

HYDRAULIC AND LUBE OIL HEATERS

# HHL Series



Warren Electric Corporation



## Welcome to Warren Electric Quality and Design Excellence

Warren Electric Corporation has over 35 years of experience in the design and manufacture of high-quality electric process heaters. This knowledge is put to work to provide long-lasting and trouble-free immersion heaters. We welcome and appreciate the opportunity to assist you with selecting, quoting, and supplying your electric heater requirements. **You will appreciate:**

- A wide selection of standard and custom **screw plug, flanged, circulation, and over-the-side** electric immersion heaters from a large parts **inventory**.
- **Prompt quotations and detailed order acknowledgements.**
- **Reliable shipping schedule** performance.
- **Ease of expediting** as our inventory and shipping schedules are monitored continuously by computer.
- High Quality Products at **competitive pricing.**
- **Custom designs from standard parts.**
- **Replacements** for most brands of electric immersion heaters.
- Prompt and **individual attention** to your particular heater needs.
- A **15 month warranty** period.
- **Terminal enclosures** available in **many different types** for all applications.
- **Heavy-duty terminal enclosures** to protect integral thermostats and electrical connections from hazards due to weather or explosive conditions.

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**Warren Electric Corporation**

Tel: 401 245-3700 Fax: 401 245-9331

# “HL” Series Heaters

## Hydraulic and Lube Oil Immersion Heaters

- Typical Applications:**
- Fluid Power
  - Compressors
  - Turbines and Bearings
  - Hydraulics
  - Custom Machinery
  - Fluids Needing Low Watt Density

Warren Electric Corporation’s “HL” Series Heaters are ideal for heating oils used in fluid power and machine lubrication applications. “HL” Series Heaters are designed with **low watt densities** (approximately 10 WSI) to allow direct immersion into storage vessels.

“HL” Series Heaters listed in this catalog are designed from 0.5 KW to 12 KW for mounting via 2", 2 1/2", and 3" NPT screw plugs as well as our convenient 4 1/2" O.D. flange (“A/B”) mount. The majority of hydraulic and lube oil applications in the United States use the aforementioned sizes. However, to accommodate other wattage requirements, dimension restrictions, and custom applications, consult the factory. (1", 1 1/4", 1 1/2", and 4" NPT, Metric, British Standard, or DIN versions, and a variety of ANSI and special flange sizes from 1" through 24" are available with power outputs up to 800 KW.)

## Heater Selection

If you desire assistance in selecting required wattage, please see page 13 for an “HL” Series Quick Quote form. Completion of this form will allow us to recommend the proper size electric immersion heater to maintain a hydraulic reservoir with a known volume at a desired operating temperature. The required information for a static hydraulic reservoir includes:

- Volume of fluid to be heated
- Dimensions and capacity of reservoir
- Thickness of insulation (if any)
- Temperature to maintain, worst case ambient temperature and desired warm-up time if tank is allowed to cool during non-operating periods
- Available operating voltage and phase
- Environmental operating conditions to select the proper terminal enclosure
- Desired temperature controls (available with or without thermostat, thermocouple, or over-temperature cut out devices)

Please call us directly or fax this information to us. An applications engineer or technical salesperson will promptly suggest an appropriate heater, quote the price, and determine a scheduled ship date.

**Note:** For circulating systems, please refer to the “HL” Series Quick Quote on page 13 or consult the factory. Refer to pages 14, 15, or Quick Quote on page 17 or consult the factory for applications not shown.

**Important:** *Each installation should be designed so that the heated section of the heater is totally immersed at all times to avoid heater failure and/or possible damage to the fluid in the tank.*

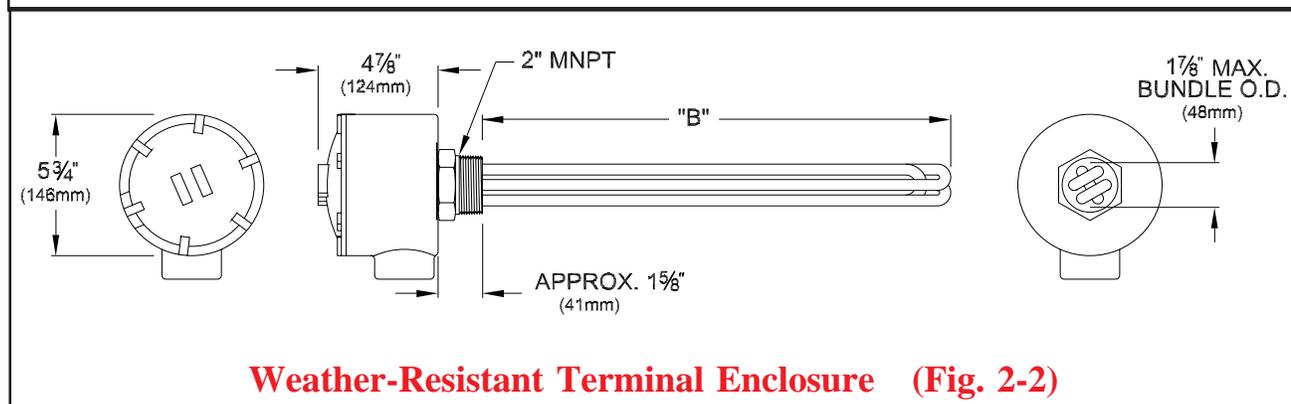
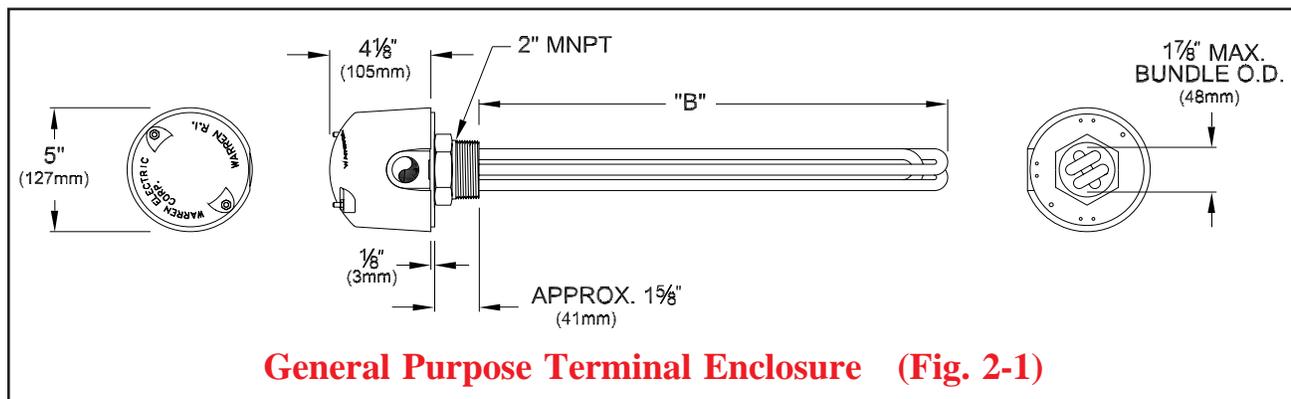
# “HL” Series

# 2" NPT Steel Screw Plug Steel Heating Elements

**Watt Density: Approx. 10 WSI (Watts Per Square Inch)**  
**Includes 60° - 250° F (16° - 121° C) SPST Integral Thermostat**

- Other **Thermostat Ranges** at **No Extra Charge** (see page 12)
- Available without Thermostat (heater supplied with low profile enclosure, see page 11)
- **Thermowell** Available (if you wish to install your own thermostat, see page 10)
- **General Purpose** Terminal Enclosure is **Heavy Duty** Cast Aluminum (Fig. 2-1)
- **Weather-Resistant** Terminal Enclosure (Fig. 2-2)
- Optional **Thermocouple** (see page 12)

The models listed on the next page have a **General Purpose** or **Weather-Resistant** Terminal Enclosure. Refer to page 11 for other Terminal Enclosures including Economy General Purpose or Explosion-Resistant Terminal Enclosures.



