rent your home. Instructions in this guide allow school aged children ages 8 and up to attempt this assessment, so that everyone can get involved. If you are a primary school student and you are interested in using this kit to conduct a home energy and water efficiency assessment, you will need the supervision of a parent or guardian to use the equipment provided. There are also some safety instructions everyone using this kit needs to be aware of. These instructions are included opposite.

Have a question? Please email us:
sustainability@alpineshire.vic.gov.au



Important Safety Information

These items are not toys, please do not leave them where children could find and play with them.



STOP! PLEASE READ

This kit includes several pieces of measurement equipment, designed to give information on your home's energy and water efficiency. There are some risks that go with using the tools provided and the proper care and precautions should be taken when using them.

Before you use these items, please be sure to read and follow the **IMPORTANT SAFETY INFORMATION** on this page, the instructions contained in this document and manuals for each piece of equipment (refer to the appendix for copies of the equipment manuals).



Infrared Thermometer

Injuries resulting from staring into the laser beam include permanent damage to the eye and subsequent partial or total loss of vision.¹

- Use extreme caution when the laser beam is turned on.
- Do not let the beam shine into yours or others' eyes.
- Be careful not to let the beam reflect off of a surface and into your eyes.
- Don't point lasers at aircraft, cars or other vehicles.
- Don't point lasers at animals.
- Don't give laser pointers to children.
- Make sure children using lasers products are supervised.
- Do not allow the laser light beam to impinge on any gas which can explode.



Hot Water

Hot water can cause scalding and burns which can be very serious and even lead to permanent disabilities if immediate treatment is not followed.³ Hot water burns can even cause shock which can be life-threatening. At a mere 60 degrees, it only takes a second to cause severe scalding. This shows how high temperatures can be hazardous. At 50 degrees it would take 5 minutes to cause scalding.

- Ensure you keep your children far away from heating water systems at all times. Young children, in particular, should be supervised to ensure that they have no access to these systems which can cause serious injury.
- Supervise children at all times when using the hot water taps in your home.



Electrical Safety - Power Mate Lite

Electrocution incidents can be fatal, while non-fatal shocks can result in serious and permanent burn injuries to skin, internal tissues and damage.²

- This product contains live mains voltages and should only be used by an adult or under adult supervision.
- Do not use in wet areas or if the device becomes wet.
- The Power Mate Lite is intended for indoor use only.
- Turn off the power before unplugging devices.
- If you suspect the equipment provided is faulty, do not use it and notify Council.
- Always supervise children around power points.
- If you try to dismantle the device, a shock hazard exists.

1. <https://www.arpana.gov.au/understanding-radiation/radiation-sources/more-radiation-sources/lasers>

2. <https://www.comcare.gov.au/office-safety-tool/spaces/work-areas/power-outlets-cables>

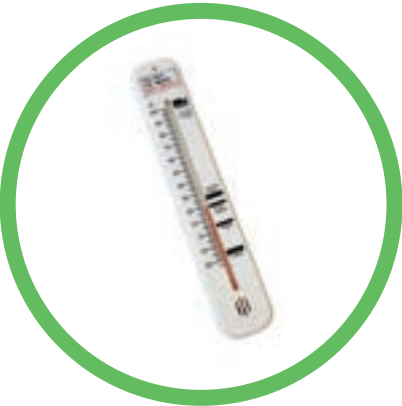
3. <https://australianhotwater.com.au/hot-water-safety/>

What's in the kit?

The contents of this kit can help you identify:

- Appliances and equipment drawing significant electricity.
- Gaps in insulation in your building envelope.
- Fixtures and fittings that are wasting water.
- The efficiency and adequacy, or excess, of lighting in and around your home.
- Appliances that may be overheating or overcooling in your house, including fridges and hot water systems.

Included in the toolkit are:



Analogue Thermometer



Infrared Thermometer



Energy meter



Lux Meter



Water Flow Measuring Jug

This guide is provided to help understand how to use the tools and interpret the results. Refer to the appendix for copies of the manufacturers equipment manuals.

How to use this kit

According to EPA Victoria, Australian households generate at least one-fifth of Australia's greenhouse gasses (more than 18 tonnes per household per year). With the biggest generators of greenhouse gas being; transport, water heating, lights and home heating and cooling.⁴ This kit is intended to help you carry out an audit on the energy and water efficiency of your home, to help you understand how your home might be contributing to greenhouse gas emissions.

Armed with this information you will be able to make changes, both small and large, to your house to improve its energy and water efficiency and reduce its greenhouse gas emissions. The improvement tips provided include small inexpensive or free changes you can make as a home owner or renter, as well as things to consider when renovating or building your home. Reducing energy and water use will save you money on your bills as well!

This instruction booklet contains general audit instructions, safety instructions and energy and water saving kits. We have used special symbols to make these easy to find:



Safety information



Instructions for use



Tips



General notes



You will want to record your measurements in a scorecard, so you can easily compare them to each other and to the recommended ranges in this guide. An excel spreadsheet or even just a piece of paper or notebook will do just fine for this. Feel free to make your own scorecard or you can download a copy of one we have prepared for you at the QR code link. Make sure you save it somewhere so you can refer to it later.



To understand more about how your home is responsible for producing greenhouse gas emissions, you can refer to reference material available to borrow from our libraries. A particularly handy reference is the Australian Government's Your Home book, which is available as a hard copy to borrow from the library (<https://www.alpineshire.vic.gov.au/community/libraries>) or you can refer to the free online version of the book (<https://www.yourhome.gov.au/>).

4. From the Global Warming Cool It! graph referenced on the EPA Vic page: https://apps.epa.vic.gov.au/AGC/r_emissions.html#!/



Thermometer

The thermometer provided has markings on it to show optimal temperature ranges in various areas of your home. Use the simple analogue thermometer to confirm that your heating and cooling appliances are working within an optimal temperature range, so you are not overheating with heating appliances, or overcooling with cooling appliances. This thermometer can measure ambient air temperature in a room, as well as being particularly handy for measuring the temperature inside fridges and the temperature of hot water. As, unlike digital thermometers, water and cold temperatures will not damage this thermometer.

Note that the thermometer can take some time to adjust to the temperature in the room or fridge/freezer, so leave it where you want to take a measurement for about 15 minutes for an accurate temperature reading. Accurate readings in water are much quicker. Be sure to note the temperature down as soon as you retrieve the thermometer, before you move it to its next location. For more information on the use of this thermometer, refer to the manufacturer’s manual in the appendix.

Heating/Cooling Temperatures

Household heating and cooling is often the largest energy consumer in our home. A simple and cost-effective way to use less energy for heating and cooling is to cool to a higher temperature in summer and warm to a lower temperature in winter. Each degree of extra heating or cooling increases the amount of energy used. If you have heating or cooling equipment with a thermostat, set the thermostat between 18°C and 20°C in winter and 25°C to 27°C in summer. Most people feel comfortable within these ranges.

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Instructions for use

- 1. Use the thermometer to check that the temperature in heated or cooled living spaces within your home are within the ranges shown, ensuring to allow time for the thermometer temperature reading to stabilise before recording the temperature.
- 2. Adjust the heating or cooling as required to get the temperature within the desired range.

Tips

- If you don’t feel comfortable within the temperature ranges noted, consider if you are dressed appropriately for the season. Warm clothes such as thermals, layering or using personal heating devices can be more efficient ways of staying warm than using large space heating systems.
- Also consider if there are any drafts or surfaces radiating hot or cold that might be making the room uncomfortable.

Measuring Hot Water Temperature

Energy used to heat hot water is another significant contributor to home energy use. Heating water for common household uses, including in the bathroom, laundry and kitchen, makes up approximately 25% of household energy use in Australia and is the second largest segment of household energy use after space heating and cooling.

Hot water systems with tank storage must be heated to 60°C at the tank to prevent the growth of harmful bacteria; noting that a few degrees are generally lost between the tank and the taps. Any home less than 10 years old, by law, should have been fitted with a tempering valve to ensure the temperature at the tap is not higher than 50°C.

Hot water coming out of the tap should ideally be no more than 50°C, but can be in the range of 50°C to 55°C, depending on the age of the hot water system. Any hotter and it can cause scolds and is wasting wastes energy. Continuous flow hot water systems should be set at no more than 50°C.

