eXPRESS-LINE
Laboratory Furnaces

Tube Furnaces
Box Furnaces
Ashing Furnaces
Control Systems
Furnace Accessories
Temperatures up to 1800°C
Thermcraft is an international leading manufacturer of high quality thermal processing equipment. We manufacture:

- laboratory and production furnaces
- recirculating ovens
- vacuum formed ceramic fiber heaters
- cast heaters
- heater coils
- air heaters
- ovens
- kilns
- and replacement diffusion heaters

Our product categories range from standard quick-ship designs, to fully customized solutions for application temperatures up to 1800°C (3272°F).

Since beginning operations in January of 1971, Thermcraft has earned a reputation as a high quality manufacturer who values customer service above all else. We are located in beautiful Winston-Salem, North Carolina, which is part of the Piedmont Triad area of central North Carolina. Since 1971, Thermcraft has continuously supported the local economy of Winston Salem, North Carolina.

Through the years we have progressively expanded our manufacturing capabilities, product lines, and our sales and distribution networks. Thermcraft currently operates in a state-of-the-art facility with 3600 square feet of office space and 70,000 square feet of manufacturing space. Our 12 acre campus offers additional space for future expansion. Thermcraft is currently recognized as a globally competitive, internationally marketed company with a passion for helping our customers succeed. At Thermcraft, customer service is our #1 Priority!
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The Protégé XST split tube furnace has a compact, lightweight, space saving design. This model is an excellent choice to begin thermal processing in a laboratory environment. The hinged body which is split along its length allows for easy process tube changes and simple installation of process tubes with end seals attached.

The Protégé has Fibercraft™ vacuum formed ceramic fiber heating elements with free radiating wire embedded into the body of the heater and tube adapters integrated into the ends.

Excellent temperature uniformity and a programmable control system make the Protégé a valuable addition to any lab.

Standard Features

- 1100°C maximum operating temperature
- Vacuum formed ceramic fiber heating elements ensure rapid heat up, excellent temperature uniformity and quick cool down
- Compact, lightweight design
- Safety switch disconnects power to heating elements when opened
- Integrated Thermcraft P91 PID control system, includes 288 program segments (see control system descriptions)
- Long life Inconel sheathed Type K thermocouple
- Accepts process tube outer diameters up to 1.25" (31mm)
- Heated length 12" (304mm)
- Furnace and controller ship fully assembled and ready for connection to incoming power supply
- Can be used in horizontal or vertical orientation

Options and Upgrades

- Choice of two different programmable controllers with optional communications
- Process tubes in various sizes and materials
- Process tube end seals for gas and vacuum
- Custom sized tube adapters available upon request, up to 1.75" (44mm) (may extend delivery time)
Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Temp (°C)</th>
<th>Heat Zones</th>
<th>Heat Up Time (mins)</th>
<th>Max OD Process Tube in. (mm)</th>
<th>Heated Length in. (mm)</th>
<th>External Dimensions HxWxD in. (mm)</th>
<th>Max Power (Watts)</th>
<th>Volts</th>
<th>Amps</th>
<th>Thermo couple Type</th>
<th>Weight lbs (kg)</th>
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<tbody>
<tr>
<td>XST-2-0-12-1V1</td>
<td>1100</td>
<td>1</td>
<td>20</td>
<td>1.25 (31)</td>
<td>12 (304)</td>
<td>14x16x11 (355x406x279)</td>
<td>1200</td>
<td>120</td>
<td>10</td>
<td>K</td>
<td>32 (15)</td>
</tr>
<tr>
<td>XST-2-0-12-1V2</td>
<td>1100</td>
<td>1</td>
<td>20</td>
<td>1.25 (31)</td>
<td>12 (304)</td>
<td>14x16x11 (355x406x279)</td>
<td>832/1200</td>
<td>208/240</td>
<td>4/5</td>
<td>K</td>
<td>32 (15)</td>
</tr>
</tbody>
</table>

***Notes***
- Continuous operating temperature is 100°C below maximum temperature
- Heat up times are measured with an empty chamber to 100°C below maximum temperature

Temperature Profiles

- Uniformity profile taken at a set-point of 1100°C
- ±5°C over 8" (203mm), ±1°C over 4" (76mm)

- Heat-up time measured from ambient to 1100°C at 100% power output
- Cool-down rate measured with top closed and power shut off
- Faster cool-down rates can be achieved with forced cooling and top open (reduces heater life)
The XST split tube furnaces have a hinged body which is split along its length. This design allows for easy process tube changes and simple installation of process tubes with end seals attached.

These furnaces use Fibercraft™ vacuum formed ceramic fiber heating elements with free radiating wire embedded into the body of the heater. The tube adapters are removable and interchangeable so that multiple process tube sizes can be used with one furnace.

Single zone models have excellent temperature uniformity and the three zone models can extend the uniform flat zone by independently controlling the end zones.