# 2" NPT Steel Screw Plug Heaters

| Power KW | Volts * | Phase | Contactor Required | Max Immersed Length "B" | Model Number<br>General Purpose<br>Terminal Enclosure | Est. Ship Wt. | Model Number<br>Weather-Resistant<br>Terminal Enclosure | Est. Ship Wt. |
|----------|---------|-------|--------------------|-------------------------|---|---------------|---|---------------|
| 0.5      | 120V    | 1     | No                 | 12"<br>(305 mm)         | 2-PS-.5-1-12  | 8 lbs.        | 2-PS-.5-1-12-LT   | 15 lbs.       |
|          | 208V    | 3     | Yes                |                         | 2-PS-.5-208-12*3                                      |               | 2-PS-.5-208-12-LT*3                                     |               |
|          | 240V    | 1     | No                 |                         | 2-PS-.5-2-12  |               | 2-PS-.5-2-12-LT   |               |
|          | 240V    | 3     | Yes                |                         | 2-PS-.5-2-12*3  |               | 2-PS-.5-2-12-LT*3                                       |               |
|          | 480V    | 3     | Yes                |                         | 2-PS-.5-4-12*3  |               | 2-PS-.5-4-12-LT*3                                       |               |
| 1        | 120V    | 1     | No                 | 18"<br>(457 mm)         | 2-PS-1-1-18   | 9 lbs.        | 2-PS-1-1-18-LT  | 16 lbs.       |
|          | 208V    | 3     | Yes                |                         | 2-PS-1-208-18*3                                       |               | 2-PS-1-208-18-LT*3                                      |               |
|          | 240V    | 1     | No                 |                         | 2-PS-1-2-18   |               | 2-PS-1-2-18-LT  |               |
|          | 240V    | 3     | Yes                |                         | 2-PS-1-2-18*3   |               | 2-PS-1-2-18-LT*3  |               |
|          | 480V    | 3     | Yes                |                         | 2-PS-1-4-18*3   |               | 2-PS-1-4-18-LT*3  |               |
|          | 550V    | 3     | Yes                |                         | 2-PS-1-5-18*3   |               | 2-PS-1-5-18-LT*3  |               |
| 1.5      | 120V    | 1     | No                 | 20"<br>(508 mm)         | 2-PS-1.5-1-20   | 10 lbs.       | 2-PS-1.5-1-20-LT  | 17 lbs.       |
|          | 208V    | 3     | Yes                |                         | 2-PS-1.5-208-20*3                                     |               | 2-PS-1.5-208-20-LT*3                                    |               |
|          | 240V    | 1     | No                 |                         | 2-PS-1.5-2-20   |               | 2-PS-1.5-2-20-LT  |               |
|          | 240V    | 3     | Yes                |                         | 2-PS-1.5-2-20*3                                       |               | 2-PS-1.5-2-20-LT*3                                      |               |
|          | 380V    | 3     | Yes                |                         | 2-PS-1.5-3-20*3                                       |               | 2-PS-1.5-3-20-LT*3                                      |               |
|          | 480V    | 3     | Yes                |                         | 2-PS-1.5-4-20*3                                       |               | 2-PS-1.5-4-20-LT*3                                      |               |
|          | 575V    | 3     | Yes                |                         | 2-PS-1.5-575-20*3                                     |               | 2-PS-1.5-575-20-LT*3                                    |               |
| 2        | 120V    | 1     | No                 | 28"<br>(711 mm)         | 2-PS-2-1-28   | 11 lbs.       | 2-PS-2-1-28-LT  | 18 lbs.       |
|          | 208V    | 3     | Yes                |                         | 2-PS-2-208-28*3                                       |               | 2-PS-2-208-28-LT*3                                      |               |
|          | 240V    | 1     | No                 |                         | 2-PS-2-2-28   |               | 2-PS-2-2-28-LT  |               |
|          | 240V    | 3     | Yes                |                         | 2-PS-2-2-28*3   |               | 2-PS-2-2-28-LT*3  |               |
|          | 480V    | 3     | Yes                |                         | 2-PS-2-4-28*3   |               | 2-PS-2-4-28-LT*3  |               |
| 2.5      | 120V    | 1     | No                 | 30"<br>(762 mm)         | 2-PS-2.5-1-30   | 11 lbs.       | 2-PS-2.5-1-30-LT  | 18 lbs.       |
|          | 208V    | 3     | Yes                |                         | 2-PS-2.5-208-30*3                                     |               | 2-PS-2.5-208-30-LT*3                                    |               |
|          | 240V    | 1     | No                 |                         | 2-PS-2.5-2-30   |               | 2-PS-2.5-2-30-LT  |               |
|          | 240V    | 3     | Yes                |                         | 2-PS-2.5-2-30*3                                       |               | 2-PS-2.5-2-30-LT*3                                      |               |
|          | 480V    | 3     | Yes                |                         | 2-PS-2.5-4-30*3                                       |               | 2-PS-2.5-4-30-LT*3                                      |               |
| 3        | 120V    | 1     | No                 | 38"<br>(965 mm)         | 2-PS-3-1-38   | 13 lbs.       | 2-PS-3-1-38-LT  | 20 lbs.       |
|          | 208V    | 3     | Yes                |                         | 2-PS-3-208-38*3                                       |               | 2-PS-3-208-38-LT*3                                      |               |
|          | 240V    | 1     | No                 |                         | 2-PS-3-2-38   |               | 2-PS-3-2-38-LT  |               |
|          | 240V    | 3     | Yes                |                         | 2-PS-3-2-38*3   |               | 2-PS-3-2-38-LT*3  |               |
|          | 480V    | 3     | Yes                |                         | 2-PS-3-4-38*3   |               | 2-PS-3-4-38-LT*3  |               |
|          | 575V    | 3     | Yes                |                         | 2-PS-3-575-38*3                                       |               | 2-PS-3-575-38-LT*3                                      |               |
| 4        | 120V    | 1     | Yes                | 54"<br>(1372 mm)        | 2-PS-4-1-54   | 15 lbs.       | 2-PS-4-1-54-LT  | 22 lbs.       |
|          | 208V    | 3     | Yes                | 2-PS-4-208-54*3         | 2-PS-4-208-54-LT*3                                    |               |   |               |
|          | 240V    | 1     | No                 | 51"<br>(1295 mm)        | 2-PS-4-2-51   |               | 2-PS-4-2-51-LT  |               |
|          | 240V    | 3     | Yes                | 2-PS-4-2-51*3           | 2-PS-4-2-51-LT*3                                      |               |   |               |
|          | 480V    | 3     | Yes                | 2-PS-4-4-51*3           | 2-PS-4-4-51-LT*3                                      |               |   |               |
| 5        | 240V    | 1     | No                 | 63"<br>(1600 mm)        | 2-PS-5-2-63   | 17 lbs.       | 2-PS-5-2-63-LT  | 24 lbs.       |
|          | 240V    | 3     | Yes                |                         | 2-PS-5-2-63*3   |               | 2-PS-5-2-63-LT*3  |               |
|          | 480V    | 3     | Yes                |                         | 2-PS-5-4-63*3   |               | 2-PS-5-4-63-LT*3  |               |

**For higher KW, see 3" NPT Screw Plug and 4 1/2" Flange Heaters (pages 6-9) or consult factory.**

\* Select a design voltage as close as possible to the actual available voltage. Refer to page 16 to determine the actual power output for actual voltages different than the design voltages shown.

For other wattages, voltages, thermostats, lengths, or terminal enclosures, please refer to page 12 or consult our factory directly.

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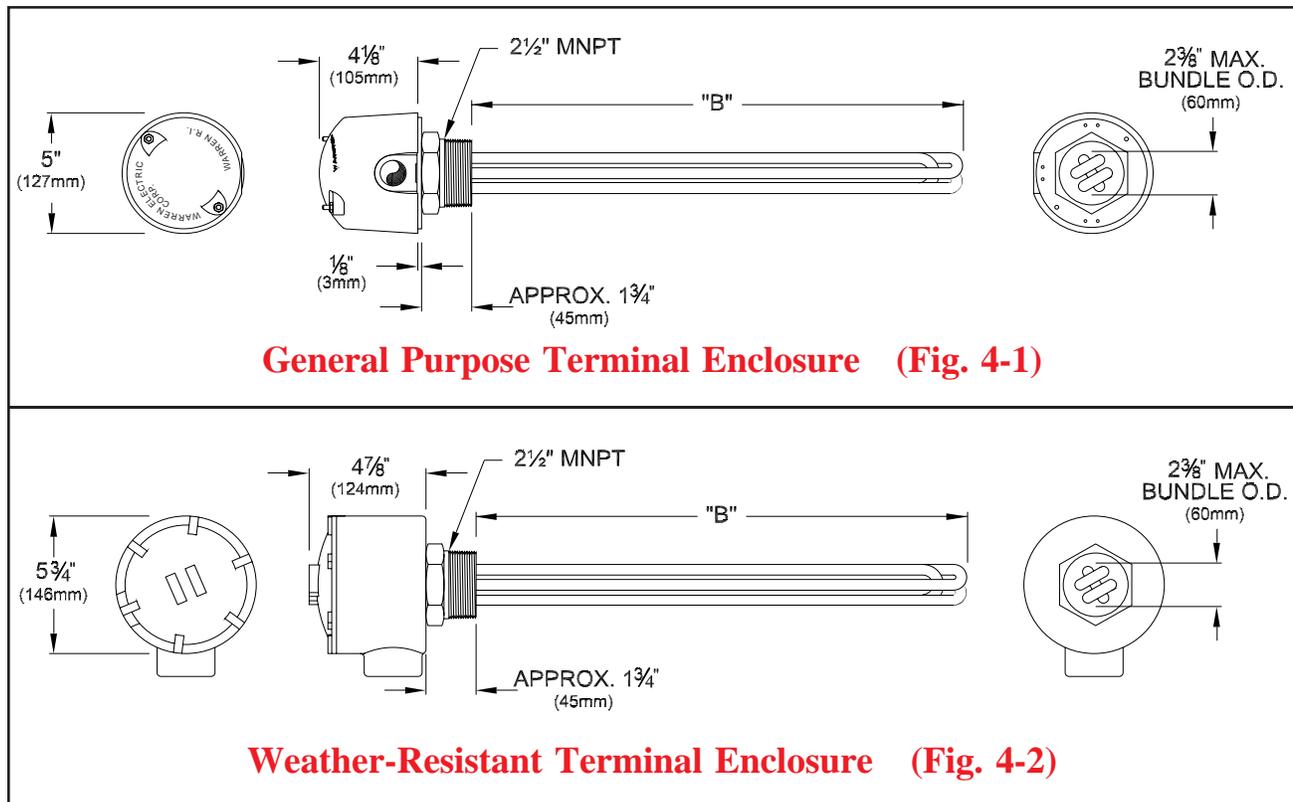
# “HL” Series

# 2 1/2" NPT Steel Screw Plug Steel Heating Elements

**Watt Density: Approx. 10 WSI (Watts Per Square Inch)**  
**Includes 60° - 250° F (16° - 121° C) SPST Integral Thermostat**

- Other **Thermostat Ranges** at **No Extra Charge** (see page 12)
- Available without Thermostat (heater supplied with low profile enclosure, see page 11)
- **Thermowell** Available (if you wish to install your own thermostat, see page 10)
- **General Purpose** Terminal Enclosure is **Heavy Duty** Cast Aluminum (Fig. 4-1)
- **Weather-Resistant** Terminal Enclosure (Fig. 4-2)
- Optional **Thermocouple** (see page 12)

The models listed on the next page have a **General Purpose** or **Weather-Resistant** Terminal Enclosure. Refer to page 11 for other Terminal Enclosures including Economy General Purpose or Explosion-Resistant Terminal Enclosures.



