

Electric Tracers

The weakest link in the sample transport system is often the selection and installation of the heat trace medium and temperature control scheme.

There are three primary tracing mediums: electric, steam and re-circulated fluids. Consistent temperature maintenance is a critical aspect of the sample transport system, yet its design and installation is often treated without the same care. Heat tracing is required for process and stack gas analyzers to maintain a specific process temperature as well as freeze protection. Many of the specifications in the marketplace today overcompensate for common failures related to poor designs or installation. Likewise, sample transport systems that are field traced and insulated pose additional problems when compared to a pre-engineered, pre-traced system like O'Brien Analytical Tracepak® and Stackpak™.

Electric heat trace products come in a wide range of heater types, accessories and temperature control schemes. There are also a host of safety issues related to electrical code compliance and approvals. Electric heat tracers can be categorized by several factors: output characteristics, the ability to cut-to-length, and temperature limits. Each heater will have its own performance and application limitations.

Output Characteristics: The output of the heater will be either fixed or variable. Fixed output heaters are referred to as 'constant wattage', the output does not vary with temperature. Variable output heaters are referred to as 'self-limiting,' 'self-regulating,' 'variable resistance' or 'power-limiting.' In all cases the output varies with the temperature of the heater; as the temperature increases the output decreases. The value and slope of the change

varies widely within this family of heater types. **The Ability to Cut-to-Length:** This refers to the ability to cut a heater to a desired length in the field without specialized training or tools. If a heater cannot be cut in the field it is referred to as 'fixed' length. In order to shorten a fixed length heater it requires specialized training and / or the addition of a transformer or a controller with power limiting capabilities. Cut-to-length heaters are divided into two subgroups: those that can be cut anywhere and those that must be cut at specific locations or nodes. The second subgroup is called zone heaters. The zone length is consistent for a given heater but may vary from one output to another.

Temperature Limits: Each heater will have a maximum maintain temperature as well as a maximum exposure temperature. Exposure temperatures can be rated as power on or power off and a heater may have a higher 'intermittent' exposure temperature rating.

Type	Characteristics	Typical Uses
Self-Regulating – Low Temperature		
 CC, CN, J & P Series Heaters	Infinitely Cut-to-Length Maximum Continuous Exposure and Maintain Temperature: 150°F (65°C) Maximum Intermittent Exposure Temperature: 185°F (85°C) Output: 5, 8 or 10 W/Ft* Hazardous Area Approvals: FM, CSA, CENELEC T-Rating: T6 Thermostatic Control: Not Required	Freeze protection for low temperature liquid samples. Can be used without temperature controllers. May be used on semi permanent installations or where moderate flexing and movement is anticipated.
Self-Regulating – High Temperature		
 B, N, W & WN Series Heaters	Infinitely Cut-to-Length Maximum Continuous Exposure and Maintain Temperature: 250°F (120°C) Maximum Intermittent Exposure Temperature: 420°F (215°C) Output: 5, 10, 15 or 20 W/Ft* Hazardous Area Approvals: FM, CSA, CENELEC T-Rating: T3 – T2 depending upon output Thermostatic Control: Required for maintain temp above 150°F (65°C)	Temperature maintenance up to 250°F (120°C). Permanent installations with no flexing or movement anticipated.
 JV & JN Series Heaters	24" Zone Lengths Maximum Continuous Maintain Temperature: 300°F (150°C) Maximum Exposure Temperature (Power OFF): 482°F (250°C) Output: 10 & 20 W/Ft Hazardous Area Approvals: FM, CSA, CENELEC Thermostatic Control: Required	Temperature maintenance up to 300°F (150°C) with high exposure temperatures. Also used for freeze protection of high temperature lines.
Constant Wattage		
 T, TN & TY Series Heaters	24" Zone Lengths Maximum Continuous Exposure and Maintain Temperature: 400°F (205°C) Maximum Intermittent Exposure Temperature: 400°F (205°C) Output: 18 W/Ft Hazardous Area Approvals: None** Thermostatic Control: Required	Temperature maintenance up to 400°F (205°C) in general purpose areas. Often used for stack gas systems. (See caution note about using zone heaters for this application.)
 Resistance Heaters	Factory Fixed Length Maximum Maintain Temperature: 450°F (230°C) Maximum Exposure Temperature: 500°F (260°C) Output: up to 30 W/Ft Hazardous Area Approvals: None** Thermostatic Control: Required	Maintain temperatures up to 450°F (260°C). Portable sample systems & heated hose.
 MI Series Heater	Factory Fixed Length Maximum Maintain Temperature: 500°F (425°C) Maximum Exposure Temperature: 1100°F (590°C) Output: up to 30 W/Ft Hazardous Area Approvals: FM, CSA, CENELEC T-Rating: determined by application Thermostatic Control: Required	Maintain temperatures up to 500°F (260°C) with high exposure temperatures. Stack gas.

* Nominal output of variable resistance heaters is rated at 50°F (10°C).
 ** Some resistance and/or zone heater selections may carry hazardous area approvals. Consult factory if hazardous area approval is required.
 = Re-circulated fluid or steam tracing has its own set of design and installation issues requiring consideration such as pressure, trapping, and system recovery. The discussion of steam and fluid tracing is not covered in this design guide.
 For more information on steam and fluid tracing visit our website at <http://www.obcorp.com>.

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Maintain temperature below 150°F (65°C)	Yes	Continuous exposure temperature below 150°F (65°C)	Yes	Intermittent exposure temperature below 185°F (85°C)	Yes	CC, CN, J & P Series Heaters
			No		No	Go to next highest maintain temperature
	No	Go to next highest maintain temperature				
Maintain temperature below 250°F (120°C)	Yes	Continuous exposure temperature below 250°F (120°C)	Yes	Intermittent exposure temperature below 420°F (215°C)	Yes	B, N, W & WN Series Heaters
			No		No	Go to next highest maintain temperature
	No	Go to next highest maintain temperature				
Maintain temperature below 300°F (150°C)	Yes	Continuous exposure temperature below 300°F (150°C)	Yes	Intermittent exposure temperature below 482°F (250°C)	Yes	JV & JN Series Heaters
			No		No	Go to next highest maintain temperature
	No	Go to next highest maintain temperature				
Maintain temperature below 390°F (200°C) Non Hazardous Area	Yes	Continuous exposure temperature below 390°F (200°C)	Yes	Intermittent exposure temperature below 450°F (230°C)	Yes	T, TN & TY Series Heaters
			No		No	Go to next highest maintain temperature
	No	Go to next highest maintain temperature				
Maintain temperature below 450°F (230°C) Non Hazardous Area	Yes	Continuous exposure temperature below 450°F (230°C)	Yes	Intermittent exposure temperature below 500°F (260°C)	Yes	Series Resistance Heaters
			No		No	Go to next highest maintain temperature
	No	Go to next highest maintain temperature				
Maintain temperature below 500°F (260°C)	Yes	Exposure temperature below 1100°F (590°C)	Yes	MI Heaters		
			No	Buffer Tracer		
	No	Reduce maintain temperature				