**Standard Features**

- 1200°C maximum operating temperature
- Vacuum formed ceramic fiber heating elements ensure rapid heat up, excellent temperature uniformity and quick cool down
- Thermcraft SmartControl touch screen PID control system (see control system descriptions)
- Long life Inconel sheathed Type K thermocouple
- Accepts process tube outer diameters up to 6" (152mm)
- Heated lengths up to 36" (914mm)
- Includes 1 set of tube adapters sized to desired internal diameter
- 10' (3m) interconnecting and power cables
- Three zone models can be controlled individually or in master/slave configuration
- Furnace and controller ship fully assembled and ready for connection to incoming power supply
- Can be used in horizontal or vertical orientation (vertical mounting brackets included)
Options and Upgrades

- The SmartControl can be upgraded to include profile programming, data acquisition and communications. These options can be purchased individually or separately and can also be purchased as an upgrade after the unit has been shipped and installed.
- Independent over temperature control
- Additional sets of tube adapters
- Process tubes in various sizes and materials
- Process tube end seals for gas and vacuum
- Eurotherm 2404 series controls and communications upgrades
- Available without control system
- Custom options and upgrades available upon request, such as output control of external devices, actuators, flow controllers, etc. (extends delivery time)
## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Temp (°C)</th>
<th>Heat Zones</th>
<th>Heat Up Time (mins)</th>
<th>Max OD Process Tube in. (mm)</th>
<th>Furnace External Dimensions HxWxD in. (mm)</th>
<th>Control External Dimensions HxWxD in. (mm)</th>
<th>Max Power (Watts)</th>
<th>Volts</th>
<th>Amps</th>
<th>Thermo couple Type</th>
<th>Weight lbs (kg)</th>
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<tbody>
<tr>
<td>XST-3-0-12-1V2</td>
<td>1200</td>
<td>1</td>
<td>30</td>
<td>3 (76)</td>
<td>18x21x20 (457x533x508)</td>
<td>9x14x14 (229x356x356)</td>
<td>1700</td>
<td>230</td>
<td>8</td>
<td>K</td>
<td>80 (36)</td>
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<td>32</td>
<td>3 (76)</td>
<td>18x27x20 (457x685x508)</td>
<td>9x14x14 (229x356x356)</td>
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<td>18x45x20 (457x1143x508)</td>
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<td>23</td>
<td>K</td>
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<td>11</td>
<td>K</td>
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<td>18x27x20 (457x685x508)</td>
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<td>230</td>
<td>16</td>
<td>K</td>
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<td>18x33x20 (457x838x508)</td>
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<td>K</td>
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<td>31</td>
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<td>18x27x20 (457x685x508)</td>
<td>11x20x17 (279x508x432)</td>
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<td>230</td>
<td>16</td>
<td>K</td>
<td>137 (62)</td>
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<td>XST-4-0-24-3V2</td>
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<td>39</td>
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<td>18x45x20 (457x1143x508)</td>
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<td>7050</td>
<td>230</td>
<td>31</td>
<td>K</td>
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<td>XST-6-0-24-1V2</td>
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<td>40</td>
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<td>20x33x23 (508x838x584)</td>
<td>9x14x14 (229x356x356)</td>
<td>6800</td>
<td>230</td>
<td>30</td>
<td>K</td>
<td>160 (73)</td>
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<tr>
<td>XST-6-0-36-1V2</td>
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<td>45</td>
<td>6 (152)</td>
<td>20x45x23 (508x1143x584)</td>
<td>9x14x14 (229x356x356)</td>
<td>10200</td>
<td>230</td>
<td>45</td>
<td>K</td>
<td>243 (110)</td>
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<tr>
<td>XST-6-0-24-3V2</td>
<td>1200</td>
<td>3</td>
<td>40</td>
<td>6 (152)</td>
<td>20x33x23 (508x838x584)</td>
<td>11x20x17 (279x508x432)</td>
<td>6800</td>
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<td>30</td>
<td>K</td>
<td>178 (81)</td>
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<tr>
<td>XST-6-0-36-3V2</td>
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<td>3</td>
<td>45</td>
<td>6 (152)</td>
<td>20x45x23 (508x1143x584)</td>
<td>11x20x17 (279x508x432)</td>
<td>10200</td>
<td>230</td>
<td>45</td>
<td>K</td>
<td>261 (119)</td>
</tr>
</tbody>
</table>

***Notes***
- Continuous operating temperature is 100°C below maximum temperature
- Heat up times are measured with an empty chamber to 100°C below maximum temperature
Temperature Profiles

- Uniformity profile taken at a set-point of 1200°C
- ±5°C over 8” (203mm), ±1°C over 3” (76mm)
- Uniform length increases respectively in furnace models with longer heated lengths
- ±5°C can be achieved over 90% of the entire length of 3-zone models

- Heat-up time measured from ambient to 1200°C at 100% power output
- Cool-down rate measured with top closed and power shut off
- Faster cool-down rates can be achieved with forced cooling and top open (reduces heater life)
1200°C Solid Tube Furnaces

The XSL solid tube furnaces have a continuous solid body design. Process tubes can be inserted through the furnace chamber before attaching end seals.