**General Purpose Terminal Enclosure (Fig. 4-1)**

**Weather-Resistant Terminal Enclosure (Fig. 4-2)**

# 2 1/2" NPT Steel Screw Plug Heaters

| Power<br>KW | Volts * | Phase | Contactor<br>Required | Max Immersed<br>Length "B" | Model Number<br>General Purpose<br>Terminal Enclosure | Est.<br>Ship Wt. | Model Number<br>Weather-Resistant<br>Terminal Enclosure | Est.<br>Ship Wt. |
|-------------|---------|-------|-----------------------|----------------------------|---|------------------|---|------------------|
| 0.5         | 120V    | 1     | No                    | 12"<br>(305 mm)            | 2-RS-.5-1-12  | 9 lbs.           | 2-RS-.5-1-12-LT   | 16 lbs.          |
|             | 240V    | 1     | No                    |                            | 2-RS-.5-2-12  |                  | 2-RS-.5-2-12-LT   |                  |
|             | 240V    | 3     | Yes                   |                            | 2-RS-.5-2-12*3  |                  | 2-RS-.5-2-12-LT*3                                       |                  |
|             | 480V    | 3     | Yes                   |                            | 2-RS-.5-4-12*3  |                  | 2-RS-.5-4-12-LT*3                                       |                  |
| 1           | 120V    | 1     | No                    | 18"<br>(457 mm)            | 2-RS-1-1-18   | 10 lbs.          | 2-RS-1-1-18-LT  | 17 lbs.          |
|             | 208V    | 3     | Yes                   |                            | 2-RS-1-208-18*3                                       |                  | 2-RS-1-208-18-LT*3                                      |                  |
|             | 240V    | 1     | No                    |                            | 2-RS-1-2-18   |                  | 2-RS-1-2-18-LT  |                  |
|             | 240V    | 3     | Yes                   |                            | 2-RS-1-2-18*3   |                  | 2-RS-1-2-18-LT*3  |                  |
|             | 480V    | 3     | Yes                   |                            | 2-RS-1-4-18*3   |                  | 2-RS-1-4-18-LT*3  |                  |
|             | 550V    | 3     | Yes                   |                            | 2-RS-1-5-18*3   |                  | 2-RS-1-5-18-LT*3  |                  |
| 1.5         | 120V    | 1     | No                    | 20"<br>(508 mm)            | 2-RS-1.5-1-20   | 11 lbs.          | 2-RS-1.5-1-20-LT  | 18 lbs.          |
|             | 208V    | 3     | Yes                   |                            | 2-RS-1.5-208-20*3                                     |                  | 2-RS-1.5-208-20-LT*3                                    |                  |
|             | 240V    | 1     | No                    |                            | 2-RS-1.5-2-20   |                  | 2-RS-1.5-2-20-LT  |                  |
|             | 240V    | 3     | Yes                   |                            | 2-RS-1.5-2-20*3                                       |                  | 2-RS-1.5-2-20-LT*3                                      |                  |
|             | 380V    | 3     | Yes                   |                            | 2-RS-1.5-3-20*3                                       |                  | 2-RS-1.5-3-20-LT*3                                      |                  |
|             | 480V    | 3     | Yes                   |                            | 2-RS-1.5-4-20*3                                       |                  | 2-RS-1.5-4-20-LT*3                                      |                  |
|             | 575V    | 3     | Yes                   |                            | 2-RS-1.5-575-20*3                                     |                  | 2-RS-1.5-575-20-LT*3                                    |                  |
| 2           | 120V    | 1     | No                    | 28"<br>(711 mm)            | 2-RS-2-1-28   | 12 lbs.          | 2-RS-2-1-28-LT  | 19 lbs.          |
|             | 208V    | 3     | Yes                   |                            | 2-RS-2-208-28*3                                       |                  | 2-RS-2-208-28-LT*3                                      |                  |
|             | 240V    | 1     | No                    |                            | 2-RS-2-2-28   |                  | 2-RS-2-2-28-LT  |                  |
|             | 240V    | 3     | Yes                   |                            | 2-RS-2-2-28*3   |                  | 2-RS-2-2-28-LT*3  |                  |
|             | 480V    | 3     | Yes                   |                            | 2-RS-2-4-28*3   |                  | 2-RS-2-4-28-LT*3  |                  |
| 2.5         | 120V    | 1     | No                    | 30"<br>(762 mm)            | 2-RS-2.5-1-30   | 12 lbs.          | 2-RS-2.5-1-30-LT  | 19 lbs.          |
|             | 208V    | 3     | Yes                   |                            | 2-RS-2.5-208-30*3                                     |                  | 2-RS-2.5-208-30-LT*3                                    |                  |
|             | 240V    | 1     | No                    |                            | 2-RS-2.5-2-30   |                  | 2-RS-2.5-2-30-LT  |                  |
|             | 240V    | 3     | Yes                   |                            | 2-RS-2.5-2-30*3                                       |                  | 2-RS-2.5-2-30-LT*3                                      |                  |
|             | 480V    | 3     | Yes                   |                            | 2-RS-2.5-4-30*3                                       |                  | 2-RS-2.5-4-30-LT*3                                      |                  |
| 3           | 120V    | 1     | No                    | 38"<br>(965 mm)            | 2-RS-3-1-38   | 14 lbs.          | 2-RS-3-1-38-LT  | 21 lbs.          |
|             | 208V    | 3     | Yes                   |                            | 2-RS-3-208-38*3                                       |                  | 2-RS-3-208-38-LT*3                                      |                  |
|             | 240V    | 1     | No                    |                            | 2-RS-3-2-38   |                  | 2-RS-3-2-38-LT  |                  |
|             | 240V    | 3     | Yes                   |                            | 2-RS-3-2-38*3   |                  | 2-RS-3-2-38-LT*3  |                  |
|             | 480V    | 3     | Yes                   |                            | 2-RS-3-4-38*3   |                  | 2-RS-3-4-38-LT*3  |                  |
|             | 575V    | 3     | Yes                   |                            | 2-RS-3-575-38*3                                       |                  | 2-RS-3-575-38-LT*3                                      |                  |
| 4           | 120V    | 1     | Yes                   | 54"<br>(1372 mm)           | 2-RS-4-1-54   | 16 lbs.          | 2-RS-4-1-54-LT  | 23 lbs.          |
|             | 208V    | 3     | Yes                   | 2-RS-4-208-54*3            | 2-RS-4-208-54-LT*3                                    |                  |   |                  |
|             | 240V    | 1     | No                    | 51"<br>(1295 mm)           | 2-RS-4-2-51   |                  | 2-RS-4-2-51-LT  |                  |
|             | 240V    | 3     | Yes                   | 2-RS-4-2-51*3              | 2-RS-4-2-51-LT*3                                      |                  |   |                  |
|             | 480V    | 3     | Yes                   | 2-RS-4-4-51*3              | 2-RS-4-4-51-LT*3                                      |                  |   |                  |
| 5           | 240V    | 1     | No                    | 63"<br>(1600 mm)           | 2-RS-5-2-63   | 18 lbs.          | 2-RS-5-2-63-LT  | 25 lbs.          |
|             | 240V    | 3     | Yes                   |                            | 2-RS-5-2-63*3   |                  | 2-RS-5-2-63-LT*3  |                  |
|             | 480V    | 3     | Yes                   |                            | 2-RS-5-4-63*3   |                  | 2-RS-5-4-63-LT*3  |                  |

For higher KW, see 3" NPT Screw Plug and 4 1/2" Flange Heaters (pages 6-9) or consult factory.

\* Select a design voltage as close as possible to the actual available voltage. Refer to page 16 to determine the actual power output for actual voltages different than the design voltages shown.

For other wattages, voltages, thermostats, lengths, or terminal enclosures, please refer to page 12 or consult our factory directly.