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Instructions for use

- 1. Use the thermometer to measure the temperature of the water at the tap with the shortest pipe run to the hot water service; this will be the tap that takes the shortest time for hot water to come out once turned on.
- 2. Hold the thermometer under the flowing tap for a few seconds after the temperature has stopped increasing, to ensure an accurate measurement. Make sure to keep your hands well away from the hot water to avoid scalds. Consider wearing rubber gloves to prevent injury.
- 3. Record the temperature and assess how close it is to the ideal temperature of 50°C.

Tips

- Ensure the thermostat on your hot water heater is set to 60°C for a hot water tank heater and 50°C for an instantaneous hot water heater, so you are not heating water more than you need to.
- To reduce hot water use, consider reducing shower times.
- Washing clothes in cold water saves energy required to heat the water, either through the inbuilt heater in the washing machine or the hot water from the tap.
- To test the adjustments made to the temperature of your hot water tank, wait until after the tank has re-heated (this usually happens overnight) to re-test the hot water temperature at the tap again.

Measuring Fridge and Freezer Temperature

Internal temperatures of fridges and freezers are critical; if the temperature is too warm then food may spoil earlier than it should, too cold and you are using more energy than you need to be.

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Instructions for use

- 1. Use the thermometer to measure the temperature by placing it inside the closed fridge or freezer, leaving it for around 15 minutes, and then read the temperature immediately on retrieving it for accuracy.
- 2. To determine if your fridge/freezer is working efficiently, place the thermometer at the back and in the door and compare these temperature measurements.
- 3. If the temperature of your fridge or freezer is outside the range indicated on the thermometer then adjust the thermostat on your fridge or freezer until you achieve a temperature within the recommended zone, noting it will take a while for the temperature to change after adjusting the thermostat.

Tips

- If you cannot get your fridge or freezer to achieve temperatures within the recommended temperature zone or the energy use by the fridge is very high then it may be worth troubleshooting the cause of this issue. Common problems include:
- If the fridge/freezer is unbalanced, the doors may not close properly and the fridge may lose cold air. The feet can generally be adjusted to fix this issue.
 - If the fridge/freezer is overfilled or hot food is added to it, the compressor may be working harder than it needs to. Make sure food is not covering any ventilation outlets inside the fridge/freezer and food is close to room temperature before being added.
 - If the door is left open for too long the fridge/freezer can lose cold air and will have to use a lot of energy to cool down again. To save energy make sure to open the door as little as possible.
 - If frost is building up or if food is spoiling in the door of the fridge and freezing in the back of the fridge it might indicate a problem with the seals or door leaking air. The seals can be replaced quite inexpensively which can make a big difference to the efficiency of your fridge.
 - Insufficient air space at the back and sides of the fridge/freezer, means hot air can't be expelled to the surrounds, resulting in it having to work harder to cool internally. There should be 5-10cm around the outside at the sides, top and back of the fridge/freezer.

If issues persist it may be worth getting a service technician to investigate what is causing this.



Non-contact Infrared Thermometer

The roof, walls, windows, doors and floor of your house (the building envelope) are the insulation keeping you warm in winter and cool in summer. Sometimes it is the materials used that insulate your home, such as stone and wood, sometimes a layer of insulating material is added inside the walls and sometimes an air gap in your wall can help regulate internal temperatures. Overall this is called the thermal performance of your home.

The infrared thermometer uses infrared radiation to measure the surface temperature of an object. A wall may be cooler than a window when direct sunlight is shining on both of them, because it is a more insulating material and lets less of the sun's radiation in. The more insulating the materials that make up a building envelope, the easier it is to regulate temperatures in your home. Are the windows letting a lot of cold in or allowing a lot of heat in? Can you feel a draught under doors or anywhere else in your house that might be making it colder?

The digital thermometer is more accurate at measuring temperature than your hand, because how a surface feels to the touch is not an indication of its temperature, but is a factor of how conductive that material is. For example, steel feels cooler than concrete when they are at the same temperature, because steel is much more conductive than concrete. So it is conducting heat away from your skin. For more information on the use of this digital thermometer, refer to the manufacturer's manual in the appendix.

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Important safety information

The following warnings are copied from the Infrared Thermometer's instruction manual (refer to the appendix).

- Use extreme caution when the laser beam is turned on.
- Do not let the beam shine onto your or others' eyes.
- Be careful not to let the beam reflect off a surface and into your eyes.
- Do not allow the laser light beam to impinge on any gas which can explode.

Instructions for use:

- 1. Turn the thermometer on by pressing the trigger button, check the reading is in Celsius (to change press the blue button marked °C/°F).
- 2. Point the thermometer at the surface you want to measure, ideally 15-50cm away from the object you are measuring and press the trigger button. The temperature of the surface will be shown on the thermometer's display.



The thermometer can give you the difference in surface temperature between materials that have different thermal conductivity/insulation properties.



Above are the screen functions from the thermometer's instruction manual.

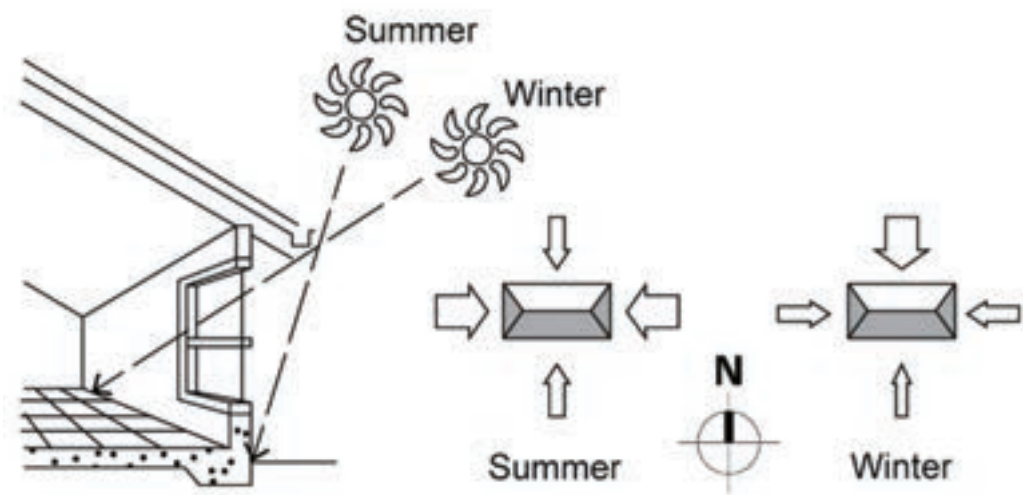
★ Tips

- The thermometer is battery operated, if it is not working check that the battery is not flat.
- Compare the surface temperatures to room temperatures recorded by the Energy Saving Thermometer; any surfaces that are significantly hotter or colder than the air temperature can be making the room uncomfortable.
- It's best to use this tool when the weather outside is cool or hot as the greater the difference between internal and external temperatures the more obvious the contrast between room temperature and hot or cold surfaces there will be.
- Note that it will take longer for surface temperatures to reach a stable temperature after turning on heating or cooling than it takes for the air to adjust; ensure objects you are measuring have had time to reach a stable temperature.
- Transparent, shiny or reflective surfaces will not give accurate readings. If you want to measure a window temperature you could put a small patch of non-shiny masking tape onto the surface and point the thermometer at the tape, once the tape has had time to adjust to the surface temperature.
- A thermometer is much more accurate to check surface temperatures than how a surface feels to the touch. How a surface feels actually reflects its thermal conductivity, not its surface temperature. For example a tiled floor will feel colder than floorboards at the same temperatures as tiles are more thermally conductive.
- After identifying any hot or cold surfaces the next step is to investigate the reasons for this such as draughts, no insulation, poor performing insulation or gaps in insulation.
- Consider improving the thermal performance of your home by providing shading of windows in summer, using curtains and blinds, awnings or by planting trees or using draught excluders under doors. You may even be considering improving the insulation in the ceilings and walls of your home.