These furnaces use ceramic refractory heating elements with embedded resistance wire. The tube adapters can be changed by removing the end caps so that multiple process tube sizes can be used with one furnace.

Temperature uniformity is excellent due to the heavy ceramic refractory heating elements and continuous solid tube heated chamber.

### Standard Features
- 1200°C maximum operating temperature
- Ceramic refractory with embedded wire heating elements ensure excellent temperature uniformity
- Thermcraft SmartControl touch screen PID control system (see control system descriptions)
- Long life Inconel sheathed Type K thermocouple
- Accepts process tube outer diameters up to 2.75" (69mm)
- Heated lengths up to 24" (609mm)
- Includes 1 set of tube adapters sized to desired internal diameter
- 10’ (3m) interconnecting and power cables
- Furnace and controller ship fully assembled and ready for connection to incoming power supply
- Can be used in horizontal or vertical orientation

### Options and Upgrades
- The SmartControl can be upgraded to include profile programming, data acquisition and communications. These options can be purchased individually or separately and can also be purchased as an upgrade after the unit has been shipped and installed
- Independent over temperature control
- Additional sets of tube adapters
- Process tubes in various sizes and materials
- Process tube end seals for gas and vacuum
- Eurotherm 2404 series controls and communications upgrades
- Available without control system
- Custom options and upgrades available upon request, such as output control of external devices, actuators, flow controllers, etc. (extends delivery time)
### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Temp (°C)</th>
<th>Heat Zones</th>
<th>Heat Up Time (mins)</th>
<th>Max OD Process Tube in. (mm)</th>
<th>Heated Length in. (mm)</th>
<th>Furnace External Dimensions HxWxD in. (mm)</th>
<th>Control External Dimensions HxWxD in. (mm)</th>
<th>Max Power (Watts)</th>
<th>Volts</th>
<th>Amps</th>
<th>Thermo couple Type</th>
<th>Weight lbs (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XSL-3-0-12-1C</td>
<td>1200</td>
<td>1</td>
<td>60</td>
<td>2.75 (69)</td>
<td>12 (304)</td>
<td>15x15x18 (381x381x457)</td>
<td>9x14x14 (229x356x356)</td>
<td>2260</td>
<td>230</td>
<td>10</td>
<td>K</td>
<td>53 (24)</td>
</tr>
<tr>
<td>XSL-3-0-18-1C</td>
<td>1200</td>
<td>1</td>
<td>65</td>
<td>2.75 (69)</td>
<td>18 (457)</td>
<td>15x21x18 (381x533x457)</td>
<td>9x14x14 (229x356x356)</td>
<td>3440</td>
<td>230</td>
<td>15</td>
<td>K</td>
<td>71 (33)</td>
</tr>
<tr>
<td>XSL-3-0-24-1C</td>
<td>1200</td>
<td>1</td>
<td>70</td>
<td>2.75 (69)</td>
<td>24 (609)</td>
<td>15x27x18 (381x686x457)</td>
<td>9x14x14 (229x356x356)</td>
<td>4520</td>
<td>230</td>
<td>20</td>
<td>K</td>
<td>89 (41)</td>
</tr>
</tbody>
</table>

***Notes***
- Continuous operating temperature is 100°C below maximum temperature
- Heat up times are measured with an empty chamber to 100°C below maximum temperature

### Temperature Profiles

- Uniformity profile taken at a set-point of 1200°C
- ±5°C over 5" (127mm), ±1°C over 2" (51mm)
- Uniform length increases respectively in furnace models with longer heated lengths.

- Heat-up time measured from ambient to 1200°C at 100% power output
- Cool-down rate measured with power shut off
- Faster cool-down rates can be achieved with forced cooling (reduces heater life)
The XSB box furnaces have a hinged vertical lift door that keeps the hot door insulation always facing away from the operator. A door safety switch interrupts power to the heating elements when the door is opened.

These furnaces use Fibercraft™ vacuum formed ceramic fiber heating elements with free radiating wire embedded into the body of the heater. The furnace chamber, heating elements, hearth plate and chamber threshold are designed to be easily replaced if they become worn out.

An air gap between the heated chamber exterior and furnace exterior surface is designed to minimize the external surface temperature of the furnace.

### Standard Features
- 1200°C maximum operating temperature
- Vacuum formed ceramic fiber heating elements ensure rapid heat up, excellent temperature uniformity and quick cool down
- Thermcraft SmartControl touch screen PID control system (see control system descriptions)
- Long life Inconel sheathed Type K thermocouple
- Heated chamber volume up to 42L
- 10' (3m) power cables
- Furnace and controller ship fully assembled and ready for connection to incoming power supply

