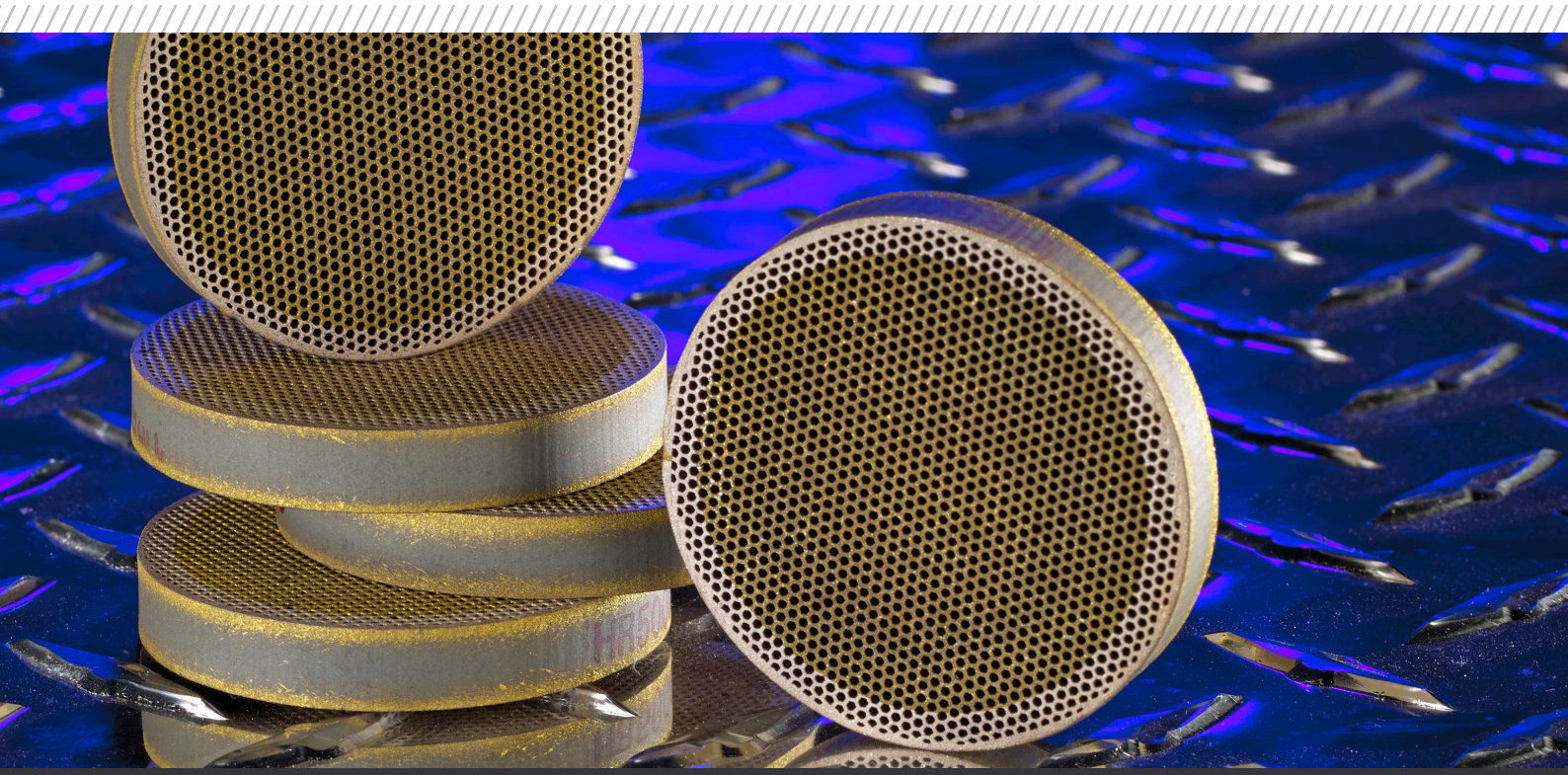


Honeycomb PTC Air Heaters

Innovation in Motion





OVERVIEW

Pelonis Technologies' innovative heating disc is made from a revolutionary ceramic material with over 1,200 holes that heat 100% of the airflow across the entire surface area of the disc. This creates a superior heat transfer in a small space, producing an instant flow of heat up to 50% hotter than conventional coil or ceramic chip heaters.

