

# Tubular Heaters

## FINBAR™ Single-Ended Heaters

Composed of aluminized steel fins press fitted to a one-inch single-ended FIREBAR element. The FINBAR™ is designed to improve heat transfer to the air and permits putting more power in tighter spaces—like forced air ducts, dryers, ovens and load bank resistors.

Heat transfer, lower sheath temperature and element life are all maximized by its finned construction. Installation is simplified by terminations exiting at one end and mounting accommodations on both ends.

### Performance Capabilities

- Watt densities up to 50 W/in<sup>2</sup> (7.7 W/cm<sup>2</sup>)
- 304 stainless steel sheath temperatures up to 1200°F (650°C)
- Voltages up to 480VAC
- Amperages up to 48 amperes per heater or 16 amperes per coil

### Features and Benefits

#### Rugged aluminized steel fins

- Provides an increase in surface area to approximately 16 square inches for every linear inch of element length. Fins press fitted to the heating element improve heat transfer to the air

#### Single-ended termination

- Simplifies wiring and installation

#### Stainless steel mounting bracket, welded to the terminal end, supplied with a slotted end

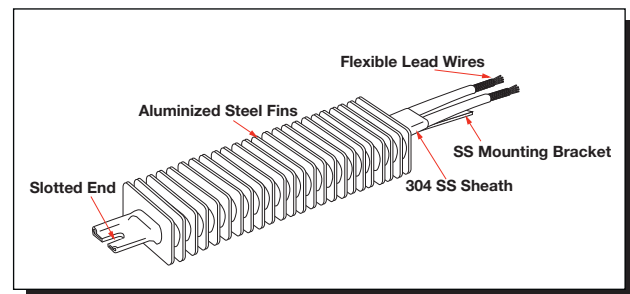
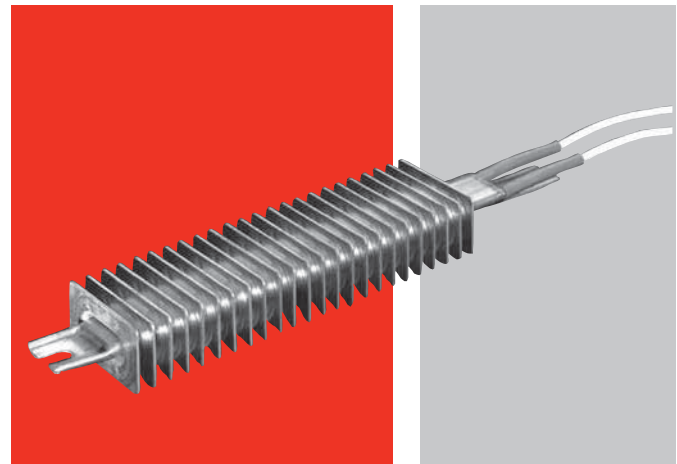
- Allows ease of installation

#### Lavacone seals

- Provides protection against humid storage conditions, moisture retardant to 221°F (105°C)

### Typical Applications

- Forced air heating for dryers, ovens, ducts
- Still air heating for ovens, comfort heating
- Incubators
- Ink drying
- Load bank resistors



### Construction Features

**Watt Density:** Up to 40 W/in<sup>2</sup> (6.2 W/cm<sup>2</sup>)

**Fin Surface Area:** 16 in<sup>2</sup>/linear in. (40.5 cm<sup>2</sup>/linear cm)

**Fin Cross Section:** 2 x 1 in. (50 x 25 mm)

**Maximum Operating Temperature:** Sheath material: 304 SS, 1200°F (650°C), Fin material; aluminized steel; 1100°F (600°C)