### Options and Upgrades
- The SmartControl can be upgraded to include profile programming, data acquisition and communications. These options can be purchased individually or separately and can also be purchased as an upgrade after the unit has been shipped and installed
- Independent over temperature control
- Inlet and outlet fittings for gas purging
- Forced exhaust fan and duct
- Sealed atmosphere retort
- Exhaust pipe for fume extraction
- Eurotherm 2404 series controls and communications upgrades
- Custom options and upgrades available upon request, such as output control of external devices, actuators, flow controllers, etc. (extends delivery time)
## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Temp (°C)</th>
<th>Heat Zones</th>
<th>Heat Up Time (mins)</th>
<th>Chamber Volume (L)</th>
<th>Chamber Internal Dimensions HxWxD in. (mm)</th>
<th>Furnace External Dimensions HxWxD in. (mm)</th>
<th>Height with Door Open in. (mm)</th>
<th>Max Power (Watts)</th>
<th>Volts</th>
<th>Amps</th>
<th>Thermo couple Type</th>
<th>Weight lbs (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XSB-6-9-1V</td>
<td>1200</td>
<td>1</td>
<td>35</td>
<td>5</td>
<td>6x6x9 (152x152x228)</td>
<td>22x18x26 (558x457x660)</td>
<td>32 (812)</td>
<td>2700</td>
<td>230</td>
<td>12</td>
<td>K</td>
<td>88 (40)</td>
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<tr>
<td>XSB-8-12-1V</td>
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<td>40</td>
<td>12</td>
<td>8x8x12 (203x203x304)</td>
<td>24x20x29 (610x508x737)</td>
<td>38 (965)</td>
<td>5500</td>
<td>230</td>
<td>24</td>
<td>K</td>
<td>132 (60)</td>
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<tr>
<td>XSB-12-18-1V</td>
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<td>50</td>
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<td>48</td>
<td>K</td>
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### Temperature Profiles

- **XSB-6-6-9-1V**
  - Heat-up/Cool-Down
  - Heat-up time measured from ambient to 1200°C at 100% power output
  - Cool-down rate measured with power shut off, door closed
  - Faster cool-down rates can be achieved with forced cooling and door open (reduces heater life)

- **XSB-6-6-9-1V**
  - Uniformity profile taken at a set-point of 1200°C
  - ±5°C over 9 data points

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***Notes***
- Continuous operating temperature is 100°C below maximum temperature
- Heat up times are measured with an empty chamber to 100°C below maximum temperature
The XSB box furnaces have a hinged vertical lift door that keeps the hot door insulation always facing away from the operator. A door safety switch interrupts power to the heating elements when the door is opened.

These furnaces use Silicon Carbide (SiC) heating elements with free radiating dual helix design. The high temperature ceramic fiber furnace chamber, heating elements, hearth plate and chamber threshold are designed to be easily replaced if they become worn out.

An air gap between the heated chamber exterior and furnace exterior surface is designed to minimize the external surface temperature of the furnace.

### Standard Features
- Up to 1600°C maximum operating temperature
- Double helix, free radiating Silicon Carbide (SiC) heating elements ensure rapid heat up, excellent temperature uniformity and quick cool down
- Thermcraft SmartControl touch screen PID control system (see control system descriptions)
- Independent over temperature control
- Long life Type R thermocouple
- Silicon Carbide hearth plate
- Heated chamber volume up to 42L
- 10' (3m) power cables
- Furnace and controller ship fully assembled and ready for connection to incoming power supply

### Options and Upgrades
- The SmartControl can be upgraded to include profile programming, data acquisition and communications. These options can be purchased individually or separately and can also be purchased as an upgrade after the unit has been shipped and installed
- Inlet and outlet fittings for gas purging
- Forced exhaust fan and duct
- Exhaust pipe for fume extraction
- Eurotherm 2404 series controls and communications upgrades
- Custom options and upgrades available upon request, such as output control of external devices, actuators, flow controllers, etc. (extends delivery time)
## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Max Temp (°C)</th>
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<th>Volts</th>
<th>Amps</th>
<th>Thermo couple Type</th>
<th>Weight lbs (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XSB-6-6-9-1S</td>
<td>1400</td>
<td>1</td>
<td>22</td>
<td>5</td>
<td>6x6x9 (152x152x228)</td>
<td>22x20x26 (558x508x660)</td>
<td>32 (812)</td>
<td>5877</td>
<td>230</td>
<td>26</td>
<td>R</td>
<td>88 (40)</td>
</tr>
<tr>
<td>XSB-8-8-12-1S</td>
<td>1400</td>
<td>1</td>
<td>35</td>
<td>12</td>
<td>8x8x12 (203x203x304)</td>
<td>25x24x31 (635x610x787)</td>
<td>41 (1041)</td>
<td>7943</td>
<td>230</td>
<td>35</td>
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<tr>
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<td>1400</td>
<td>1</td>
<td>42</td>
<td>42</td>
<td>12x12x18 (304x304x457)</td>
<td>31x26x36 (787x660x914)</td>
<td>48 (1220)</td>
<td>16000</td>
<td>230</td>
<td>70</td>
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<td>176 (80)</td>
</tr>
<tr>
<td>XSB-6-6-9-1SS</td>
<td>1600</td>
<td>1</td>
<td>37</td>
<td>5</td>
<td>6x6x9 (152x152x228)</td>
<td>22x20x26 (558x508x660)</td>
<td>32 (812)</td>
<td>5877</td>
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<td>26</td>
<td>R</td>
<td>88 (40)</td>
</tr>
<tr>
<td>XSB-8-8-12-1SS</td>
<td>1600</td>
<td>1</td>
<td>59</td>
<td>12</td>
<td>8x8x12 (203x203x304)</td>
<td>25x24x31 (635x610x787)</td>
<td>41 (1041)</td>
<td>7943</td>
<td>230</td>
<td>35</td>
<td>R</td>
<td>132 (60)</td>
</tr>
<tr>
<td>XSB-12-12-18-1SS</td>
<td>1600</td>
<td>1</td>
<td>114</td>
<td>42</td>
<td>12x12x18 (304x304x457)</td>
<td>31x26x36 (787x660x914)</td>
<td>48 (1220)</td>
<td>16000</td>
<td>230</td>
<td>70</td>
<td>R</td>
<td>176 (80)</td>
</tr>
</tbody>
</table>