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# “HL” Series

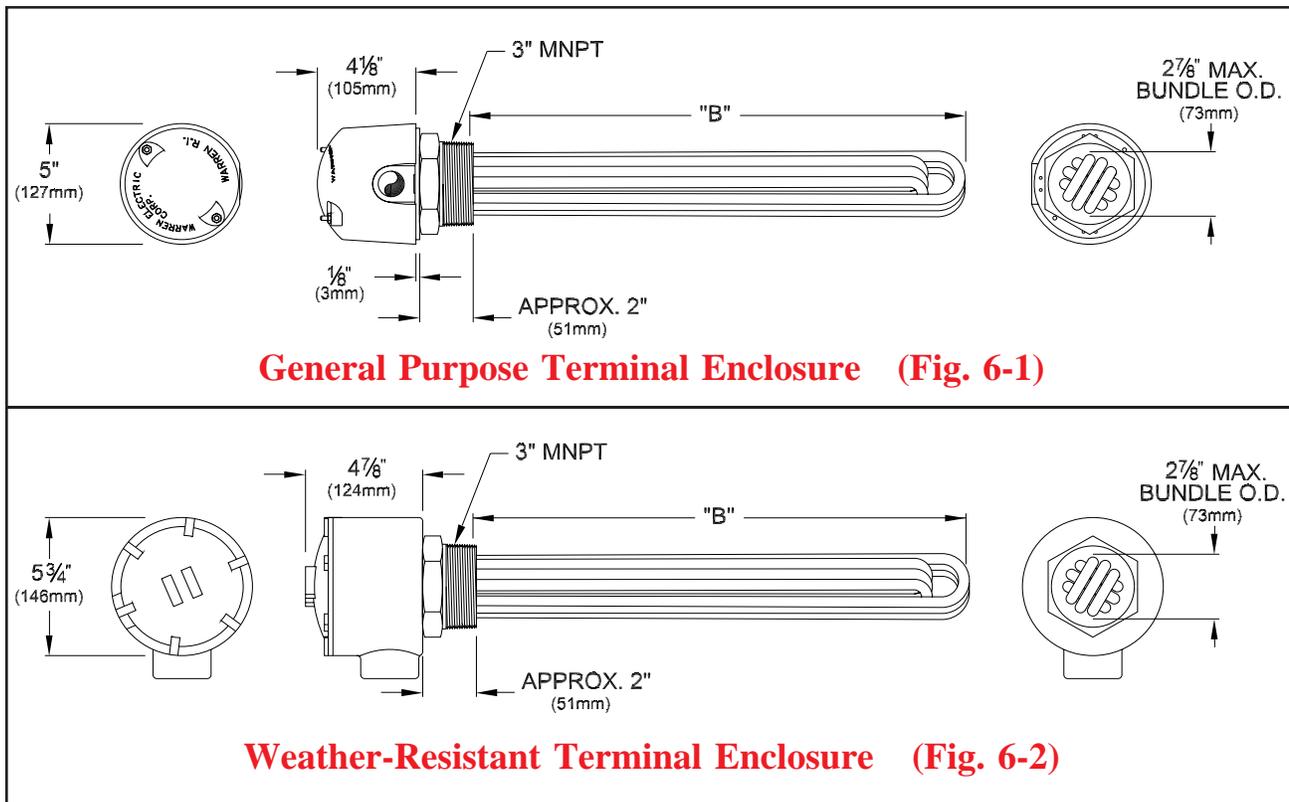
# 3" NPT Steel Screw Plug Steel Heating Elements

## Higher Power Output

**Watt Density: Approx. 10 WSI (Watts Per Square Inch)**  
**Includes 60° - 250° F (16° - 121° C) SPST Integral Thermostat**

- **Increased Available Wattage** compared to 2" and 2 1/2" NPT without Increasing either Heater Length or Watt Density
- Other **Thermostat Ranges** at **No Extra Charge** (see page 12)
- Available without Thermostat (heater supplied with low profile enclosure, see page 11)
- **Thermowell** Available (if you wish to install your own thermostat see page 10)
- **General Purpose** Terminal Enclosure is **Heavy Duty** Cast Aluminum (Fig. 6-1)
- **Weather-Resistant** Terminal Enclosure (Fig. 6-2)
- Optional **Thermocouple** (see page 12)

The models listed on the next page have a **General Purpose** or **Weather-Resistant** Terminal Enclosure. Refer to page 11 for other Terminal Enclosures including Economy General Purpose or Explosion-Resistant Terminal Enclosures.



# 3" NPT Steel Screw Plug Heaters

| Power<br>KW | Volts* | Phase | Contactor<br>Required | Max Immersed<br>Length "B" | Model Number                          |   | Est.<br>Ship Wt. | Est.<br>Ship Wt. |
|-------------|--------|-------|-----------------------|----------------------------|---------------------------------------|---|------------------|------------------|
|             |        |       |                       |                            | General Purpose<br>Terminal Enclosure | Weather-Resistant<br>Terminal Enclosure |                  |                  |
| 3           | 120V   | 1     | No                    | 20"<br>(508 mm)            | 2-CS-3-1-20                           | 2-CS-3-1-20-LT                          | 16 lbs.          | 23 lbs.          |
|             | 208V   | 3     | Yes                   |                            | 2-CS-3-208-20*3                       | 2-CS-3-208-20-LT*3                      |                  |                  |
|             | 240V   | 1     | No                    |                            | 2-CS-3-2-20                           | 2-CS-3-2-20-LT                          |                  |                  |
|             | 240V   | 3     | Yes                   |                            | 2-CS-3-2-20*3                         | 2-CS-3-2-20-LT*3                        |                  |                  |
|             | 480V   | 3     | Yes                   |                            | 2-CS-3-4-20*3                         | 2-CS-3-4-20-LT*3                        |                  |                  |
| 4           | 120V   | 1     | Yes                   | 28"<br>(711 mm)            | 2-CS-4-1-28                           | 2-CS-4-1-28-LT                          | 18 lbs.          | 25 lbs.          |
|             | 208V   | 3     | Yes                   |                            | 2-CS-4-208-28*3                       | 2-CS-4-208-28-LT*3                      |                  |                  |
|             | 240V   | 1     | No                    |                            | 2-CS-4-2-28                           | 2-CS-4-2-28-LT                          |                  |                  |
|             | 240V   | 3     | Yes                   |                            | 2-CS-4-2-28*3                         | 2-CS-4-2-28-LT*3                        |                  |                  |
|             | 480V   | 3     | Yes                   |                            | 2-CS-4-4-28*3                         | 2-CS-4-4-28-LT*3                        |                  |                  |
| 5           | 120V   | 1     | Yes                   | 30"<br>(762 mm)            | 2-CS-5-1-30                           | 2-CS-5-1-30-LT                          | 19 lbs.          | 26 lbs.          |
|             | 208V   | 3     | Yes                   |                            | 2-CS-5-208-30*3                       | 2-CS-5-208-30-LT*3                      |                  |                  |
|             | 240V   | 1     | No                    |                            | 2-CS-5-2-30                           | 2-CS-5-2-30-LT                          |                  |                  |
|             | 240V   | 3     | Yes                   |                            | 2-CS-5-2-30*3                         | 2-CS-5-2-30-LT*3                        |                  |                  |
|             | 480V   | 3     | Yes                   |                            | 2-CS-5-4-30*3                         | 2-CS-5-4-30-LT*3                        |                  |                  |
| 6           | 120V   | 1     | Yes                   | 38"<br>(965 mm)            | 2-CS-6-1-38                           | 2-CS-6-1-38-LT                          | 22 lbs.          | 29 lbs.          |
|             | 208V   | 3     | Yes                   |                            | 2-CS-6-208-38*3                       | 2-CS-6-208-38-LT*3                      |                  |                  |
|             | 240V   | 1     | No                    |                            | 2-CS-6-2-38                           | 2-CS-6-2-38-LT                          |                  |                  |
|             | 240V   | 3     | Yes                   |                            | 2-CS-6-2-38*3                         | 2-CS-6-2-38-LT*3                        |                  |                  |
|             | 480V   | 3     | Yes                   |                            | 2-CS-6-4-38*3                         | 2-CS-6-4-38-LT*3                        |                  |                  |
| 7           | 120V   | 1     | Yes                   | 48"<br>(1219 mm)           | 2-CS-7-1-48                           | 2-CS-7-1-48-LT                          | 25 lbs.          | 32 lbs.          |
|             | 208V   | 3     | Yes                   |                            | 2-CS-7-208-48*3                       | 2-CS-7-208-48-LT*3                      |                  |                  |
|             | 240V   | 1     | Yes                   |                            | 2-CS-7-2-48                           | 2-CS-7-2-48-LT                          |                  |                  |
|             | 240V   | 3     | Yes                   |                            | 2-CS-7-2-48*3                         | 2-CS-7-2-48-LT*3                        |                  |                  |
|             | 480V   | 3     | Yes                   |                            | 2-CS-7-4-48*3                         | 2-CS-7-4-48-LT*3                        |                  |                  |
| 8           | 120V   | 1     | Yes                   | 54"<br>(1372 mm)           | 2-CS-8-1-54                           | 2-CS-8-1-54-LT                          | 27 lbs.          | 34 lbs.          |
|             | 208V   | 3     | Yes                   |                            | 2-CS-8-208-54*3                       | 2-CS-8-208-54-LT*3                      |                  |                  |
|             | 240V   | 1     | Yes                   |                            | 2-CS-8-2-54                           | 2-CS-8-2-54-LT                          |                  |                  |
|             | 240V   | 3     | Yes                   |                            | 2-CS-8-2-54*3                         | 2-CS-8-2-54-LT*3                        |                  |                  |
|             | 480V   | 3     | Yes                   |                            | 2-CS-8-4-54*3                         | 2-CS-8-4-54-LT*3                        |                  |                  |
| 10          | 120V   | 1     | Yes                   | 66"<br>(1676 mm)           | 2-CS-10-1-66                          | 2-CS-10-1-66-LT                         | 31 lbs.          | 38 lbs.          |
|             | 208V   | 3     | Yes                   |                            | 2-CS-10-208-66*3                      | 2-CS-10-208-66-LT*3                     |                  |                  |
|             | 240V   | 1     | Yes                   |                            | 2-CS-10-2-66                          | 2-CS-10-2-66-LT                         |                  |                  |
|             | 240V   | 3     | Yes                   |                            | 2-CS-10-2-66*3                        | 2-CS-10-2-66-LT*3                       |                  |                  |
|             | 480V   | 3     | Yes                   |                            | 2-CS-10-4-66*3                        | 2-CS-10-4-66-LT*3                       |                  |                  |
| 12          | 208V   | 3     | Yes                   | 78"<br>(1981 mm)           | 2-CS-12-208-78*3                      | 2-CS-12-208-78-LT*3                     | 35 lbs.          | 42 lbs.          |
|             | 240V   | 1     | Yes                   |                            | 2-CS-12-2-78                          | 2-CS-12-2-78-LT                         |                  |                  |
|             | 240V   | 3     | Yes                   |                            | 2-CS-12-2-78*3                        | 2-CS-12-2-78-LT*3                       |                  |                  |
|             | 460V   | 3     | Yes                   |                            | 2-CS-12-4-78*3                        | 2-CS-12-4-78-LT*3                       |                  |                  |