**Heater Length:** 11 to 120 in. (280 to 3050 mm)

**No-Heat Length:** 1 in. (25 mm) min., 12 in. (305 mm) max.

**Voltages:** Up to 240VAC

**Phase:** 1-phase parallel or 3-phase wye

**Resistance Coils:** 1 or 3

**Terminations:** Flexible lead wires, quick connect (spade), screw lug (plate) and threaded stud

**Seal Material:** Lavacone, rated to 221°F (105°C)

**Single-End Configuration:** Slotted

**Agency Recognition:** Refer to FIREBAR UL®

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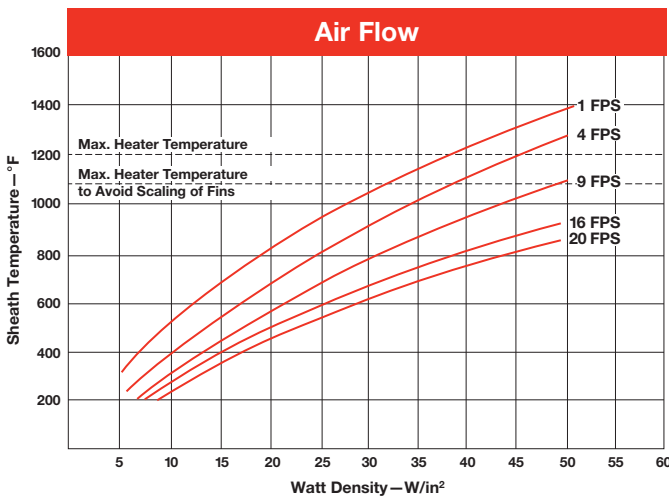
### Air Heating

The *Watt Density, Air Flow and Sheath Temperature* graph shows the relationship between watt density, air flow velocity and sheath temperature, along with a recommended temperature to avoid deteriorating the fins. Be aware that **lower sheath temperature yields longer heater life**.

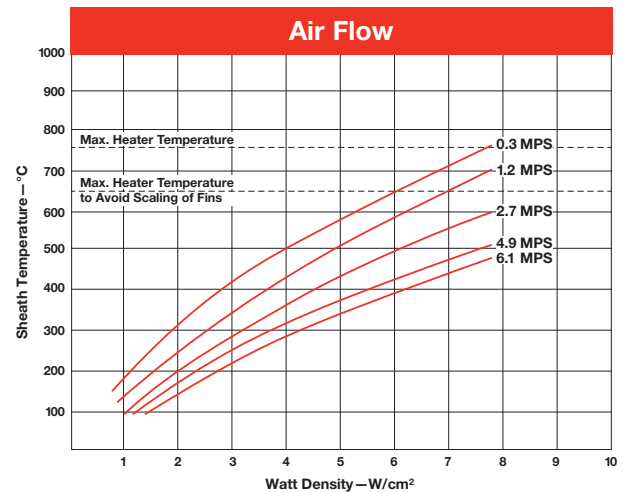
The graphic representation is based on a single-ended FINBAR, various air velocities (at 68°F/20°C inlet temperature) and different watt densities.

To determine, from the graph, the operating temperature of the FINBAR's sheath, identify the air velocity curve that approximates your application in feet per second (meters per second). Then, look at the vertical line that most closely approximates the FINBAR's watt density. From the intersecting point, read over to the temperature column to determine the sheath's operating temperature.

Watt Density, Air Flow and Sheath Temperature (°F)



Watt Density, Air Flow and Sheath Temperature (°C)



### Dual Ended FINBAR

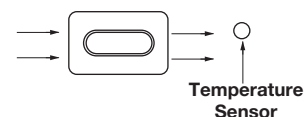
FINBAR elements are typically terminated at one end. Upon request, however, dual-ended FINBAR heaters can be ordered. To order, specify **dual-ended FINBAR** and lead length.

### Application Hints

- Avoid deteriorating the fins by not exceeding the recommended maximum fin temperature of 1100°F (600°C).
- Ensure proper air flow to prevent premature heater failure.
- Locate the temperature sensor downstream from heater(s) for process temperature sensing.

The following mounting parameters are recommended:

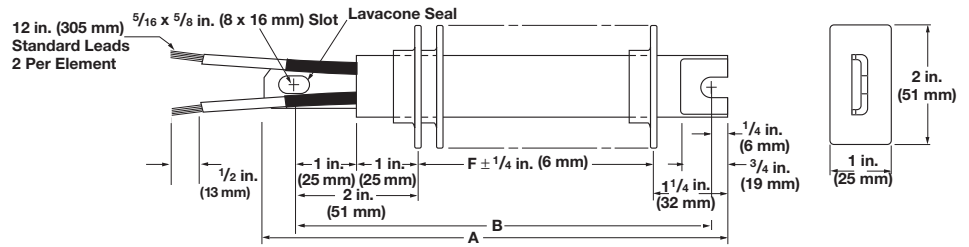
- Air flow over element must be parallel with the flat side.
- Element center line to element center line spacing must be a minimum of 1½ in. (38 mm).