**Notes**
- Continuous operating temperature is 100°C below maximum temperature
- Heat up times are measured with an empty chamber to 100°C below maximum temperature

## Temperature Profile

- Heat-up time measured from ambient to maximum temperature at 100% power output with empty chamber
- Cool-down to 200°C is 6 hours, measured with power shut off, door closed
- Faster cool-down rates can be achieved with forced cooling and door open (reduces heater life)
- Uniformity ±5°C over 9 data points, profile taken at a maximum temperature
- Temperature stability of ±1°C across entire temperature range
The XSB box furnaces have a hinged vertical lift door that keeps the hot door insulation always facing away from the operator. A door safety switch interrupts power to the heating elements when the door is opened.

These furnaces use Molybdenum Disilicide (MoSi2) heating elements with free radiating u-shaped design, suspended from the roof of the chamber. The high temperature ceramic fiber furnace chamber, heating elements, hearth plate and chamber threshold are designed to be easily replaced if they become worn out.

An air gap between the heated chamber exterior and furnace exterior surface is designed to minimize the external surface temperature of the furnace.

### Standard Features
- Up to 1800°C maximum operating temperature
- Molybdenum Disilicide (MoSi2) heating elements with free radiating u-shaped design ensure rapid heat up, excellent temperature uniformity and quick cool down
- Thermcraft SmartControl touch screen PID control system (see control system descriptions)
- Independent over temperature control
- Long life Type B thermocouple
- Alumina hearth plate
- Heated chamber volume up to 12L
- 10' (3m) power cables
- Furnace and controller ship fully assembled and ready for connection to incoming power supply

### Options and Upgrades
- The SmartControl can be upgraded to include profile programming, data acquisition and communications. These options can be purchased individually or separately and can also be purchased as an upgrade after the unit has been shipped and installed
- Inlet and outlet fittings for gas purging
- Exhaust pipe for fume extraction
- Eurotherm 2404 series controls and communications upgrades
- Custom options and upgrades available upon request, such as output control of external devices, actuators, flow controllers, etc. (extends delivery time)
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<th>Volts</th>
<th>Amps</th>
<th>Thermo couple Type</th>
<th>Weight lbs (kg)</th>
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</thead>
<tbody>
<tr>
<td>XSB-6-6-9-1M</td>
<td>1700</td>
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<td>5</td>
<td>6x6x9 (152x152x228)</td>
<td>23x33x26 (584x838x660)</td>
<td>37 (940)</td>
<td>5835</td>
<td>230</td>
<td>26</td>
<td>B</td>
<td>310 (141)</td>
</tr>
<tr>
<td>XSB-8-8-12-1M</td>
<td>1700</td>
<td>1</td>
<td>56</td>
<td>12</td>
<td>8x8x12 (203x203x304)</td>
<td>23x33x26 (584x838x660)</td>
<td>37 (940)</td>
<td>8423</td>
<td>230</td>
<td>37</td>
<td>B</td>
<td>350 (160)</td>
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<tr>
<td>XSB-6-6-9-1MM</td>
<td>1800</td>
<td>1</td>
<td>65</td>
<td>5</td>
<td>6x6x9 (152x152x228)</td>
<td>23x33x26 (584x838x660)</td>
<td>37 (940)</td>
<td>8000</td>
<td>230</td>
<td>35</td>
<td>B</td>
<td>310 (141)</td>
</tr>
<tr>
<td>XSB-8-8-12-1MM</td>
<td>1800</td>
<td>1</td>
<td>67</td>
<td>12</td>
<td>8x8x12 (203x203x304)</td>
<td>23x33x26 (584x838x660)</td>
<td>37 (940)</td>
<td>8600</td>
<td>230</td>
<td>38</td>
<td>B</td>
<td>350 (160)</td>
</tr>
</tbody>
</table>

***Notes***
- Continuous operating temperature is 100°C below maximum temperature
- Heat up times are measured with an empty chamber to 100°C below maximum temperature

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**Temperature Profile**

- Heat-up time measured from ambient to maximum temperature at 100% power output with empty chamber
- Cool-down to 200°C is 8 hours, measured with power shut off, door closed
- Faster cool-down rates can be achieved with forced cooling and door open (reduces heater life)
- Uniformity ±5°C over 9 data points, profile taken at a maximum temperature
- Temperature stability of ±1°C across entire temperature range
The XSB ashing furnaces are designed to provide ideal conditions for complete combustion of test samples. They have a hinged vertical lift door that keeps the hot door insulation always facing away from the operator. A door safety switch interrupts power to the heating elements when the door is opened.