**For higher KW, consult factory.**

\* Select a design voltage as close as possible to the actual available voltage. Refer to page 16 to determine the actual power output for actual voltages different than the design voltages shown.

For other wattages, voltages, thermostats, lengths, or terminal enclosures, please refer to page 12 or consult our factory directly.

# “HL” Series

# “A/B” - 4 1/2" O.D. Cast Iron Flange Steel Heating Elements

## Higher Power Output

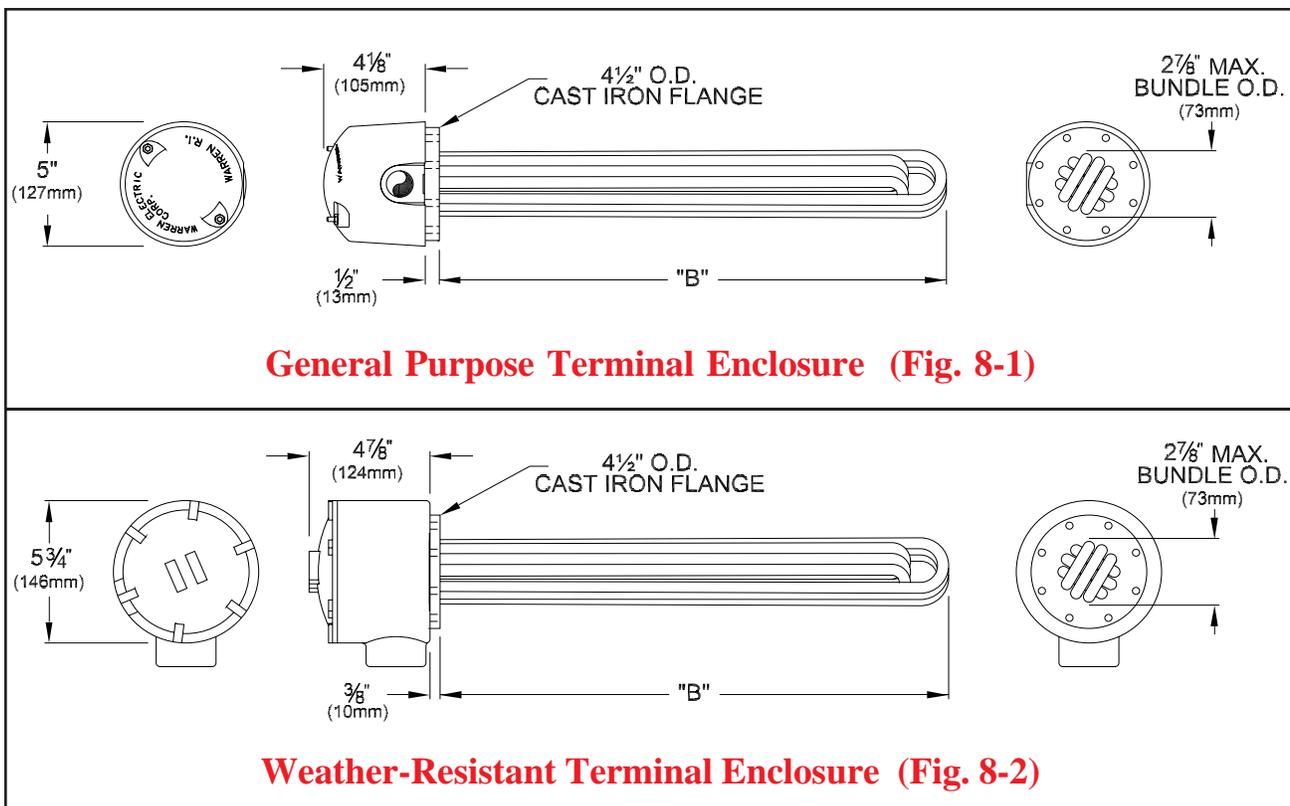
**Watt Density: Approx. 10 WSI (Watts Per Square Inch)**

**Includes 60° - 250° F (16° - 121° C) SPST Integral Thermostat**

The “A/B” and Compact “A/B” series of *Flanged Immersion Heaters* offers an alternative to Screw Plug Heaters. Consider the benefits of a convenient flanged design on your next screw plug heater application. **Contact us for a brochure on the “A/B” Series.**

- Includes All of the Options Available with the **3" NPT Screw Plug Heaters**
- Designed to Fit in **3" Pipe** (Also Available in Designs to Fit **2"** and **2 1/2" Pipe**)
- **Tank Adaptors** for Mounting these Heaters are Available (See Page 10)
- **Adaptors** are Available with **Threaded Ends** to Easily Convert an Existing Screw Plug Application to a Flange or with a **Square End** for Welding into a Tank or Pipe
- Can **Replace Most Screw Plug Applications** Eliminating Need for Large Wrenches (helpful in confined spaces) (see Fig 10-1 on page 10 for Mounting Adaptor)

The models listed on the next page have a General Purpose or Weather-Resistant Terminal Enclosure. Refer to page 11 for other Terminal Enclosures including Economy General Purpose or Explosion-Resistant Terminal Enclosures.