SAFE AND ENERGY EFFICIENT

Each compact honeycomb PTC heating disc provides a quick and efficient source of heat. Its advanced thermoelectric properties are based on an innovative extrusion technology that allow each disc to operate at high airflow temperatures but below the combustion point of most materials.

HONEYCOMB PTC HEATER ASSEMBLIES

Honeycomb PTC heating elements can be configured into three, four, or five disc configurations that produce up to 2000 watts of heat output. Other OEM configurations are possible depending on customer applications. All PTC heater assemblies consist of high temperature PPS plastic, stainless steel contacts, and protective coatings for optimum conductivity.

FEATURES & BENEFITS

- Superior heat transfer
- Very efficient
- Compact size
- Long operating life

PTC heaters can be used in a variety of industrial applications, including the following:

- | | |
|----------------------|-----------------------|
| ■ Air conditioners | ■ Space heaters |
| ■ Water heaters | ■ Mat/cushion heaters |
| ■ Hot plates | ■ Clothes dryers |
| ■ Thermos containers | ■ Rice cookers |
| ■ Shoe dryers | ■ Photo copiers |
| ■ Steam irons | ■ Steam hair brushes |
| ■ Sauna equipment | ■ Injector warmers |
| ■ Phone displays | ■ Cathode ray tubes |
| ■ Motor starters | ■ Luminance starters |
| ■ Circuit breakers | ■ Blood analyzers |

Honeycomb PTC Heaters are ideal alternatives to traditional air heaters and can be customized to satisfy a variety of applications that require an effective heating solution that is compact, extremely safe, and energy efficient.

WHAT IS PTC?

PTC is a semiconductor ceramic that has a very high Positive Temperature Coefficient (PTC). When power is applied on the PTC, its resistance initially decreases and its temperature increases. This reduction of resistance accounts for the inrush current which usually occurs within the first 5 seconds.

As the temperature of the PTC increases and reaches the PTC's Curie Temperature (T_c), its resistance drastically increases, resulting in current reduction. Current reduction also results in power reduction and temperature reduction. Thus, the PTC material will try to maintain a constant temperature which in practical applications (near the Curie Temperature) is independent of the air flow applied.

The PTC heat output can be regulated by the air flow applied in typical applications of heat generation; the higher the air flow, the higher the heat output.

Fig. A shows the typical Resistance vs. Temperature characteristics and Fig. B shows the Current vs. Time characteristics.

RESISTANCE/TEMPERATURE GRAPH

In Fig. A, we plot Resistance / Temperature characteristics of two different PTC pellets. Basically, you have the "A" category, which are the high Curie temperature PTC pellets where T_c is larger than 120°C . These are suitable as over-heat protectors and high heat generation heaters. Notice that the R/T slope is not as steep to allow for smaller resistance change per degree of temperature change. This gives a larger "operating window" in the R/T curve.

In the "B" category, those with Curie point below 120°C , the steep slope gives us higher resistance sensitivity in an ON - OFF situation, making them ideal for switching purposes (e.g. thermal sensors, over-current protectors, relays, and degassers).

Based on the PTC characteristics, there are 3 different types of applications where PTC can be used:

1. Heat Generation: The PTC is used as a heating element by applying the rated voltage range and choosing the operating current point by removing the heat generated either by conduction, natural convection, forced air convection, or radiation.

2. Temperature Sensing: In this case, we are utilizing the property of the Curie Temperature point at which the PTC resistance increases drastically. Selecting the Curie Temperature to be the same as the critical ambient temperature for our application, we can use the resistance change effect for temperature monitoring and compensation purposes.

3. Initial Current Applications: In this case, the inrush current property is utilized (as in the case of the motor starter for activation of the starting coil). The PTC allows maximum current flow for the first few seconds and then it will present a high resistance (it will virtually act as an open circuit).

