



# 146 Series

## ASTM Testing Mechanical Convection Ovens

The Blue M ASTM Convection Oven is ideal for a number of industrial oven applications, including ASTM testing, epoxy curing, moisture drying, UL testing, aging of electronic components and devices, and other processes and testing requirements. The Blue M ASTM Mechanical Convection Oven meets ASTM 5374 and 5423 Type I and/or Type II along with E-145 type IIA and IIB testing requirements.

### ▶ Oven Features

- Fiberglass insulation to ensure safe cabinet skin temperature
- Heavy-duty door - double-wall, insulated construction
- Independent, over-temperature protection (high limit controller) included
- Corrosion resistant, fully welded and sealed stainless steel (type 304) interior
- Welded and sealed inner chamber
- All-welded, heavy-duty exterior with heavy-gauge, reinforced, cold-rolled steel
- Baked on white powder-coated enamel finish on exterior for long-lasting corrosion protection
- Every oven is fully assembled and individually factory tested
- Circuit breaker provided for ground fault protection as standard
- Single or three phase operation available in 50 Hz or 60 Hz

### ▶ Uniform, Accurate and Reliable Temperature Control

- Available with profiling or single setpoint temperature controls, Ethernet and USB communications
- Horizontal airflow assures uniform thermal performance under most loading conditions
- Exclusive, adjustable, semi-pierced duct walls for tuning of air flow
- Variable frequency drive on circulation blower
- Exclusive Blue M Eterna heating elements - the most reliable available, with heavy-gauge high temperature nickel chromium wire and low-watt density for longer service life
- Airflow switch provided as standard to protect oven and product
- Direct drive, multi-blade, centrifugal blower with high-volume air delivery and dynamically balanced or noise reduction



- ✓ Designed to satisfy the most challenging applications.
- ✓ Our engineered-to-order skills can accommodate your unique requirements.



Blue M is a brand of Thermal Product Solutions, LLC.

» Blue M » Gruenberg » Lindberg/MPH » Lunaire  
» Redline Chambers » Tenney » Wisconsin Oven

[www.bluem.com](http://www.bluem.com)

2821 Old Route 15 | New Columbia, PA 17856-9396 | USA | P: (570) 538-7200 | F: (570) 538-7380

# INDUSTRY SOLUTIONS

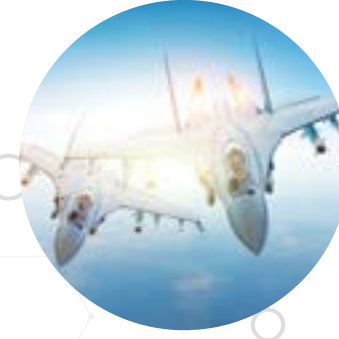
Blue M's experienced engineers are able to meet even the most stringent requirements when designing customer equipment.

## Applications

- Aging
- Annealing
- ASTM Testing
- Curing
- Drying
- Photo Resist
- Solvents, Coatings, and Paint Curing
- Stress-Relief

## Industries

- Aerospace
- Agriculture
- Automotive
- Defense
- Education
- Electronics
- Energy
- Government
- Medical
- Oil & Gas
- Pharmaceutical
- Research & Development
- Rubbers & Plastics
- Semiconductors
- Telecom
- Textiles



Blue M is a brand of Thermal Product Solutions, LLC.

»»Blue M   »»Gruenberg   »»Lindberg/MPH   »»Lunaire  
»»Redline Chambers   »»Tenney   »»Wisconsin Oven

[www.bluem.com](http://www.bluem.com)

2821 Old Route 15 | New Columbia, PA 17856-9396 | USA | P: (570) 538-7200 | F: (570) 538-7380

# OVEN SPECIFICATIONS

Temperature					
Standard Temperature Range	15°C (27°F) above ambient to 350°C (662°F)				
Controller Accuracy	+/- 1.0°C (+/- 1.8°F)				
Controller Resolution	+/- 0.1°C (+/- 0.1°F)				
Heat up time	350°C (662°F) 60 minutes or less depending on model and voltage, empty chamber				
Uniformity	Designed to meet ASTM 5423 Type I and/or Type II uniformity, ASTM E-145 Type IIA or Type IIB Uniformity.				
Performance					
Model	DC – 206 (Bench Model)	DC – 256 (Bench Model)	DC – 296 (Floor Model)	DC – 336 (Floor Model)	DC – 1406 (Floor Model)
Airflow SCFM @ 0.5"WC	785	925	1230	1230	1600
Airflow SFPM	314	333	283	233	267
Max Exhaust SCFM at Ambient <sup>***</sup>	115	130	120	120	145
Exhaust Port Diameter (inches)	3	3	3	3	3
Heat Rejection <sup>****</sup> (BTUH) <sup>****</sup>	4727	5672	7428	8643	12965
<sup>***</sup> Approximate <sup>****</sup> Estimated values at unit's max temperature with the oven ducted outside of the room					

## Rate of Ventilation and Temperature Uniformity Tests

Abbreviated Temperature Uniformity and Rate of Ventilation Rate tests are performed at only one temperature set point and one air exchange rate to verify that the oven meets the specification of the ASTM classification (oven type) concerning those two (2) requirements only. Test duration will be no more than 1 hour at set point with the proper air change rates, in a stabilized oven.