! Safety note: If you are planning to inspect your roof insulation, caution should be taken to avoid hazards, including; asbestos, insulation fibres including fibreglass, dust and other fibrous material as well as electrical hazards from high voltage wiring and other physical

Further Investigation

While highly insulating materials in the envelope of your home can increase the thermal comfort inside greatly, this is not the only thing to consider when assessing your home’s thermal performance. Understanding the part orientation plays in the thermal performance of your home can help you understand how your home heats up and cools down during the day and at different times of year. Which walls and windows get the most sun exposure in summer? Which windows and doors let the most heat escape in winter? Letting the sun into your windows in winter can provide a passive (and free) way of heating your house, while shading windows from the sun in summer can passively cool your house, decreasing your need for mechanical heating and cooling (air conditioning and fans).



The desired amount of solar access varies with the season and climate.
Source: Your Home website, accessed 28/10/2022.

You can access online tools to assess the orientation of your home. There are many free online mapping tools that can show you the orientation of your home, or you can use a compass. It might be helpful to sketch a map of your home, including any large trees that might be shading the house.

There are even sophisticated 3D modelling software available online, that can be used to visualise the sun path over your house at different times of the year. More information can be found on understanding how to passively heat and cool your home in the Australian Government’s Your Home free reference here:

<https://www.yourhome.gov.au/passive-design>

Thermal imaging cameras can help get a complete picture of the temperature variation in a room. These cameras are not a part of this kit and should only be operated by people trained in their use. If you are interested in conducting an analysis in your house with a thermal imaging camera, there are local groups who can assist you. Sustainable Upper Ovens, Myrtleford Community Power and Totally Renewable Energy Kiewa (TREK) have thermal imaging cameras and volunteer advisors ready to help you to conduct an assessment of your home. If you are interested, please get in touch with us at sustainability@alpineshire.vic.gov.au.



The sun can be a source of free home heating.



Energy Meter

Use the energy meter to help you understand how much energy your appliances use while operating, or in standby mode.

The Power-Mate Lite Energy Meter measures how much electricity the equipment that is plugged into it is using, it can help to identify what might be causing high electricity bills. Note that this meter cannot be used for hard-wired equipment such as electric hot water systems, electric stoves and ovens and lighting; but can be used on items that plug into a power point such as a clothes dryer, wall heater, kettle or TV. More information on the Power Mate Lite can be found in the manufacturers manual in the appendix.

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! Important safety information

The following warnings are copied from the Energy Meter’s instruction manual.

- **The Power-Mate is intended for indoor use only.**
- **Do not use the Power-Mate if the case or cord is damaged.**
- **Do not use the Power-Mate if it becomes wet.**
- **Avoid using the Power-Mate in bathrooms or wet areas**
- **Use the Power-Mate with sine-wave power sources only i.e. Mains power or inverters labelled as ‘pure sine wave’.**
- **Do not use the unit with ‘Quasi sine wave’ or square wave inverters, as the Power-Mate may be damaged.**
- **Do not expose the Power-Mate to excessive heat i.e. A vehicle in direct sunlight, to avoid damage to the case.**
- **Do not dismantle the Power-Mate, there are no user serviceable parts inside and a shock hazard exists**

Below is an image of the screen while in operation:



Button functionality

Each button has a short press ‘click’ or longer press ‘hold’ function. Clicking through the **Menu** button displays the different modes of cost, greenhouse gas, energy, meter and time. Clicking the **Run** button allows you to start, stop or pause a measuring period. The zoom button allows you to zoom in on individual lines on the screen. Appliances can be measured over short and long time periods. Previous data should be cleared before measuring each appliance by holding down the run button and then pressing run again in the clear data screen.

More detailed functionality can be found in the user manual. Note that the cost function will depend on the rates of your electricity supply contract, specific to your household. The cost and greenhouse gas functions require additional input data to obtain accurate information. Instructions can be found in the manual for this tool.

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✓ Instructions for use

1. Switch off and unplug the device you want to measure at the power point.
2. Plug the Power-Mate into the power point.
3. Then plug the device into the Power-Mate socket.
4. Switch the power point on. The power being used by the appliance will be displayed on the Power-Mate in Watts or kilowatt-hours (kWh) or kilowatts per hour.

i General notes

- This unit is not battery operated.
- Power measurements in kWh are a function of time and will be more accurate the longer you can take measurements.

Understanding electricity usage

The amount of electrical energy used is the power (in Watts), multiplied by the length of time it is used for. The electricity usage you see on your electricity bill is usually in kilo-Watt-hours (kWh), which is the amount of 1,000 Watts that are used over one hour. The maths to convert power (Watts) to energy use (kWh) is quite simple, divide the amount of Watts by 1000:

- 10 Watts = 0.01kW
- 100 Watts = 0.1kW
- 1000 Watts = 1kW

Then multiply the kW by how many hours it is used for.

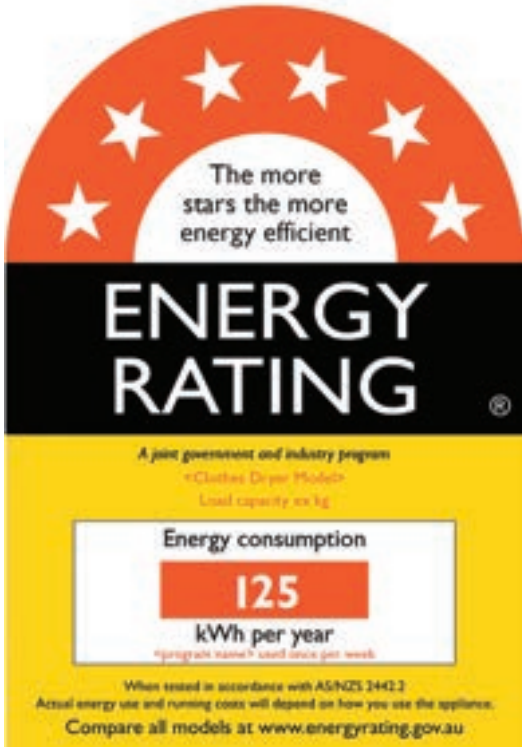
Eg. An item drawing 100 Watts (0.1kW), operating for 5 hours, 0.1kW x 5 hours = 0.5kWh

This simple maths shows how a small item running 24 hours a day can quickly use more electricity than a high powered item running for a short time.

Eg. An internet router consuming 10 Watts (0.01kW) for 24 hours a day will use 0.01 x 24 = 0.24kWh per day

A kettle that consuming 2400W for 5 minutes over the day (to convert minutes to hours divide by 60, 5/60 = 0.083 hours) will use 2.4 x 0.083 = 0.2kWh per day. Almost as much as the modem being on all day.

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★ Tips

- Doing this calculation for appliances across your house will indicate your electricity usage. Try setting up a table to record watts, hours used and watts/day for all of your appliances to determine the highest users.
- If the device has an on/off/standby function observe the power being used in each of these functions to investigate how the device will use power throughout a day. Consider turning these devices off at the wall to save standby power use.
- For thermostat items like fridges or portable heaters that maintain the correct temperature by switching on and off while they are operating, you will need to monitor their energy use over several hours or days. The Power-Mate can log energy use over time, for instructions on how to do this refer to the manual included in the kit, or available online by searching for Power-Mate Lite manual.
- Measure as many appliances as you can, even old fridges or freezers used in garages and sheds; these can be significant energy users as older items are generally less efficient and in sheds they are exposed to more extreme temperature changes.

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Many appliances come with an energy star rating with estimates of typical energy use; if labels have been removed from your appliances see if you can find them on the official database: www.energyrating.gov.au

When purchasing a new item remember to look at the energy star rating; the more stars the less energy it will use.

Simple changes to how you use even the most efficient appliances, like washing clothes in cold water and turning equipment off at the power point when not in use, can save energy.



Lux Meter

Use the Lux Meter to measure the lighting intensity, and natural light levels, in areas of your home.

The two most effective ways to reduce the electricity your lights are using is by replacing all traditional filament bulbs and fluorescent tube bulbs with LED bulbs and avoiding using lights where and when they are not required. Measuring the light intensity levels around your home can help you identify areas that may be over lit and thus wasting energy, not to mention being uncomfortable on your eyes. The Lux Meter can also help you measure how much sunlight a room is getting. At certain times of the day you might not need to turn the lights on at all.