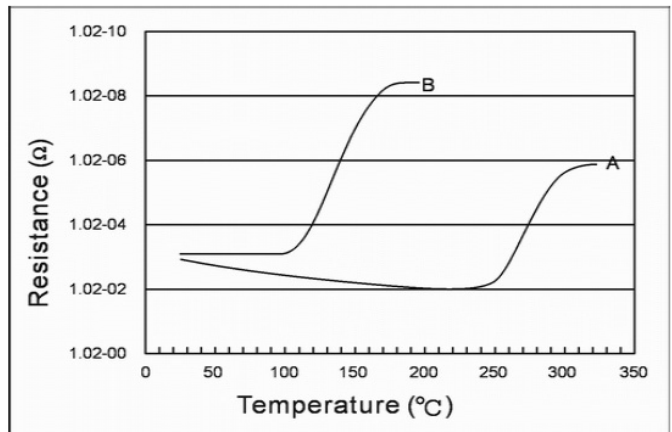


Fig. A

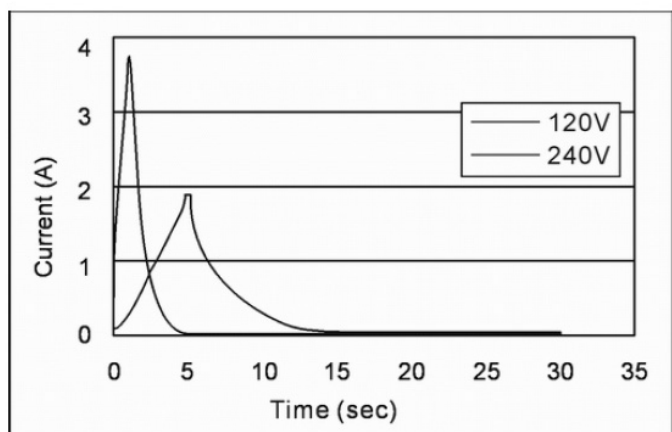


Fig. B

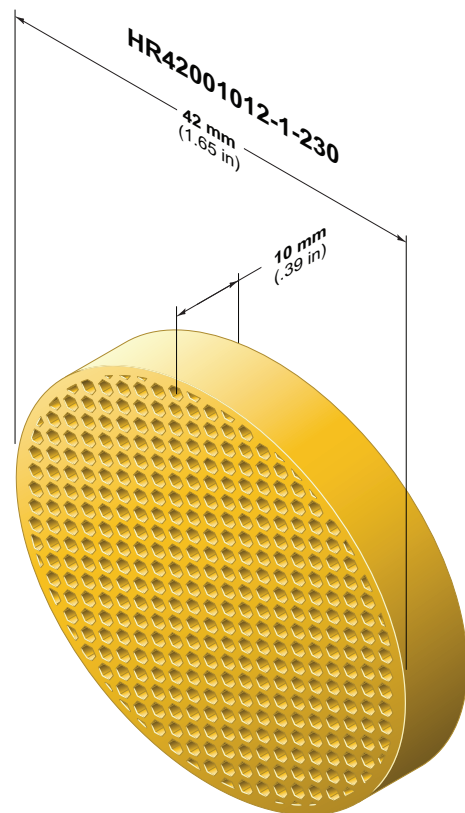
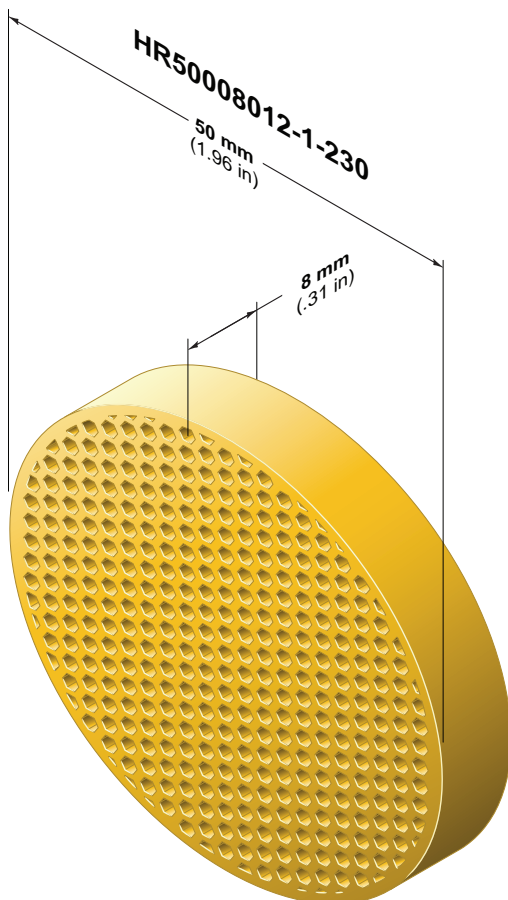