Proper air flow relative to the heater's sheath is parallel with the longer cross sectional axis.

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## FINBAR Single-Ended Heaters



FINBAR Description	Overall A Dimension		Overall F Dimension		Mounting B Dimension		Watts	Part Number		Est. Net Wt.	
	in.	(mm)	in.	(mm)	in.	(mm)		120VAC	240VAC	lbs	(kg)

### Application: Forced Air

20 W/in <sup>2</sup> 304 SS (3.1 W/cm <sup>2</sup> )	10 <sup>1</sup> / <sub>4</sub>	(260.0)	6 <sup>1</sup> / <sub>2</sub>	(158.0)	9 <sup>1</sup> / <sub>2</sub>	(241.0)	300	FSP91WMF		1.4	(0.7)
	11 <sup>3</sup> / <sub>4</sub>	(298.0)	8	(203.0)	11	(279.0)	375	FSP101WMF		1.4	(0.7)
	13 <sup>3</sup> / <sub>4</sub>	(349.0)	10	(254.0)	13	(330.0)	450	FSP121WMF		1.5	(0.7)
	15	(381.0)	11 <sup>1</sup> / <sub>4</sub>	(285.0)	14 <sup>1</sup> / <sub>4</sub>	(362.0)	500	FSP141WMF		1.5	(0.7)
	17 <sup>5</sup> / <sub>8</sub>	(447.7)	13 <sup>7</sup> / <sub>8</sub>	(352.4)	16 <sup>7</sup> / <sub>8</sub>	(428.6)	650	FSP161WMF	FSP1610WMF	1.6	(0.8)
	19 <sup>1</sup> / <sub>4</sub>	(489.0)	15 <sup>1</sup> / <sub>2</sub>	(393.0)	18 <sup>1</sup> / <sub>2</sub>	(469.0)	725	FSP181WMF	FSP1810WMF	1.7	(0.8)
	20 <sup>3</sup> / <sub>4</sub>	(527.0)	17	(431.0)	20	(508.0)	800	FSP191WMF	FSP1910WMF	1.7	(0.8)
	23 <sup>1</sup> / <sub>2</sub>	(597.0)	19 <sup>3</sup> / <sub>4</sub>	(501.0)	22 <sup>3</sup> / <sub>4</sub>	(577.0)	900	FSP221WMF	FSP2210WMF	1.8	(0.9)
	25 <sup>1</sup> / <sub>4</sub>	(641.0)	21 <sup>1</sup> / <sub>2</sub>	(546.0)	24 <sup>1</sup> / <sub>2</sub>	(622.0)	1000	FSP241WMF	FSP2410WMF	1.9	(0.9)
	26 <sup>1</sup> / <sub>2</sub>	(673.0)	22 <sup>3</sup> / <sub>4</sub>	(577.0)	25 <sup>3</sup> / <sub>4</sub>	(654.0)	1050	FSP251WMF	FSP2510WMF	1.9	(0.9)
	30 <sup>1</sup> / <sub>8</sub>	(765.2)	26 <sup>3</sup> / <sub>8</sub>	(669.9)	29 <sup>3</sup> / <sub>8</sub>	(746.1)	1250	FSP291WMF	FSP2910WMF	2.1	(1.0)
	33 <sup>1</sup> / <sub>8</sub>	(841.4)	29 <sup>3</sup> / <sub>8</sub>	(746.1)	32 <sup>3</sup> / <sub>8</sub>	(822.3)	1350	FSP321WMF	FSP3210WMF	2.2	(1.0)
	35 <sup>5</sup> / <sub>8</sub>	(904.9)	31 <sup>7</sup> / <sub>8</sub>	(809.6)	34 <sup>7</sup> / <sub>8</sub>	(885.8)	1500		FSP3410WMF	2.3	(1.1)
	38 <sup>3</sup> / <sub>8</sub>	(974.7)	34 <sup>5</sup> / <sub>8</sub>	(879.5)	37 <sup>5</sup> / <sub>8</sub>	(955.7)	1600		FSP3710WMF	2.4	(1.1)