The Lux Meter can measure lighting intensity from 0 to 50,000 Lux, displaying lighting levels in units of Lux (lx), which is lumens per square meter, and Foot Candles (fc), which is lumens per square foot. LED light bulbs and fittings have specifications of total lumen output; but in practice you can only measure the lux at a specific location which accounts for all light sources including natural light.

Below is an image of the screen while in operation:



Button functionality

The main dial turns the power on or off and selects the measurement ranges. Pressing the HOLD button will keep the reading at the time it is pressed on the screen, press again to release the hold. Pressing the MAX button will hold the maximum reading on the screen, pressing again will release the hold. More detailed functionality can be found in the manufacturer's manual in the appendix .

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Instructions for use

1. Turn all the light(s) on in the room in which you wish to measure the lighting level.
2. Turn the Lux Meter on by turning the dial to select the range desired, beginning with the dial on 200.
3. Remove the cover from the attached wand (photo detector) and hold it horizontally in the centre of the room.
4. The number on the display is the Lux measurement. Compare this measurement with the table of recommended lux range below.
5. If the lux meter is not reading lux values be sure to ensure the wand cover is removed.
6. The Lux meter is battery operated, if it is not working check that the battery is not flat. The battery is contained in the back of the main unit. Undo the small Phillips head screw to access.
7. Note that if only a '1' is displayed then the input signal is too strong and a higher range needs to be selected by turning the dial up to the right. For most home applications, starting at 200 Lux (lx) should work.
8. The table below is adapted from Australian Standards lighting levels for different tasks, to suit residential environments and is a guide only. There will be times when a higher Lux is required for certain more difficult tasks or for personal comfort.



Room	Recommended luminance (lx)
Corridors and passageways	40 - 80
Toilet/Bathroom	80 - 100
Home Office/Study	240 - 400
Workshops/Art Rooms	600 - 1600
Kitchen/Counter tops	240
Living Room	160 - 320
Bedrooms	160 - 320

Source: <https://australianbuildingservices.wordpress.com/lighting-levels/>



Tips

- If Lux levels are far above the recommended luminance in the table above consider taking measures to lower the Lux levels. Do this by leaving some lights off, or where multiple lights operate of the same switch light bulbs can be removed or replaced with bulbs with lower lumen outputs.
- It could be worth conducting the tests during daylight hours as well as at night time to determine how much natural light impacts the light levels within a room.
- Use omni-directional (light in all directions) light bulbs in pendants, chandeliers, ceiling or wall-mounted fixtures.
- Choose light fittings and lamp shades that allow most of the light through so a lower lumen light bulb can be used. Some light fittings can block or absorb 50% or more of light.
- Avoid using downlights for general illumination. They can make bright ‘pools’ of light on the floor while making the ceiling cavity appear dark which creates a ‘gloomy’ ambience. Downlights are better suited to task lighting over workspaces. Up to 6 downlights may be needed to light the same area as 1 pendant light.
- Consider using brighter task-specific lighting in one small location, such as a work bench, instead of making the entire room or space very bright.
- Installing dimmable lighting makes it easier to use only the lighting level you need, when you need it.
- Use timers, daylight controls or motion sensors to automatically switch lights on and off in areas you don’t need to light all the time, like corridors and storerooms.
- The Your Home resource provides advice on the right LED bulb to purchase for different uses in your home:
- Previously bulbs were purchased according to the amount of power (or watts) they used; however modern bulbs – especially LEDs – produce the same amount of light using far less electricity. This means that it no longer makes sense to choose a new bulb based on how many watts it uses. Nowadays, the way to choose a new bulb is to look at how much light it produces, which is measured in ‘lumens’ (lm). A higher number of lumens means a brighter bulb. If a single light bulb were to be used to illuminate a room, standard bulb sizes in lumens are:
 - 420 lm – for a table lamp
 - 800 lm – for a small room
 - 930 lm – for a medium room
 - 1300 lm – for a large room or a bright work area

Water Flow Measuring Jug



Use the water flow measuring cup to measure how much water your taps are using per minute.

This measurement can help you to identify taps that could do with a flow restrictor, or a low-flow shower head, to save you lots of water and also save electricity or gas by reducing hot water use.

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Instructions for use

- Push the cup handles together, turn on the tap fully and hold the flow measuring cup under the running water as if you were filling up the cup.
- Slowly pull the handles apart to let more water flow out of the bottom of the cup, until the water is level with the top of the cup and no longer overflowing. If you have gone past that point and the level is dropping then push the handles back together a bit.
- Once the cup is full to the top, and staying level, turn off the tap, keeping the handles in position. Read the number on the side of the cup indicated by the handle position – this will give you the litres per minute (L/min) of flow.
- Compare this measurement with the table of recommended flow rates below.
- Make sure the measuring cup is completely dry before putting it back in the box.

Tap type	Recommended maximum flow rate (Litres/minute)
Hand basins	4
Kitchen sinks	6 - 8
Laundry sinks	8
Outdoor taps	6
Shower heads	6 - 9



Tips

- Measuring the flow from a shower head is a bit trickier because of the wider area of water flow. Try improvising with a wide funnel made from a sheet of plastic to funnel the flow into the cup. Otherwise use a larger bucket with measurement markings, turn the tap on for 30 seconds, measure the amount of water in the bucket and double it to get the litres per minute flow rate.
- Many taps and water using appliances, such as washing machines and dishwashers, come with a water efficiency star rating certifying how much water they should use per load (per flush for toilets or per minute for taps); if labels have been removed from your appliances see if you can find them on the official database: www.waterrating.gov.au
- When purchasing a new item remember to look at the water star rating; the more stars the less water it will use.
- Most modern taps can be replaced with flow restrictors or aerators to reduce their water use.
- Be aware of how long you are leaving taps on for, particularly for high water using taps, and try to change your behaviours to reduce your water use.
- When buying new appliances, or when choosing taps for renovation or building projects, be sure to look for products with high water star ratings.
- Using less water will also use less energy when the water needs to be heated, amplifying the savings over time.



Next Steps

Further Information

There are many great resources available online to help you learn more about reducing home energy and water use. Be sure to adapt any advice on international resources to our local climate. Some useful resources local to Australia and the region include:

Your Home (Australian Government)

Your Home is Australia's independent guide to designing, building or renovating homes to ensure they are energy efficient, comfortable, affordable and adaptable for the future. While the website is primarily aimed at new homes or renovations, much of the information can be applied to an existing home. Copies of the printed 'Your Home' book are available at Council libraries, separate to this pack, to loan; however, all the information contained in the book is all available for free online. <https://www.yourhome.gov.au/>

Household Energy Action Guide (Sustainability Victoria)

Household Energy Action Guide provides simple but cost-effective actions to help reduce your energy bill and improve the comfort of your home. Some actions will have no cost and require minimal effort, but result in big dollar savings. These are the obvious ones to start with and will give the biggest bang for your buck. <https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/save-energy-in-the-home>

Renew

Renew ('Alternative Technology Association Inc' trading as Renew Australia) is a national, not-for-profit organisation that inspires, enables and advocates for people to live sustainably in their homes and communities. Established in 1980, Renew provides expert, independent advice on sustainable solutions for the home to households, government and industry. <https://renew.org.au/>

Plug In

Plug in is a website created by Energy Consumers Australia, the independent national advocacy voice for household and small business energy consumers.

Buying and using new tech like solar panels, batteries and electric vehicles can feel daunting. What questions should you ask? Where can you turn if something goes wrong? We'll help you get started with independent, practical and clear advice. <https://www.energytechguide.com.au/>

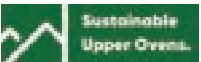
Alpine Shire Council Sustainability Website



Use this QR code to access further information and resources at our sustainability website.

More detailed assessments, volunteer community group assistance and several volunteer run community groups throughout the Alpine Shire are available to undertake more detailed assessments of your home. These assessments are intended to be a useful resource for residents to save energy and power costs. These assessments are provided by committed volunteers who generously donate their time for this worthy cause. These assessments won't provide an official energy rating for your home and can't be used as such.

