

FREEZE PROTECTION OF PIPEWORK



THE APPLICATION

In cold climates, water or chemical pipework often needs to be heat traced to prevent freezing.

Thermal insulation alone is incapable of preventing freezing. A 25mm bore pipe at 5°C having 25mm thick insulation will reach freezing point within one hour in an ambient temperature of -10°C.

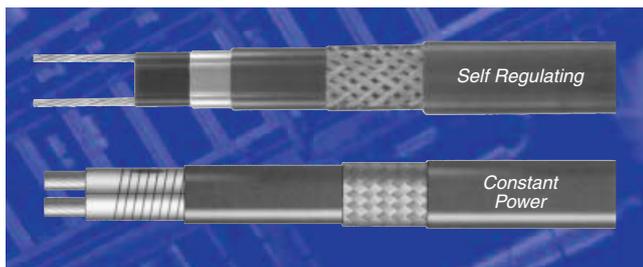
Steam at, say 150°C, is not a viable fuel source for simple freeze protection and of course, condensate returns may themselves freeze. Electric heat tracing having a low power output is the most convenient and efficient option.

The type of control system will determine operating costs.

SMALL INSTALLATIONS

Heating Cables

For installations of, up to perhaps 500m of pipework, parallel resistance self-regulating (eg. *Freezstop Regular*) or constant power heating cables (eg. *Microtracer*) are chosen which can be cut to length at site.



Conventional Control

Control most commonly comprises a simple ON/OFF air sensing thermostat (eg. *Capstat* or *Durastat*) acting through a load contactor if required, which fully powers the system at all times when the air temperature falls below a set point of say 4°C. The system may typically be energised for 2000 hours per year.

Heat is actually only needed below freezing point (say 1000 hours per year) during which the *average* freezing temperature may be typically -3°C. As the installed load must be capable of compensating for losses at minimum ambient temperatures, a high percentage of energy is wasted for most of the time.

Even so, a small installed load will have low operating costs and may not justify a more expensive, energy efficient control system.

Circuit Health Monitoring

When self-regulating heaters are used, circuits may be monitored only for continuity. If monitoring for correct heating function is required, a constant power heater should be selected and used in conjunction with an automatic and continuous circuit health monitor and alarm (eg. *Monitohm* or *Watchdog*).

LARGE INSTALLATIONS

For larger installations, consideration should be given to energy management by using self-regulating controls which produce a reduction in operating costs of 85–90% when compared with a conventional seasonal ON/OFF thermostat.

Self-regulation is achieved by *Powermatching*.

Heating Cables

When Powermatching is to be used, heaters should be normally constant wattage, either convenient parallel resistance cut to length type, or when long circuits are needed, of the series resistance type (eg. *Longline*).

Powermatch Control

A Powermatch is programmed to self-regulate the applied power to always deliver precisely the amount of heat to prevent freezing and virtually eliminate wastage.



ENERGY SAVINGS
85–90%

Payback

The 85–90% reduction in the operating costs of the *Powermatch* system results in a payback of less than one winter season for all installations with a heating load of 10kW or more. This may typically equate to 1000m of pipework.

Therefore, *Powermatch* may be considered viable for all installations of 500m or more (2 year payback).

Circuit Health Monitoring

Freeze protection systems typically spend 10 months of the year switched off. Heating circuit damage may only become apparent when the pipe bursts!

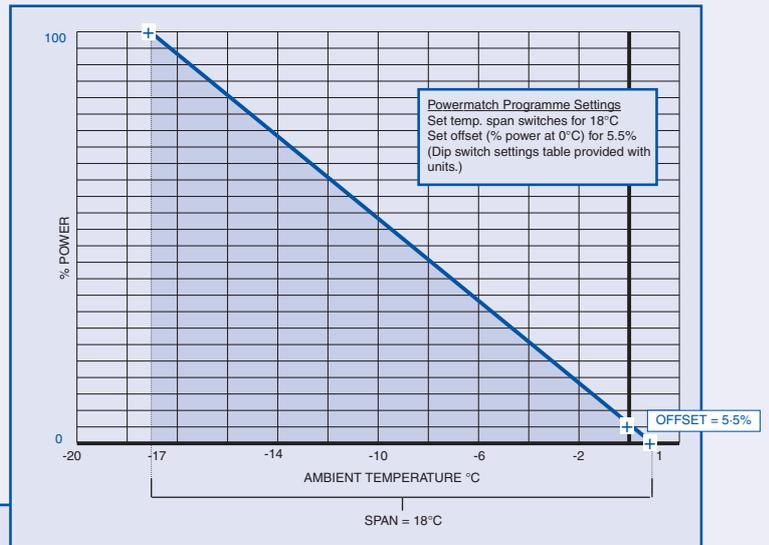
Year round circuit monitoring and alarm is possible with a *Powermatch* self-regulated freeze protection system.