**General Purpose Terminal Enclosure (Fig. 8-1)**

**Weather-Resistant Terminal Enclosure (Fig. 8-2)**

# 4 1/2" O.D. Cast Iron Flange Heaters \*\*("A/B" Flange)

| Power KW | Volts* | Phase | Contactor Required | Max Immersed Length "B" | Model Number<br>General Purpose<br>Terminal Enclosure | Est. Ship Wt. | Model Number<br>Weather-Resistant<br>Terminal Enclosure | Est. Ship Wt. |
|----------|--------|-------|--------------------|-------------------------|---|---------------|---|---------------|
| 3        | 120V   | 1     | No                 | 20"<br>(508 mm)         | 2-BF-3-1-20   | 12 lbs.       | 2-BF-3-1-20-LT  | 19 lbs.       |
|          | 208V   | 3     | Yes                |                         | 2-BF-3-208-20*3                                       |               | 2-BF-3-208-20-LT*3                                      |               |
|          | 240V   | 1     | No                 |                         | 2-BF-3-2-20   |               | 2-BF-3-2-20-LT  |               |
|          | 240V   | 3     | Yes                |                         | 2-BF-3-2-20*3   |               | 2-BF-3-2-20-LT*3  |               |
|          | 480V   | 3     | Yes                |                         | 2-BF-3-4-20*3   |               | 2-BF-3-4-20-LT*3  |               |
| 4        | 120V   | 1     | Yes                | 28"<br>(711 mm)         | 2-BF-4-1-28   | 14 lbs.       | 2-BF-4-1-28-LT  | 21 lbs.       |
|          | 208V   | 3     | Yes                |                         | 2-BF-4-208-28*3                                       |               | 2-BF-4-208-28-LT*3                                      |               |
|          | 240V   | 1     | No                 |                         | 2-BF-4-2-28   |               | 2-BF-4-2-28-LT  |               |
|          | 240V   | 3     | Yes                |                         | 2-BF-4-2-28*3   |               | 2-BF-4-2-28-LT*3  |               |
|          | 480V   | 3     | Yes                |                         | 2-BF-4-4-28*3   |               | 2-BF-4-4-28-LT*3  |               |
| 5        | 120V   | 1     | Yes                | 30"<br>(762 mm)         | 2-BF-5-1-30   | 15 lbs.       | 2-BF-5-1-30-LT  | 22 lbs.       |
|          | 208V   | 3     | Yes                |                         | 2-BF-5-208-30*3                                       |               | 2-BF-5-208-30-LT*3                                      |               |
|          | 240V   | 1     | No                 |                         | 2-BF-5-2-30   |               | 2-BF-5-2-30-LT  |               |
|          | 240V   | 3     | Yes                |                         | 2-BF-5-2-30*3   |               | 2-BF-5-2-30-LT*3  |               |
|          | 480V   | 3     | Yes                |                         | 2-BF-5-4-30*3   |               | 2-BF-5-4-30-LT*3  |               |
| 6        | 120V   | 1     | Yes                | 38"<br>(965 mm)         | 2-BF-6-1-38   | 18 lbs.       | 2-BF-6-1-38-LT  | 25 lbs.       |
|          | 208V   | 3     | Yes                |                         | 2-BF-6-208-38*3                                       |               | 2-BF-6-208-38-LT*3                                      |               |
|          | 240V   | 1     | No                 |                         | 2-BF-6-2-38   |               | 2-BF-6-2-38-LT  |               |
|          | 240V   | 3     | Yes                |                         | 2-BF-6-2-38*3   |               | 2-BF-6-2-38-LT*3  |               |
|          | 480V   | 3     | Yes                |                         | 2-BF-6-4-38*3   |               | 2-BF-6-4-38-LT*3  |               |
| 7        | 120V   | 1     | Yes                | 48"<br>(1219 mm)        | 2-BF-7-1-48   | 21 lbs.       | 2-BF-7-1-48-LT  | 28 lbs.       |
|          | 208V   | 3     | Yes                |                         | 2-BF-7-208-48*3                                       |               | 2-BF-7-208-48-LT*3                                      |               |
|          | 240V   | 1     | Yes                |                         | 2-BF-7-2-48   |               | 2-BF-7-2-48-LT  |               |
|          | 240V   | 3     | Yes                |                         | 2-BF-7-2-48*3   |               | 2-BF-7-2-48-LT*3  |               |
|          | 480V   | 3     | Yes                |                         | 2-BF-7-4-48*3   |               | 2-BF-7-4-48-LT*3  |               |
| 8        | 120V   | 1     | Yes                | 54"<br>(1372 mm)        | 2-BF-8-1-54   | 23 lbs.       | 2-BF-8-1-54-LT  | 30 lbs.       |
|          | 208V   | 3     | Yes                |                         | 2-BF-8-208-54*3                                       |               | 2-BF-8-208-54-LT*3                                      |               |
|          | 240V   | 1     | Yes                |                         | 2-BF-8-2-54   |               | 2-BF-8-2-54-LT  |               |
|          | 240V   | 3     | Yes                |                         | 2-BF-8-2-54*3   |               | 2-BF-8-2-54-LT*3  |               |
|          | 480V   | 3     | Yes                |                         | 2-BF-8-4-54*3   |               | 2-BF-8-4-54-LT*3  |               |
| 10       | 120V   | 1     | Yes                | 66"<br>(1676 mm)        | 2-BF-10-1-66  | 27 lbs.       | 2-BF-10-1-66-LT   | 34 lbs.       |
|          | 208V   | 3     | Yes                |                         | 2-BF-10-208-66*3                                      |               | 2-BF-10-208-66-LT*3                                     |               |
|          | 240V   | 1     | Yes                |                         | 2-BF-10-2-66  |               | 2-BF-10-2-66-LT   |               |
|          | 240V   | 3     | Yes                |                         | 2-BF-10-2-66*3  |               | 2-BF-10-2-66-LT*3                                       |               |
|          | 480V   | 3     | Yes                |                         | 2-BF-10-4-66*3  |               | 2-BF-10-4-66-LT*3                                       |               |
| 12       | 208V   | 3     | Yes                | 78"<br>(1981 mm)        | 2-BF-12-208-78*3                                      | 31 lbs.       | 2-BF-12-208-78-LT*3                                     | 38 lbs.       |
|          | 240V   | 1     | Yes                |                         | 2-BF-12-2-78  |               | 2-BF-12-2-78-LT   |               |
|          | 240V   | 3     | Yes                |                         | 2-BF-12-2-78*3  |               | 2-BF-12-2-78-LT*3                                       |               |
|          | 460V   | 3     | Yes                |                         | 2-BF-12-4-78*3  |               | 2-BF-12-4-78-LT*3                                       |               |

**For higher KW, consult factory.**

\* Select a design voltage as close as possible to the actual available voltage. Refer to page 16 to determine the actual power output for actual voltages different than the design voltages shown.

For other wattages, voltages, thermostats, lengths, or terminal enclosures, please refer to page 12 or consult our factory directly.

\*\*"A/B" Tank Adaptor or "A/B" Flange is offered to Ease Tank Construction, Heater Installation, and Heater Removal. This is a pre-constructed flanged nozzle to be welded into the tank wall. See next page (Fig 10-1) for details. Additional Sizes are available. Please consult the factory.

**Warren Electric Corporation**

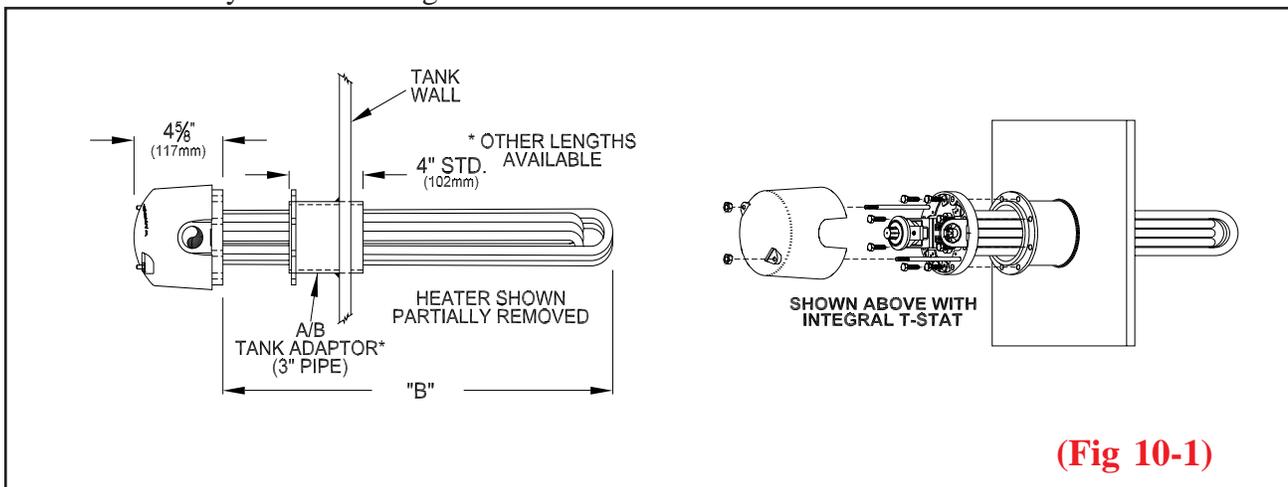
Tel: 401 245-3700 Fax: 401 245-9331

## “A/B” Tank Adaptor for 4 1/2" O.D. Cast Iron Flange

A flange mount is often preferred over a screw plug mount if accessibility with a large wrench is difficult or if other physical restrictions pose a problem. Also, corrosion on large size screw plugs can make removal of the heater difficult. **Contact us for a brochure on the “A/B” Series.**

Warren Electric’s solution is the 4 1/2" O.D. Cast Iron “A/B” Flange with 8 Bolts (1/4 - 20) on a 4" Diameter Bolt Circle. “BF” Style heaters utilizing this flange construction are described and listed in this catalog on pages 8 and 9. Only a 7/16" socket, box, or open end wrench is required to remove the heater.

The “A/B” Tank Adaptor is a compact 3" pipe nozzle with an 8 bolt hole flange ring constructed to match the 4 1/2" O.D. cast iron flange on these heaters. It is available as a complete unit from Warren Electric or you may purchase just the matching “A/B” 8 bolt hole flange ring. The “A/B” Tank Adaptor may be welded or threaded into tank wall, and it can be fixed or rotating. Please consult the factory to discuss length and installation instructions.



“A/B” flanges, flange rings, and tank adaptors are also available for 2" and 2 1/2" pipe. Please consult factory for information and request the AB Series brochure.

## Thermostat/Thermowell Information

*A specific wiring instruction sheet is provided with each heater.*

All heaters listed in this catalog are shown with 60° - 250° F (16° - 121° C) **SPST Integral Thermostats**. However, all heaters are available without Thermostats or with Thermostats having other temperature ranges. SPDT, DPST and Indicating Thermostats are also offered as well as thermal cutouts and **thermocouples**.

All heaters ordered without thermostats and/or thermocouples are provided without thermowells and with low profile terminal enclosures **unless otherwise requested**. If a **thermowell** is desired without an integral thermostat, the thermowell material, thermostat bulb diameter and length, and type of terminal enclosure required (See Fig.11-1 on page 11) must be specified when ordering a heater. Please consult the factory for further information.

# Terminal Enclosures

Warren Electric offers the largest variety of terminal enclosures in the industry!