If you are interested in conducting an analysis in your home with a thermal imaging camera, there are local groups who can assist you. Sustainable Upper Ovens, Myrtleford Community Power and Towards Renewable Energy Kiewa (TREK) have a thermal imaging camera, sponsored by the Hume Community Power Hub, and volunteer advisors ready to help you to conduct an assessment of your home. If you are interested, please get in touch with us at sustainability@alpineshire.vic.gov.au so we can put you in touch with the relevant group.



NatHERS Energy Rating Scheme

The Nationwide House Energy Rating Scheme (NatHERS) provides energy ratings for new dwellings. This is helping create energy efficient, resilient and comfortable homes for the future that cost less to run. From September this year, NatHERS has been upgraded to provide world-leading measurement tools the building sector can use to support the move to net zero emissions by 2050. The Scheme can now rate the energy performance for the whole home including the major appliances, solar panels and batteries, in addition to the star rating for the building shell. NatHERS provides a streamlined pathway to meet or beat the new National Construction Code (NCC) 2022 energy efficiency requirements.

The National Construction Code energy efficiency requirements apply to all new residential buildings as well as alterations and additions in some circumstances. Currently new residential buildings are required to achieve a NatHERS 6 star energy rating. The recent update of the NCC will see the required energy rating increase from 6 stars to 7 stars. Energy efficiency changes to the Code are voluntary from 1 October 2022, with a transition period until 1 October 2023 (but may vary by state and territory).

NatHERS energy rating assessments need to be performed by a registered NatHERS assessor.



**Equipment
Manufacturer's
Manuals**

Heating, cooling and hot water accounts for over 50% of energy consumption in Australian homes.

Use this thermometer to check whether your appliances are operating within an optimal temperature range.

Freezers: -12°C to -18°C

- Freezers are often factory set to -20°C or less.
- Increasing their set-point temperature to within the above range will decrease power consumption while still safely storing foods.

Fridges: 3°C to 5°C

- Leave the thermometer inside the fridge for at least 10 minutes before checking the temperature.

Heating: 18°C to 20°C (room temp)

- A higher temperature setting will not usually heat your room up faster, it just wastes energy.
- Use the thermometer to check actual room temperature.

Cooling: 24°C to 26°C (room temp)

- Avoid unnecessary over-cooling in summer.
- Every 1°C increase in set-point temperature saves between 5 to 10% of AC power consumption.

Running hot water: max 50°C

- A high hot water temperature increases risk of burns and boosts your energy usage.
- To test, place the thermometer's bulb under running hot water.

For more energy efficiency advice and products, visit:

www.reductionrevolution.com.au

protech

Compact Non-Contact Thermometer
QM7410
User Manual

1. Description

Thank you for purchasing the QM7410. This product is capable of non-contact (infrared) temperature measurements at the touch of a button. The built-in laser pointer increases target accuracy while handy push-buttons combine for convenient, ergonomic operation. The QM7410 can be used to measure the temperature of objects with a surface that cannot be measured by traditional contact thermometers. Proper use and care of this meter will provide years of usage.

2. Features

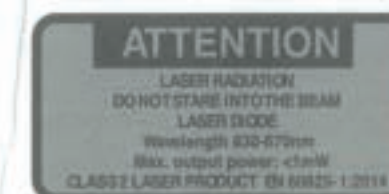
- Rapid Detection Function
- Precise Non-Contact Measurements
- Single Laser Sighting
- Unique Flat Surface, Modern Housing Design
- Automatic Data Hold
- "MAX/MIN" Function

3. Wide Range Application

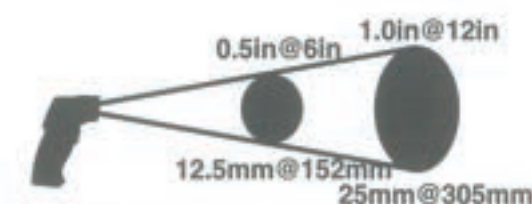
Food preparation, safety and fire inspectors, plastic molding, asphalt, marine, screen printing, measure ink and dryer temperature, HVAC/R, diesel and fleet maintenance, etc.

4. Safety

- Use extreme caution when the laser beam is turned on.
- Do not let the beam shine onto your or others eyes.
- Be careful not to let the beam reflect off of a surface and into your eyes.
- Do not allow the laser light beam impinge on any gas which can explode.



5. Distance & Spot Size



Distance : Spot = 12:1

6.Specifications

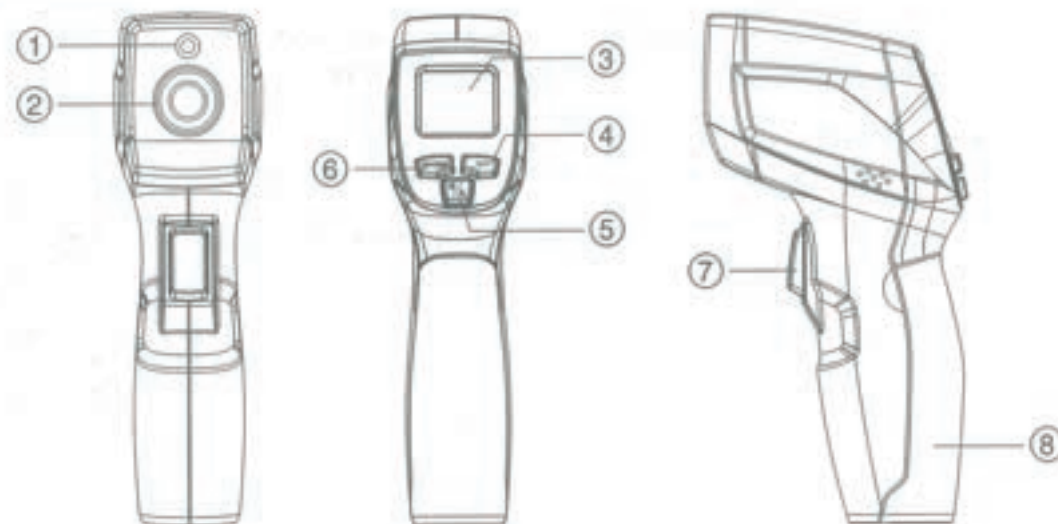
Temperature Range:	-50 to 500°C (-58 to 932°F)
D:S:	12:1
Display Resolution:	0.1°C (0.1°F)
Emissivity:	Fixed at 0.95
Accuracy:	±3°C (5.4°F) at -50 to 20°C (-58 to 68°F), ±2.0% ±2°C (3.6°F) at 20 to 500°C (68 to 932°F)
Repeatability:	±1°C (1.8°F)
Response Time:	500ms
Spectral Response:	8~14μm
Over Range Indication:	LCD will show "----"
Diode Laser:	Output <1mW; Wavelength 630~670nm; Class 2 laser product
Operating Temperature:	0 to 50°C (32 to 122°F)
Storage Temperature:	-10 to 60°C (14 to 140°F)
Relative Humidity:	10% to 90%RH operating; <80%RH storage
Power:	9V Battery (Included)

Note:

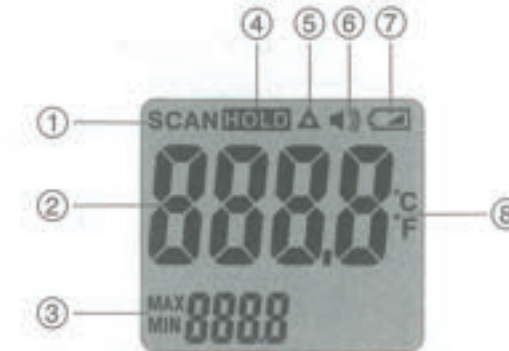
Field of View: Make sure that the target is larger than the units spot size. The smaller the target, the closer you should be to it. When accuracy is critical, make sure the target is at least twice as large as the spot size.