These furnaces use wound wire heating elements that are protected by hard ceramic plates. The furnace chamber, heating elements, hearth plate and chamber threshold are designed to be easily replaced if they become worn out.

An air gap between the heated chamber exterior and furnace exterior surface is designed to minimize the external surface temperature of the furnace.

### Standard Features
- 1100°C maximum operating temperature
- Perfect for ashing petrochemicals, coal, food, plastics and other hydrocarbons
- Conforms to ASTM specifications D874, D482, D5184, D3174 and ISO specifications 3987, 6245, 10478, 1171
- Air is preheated before entering chamber
- Air inlet and exhaust chimney provide 6 air changes per minute.
- Optional air flow metering allows for 2-10 air changes per minute
- Thermcraft SmartControl touch screen PID control system (see control system descriptions)
- Long life inconel sheathed Type K thermocouple
- Heated chamber volume up to 40L
- 10' (3m) power cables
- Furnace and controller ship fully assembled and ready for connection to incoming power supply

### Options and Upgrades
- The SmartControl can be upgraded to include profile programming, data acquisition and communications. These options can be purchased individually or separately and can also be purchased as an upgrade after the unit has been shipped and installed
- Adjustable air flow meter to reduce or increase air flow rate
- Sample trays and crucibles
- Eurotherm 2404 series controls and communications upgrades
- Custom options and upgrades available upon request, such as output control of external devices, actuators, flow controllers, etc. (extends delivery time)
# Specifications

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<tr>
<th>Model</th>
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<th>Height with Door Open in. (mm)</th>
<th>Max Power (Watts)</th>
<th>Volts</th>
<th>Amps</th>
<th>Thermo couple Type</th>
<th>Weight lbs (kg)</th>
</tr>
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<tbody>
<tr>
<td>XSB-5-8-7-1C-F01-P</td>
<td>1100</td>
<td>1</td>
<td>60</td>
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<td>5.1x7.9x6.7 (130x200x170)</td>
<td>22x18x26 (558x457x660)</td>
<td>32 (812)</td>
<td>2400</td>
<td>230</td>
<td>11</td>
<td>K</td>
<td>88 (40)</td>
</tr>
<tr>
<td>XSB-7-9-13-1C-F01-P</td>
<td>1100</td>
<td>1</td>
<td>80</td>
<td>15</td>
<td>6.7x9x13.4 (170x230x340)</td>
<td>24x20x29 (610x508x737)</td>
<td>38 (965)</td>
<td>3500</td>
<td>230</td>
<td>15</td>
<td>K</td>
<td>132 (60)</td>
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<tr>
<td>XSB-10-13-19-1C-F01-P</td>
<td>1100</td>
<td>1</td>
<td>100</td>
<td>40</td>
<td>9.8x12.6x19.3 (250x320x490)</td>
<td>29x24x34 (737x610x864)</td>
<td>44 (1118)</td>
<td>6000</td>
<td>230</td>
<td>26</td>
<td>K</td>
<td>176 (80)</td>
</tr>
</tbody>
</table>

**Temperature Profile**

- Heat-up time measured from ambient to 1000°C at 100% power output with empty chamber
- Cool-down to 200°C is 6 hours, measured with power shut off, door closed
- Faster cool-down rates can be achieved with forced cooling and door open (reduces heater life)
- Uniformity ±5°C over 9 data points, profile taken at a set-point of 1000°C

***Notes*** - Continuous operating temperature is 100°C below maximum temperature
- Heat up times are measured with an empty chamber to 100°C below maximum temperature
SmartControl Standard Controller

The SmartControl System combines all of the features of typical PID controllers, video/chart recorders and data logging systems into a single, intuitive device. The SmartControl provides a 4.3” color touch screen interface with standard, user configurable, runtime features for 1-10 zone control applications. All loop configuration and runtime user access is configurable at the device with no PC software required. SmartControl supports 1-10 control zones, offering up to 4 control outputs per zone, powerful profiling capabilities including up to three event outputs and more.

Optional LAN features include e-mail, SMS (text messaging) on alarm, FTP (file transfer protocol for automated file transfer/data backup), remote access (web and VNC embedded servers) and national timeserver time synchronization are standard. The web and VNC servers allow remote access using a PC, tablet or other smart phone devices.

If you can use a “smart device” (iPhone, Android, etc.), you can use SmartControl! User configurable with “slide nav” finger navigation similar to “smart devices” or with a traditional drop down menu system, SmartControl is intuitive to operate and use. With one touch language configuration for all icons, menus and help screens, SmartControl provides ease of use in any one of 28 languages.

