



Thermal Work Limit (TWL30 Firmware)

Features

- Accurate heat stress indicator
- Protects staff in hot working conditions
- Maintains productivity in hot working conditions
- Tested throughout Australia & Middle East
- Accounts for the accumulative effect of sun, wind, temperature & humidity
- Default values for clothing, posture & sweat rate, or factory set to your specific needs
- Calculated in Envirodata's weather stations

Applications

- OH & S heat stress management & alerts
- Manage productivity & morale in thermally stressful working environments

TWL Summary

Heat stress occurs when the body's metabolic heat production exceeds the individual's ability to dissipate the heat produced.

As the principal factor driving metabolic heat production is muscular activity, those *working in hot* conditions are at greatest risk.

For any set of weather conditions, there is a maximum rate at which an individual can dissipate heat i.e. a **limiting metabolic rate**, and therefore a maximum rate at which they can safely work.

Many industries, particularly in the military, resource or construction sectors, have workers exposed to thermally stressful work environments. These workers need to be protected from heat stress, but without unnecessarily compromising productivity.

In research conducted throughout Australia and the Middle East by a research team from Curtin



TWL Weather Maestro Weather Station

University (Western Australia), Thermal Work Limit (TWL) has been developed to indicate the limiting metabolic rate a worker can sustain given the environmental factors to which they are exposed.

Envirodata can now incorporate TWL into our weather stations, the TWL30 firmware option.

This option gives OH&S professionals and line management the means to implement safe working limits based on weather conditions at any given moment.

TWL has been shown to be more appropriate than the traditional Wet Bulb Globe Temperature (WBGT) as a predictor of heat stress. WBGT can also be provided as a standard output from our weather stations.

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Specifications:

Sensors Used:

- Air Temperature (Ambient)
- Relative Humidity (Ambient)
- Wind Speed (2m)
- Radiant Heat (Black Globe)
- Barometric Pressure (Optional)

Factory Programmable Factors:

- Clothing Factor
- Clothing Permeability
- Posture Factor
- Maximum Sweat Rate

Firmware Outputs:

- Wet Bulb Temperature (°C)
- WBGT (°C)
- TWL (Watts/m²)

Weather Stations:

The TWL firmware (TWL30) is available in all Envirodata's new generation of weather stations:

- Weather Maestro
- WeatherMate 3000
- WeatherMaster 3000

TWL Alerts:

The Weather Maestro and WeatherMaster 3000 stations can provide alerts based on the TWL.

These alerts can be sent via SMS where a modem and alarm firmware is fitted.

Alerts can also control local devices or activate local alarm devices such as flashing beacons or sirens.

How To Use the TWL:

The TWL output represents the maximum metabolic rate a worker can sustain in terms of the prevailing environmental variables.

It presumes the worker is acclimatised and has access to cool drinking water for hydration.

As the TWL decreases, this indicates a lower metabolic rate and a corresponding lower level of work that is sustainable.

Please refer to your relevant OH&S professional for management guidelines based on TWL. However a quick guide is included below:

TWL working zones and recommended management interventions*

TWL (W/m ²)	Working zone	Interventions
140 or above	Unrestricted	No limits on self-paced work for educated, hydrated, acclimatised workers.
Between 115 & 140	Buffer	Buffer zone exists to identify situations in which environmental conditions may be limiting to work <ul style="list-style-type: none"> • Any practicable intervention to reduce heat stress should be implemented e.g. provide shade, improve ventilation etc. • Working alone to be avoided if possible • Unacclimatized workers not to work in this zone • Fluid intake of ≥1 litre per hour required • Work-rest cycling or rotation required
Less than 115	Withdrawal	Work limited to essential maintenance or rescue operations <ul style="list-style-type: none"> • No person to work alone • No unacclimatised person to work • Documentation required authorising work in hostile thermal conditions for specific purpose • Specific induction required emphasising hydration and identifying signs of heat strain • Apply 20 minutes work - 40 minutes rest schedule Dehydration testing recommended at end of shift • Personal water bottle (2 litre capacity) must be on the job at all times

* With kind permission of Dr Graham Bates, the above table was sourced from:

<http://www.pointhealth.com.au/pdf/TWL%20Working%20Zones%20and%20Interventions.pdf>