

# 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 and the Middle East
- Accounts for the accumulative effect of sun, wind, temperature and humidity
- Default values for clothing, posture and sweat rate or factory set to your specific needs
- Calculated in Environdat's weather stations

### Applications

- OH&S heat stress management and alerts
- Manage productivity and 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.



SS32 Bottom Mounted Sensor Shelter

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

Environdat can incorporate TWL into our weather stations with 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.

# THERMAL WORK LIMIT 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/m<sup>2</sup>)

## Weather Stations

The TWL firmware (TWL30) is available in Envirodata's weather stations:

- Weather Maestro
- WeatherMaster ULTRA

## TWL Alerts

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

These alerts can be sent via SMS or email to your nominated users.

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

\* Supplied with kind permission of Dr Graham Bates