Up to 10 Zones Controlled Through One SmartControl Interface
Menu System: User Selectable as Icon or traditional drop down text menu

SmartControl Intuitive Operation

User configurable with "slide nav" finger icon navigation similar to smart phones or tablets or as a traditional drop down menu system.

The SmartControl display is split into two sections; the icon bar and main display area.

- The Main display area is used to view loop information with configurable tag names, active PV, SP & PID % values, navigation icons and appropriate functions selected; i.e. chart view, PID tuning, profiling, data logging, etc.
- The icon bar is visible at all times providing one touch selection of the Menu (navigation), Help, Home, Alarm (flashes when an alarm occurs) icons, Data/Time field, Notification Window when date/time selected and Navigation Arrows.
- The Help icon provides the user content sensitive information for every function.
- The date/time field provides the current date/time and when depressed a Notifications window is opened. The Notification window provides a one-touch snapshot of current SmartControl activity; i.e. PV/SP values, Alarm, Data Logging, Profile, Security activity and more.
Control System Descriptions

SmartControl

Optional Program Profile Ramp/Soak:
- Profiles: Virtually an unlimited number of program profiles in system memory with up to 64 program steps per program
- Profile Type: System configurable for separate profiles per loop.
- Profile Start: via touch screen or via Event input.
- Profile Name: Free form 16 character (max) naming convention with auto append time/date stamp.
- Global Profile Configuration
- Profile Time Base: Time Ramp (hh:mm or mm:ss)
- Ramp Rate (degrees/minute or hour)
- Starting and Ending SP values (may be individually active or not).
- Guaranteed Soak & Ramp (GS).
- Power Fail / Recovery when Profile is active:
  - Continue from last SP value.
  - Continue from last PV value.
- Static mode (abort profile) with last static SP entered.
- Jump to Segment: configurable by segment (also nested looping)
- Events: up to 3 events per segment.
- Guaranteed Soak & Ramp: Configurable active or not by segment.
- Configurable functions (mutually exclusive to each other)
  - Profile Run (momentary)
  - Profile Hold (closed profile hold, open profile run)
  - Profile Run/Hold (closed profile run, open profile hold)
  - Step Advance (momentary)
  - Profile Abort (momentary)
  - PID Selection: select PID #1 or PID#2

Historical Audit Trail

Audit Trail File View

<table>
<thead>
<tr>
<th>FDC System Power Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDC System</td>
</tr>
<tr>
<td>5/25/2012 3:56 AM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setpoint Change for: Temp From 5.9 To 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDC System</td>
</tr>
<tr>
<td>5/25/2012 4:33 AM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ack Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDC System</td>
</tr>
<tr>
<td>5/25/2012 4:33 AM</td>
</tr>
</tbody>
</table>
Optional Data Acquisition:

- Data log PV, SP and PID Percent.
- Log interval: configurable 6 seconds to 31 minutes with configurable number of days to auto start & name next file (1 to 31 days).
- File Start/Stop: Configurable; operator on-demand, on system boot, profile ramp-soak start/end or digital inputs.
- File Interval: Once started a data log file is configurable to auto end and start new file with the same name as previous file with an appended time/date name. Configurable time interval is from 1 to 31 days.
- File name: Operator entered file name, batch & lot number or if running a profile, file name same as profile name. (all file names appended with date-time to file name).
- Operator Comments/Events: Unlimited operator comments/events linked to each file entered manually or via Bar Code Scanner.
- Digital Signatures: full support for user based digital signatures for each data file (data encryption).
- Historical Data File: View & print the data directly from the display (auto scale on X & Y axis with each channel selectable for right or left axis values), from a PC after data is copied/moved via LAN (FTP or e-mail) or USB Flash Memory card provided.

Language Selection:

SmartControl provides a one-button language configuration for the following languages:

- Afrikaans
- Albanian
- Arabic
- Basque
- Belarusian
- Czech
- Danish
- Dutch
- English
- Finnish
- French
- Greek
- German
- Hebrew
- Hungarian
- Icelandic
- Italian
- Japanese
- Korean
- Norwegian
- Polish
- Portuguese
- Russian
- Spanish
- Swedish
- Turkish
- Chinese–Simplified
- Chinese–Traditional
Eurotherm 2404 Series Controllers

These 1/4 DIN size PID controllers offer up to 64 segments of programmable control. Each program segment can be a ramp, step or dwell.

- 2404CC and 2404CG offer 8 programmable segments
- 2404CP offers 16 programmable segments
- 2404P4 offers 4 programs with 16 segments per program

Options and Upgrades

- The 2404 series controllers can be upgraded to include EIA485 2-wire, 4 wire or EIA232. With industry-standard protocols including: Modbus, DeviceNet®, Profibus DP, and Eurotherm® Bisync
- Custom options and upgrades available upon request (extends delivery time)

Thermcraft P91 and Eurotherm 2416 Controllers

These 1/16 DIN size PID controllers offer up to 288 segments of programmable control.