Honeycomb PTC Air Heater

42 x 10mm (1.65 x 0.39in)
50 x 8mm (1.96 x 0.31)

- 230V
- 250W and 300W
- Quick Heat Up
- Safe Operation
- Energy efficient
- Long operating life

| Part Number | Voltage (V) | Dimensions (mm) | Thickness (mm) | Resistance at 25°C (Ω) | Heat Output (W) at 25°C 0.25mm ³ /min |
|------------------|-------------|-----------------|----------------|------------------------|--|
| HR42001012-1-230 | 220-240 | 42±1.5 | 10±0.3 | 100~300 | 250±50 |
| HR50008012-1-230 | 220-240 | 50±1.5 | 8.0±0.3 | 100~300 | 300±50 |



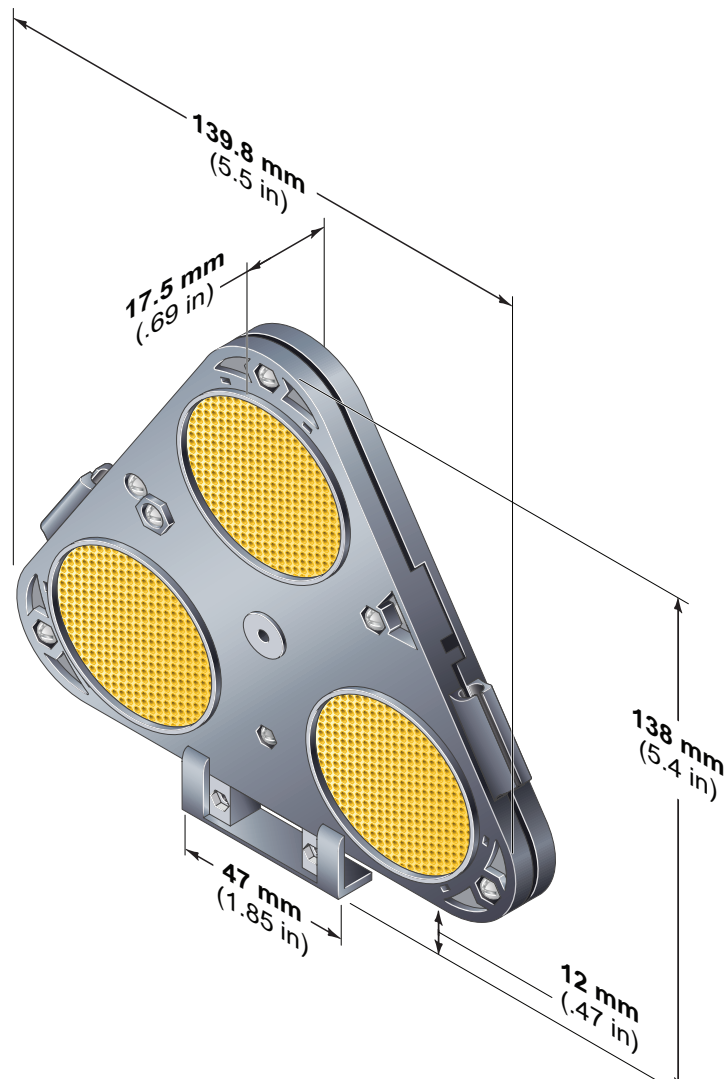
3-Honeycomb PTC Air Heater Assembly

140 x 138 x 18mm (5.5 x 5.4 x 0.69in)

- 110V
- 1100W
- Quick Heat Up
- Safe Operation
- Energy efficient
- Long operating life