7.Panel Description

- 1-Laser
- 2-Infrared Sensor
- 3-Display Screen
- 4-°C/°F Button
- 5-Laser/Backlight Button
- 6-Max/Min Button
- 7-Power On/Measure Button (Automatic switch off after 10 seconds)
- 8-Battery Cover

**8.LCD Interface Instruction**

- 1-Scan Symbol
- 2-Measure Data
- 3-Temperature Value for Max/Min
- 4-Data Hold Symbol
- 5-Laser on Symbol
- 6-Buzzer Symbol
- 7-Lower Power Symbol
- 8-°C/°F Symbol

**9.Measurement Operation**

- 1.Hold the meter by its Handle Grip and point it toward the surface to be measured.
- 2.Pull and hold the Trigger to turn the meter on and begin testing. The display will light if the battery is good. Replace the battery if the display does not light.
- 3.Release the Trigger and the HOLD display icon will appear on the LCD indicating that the reading is being held. In HOLD status, press the laser button to turn on or off the laser. And press the buzzer button to turn on or off the backlight.
- 4.The meter will automatically power down after approximately 10 seconds after the trigger is released.

Switching °C/°F

Short press the °C/°F button

Switching Max/Min

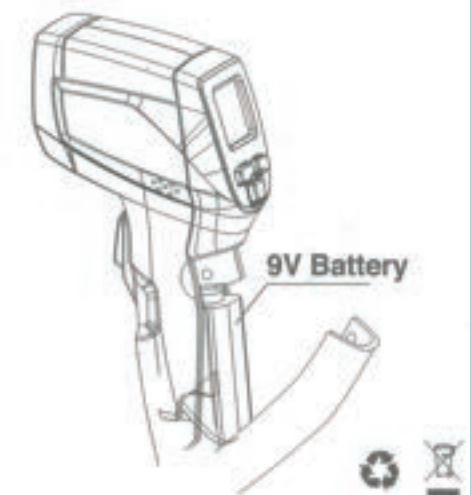
Press the Max/Min button.

Switch ON/OFF Laser and Backlight

- Push the Laser/ Backlight button once to turn on the laser pointer .When the laser is on the laser icon will appear on the LCD over the temperature.
- Short press the Laser/ Backlight button to turn on/turn off the backlighting .
- Long press the Laser/ Backlight button to turn on/ turn off the laser

10.Battery Replacement

- As battery power is not sufficient, LCD will display the lower power symbol, replacement with one new battery type 9V is required.
- Open battery cover, then take out the battery from instrument and replace with a new 9-volt battery. Then replace the battery cover.



HYPERTECTM

FOR THE PROFESSIONAL DATA ROOM INSTALLER

POWER-MATE LITE "QUICK-START" OPERATING INSTRUCTIONS

Warning: This product contains live mains voltages and should be used only by an adult or under adult supervision. If the power cord or case becomes damaged, please return to either the manufacturer or an authorised service company for repair. Do not use in wet areas or if the unit becomes wet.

INTRODUCTION

The Power-Mate Lite (PML) reveals Running cost, Energy use, Greenhouse Gas (G/Gas) all expected Meter readings (including VA & PF) and it has a selectable timer function built in for taking readings over a preset period.

TERMS USED IN THIS MANUAL

The Power-Mate Lite (PML) screen shows multiple lines of data at the same time.

There are 3 buttons, which you either "click" with a short press or "hold" with a long press.

The "Zoom" button selects a line to magnify by clicking, or zooms into the line by holding.

The "Menu" button changes between the screens for Cost, Greenhouse Gas, Energy, Meter and Timing by clicking, or enters the setting mode for Cost, G/Gas and the Timer screen by holding.

The "Run" button starts, stops or pauses a measurement by clicking the button or resets the meter and clears all data by holding.

In the Time screen, a convenient count-down timer can be set by choosing between 9 selectable preset times or "Not Set". If "Not Set" is chosen, the Timer counts time up from zero and the display shows the total measurement elapsed time or Runtime. If a time period is selected though, the display then shows the time remaining or Endtime for the measurement.

ENTERING INITIAL COST AND GREENHOUSE GAS (G/GAS) DATA

When delivered from new, the Power-Mate Lite will be prompting you to enter the cost value of your electricity when power is first applied. To obtain best accuracy, the cost must be entered in cents per kilowatt-hour (kWh) from your energy providers' most recent account.

Note: 1) Some energy providers refer to kWh as units. PML's are shipped preset to 18c/kWh.
2) You must first be in either the Cost or G/Gas screens to be able to set their values, then simply hold the "menu" button depressed until the "Set" screen is displayed.

To modify the Cost or G/Gas value, click the Zoom button to change the number (this cycles through 0-9). Clicking the Run key moves to the next digit, like setting a typical digital clock.

Similarly, enter the greenhouse gas coefficient, which can be found on the website: www.climatechange.gov.au/table#39 which is measured in kg CO2-e/kWh.

Note: the G/Gas coefficient varies from state to state – look to "Table 5: Indirect (scope 2) emission factors for consumption of purchased electricity from the grid" for your state's value. If accurate figures are not available, 1.0kg CO2-e/kWh can be used as a reasonable approximation (units come shipped with the G/Gas value pre-set to 1.0kg CO2-e/kWh).

DISPLAY

The Cost, G-Gas and Energy screens simultaneously provide four lines of information, shown in order here:

- 1) The real (or actual) figure to date (since the measurement was started).
- 2) The estimated Hourly amount.
- 3) The estimated Quarterly amount.
- 4) The estimated Yearly amount.

These estimated amounts are calculated from the average energy consumption of the appliance, derived from the data collected during a measurement period.

The Meter screen displays simultaneously True Power (W), Apparent Power (VA), Volts (V), Amps (A), Power-Factor & Frequency (Hz). Using "Zoom", the meter screen also displays minimum and maximum values for V, A, W & VA

Note: the minimum and maximum figures will not be updated if the PML is stopped or paused.

A click of the Run key will start or stop a measurement period, whilst a hold will reset (clear) the data in the PML. When the PML is running, a flashing triangle icon shows on the top right corner of the LCD.

If the power fails during a measurement period, data is not lost and the PML resumes when power returns, another icon though will show next to the run icon showing that the power was disconnected.

MAKING YOUR FIRST MEASUREMENT

Plug an appliance into the piggy-back plug of the PML and switch on the appliance. If you are not on the cost screen, click the menu button a few times until cost is displayed.

Now hold the Run button until prompted "clear all data" click the button under "Yes".
Now click the Run button to start your measurement. The cost screen will instantly update with the running cost data for the appliance.

Note: devices with a thermostat, like a fridge, should be measured over a 24hr period to obtain the best accuracy.

Complete operating instructions and specifications can be downloaded from:

www.power-mate.com.au

WARRANTY:

This product is guaranteed against faulty components and workmanship for a period of 12 months from the date of purchase. It is the responsibility of the purchaser to return the unit to the manufacturer or place of purchase with a copy of the sales receipt or invoice when requesting warranty repairs to be undertaken.

After the warranty repairs or work is completed, the manufacturer will return the goods to the purchaser using the Australian Post standard parcel service at no extra cost to the purchaser. If insurance or registered or express post is required, the cost shall be borne by the purchaser.

The Manufacturer is not responsible for goods lost or damaged by the Australian Post service. Great care was taken to ensure the integrity of data and information and correct operation of this product. The Manufacturer though will not accept any claims for data loss, financial loss or any other losses or consequential damage resulting from the data, use or failure to perform of this product, no other guarantees are implied or given.

To obtain warranty service on your Power-Mate Lite, please send it, together with your full name and return address, directly to the manufacturer:

Legend Performance Technology PTY LTD
8 Distribution Place
Seven Hills NSW 2147
Ph: 1800 328 200
Internet: www.legend.com.au
Email: sales@legend.com.au

Address

Date of Purchase

Place of Purchase

Invoice no.

POWER FAILURE DURING A MEASUREMENT PERIOD.

If the power is interrupted during a measurement period an "unplugged" icon will be displayed next to the activity icon in the top right corner of the screen to inform you of a power failure. Although the meter will resume what it was doing automatically without loss of data after a power-failure, for best accuracy, if the period of the power failure is not known, the measurement should be taken again.

When measuring a refrigerator for 24 hours a short power failure will have little effect on the data, but an extended loss of power could lead to inaccurate data, especially for estimated quarterly or yearly calculations.

To clear the "Power Fail" icon, simply reset the meter by holding down the Run button as described above in the "starting a new measurement" section.

SCREEN DESCRIPTIONS

In the Cost, G/Gas, and Energy screens, information for the actual, hourly, quarterly and yearly periods is provided. These values will be displayed and continuously updated once the PML is "Run" or started.