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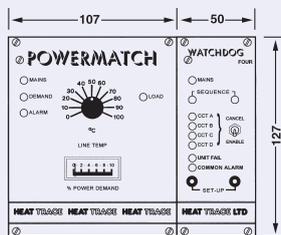
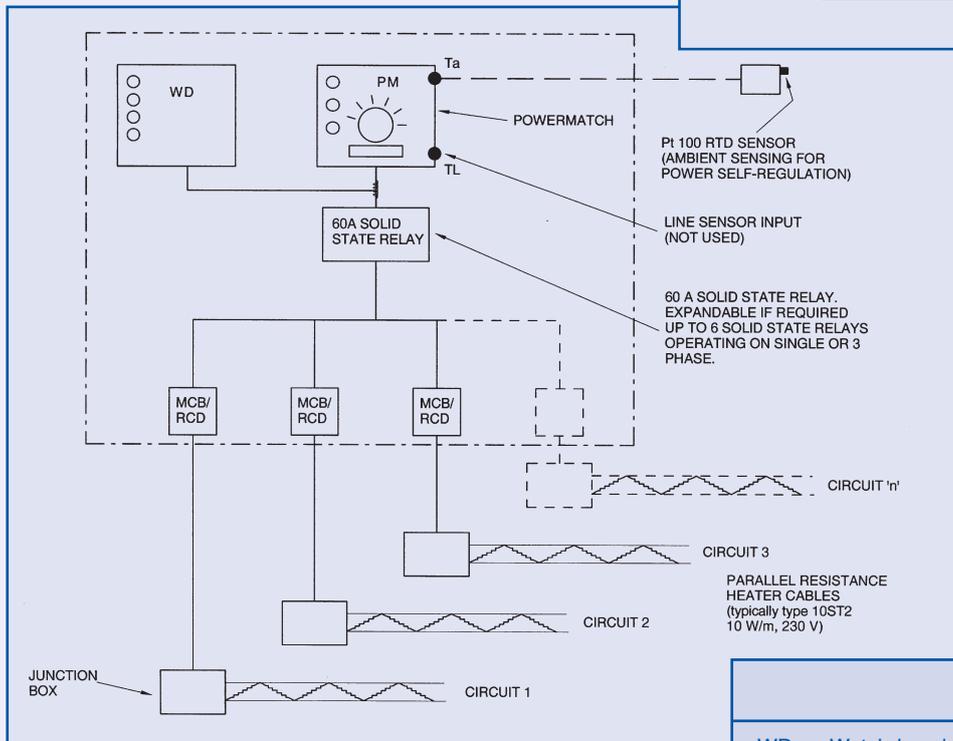
INSTALLATION EXAMPLE Sprinkler System

Pipework length 1000m
 Minimum ambient temperature -17°C
 Losses at minimum ambient 10W/m
 Installed load 10kW (43.5A)
 Electrical supply 230vac

Heat losses vary directly with changes in ambient temperature. The *Powermatch* should therefore be set up as below:



TYPICAL CONTROL ARRANGEMENT



PANEL FASCIA

KEY

WD	Watchdog circuit health monitor	CPDS070
PM	Powermatch self-regulating controller	CPDS030

Further reading . . .

Durastat Proportional Controller	CPDS010
Monitohm Circuit Health Monitor	CPDS020
Capstat Capillary Thermostat	CPDS080
Solid State Output Drives	CPDS130
Freezstop Regular Heating Tape	HPDS010
Microtracer Type ST Heating Tape	HPDS060
Longline Heating Tape	HPDS140