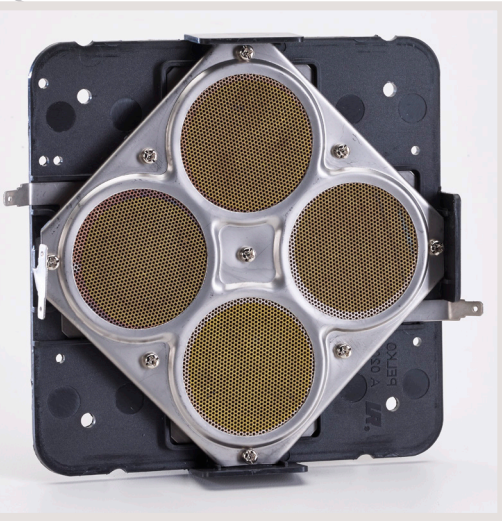
| Part Number | Voltage (V) | Heat Output (W) | Material |
|-------------|-------------|-----------------|--|
| PH1209-Q4 | 110-130 | 1100 | PPS High Temperature Plastic, Stainless Steel Contacts, and Silver Coating |
| PH2205-Q4 | 220-240 | 1100 | |



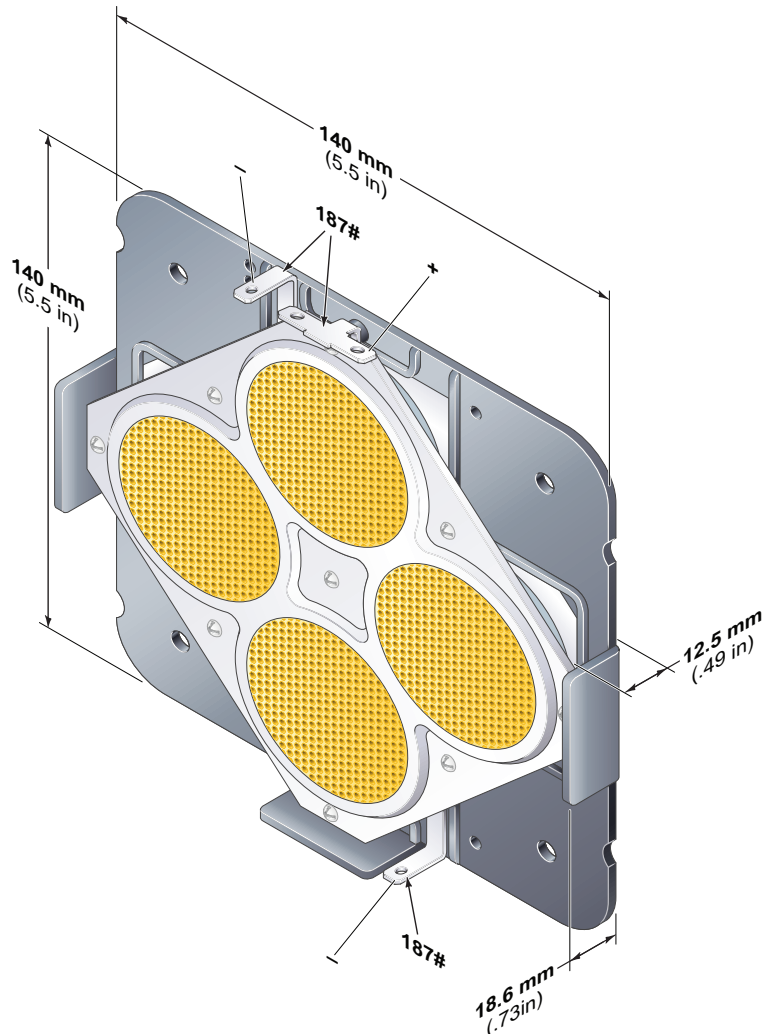
4-Honeycomb PTC Air Heater Assembly

140 x 140 x 12.5mm (5.5 x 5.5 x 0.49in)

- 110/220V
- 1500W
- Quick Heat Up
- Safe Operation
- Energy efficient
- Long operating life



| Part Number | Voltage (V) | Heat Output (W) | Material |
|-------------|-------------|-----------------|--|
| PH1212-A8 | 110-130 | 1500 | PPS High Temperature Plastic, Stainless Steel Contacts, and Silver Coating |
| PH2207-A9 | 220-240 | 1500 | |