42 <sup>1</sup> / <sub>8</sub>	(1070.0)	38 <sup>3</sup> / <sub>8</sub>	(974.7)	41 <sup>3</sup> / <sub>8</sub>	(1051.0)	1800		FSP4110WMF	2.5	(1.2)	
47 <sup>3</sup> / <sub>4</sub>	(1213.0)	44	(1117.0)	47	(1193.0)	2000		FSP4610WMF	2.7	(1.3)	
40 W/in <sup>2</sup> 304 SS (6.2 W/cm <sup>2</sup> )	10 <sup>1</sup> / <sub>4</sub>	(260.0)	6 <sup>1</sup> / <sub>2</sub>	(158.0)	9 <sup>1</sup> / <sub>2</sub>	(241.0)	600	FSP91WKF		1.4	(0.7)
	11 <sup>3</sup> / <sub>4</sub>	(298.0)	8	(203.0)	11	(279.0)	750	FSP101WKF		1.4	(0.7)
	13 <sup>3</sup> / <sub>4</sub>	(349.0)	10	(254.0)	13	(330.0)	900	FSP121WKF	FSP1210WKF	1.5	(0.7)
	15	(381.0)	11 <sup>1</sup> / <sub>4</sub>	(285.0)	14 <sup>1</sup> / <sub>4</sub>	(362.0)	1000	FSP131WKF	FSP1310WKF	1.5	(0.7)
	17 <sup>5</sup> / <sub>8</sub>	(447.7)	13 <sup>7</sup> / <sub>8</sub>	(352.4)	16 <sup>7</sup> / <sub>8</sub>	(428.6)	1300	FSP161WKF	FSP1610WKF	1.6	(0.8)
	19 <sup>1</sup> / <sub>4</sub>	(489.0)	15 <sup>1</sup> / <sub>2</sub>	(393.0)	18 <sup>1</sup> / <sub>2</sub>	(469.0)	1450	FSP181WKF	FSP1810WKF	1.7	(0.8)
	20 <sup>3</sup> / <sub>4</sub>	(527.0)	17	(431.0)	20	(508.0)	1600		FSP1910WKF	1.7	(0.8)
	23 <sup>1</sup> / <sub>2</sub>	(597.0)	19 <sup>3</sup> / <sub>4</sub>	(501.0)	22 <sup>3</sup> / <sub>4</sub>	(577.0)	1800		FSP2210WKF	1.8	(0.9)
	25 <sup>1</sup> / <sub>4</sub>	(641.0)	21 <sup>1</sup> / <sub>2</sub>	(546.0)	24 <sup>1</sup> / <sub>2</sub>	(622.0)	2000		FSP2410WKF	1.9	(0.9)
	26 <sup>1</sup> / <sub>2</sub>	(673.0)	22 <sup>3</sup> / <sub>4</sub>	(577.0)	25 <sup>3</sup> / <sub>4</sub>	(654.0)	2100		FSP2510WKF	1.9	(0.9)
	30 <sup>1</sup> / <sub>8</sub>	(765.2)	26 <sup>3</sup> / <sub>8</sub>	(669.9)	29 <sup>3</sup> / <sub>8</sub>	(746.1)	2500		FSP2910WKF	2.1	(1.0)
	33 <sup>1</sup> / <sub>8</sub>	(841.4)	29 <sup>3</sup> / <sub>8</sub>	(746.1)	32 <sup>3</sup> / <sub>8</sub>	(822.3)	2700		FSP3210WKF	2.2	(1.0)
	35 <sup>5</sup> / <sub>8</sub>	(904.9)	31 <sup>7</sup> / <sub>8</sub>	(809.6)	34 <sup>7</sup> / <sub>8</sub>	(885.8)	3000		FSP3410WKF	2.3	(1.1)
	38 <sup>3</sup> / <sub>8</sub>	(974.7)	34 <sup>5</sup> / <sub>8</sub>	(879.4)	37 <sup>5</sup> / <sub>8</sub>	(955.7)	3200		FSP3710WKF	2.4	(1.1)
42 <sup>1</sup> / <sub>8</sub>	(1070.0)	38 <sup>3</sup> / <sub>8</sub>	(974.7)	41 <sup>3</sup> / <sub>8</sub>	(1050.9)	3600		FSP4110WKF	2.5	(1.2)	
47 <sup>3</sup> / <sub>4</sub>	(1213.0)	44	(1117.0)	47	(1193.0)	4000		FSP4610WKF	2.7	(1.3)	

• M - Manufacturing lead times