COST SCREEN

Cost values are provided in dollars and cents for the actual, hourly, quarterly and yearly periods. The "actual" value is the cost to run the appliance since the test was started. The hourly quarterly and yearly values are calculated from the data collected to date, since the measurement period started. The values are displayed and continuously updated once a measurement period is in progress.

G/GAS (GREENHOUSE GAS) SCREEN

Greenhouse Gas emission values are given in kilograms for the actual, hourly, quarterly and yearly periods. The "actual" value is the greenhouse gas emissions released, in kilograms, through the use of the appliance since the test was started. The hourly quarterly and yearly values are calculated from the data collected to date. The values are displayed and continuously updated once a measurement period is in progress.

ENERGY SCREEN

Energy usage values are provided in kiloWatt-hours for the actual, hourly, quarterly and yearly periods. The "actual" value is the actual kilo Watt hours of energy consumed by the appliance since the test was started. The hourly quarterly and yearly values are calculated from the data collected to date. The values are displayed and continuously updated once a measurement period is in progress.

METER SCREEN DEFINITIONS

The meter screen provides technical information, which may be of little interest to non-technical people.

True Power (Watts) – The actual power used, which the energy provider bills you for.

Apparent Power (VA) – The power figure calculated from the sum of RMS Volts x RMS Amps.

Volts – The RMS AC voltage available for supply to the Load.

Amps – The RMS AC current drawn by the Load.

Power Factor – The ratio of True Power to Apparent Power.

Frequency – The alternating frequency of the mains voltage.

When zoomed in, Minimum and Maximum values are logged and displayed for the True and Apparent Power, also for Volts and Amps. The Min and Max values are only logged during a measurement period (PML is running) and can be cleared by holding the Run button.

SUPPRESSING UNWANTED SCREENS

If your interest is just cost for example, it is possible to suppress any of the other unwanted screens from displaying.

When in the RUNTIME mode hold the Menu key until the Set Timer screen is showing, now press and hold the Menu key again until the Set View screen is showing. Now click the Zoom button to shift between the choices, and click the Run button to Y to display a screen or NO to suppress it. When finished screen selection, click Menu to exit back to normal. Of course enabling the screens again is simply a reversal of the above steps, but answering Y (yes) to the screens to be enabled.

OVERLOAD

When the current exceeds 10A, the display flashes the message "WARNING, OVER/LOAD", disconnect the excessive load as soon as possible to avoid overloading and damaging the Power- Mate.

SPECIFICATIONS

NOTE: This unit is intended for operation @ 240Volts AC with a maximum load current of 10Amps.

Setting	Range	Units	Resolution	Units
Rate Setting	0 – 99.999	c/kWh		
G/Gas Setting	0 – 9.999	kg/kWh		
Inbuilt Timer	1, 8, 12, 24	Hours		
2, 5, 7, 14, 28	Days			
Cost	0 – 999999	± \$	0.01	c
Energy	0 – 99999	± kWh	0.01	kWh
G-Gas	0 – 99999	± kg	0.01	g
Volts	170.0 – 270.0	V _{RMS}	0.1	V
Amps	00.000 – 10.000	A _{RMS}	0.001	A
Power	0 – 2,400.0	± W	0.1	W
Apparent Power	0 – 2,400.0	VA	0.5	W
Power Factor	± 0.001 to 1	(dimensionless)	Leading/Lagging	
Frequency	45-65	Hz	0.1	Hz
Run-Time measurement	99:23:59:59	Days:Hours:Min.:Sec.		

Accuracy error for all ranges is below 2%, (typical accuracy is below 1%)

Note 1 : The VA and Power Factor accuracy is as specified when measuring above 2W.

Note 2 : Where the display shows more digits than the resolution specified, the accuracy of any extra displayed digits is not guaranteed.

Legend Performance Technology PTY LTD

Customer Care: 1800 328 200

Internet: www.legend.com.au

Email: sales@legend.com.au

HYPERTEC™

FOR THE PROFESSIONAL DATA ROOM INSTALLER

FULL OPERATORS MANUAL FOR POWER-MATE LITE

QUICK START MANUAL BEGINS ON PAGE 5

OVERVIEW

Congratulations on your purchase of the new Power-Mate-Lite (PML). PML is easy to use, accurate and can help you to identify which appliances are guzzling your money. You can then take some steps to reduce energy consumption and therefore save money and also reduce greenhouse gas emissions.

The PML is the easiest to use energy and cost meter that is currently available. Not only is it simple to use but importantly the results are also easily understood and accurate.

It makes no difference whether you purchased the PML to reduce your electricity cost or to help reduce energy consumption and therefore to help the environment, as the two go hand in hand. The more you reduce your energy & cost, the more the environment benefits – a perfect win/win result.

Although you may be impatient to use the meter straight away, to get the best results from your PML please take a little time to read these instructions before taking measurements. Plug in the PML and press the buttons freely as described whilst reading the text to familiarise yourself with the PML operation.

GENERAL PRECAUTIONS BEFORE USING THE PML

- The Power-Mate is intended for indoor use only.
- Do not use the Power-Mate if the case or cord is damaged.
- Do not use the Power-Mate if it becomes wet.
- Avoid using the Power-Mate in bathrooms or wet areas.
- Use the Power-Mate with sine-wave power sources only i.e. Mains power or inverters labelled as "pure sine wave".
- Do not use the unit with "Quasi sine wave" or square wave inverters, as the Power-Mate may be damaged.
- Do not expose the Power-Mate to excessive heat i.e. A vehicle in direct sunlight, to avoid damage to the case.
- Do not dismantle the Power-Mate, there are no user serviceable parts inside and a shock hazard exists.

The PML is limited to a maximum capacity of 10 Amps. If you are unsure of the power required for an appliance, the power (or current) rating is usually written on the unit's label or even cast into the plastic or metal of the appliance. Alternatively refer to the appliance's user manual in the specification section or contact the manufacturer.

THE PML OVERVIEW

It would be helpful now to describe the operation of the three buttons from left to right. The buttons all have two operations, one for a short press or "click", the other for a longer press or "hold".

MENU BUTTON

"Click" the Menu button to display the different modes, these are: Cost, Greenhouse Gas, Energy, Meter and Time screens. Each mode (except time) displays multiple lines of information in a small font.

ZOOM BUTTON

In the various modes the un-zoomed first line of information is presented with the first word in reverse video (white on black) we shall refer to this as the "cursor". "Click" the Zoom button and the cursor will toggle to the next line, "hold" the Zoom button to magnify the information contained in the cursor line to double size allowing it to be read easily. "Click" the Zoom button whilst in the magnified mode to toggle through each line in sequence, "Hold" the Zoom button to revert the screen back to un-zoomed – or simply "click" the Menu button to un-zoom the screen and change to the next mode in one step.

RUN BUTTON

Click the "Run" button to start stop or pause a measurement period, "Hold" the Run button to erase all the data, a message prompts "clear all data Yes/No ?", selecting Yes clears all the stored data.

When the meter is running (during a measuring period) the top right hand corner of the display has a flashing activity icon. When paused a "II" symbol is displayed. After the PML has been reset the activity icon is not displayed until the Run button is pressed again to start a new measurement period.

ENTERING COST AND GREENHOUSE GAS INFORMATION.

When in the COST screen mode, "hold" the Menu button until the Set Cost screen appears. Click the Zoom button to change the flashing number, click the Run button to select the next digit and so on. When finished setting the cost, click the Menu button to exit the set up mode.

When in the G/GAS screen mode, hold the Menu button until the Set G/GAS screen appears, enter the Greenhouse Gas value in a similar fashion as for entering cost in the previous step. When finished setting the G/GAS, click the mode button to exit the set up mode.

SETTING OR CHANGING THE MEASUREMENT PERIOD.

When in the RUNTIME/ENDTIME screen mode, hold the Menu button until the SET TIMER screen appears. Click the Zoom button to select the desired run time. If no period has been selected (Timer Duration Not Set) then when run, the PML will count time upwards continuously until manually stopped.

When a RUNTIME period has been selected (1,8,12 & 24 hours or 2,5,7,14 & 28 days), pressing "Run" will load the timer with the selected run-time and the displayed time will count downwards until zero is reached causing the meter to stop. Note it is best to stop and clear the Meter before setting a new Runtime.