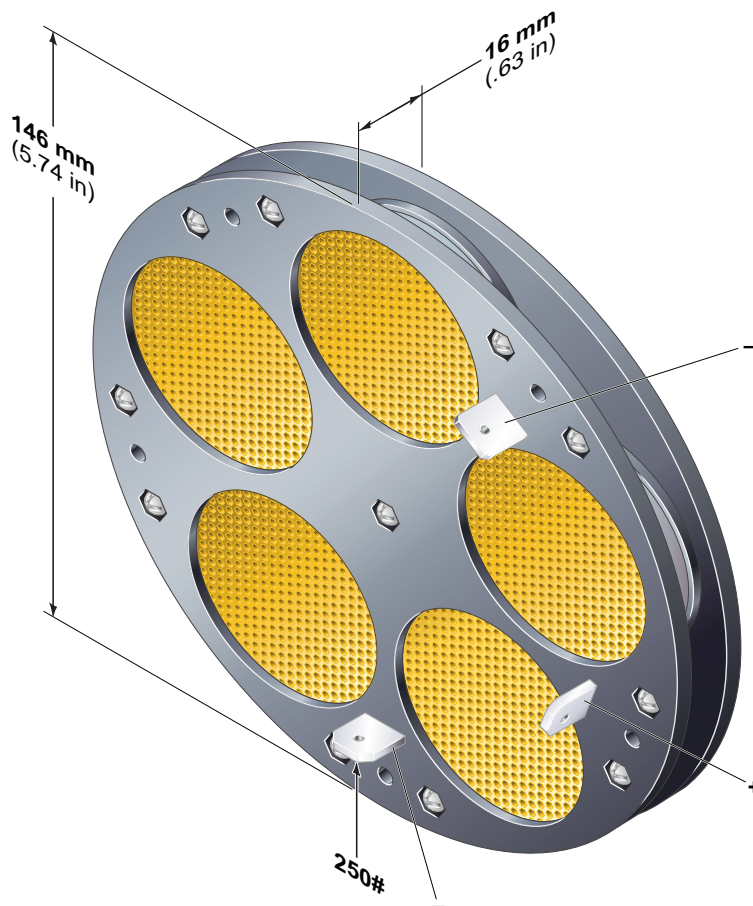
5-Honeycomb PTC Air Heater Assembly

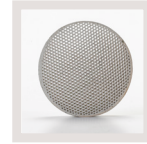
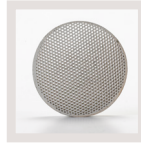
146 x 16mm (5.7 x 0.63in)

- 110/220V
- 1500W and 2000W
- Quick Heat Up
- Safe Operation
- Energy efficient
- Long operating life

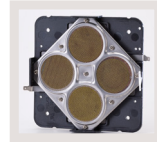


| Part Number | Voltage (V) | Heat Output (W) | Material |
|-------------|-------------|-----------------|--|
| PH1212-L4 | 110-130 | 1500 or 2000 | PPS High Temperature Plastic, Stainless Steel Contacts, and Silver Coating |
| PH2207-L4 | 220-240 | 1500 or 2000 | |





| Part Number | HR42001012-1-230 | HR50008012-1-230 |
|--|--------------------------|--------------------------|
| Product Name | Honeycomb PTC Air Heater | Honeycomb PTC Air Heater |
| Dimensions (mm) | 42±1.5 | 50±1.5 |
| Dimensions (in) | 1.65±0.05 | 1.96±0.05 |
| Thickness (mm) | 10±0.3 | 8±0.3 |
| Thickness (in) | 0.39±0.01 | 0.31±0.01 |
| Voltage (V) | 220-240 | 220-240 |
| Resistance at 25°C (Ω) | 100~300 | 100~300 |
| Heat Output (W) at 25°C 0.25mm ³ /min | 250±50 | 300±50 |



| Part Number | PH1209-Q4 | PH2205-Q4 | PH1212-A8 | PH2207-A9 | PH1212-L4 | PH2207-L4 |
|-------------------|----------------------------|-----------|----------------------------|-----------|----------------------------|-----------|
| Product Name | 3-Honeycomb PTC Air Heater | | 4-Honeycomb PTC Air Heater | | 5-Honeycomb PTC Air Heater | |
| Dimensions (mm) | 140 x 138 x 18 | | 140 x 140 x 12.5 | | 146 x 16 | |
| Dimensions (in) | 5.5 x 5.4 x 0.69 | | 5.5 x 5.5 x 0.49 | | 5.74 x 0.63 | |
| Rated Voltage (V) | 110 | 220 | 110 | 220 | 110 | 220 |
| Heat Output (W) | 1100 | | 1500 | | 1500 or 2000 | |

