

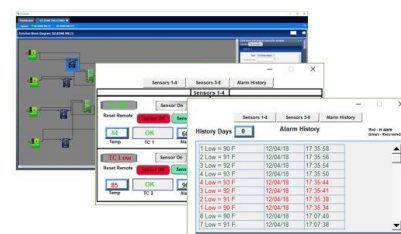


**Watt Solutions®**  
Thermal Systems ... Embracing Complexity

### What We Do!

Watt Solutions is a Provider of Thermal Systems

- ✓ on-site application engineering
- ✓ temperature and process controller support
- ✓ wattage calculations
- ✓ sketches & drawings
- ✓ critique OEM designs



- efficient thermal design
- heating element life
- temperature sensing
- temperature control
- safety limit
- power control
- user interface
- communications
- environment
- temperature uniformity
- data logging
- ramp/soak profile
- process control
- SCADA

#### Equation 1

$$Q_A \text{ or } Q_B = \frac{W \cdot C_p \cdot \Delta T}{3.412}$$

$Q_A$  = Heat Required to Raise Temperature of Materials During Heat-Up (Wh)

$Q_B$  = Heat Required to Raise Temperature of Materials Processed in Working Cycle (Wh)

$W$  = Weight of Material (lb)

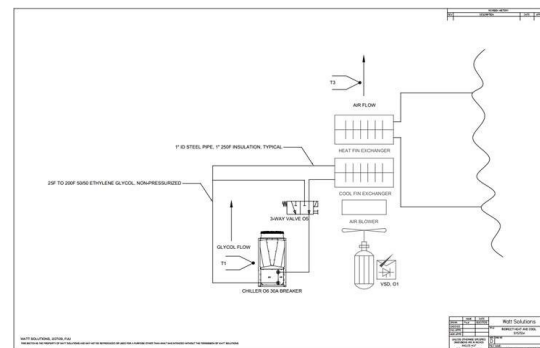
$C_p$  = Specific Heat of Material (Btu/lb · °F)

$\Delta T$  = Temperature Rise of Material ( $T_{Final} - T_{Initial}$ ) (°F)

This equation should be applied to all materials absorbing heat in the application. Heated media, work being processed, vessels, racks, belts, and ventilation air should be included.

**Example:** How much heat energy is needed to change the temperature of 50 lbs of copper from 10°F to 70°F?

$$Q = \frac{W \cdot C_p \cdot \Delta T}{3.412} = \frac{(50 \text{ lbs}) \cdot (0.10 \text{ Btu/lb} \cdot \text{°F}) \cdot (60\text{°F})}{3.412} = 88 \text{ (Wh)}$$





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Thermal Systems ... Embracing Complexity

Watt Solutions enables customers such as yourself to excel in their field & thrive! As a leading thermal systems solutions provider, "we deliver" when it comes to full-service engineering & support, above and beyond commissioning.

Please take advantage of our engineering capability & thermal systems expertise. We have the product and industry experience to provide "turn-key results" that match the needs of your application. We are experts with heaters, sensors, controllers & thermal systems and we have many years of experience so feel free to bring your technical questions directly to us and be sure to contact us if you are interested in a change for the better!

We welcome request-for-quotes on all standard part numbers as well as those more challenging applications and custom designs. In addition to selling heaters, sensors, and controllers, we offer insulation, glycol/water/oil heating systems plus vacuum components & systems.

### Watt Solutions' Line Card



Heater  
Designs



TURK HILLINGER  
THERMAL TECHNOLOGY



Nor-Cal Products  
by PFEIFFER VACUUM

INDEECO

UNITHERM  
international inc.

ACCUTHERM

BBC  
INDUSTRIES, INC.

CHROMALOX  
Advanced Thermal Technologies

Hi-Heat Industries, Inc.

hotset

EXERGEN  
CORPORATION

CAS CAST ALUMINUM  
Solutions

ecs  
East Coast Sensors, Inc.



Heat & Sensor  
Technology

Eurotherm