Heavy duty general purpose terminal enclosures are standard with “HL” Series Heaters. Warren Electric’s general purpose terminal enclosure provides superior mechanical protection for your heater’s wiring, terminals, and thermostat. Our general purpose terminal enclosure is constructed from heavy gauge cast aluminum, as opposed to a drawn “tin can” style often seen with other brands.

Should you require additional environmental protection, any heater can be ordered with the terminal enclosures shown below (Fig. 11-1). All are manufactured with materials chosen to provide superior mechanical protection to complement their weather- and/or explosion-resistant features.

Example: Model Number with Weather-Resistant Designation: 2-PS-4-2-51-**LT**\*3

Note: Replace **LT** in above example with appropriate designation for other types shown below. If left blank a general purpose terminal enclosure will be provided. Please consult factory for other options.

- Selection: No Designation = General Purpose
- LT** = Weather-Resistant: Dust and Moisture Resistant
  - EP** = Explosion-Resistant: Dust and Vapor Resistant
  - EP/LT** = Explosion-Resistant and Weather-Resistant

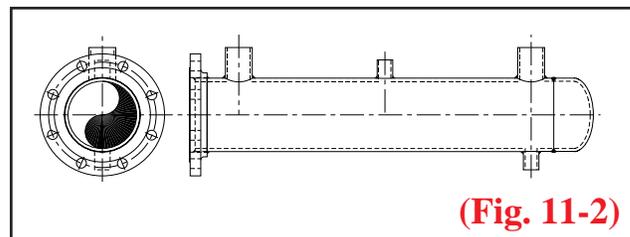
**(Fig. 11-1)**

| SCREW PLUG SIZE | GENERAL PURPOSE WITH EXTERNAL T-STAT ADJUST |         | GENERAL PURPOSE WITH T-STAT |         | LOW PROFILE GENERAL PURPOSE WITHOUT T-STAT WITHOUT T-COUPLE |        | WEATHER-RESISTANT AND/OR EXPLOSION-RESISTANT WITH T-STAT |         | WEATHER-RESISTANT AND/OR EXPLOSION-RESISTANT WITHOUT T-STAT WITHOUT T-COUPLE |        |
|-----------------|---|---------|-----------------------------|---------|---|--------|--|---------|--|--------|
|                 | D   | H       | D                           | H       | D   | H      | D  | H       | D  | H      |
| 2"              |   |         |                             |         |   |        |  |         |  |        |
| 2½"             | 5"  | 5"      | 5"                          | 4 1/8"  | 5"  | 2¾"    | 5¾"  | 4 7/8"  | 4"   | 3"     |
| 3"              | (127mm)                                     | (127mm) | (127mm)                     | (105mm) | (127mm)   | (70mm) | (146mm)  | (124mm) | (102mm)  | (76mm) |
| 4½" O.D. FLANGE |   |         |                             |         |   |        |  |         |  |        |

Alternate terminal enclosures are available for those applications where economy is paramount and the need for mechanical and environmental protection of the terminals is less important. For further information on these options, please contact the factory.

## Casings

Standard and custom design casings are available for all screw plug and flange models with inlet, outlet, drain, and vent configurations per your request. Pressure ratings from 150 to 2500 PSIG (including ASME certification) are available. Please submit details to our factory for quote.



**Warren Electric Corporation**

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# “HL” Series Model Designation and Options

**Model Designation Structure:** (TC) - (Type) - (KW) - (V) - (L)(Element Material) - (TE) \*(PH)

**Example of Model Designation:** 2 - PS - 4 - 2 - 51 - LT \* 3

(60° - 250° F SPST Thermostat, 2" NPT Carbon Steel Screw Plug, 4 KW, 240 Volts, 51" Immersed Length, Steel Sheath Heating Elements, Weather-Resistant Terminal Enclosure, 3 Phase Power)

**(TC) Temperature Control:** Standard thermostats are SPST rated at 25amps/250VAC.  
Please consult the factory for SPDT and DPST thermostats.

- Selection:
- X** = No thermostat supplied
  - 1** = 0° - 100° F Range SPST Thermostat (-18° - 38° C)
  - 2** = 60° - 250° F Range SPST Thermostat (16° - 121° C)
  - 3** = 175° - 550° F Range SPST Thermostat (79° - 288° C)
  - 5** = Thermocouple. Specify Type “J”, “K”, “T”, or “E” when ordering

**(Type) Heater:** This denotes heater mounting size and type.

|            |   |  |
|------------|---|--|
| Selection: | <p><b>First Letter</b> *</p> <p><b>F</b> = 1"      <b>R</b> = 2 1/2"</p> <p><b>G</b> = 1 1/4"    <b>C</b> = 3"</p> <p><b>Q</b> = 1 1/2"    <b>U</b> = 4"</p> <p><b>P</b> = 2"        <b>B</b> = 4 1/2" O.D.**</p> <p>* Consult factory for Metric, DIN or British Standard</p> <p>** Cast Iron “AB” Standard fits 3” pipe</p> | <p><b>Second Letter</b></p> <p><b>F</b> = Flange (150 PSI ANSI) ***</p> <p><b>S</b> = NPT Screw Plug ***</p> <p><b>J</b> = Flange Circulation</p> <p><b>JS</b> = Screw Plug Circulation</p> <p>*** Carbon Steel. Other Materials or PSI available. Please consult factory.</p> |
|------------|---|--|

**(KW) Power:** Specify desired power in kilowatts.  
Example: 8000 Watts = **8** KW and 4500 Watts = **4.5** KW

**(V) Voltage:**

|  |   |
|--|---|
| <ul style="list-style-type: none"> <li><b>1</b> = 120 Volts</li> <li><b>2</b> = 240 Volts</li> <li><b>3</b> = 380 Volts</li> <li><b>4</b> = 480 Volts</li> <li><b>5</b> = 550 Volts</li> </ul> | <p>For other voltages specify the actual voltage using 3 digits.<br/>i.e.: 440 Volts = <b>440</b></p> |
|--|---|

**(L) Immersed Length:** Maximum Immersed Length (in inches)

**(Element Material) No Designation** = Steel is standard and has no special designation

- SS** = Stainless Steel (Type 321 standard. Other types also available)
- IC** = Incoloy (Type 840 standard. Other types also available)
- C** = Copper

**(TE) Terminal Enclosure:**

- No Designation** = General Purpose
- LT** = Weather-Resistant
- EP** = Explosion-Resistant
- EP/LT** = Explosion- and Weather-Resistant

**(PH) Phase:**

- No Designation** = Single Phase
- \*3** = Three Phase

# “HL” Series Quick Quote

To: **Warren Electric Corporation** Tel: **401 245-3700**  
 36 Franklin Street • P.O. Box 86 Fax: **401 245-9331**  
 Warren, Rhode Island 02885-0086 USA Date: \_\_\_/\_\_\_/\_\_\_

From: \_\_\_\_\_ Tel: (\_\_\_\_) \_\_\_\_ - \_\_\_\_\_ Fax: (\_\_\_\_) \_\_\_\_ - \_\_\_\_\_

Company: \_\_\_\_\_ Location #: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

**Please recommend an appropriate Hydraulic/Lube Oil Immersion Heater for the following reservoir and conditions.**

|                  |  |                                     |                                 |                                      |
|------------------|--|-------------------------------------|---------------------------------|--------------------------------------|
| Screw Plug Size: | <input type="checkbox"/> 2" NPT  | <input type="checkbox"/> 2 1/2" NPT | <input type="checkbox"/> 3" NPT | <input type="checkbox"/> Other _____ |
| OR Flange Size:  | <input type="checkbox"/> A/B (4 1/2" O.D.) <input type="checkbox"/> Other: _____" X _____ PSI (Example: 3" X 150#) |                                     |                                 |                                      |

|                              |             |             |                      |
|------------------------------|-------------|-------------|----------------------|
| Available Voltage and Phase: | _____ Volts | _____ Phase | KW (if known): _____ |
|------------------------------|-------------|-------------|----------------------|

|   |  |
|---|--|
| Volume of oil to be heated: _____ gallons   | <input type="checkbox"/> Open Top OR <input type="checkbox"/> Closed Top   |
| Tank Size: _____" Length x _____" Width x _____" Height   | Tank Insulation: <input type="checkbox"/> None<br><input type="checkbox"/> 1"<br><input type="checkbox"/> 2"<br><input type="checkbox"/> Other _____ |
| OR  |  |
| _____ " Diameter x _____ " Height or Length<br><input type="checkbox"/> Horizontal OR <input type="checkbox"/> Vertical |  |

|   |
|---|
| Maximum Allowable Immersed Length: _____ inches |
|---|

|  |
|--|
| Desired Temperature to Maintain: _____ ° F OR _____ ° C          |
| Outside Ambient Temperature (worst case): _____ ° F OR _____ ° C |
| Initial Heat Up Time (if required): _____ Hours                  |

|  |   |  |
|--|---|--|
| Terminal Enclosure: <input type="checkbox"/> General Purpose | <input type="checkbox"/> Weather-Resistant                | <input type="checkbox"/> Explosion-Resistant |
| <input type="checkbox"/> Economy                             | <input type="checkbox"/> Weather- and Explosion-Resistant |  |

|   |   |
|---|---|
| Thermostat: <input type="checkbox"/> Yes OR <input type="checkbox"/> No | Temperature Range: _____ 0° - 100° F (-18° - 38° C) |
| Thermocouple: Type "____"   | _____ 60° - 250° F ( 16° - 121° C)                  |
|   | _____ 175° - 550° F ( 79° - 288° C)                 |
|   | _____ Other: _____ °F _____ °C                      |