When finished setting the desired RUNTIME, a short press of the Menu button will exit the set up mode.

When time is counted up the Timer screen is labelled RUNTIME as it shows the actual elapsed time, or when counting down it is labelled as ENDTIME or the time remaining for the measurement.

STARTING A MEASUREMENT PERIOD

Before starting a new measurement period, always clear all the old data from the meters' memory. Press and hold the Run button until prompted "ERASE ALL DATA NO?/YES?", press the button under the "Yes" prompt to clear all the old data (or select No to retain the data).

When the meter is running during a measurement period it is OK to "click" the Menu button to change through the various modes to view the data in real time, or to use the Zoom button.

If the appliance being measured is cyclic in nature i.e. it starts and stops automatically, such as a fridge or similar thermostatically controlled device, the data for estimated cost, greenhouse gas and energy will be more accurate if measured for a longer period. For continuous cyclic appliances such as a fridge it is best to measure over a 24-hour period (or a longer complete multiple of 24-hour periods).

SCREEN BACK-LIGHT

The screen back-light is automatically turned off after 30 seconds but will be turned on again for another 30 seconds if any of the buttons are pressed. The best button to use, if you do not want to change modes or start / stop the unit, is the Zoom key.

When the back-light is off the first click of the Zoom key does nothing except turn on the backlight, of course pressing the Zoom button whilst the back-light is on will toggle to the next line of data as usual.

protech

Digital Light Meter

QM1587

User Manual

TABLE OF CONTENTS

TITLE

1. FEATURES
2. SPECIFICATIONS
3. PANEL DESCRIPTION
4. OPERATING INSTRUCTION
5. BATTERY REPLACEMENT

1. FEATURES

- Easy to use with pock size and light weight
- 3 1/2 digital LCD display with LUX, fc, LOBAT, MAX, HOLD indication
- Accurately display light level in terms of Foot Candles (Fc) or Lux over wide range.
- Measures from 0 to 50000 Lux/ Fc in four ranges with resolution 0.1Lux/Fc .
- Max Hold and Data Hold
- Auto power off

2. SPECIFICATIONS

Display: 1999 counts LCD display with LUX, fc, LOBAT, MAX, HOLD indication

Polarity: Automatic, (-) negative polarity indication.

Over-range: "1" mark indication.

Low battery indication: The "BAT" is displayed when the battery voltage drops below the operating level.

Measurement rate: 1.5 times per second, nominal.

Storage temperature: -10 °C to 60 °C (14 °F to 140 °F) at < 80 % relative humidity

Auto Power Off: Meter automatically shuts down after approx .15 minutes of inactivity.

Power: One standard 12V, A23 battery.

Dimensions/Wt.: 188 (H) x 64.5 (W) x 24.5 (D) mm/160g

Photo Detector Dimensions/Wt.: 115 X 60 X 27 mm/80g

Light

Measuring Range: 200, 2000, 20000, 50000 Lux/fc (1Fc=10.76 Lux)

Accuracy: $\pm 5\%$ rdg ± 10 dgt (< 10,000Lux/fc)

Accuracy: $\pm 10\%$ rdg ± 10 dgt (> 10,000Lux/fc)
(20,000lux range reading x10, 50,000lux range reading x100)

Overrate Display: Highest digit of "1" is displayed.

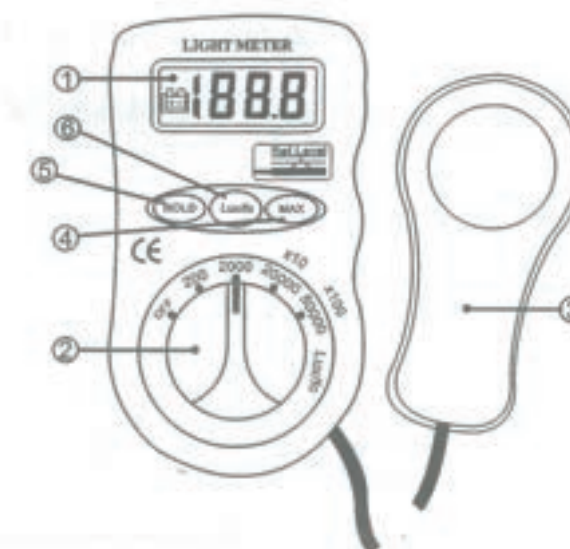
(calibrated to standard incandescent lamp at color temperature 2856 k).

Repeatability: $\pm 2\%$.

Temperature Characteristic: $\pm 0.1\%$ / °C.

Photo detector: One silicon photo diode with filter.

3. PANEL DESCRIPTION



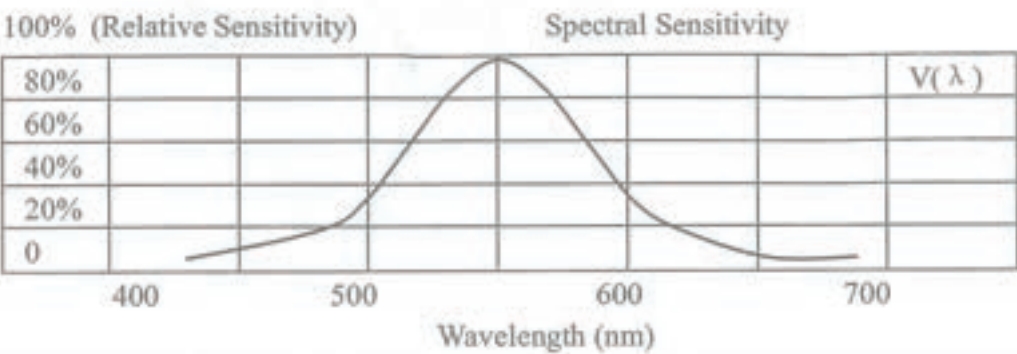
1. **LCD display:** 1999 counts LCD display with LUX, fc, LOBAT, MAX, HOLD indication
2. **Power /function /range switch:** Turn power ON or OFF and select measurement function and ranges.
3. **Photo Detector:** long life silicon photo diode inside

4. **MAX. HOLD:** If you press the MAX. button, the maximum reading will be held.
Press once again the button, will release the hold and allow a further measurement.
5. **DATA HOLD:** The reading will be held when Data Hold button Switch is pressed.
If the button Switch is pressed once again, will release the hold and allow a further measurement.
6. **Function button:** Selects measurement functions of Lux or fc

4. OPERATING INSTRUCTION

Measuring Light

1. Turn the power/function/range switch to select the range to desired (x1 lux/fc , x10lux/fc, x100lux/fc) range.
2. Remove the photo detector to light source in a horizontal position.
3. Read the illuminance nominal from the LCD display.
4. Over-range: If the instrument only display one "1" in the M.S.D. the input signal is too strong, and a higher range should be selected.
5. When the measurement is completed. Replace the photo detector from the light source.
6. Spectral sensitivity characteristic: To the detector, the applied photo diode with filters makes the spectral sensitivity characteristic almost meet C.I.E. (International Commission on Illumination) photopia curve V (λ) as the following chart described.



7. Recommended Illumination:

Locations	Lux
*Office	
Conference, Reception room.	200~750

Clerical work	700~1,500
Typing drafting	1000~2,000
*Factory	
Packing work, Entrance passage	150~300
Visual work at production line	300~750
Inspection work	750~1,500
Electronic parts assembly line	1500~3,000
*Hotel	
Public room, Cloakroom	100~200
Reception, Cashier	200~1,000
*Store	
Indoors Stairs Corridor	150~200
Show window, Packing table	750~1,500
Forefront of show window	1500 ~3,000
*Hospital	
Sickroom, Warehouse	100~200
Medical Examination room	300~750
Operating room	
Emergency Treatment	750~1,500
*School	
Auditorium, Indoor Gymnasium	100~300
Class room	200~750
Laboratory Library Drafting room	500~1,500

5. BATTERY REPLACEMENT

If the sign "BAT" appears on the LCD display, it indicates that the battery should be replaced. Open the battery case and replace the exhausted battery with new battery. (1 x 12V battery , A23 or equivalent)

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