- P91 offers 9 programs with a total of 288 programmable segments
- 2416CP offers 16 programmable segments

Options and Upgrades

- The P91 controller can be upgraded to include either RS485 or RS232, 2-wire, with industry-standard Modbus protocol
- The 2416 controller can be upgraded to include EIA485 2 wire or 4 wire or EIA232. Industry-standard protocols including: Modbus®, Eurotherm Bisync, and SPI
- Custom options and upgrades available upon request (extends delivery time)
Independent Over Temperature Controllers, 1/16 DIN Size

Independent over temperature controllers, sometimes referred to as "high limit controllers", are independent of the main temperature controller. The over temperature controller has its own thermocouple and power relay that will break the power circuit to the heating elements if the temperature should rise above the over temperature control setpoint.

The over temperature controller must be manually reset if the power to the heating elements is interrupted.

All control systems have the option of adding an over temperature controller.

All control systems for furnaces with maximum operating temperatures above 1200°C will come standard with an independent over temperature controller.

Control System Software

SmartControl Standard Control System

Free optional PC software for the SmartControl includes:

- **EnVision** is a FREE SCADA (Supervisory Control and Data Acquisition) package allowing users to assemble a control and data acquisition system for up to 128 devices, each with their own data log file as well as one system data log file of any combination of devices (up to 129 concurrent data log files). Data files include Operator Events (messages) with Digital Signature capability to provide data integrity. Other features include Alarm Logs, operator Audit Trails, General and Service Notes per device, LAN capability (email/text on alarm & Web Page) and more, all standard without the need for programming.

- **DataViewer** is FREE PC Software to View, Graph, Print, export Historical Data, Audit Trail, Alarm & Operator Event Files, validate Data File Digital Signatures and more. The application opens in a spreadsheet type window that displays saved data in cells. These cells can be selected for printing or plotting without additional setup. The data viewer is the main window displayed when the application starts. The data viewer is separated by tabs for the following functions: Data, Operator Events, Audit Trail, Alarm History and Trend Data

Eurotherm Controllers

Free optional PC software for Eurotherm Controllers includes:

- **iTools** is a versatile suite of software tools to allow configuration and monitoring of all Eurotherm 2000 and 3000 series controllers.
## Options

### Options for all Furnaces and Control Systems

<table>
<thead>
<tr>
<th><strong>SmartControl (Standard Control System)</strong></th>
<th></th>
</tr>
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<tbody>
<tr>
<td><strong>Optional SmartControl Features</strong></td>
<td></td>
</tr>
<tr>
<td>Profile Programming - 99x64 Program Segments</td>
<td></td>
</tr>
<tr>
<td>Communications - Includes Ethernet and RS232 (adaptable to RS485)</td>
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</tr>
<tr>
<td>Data Acquisition</td>
<td></td>
</tr>
<tr>
<td>Independent Over Temperature Controller (1 per zone required)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Eurotherm Controller (Optional Controllers)</strong></th>
<th>(1 per zone required)</th>
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</thead>
<tbody>
<tr>
<td>2404CC - 8 Program Segments</td>
<td></td>
</tr>
<tr>
<td>2404CP - 16 Program Segments</td>
<td></td>
</tr>
<tr>
<td>2404P4 - 4x16 Program Segments</td>
<td></td>
</tr>
<tr>
<td>Communications - RS232 or RS485</td>
<td></td>
</tr>
<tr>
<td>Independent Over Temperature Controller (1 per zone required)</td>
<td></td>
</tr>
</tbody>
</table>

| **Protégé Compact Split Tube Furnace** |  |
| Thermcraft P91 - 9 Programs, 288 Segments (Standard Controller) |  |
| Communications - RS232 or RS485 (Optional) |  |
| Eurotherm 2416CP - 1 Program, 16 Segments (Optional Controller) |  |
| Communications - RS232 or RS485 (Optional) |  |

| **XSB Box Furnace** |  |
| Inlet and Outlet Ports for Gas Purging (for 1/4" (6mm) pipe insertion) |  |
| Forced Exhaust Fan and Duct |  |
| Sealed Atmosphere Retort |  |
| Exhaust Chimney for Fume Ventilation |  |

Custom options available upon request (extends delivery time)
Accessories Available for all Furnaces

- Alumina Process Tubes
- Quartz Process Tubes
- Alumina Boats and Crucibles
- Process Tube Flanges for Gas and Vacuum
Other Thermcraft Products:

- Tube Furnaces
- Box Furnaces
- Ceramic Heating Elements
- Ceramic Fiber Insulation & Insulation Packages
- Control Systems
- Custom Ovens
- Diffusion Heating Elements
- Fibercraft Vacuum Formed Heating Elements
- LAB-TEMP
- TransTemp Furnaces
- Marshall Furnaces
- eXPRESS-LINE Furnaces & Ovens
- Contemporary Kilns
- Thermocouples
- Vestibule Blocks

Contact your local sales representative or our staff of trained sales engineers in our Winston-Salem facility with any of your thermal requirements. For more information on Thermcraft, our product line and exceeding all your industrial heating needs, please contact us at:

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Winston-Salem, North Carolina, USA, 27107
Tel: 1.336.784.4800
Fax: 1.336.784.0634
www.thermcraftinc.com