Other Requirements: \_\_\_\_\_

Recommendation will be provided using the above parameters assuming fluid is in a static state. **If the fluid is continuously circulating out of the tank and returned, provide a flow rate in gallons per hour or gallons per minute.**

Flow rate: \_\_\_\_\_ GPH or \_\_\_\_\_ GPM Inlet Temperature: \_\_\_\_\_ °F or °C Outlet Temperature: \_\_\_\_\_ °F or °C

Additional Heat Loss Considerations: \_\_\_\_\_

**QQ-HL-100-0**

**Warren Electric Corporation**

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# Warren Electric Corporation

## Additional Products

### *Electric Immersion Heaters*

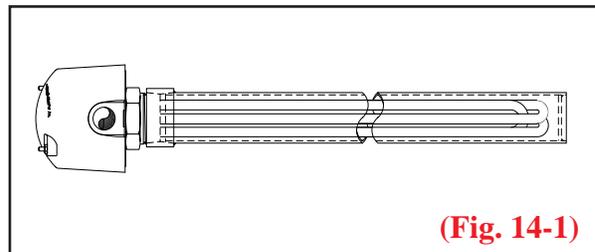
- Standard Heater Flanges are ANSI 150 PSIG Carbon Steel in Sizes from 1" to 24". Other Pressure Ratings are available on all Flanges. Also available in Stainless Steel in types 304, 304L, 316, and 316L.
- Screw Plug Heaters are available from 1" to 4" NPT in Steel, Stainless Steel, Brass, or Bronze.
- KW Ratings from 0.5 to 800 KW.
- Element Sheath Materials include Steel, Stainless Steel, Copper, Incoloy, and Inconel. Other Materials are also available. (Please consult the factory.)
- Elements can be Brazed, Welded, or Removable.
- Integral Thermostats, Thermocouples, Thermowells, or Manual Resets are available on most models.
- Standard Heavy Gauge Cast Aluminum, Economy, and Weather- or Explosion-Resistant Terminal Enclosures.
- Operating Voltages to 600 Volts.
- Watt Densities are available up to 150 Watts Per Square Inch (WSI).

### *Casings and Pressure Vessels for Circulation Requirements*

- Standard and Custom Vessel Designs are readily available for any Warren Electric Corporation Screw Plug or Flange Mount Heater.
- Virtually any Type and Size of Inlet, Outlet, Drain, and/or Vent can be built in your Vessel.
- Pressure Ratings from 150 - 2500 PSIG. ASME Code Certification and National Board of Boiler & Pressure Vessels Registrations are available upon request.
- High temperature Insulation and/or Jacketing as requested. Models can be furnished without Insulation and Jackets for Lower-Temperature Applications. (A cost savings to you!)

### *Pipe Insert Heaters*

- Allows removal and servicing of heater without draining tank. Low Watt Density Tubular Element Heater is inserted into a closed pipe installed in the tank. Consult factory with your tank dimensions/diagram and heat requirements.



(Fig. 14-1)

*Please call the factory for additional information on these products.*

# ELECTRIC PROCESS HEATERS

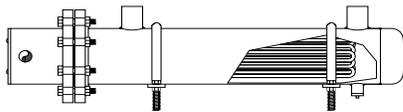
## FEATURES AND OPTIONS

All *Warren Electric Corporation* models are available with a variety of options, modifications, and special features, such as:

- Standard Temperature Control Ranges of 0° - 100° F, 60° - 250° F, 175° - 550° F.  
(Other temperature ranges available. Centigrade also available.)
- On/Off Temperature Controls, Indicating Controls, or Controls per your Specifications.  
All Types of Single or Multiple Thermocouples and Thermowells.
- High Temperature Extended Terminal Enclosures.
- Power Distribution Blocks and Multiple Circuits for High Current Applications.
- Pressure Vessels and Casing Assemblies with Options of your Choice.

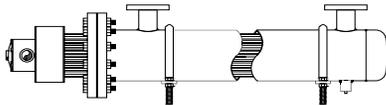
## OTHER TYPICAL HEATER STYLES

(Fig. 15-1)



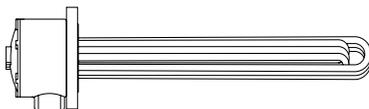
**Flanged Circulation Heater**  
with FNPT Inlet, Outlet, Drain and  
Weather-Resistant Terminal Enclosure

(Fig. 15-2)



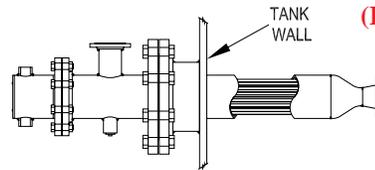
**Extended Head High-Temperature  
Heat Transfer Fluid Heater** with  
Flanged Inlet and Outlet and FNPT Drain

(Fig. 15-3)



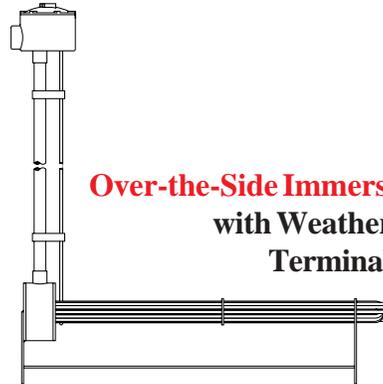
**ANSI Flanged Heater**  
without Casing and with  
Explosion-Resistant Terminal Enclosure

(Fig. 15-4)



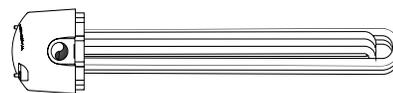
**Suction Heater**  
Shown in  
a Typical Installation

(Fig. 15-5)



**Over-the-Side Immersion Heater**  
with Weather-Resistant  
Terminal Enclosure

(Fig. 15-6)



**"A/B" Style Fuel Oil Heater**  
with General Purpose  
Terminal Enclosure

For technical assistance, please contact the factory directly or complete the Quick Quote form on page 17. An applications engineer or technical salesperson will be pleased to answer your questions and assist you promptly.

**Warren Electric Corporation**

Tel: 401 245-3700 Fax: 401 245-9331

# Useful TECHNICAL Information

## Determining Required Power:

$$\text{Power (KW)} = \frac{\text{FR} \times g_c \times C_p \times \text{DT} \times \text{SF}}{3412 \text{ BTU/KW-HR}}$$

- FR** = Flow rate in Gallons Per Hour (static reservoirs use gallon capacity)  
In a Circulating System this is the Actual Flow Rate During Operation
- g<sub>c</sub>** = Density of Fluid/Gas (lbs./gallon)
- C<sub>p</sub>** = Specific Heat of Fluid/Gas (BTU/(lb. °F))
- DT** = Differential Between Desired Temperature and Lowest Anticipated Ambient (°F)
- SF** = Safety Factor (typically 20%) SF = 1.2

## Wattage Differential:

When heaters are used at voltages other than the **DESIGN VOLTAGE**, different power outputs will result. It is acceptable to use Warren Electric heaters up to 10% above the design voltage and any percentage below. (Note: Applied voltage will affect the power output as shown below.)

Determining actual power output:

$$\text{KW}_{\text{Actual}} = \text{KW}_{\text{Design}} \times \left( \frac{\text{Voltage}_{\text{Actual}}}{\text{Voltage}_{\text{Design}}} \right)^2$$

Warren Electric heaters are normally range rated (showing the recommended maximum and minimum voltage and corresponding wattage). The below table shows the standard Warren Electric ranges as they apply.

| Design Voltage | Nameplate Voltage | Nameplate Wattage                                      |
|----------------|-------------------|--|
| 120            | 110-120           | Corresponds to the output wattage at nameplate voltage |
| 240            | 220-240           |  |
| 480            | 440-480           |  |
| 550            | 550-575           |  |
|                |                   |  |

## Amperage:

Many local electrical codes and good engineering practices limit line current to 48 amps. When this limit is exceeded, Warren Electric heaters are normally designed with multiple circuits which limit the line current below 48 amps per circuit. Please consult factory to discuss other options.

Determining Line Current = "I" (amperes)

$$\text{Single Phase: "I" = Line Current [amps]} = \frac{\text{Power}_{\text{Actual}} \text{ (WATTS)}}{\text{Voltage}_{\text{Actual}}}$$

$$\text{Three Phase: "I}_L\text{" = Line Current [amps]} = \frac{\text{Power}_{\text{Actual}} \text{ (WATTS)}}{\text{Voltage}_{\text{Actual}} \times 1.73}$$



**AN ISO 9001  
REGISTERED MANUFACTURER**



**ELECTRIC PROCESS HEATERS FOR INDUSTRY.**

Since 1962, Warren Electric Corporation has been industry's source for high quality standard and custom electric immersion heaters, assemblies and accessories. We offer solutions for nearly any process heater application, from the simple to the demanding. Warren Electric means quality products and total quality service defined by application expertise, quick turnaround, competitive prices, and rapid response to customer needs. Turn to the heat source, Warren Electric, for your next requirement.

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