TPS will not guarantee that the unit will meet the uniformity at different ventilation rate specifications and at other temperature set points other than the temperature set point and air change rate that the oven was tested at the factory. The ASTM certificate is not included. If requested, TPS can quote to specific test parameters below:

- Calibration at a specific air change rate
- Thermal Lag Time Test
- Additional set point temperature



Model Dimensions					
Model	DC – 206 (Bench Model)	DC – 256 (Bench Model)	DC – 296 (Floor Model)	DC – 336 (Floor Model)	DC – 1406 (Floor Model)
Cubic Feet (Liters)	4.2 (119)	5.8 (164)	9 (255)	11 (312)	24 (680)
Work Space Inches (mm) (W x D x H)	20 x 18 x 20 (508 x 457 x 508)	25 x 20 x 20 (635 x 508 x 508)	25 x 25 x 25 (635 x 635 x 635)	25 x 20 x 38 (635 x 508 x 965)	48 x 24 x 36 (1219 x 610 x 914)
Exterior Inches (mm) (W x D x H)	40 x 34 x 49 (1016 x 864 x 1295)	45 x 36 x 49 (1143 x 914 x 1245)	45 x 40 x 63 (1143 x 1016 x 1600)	45 x 36 x 75 (1143 x 914 x 1905)	68 x 40 x 73 (1727 x 1016 x 1854)
Machine Footprint (sq. ft.)	9.4	11.3	12.5	11.3	19
Approx Unit Weight (lbs)	600	700	850	900	1350
Load / Capacity					
Max Number of Shelves <sup>*</sup>	8	8	8	17	16
Shelf Spacing (inches)	2	2	2	2	2
Shelf Weight Capacity (lbs) <sup>**</sup>	125	225	200	225	150
Chamber Capacity (lbs) <sup>**</sup>	400	400	400	400	400
Floor Load Rating (lbs) <sup>**</sup>	75	75	75	75	100
Door(s)	Single Door Right-Hinged				Dual-Leaf Double Door
Electrical Service					
Model	DC – 206 (Bench Model)	DC – 256 (Bench Model)	DC – 296 (Floor Model)	DC – 336 (Floor Model)	DC – 1406 (Floor Model)
208 VAC 1 Ph 60 Hz Heater KW Line Current (Amps)	3 (17)	4.5 (26)	6 (35)	6 (35)	6.8 (38)
240 VAC 1 Ph 60 Hz Heater KW Line Current (Amps)	4 (20)	6 (29)	8 (40)	8 (40)	9 (44)
208 VAC 3Ph 60 Hz Heater KW Line Current (Amps)	6.8 (20)	9 (27)	13.5 (40)	13.5 (40)	18 (53)
240 VAC 3Ph 60 Hz Heater KW Line Current (Amps)	9 (23)	12 (31)	18 (46)	18 (46)	24 (61)
480 VAC 3Ph 60 Hz Heater KW Line Current (Amps)	9 (12)	12 (16)	18 (23)	18 (23)	24 (31)
<sup>*</sup> Shelves not included with the unit <sup>**</sup> Distributed Load					

The NIST Certificate of Calibration provides NIST temperature or temperature and relative humidity (if applicable) traceability for the equipment as a system at the specified setpoint. The recording instrument is supplied, calibrated and maintained by TPS to assure valid test results, with traceability to NIST. Such instrument is intended for factory testing only and may not comply with ASTM requirements with regards to calibration and frequency of calibration.



Scan for more information regarding Calibration Services



Blue M is a brand of Thermal Product Solutions, LLC.

»Blue M »Gruenberg »Lindberg/MPH »Lunaire  
»Redline Chambers »Tenney »Wisconsin Oven

[www.bluem.com](http://www.bluem.com)

2821 Old Route 15 | New Columbia, PA 17856-9396 | USA | P: (570) 538-7200 | F: (570) 538-7380



# OPTIONS & ACCESSORIES

Blue M industrial and laboratory ovens are available with a variety of options to enhance the capabilities and performance of the unit. Options categories include ergonomics, performance, process control/electrical and safety. Ask your sales representative for additional options and custom solutions.



**Honeywell Truline 1-Pen Chart Recorder** is a one-channel microprocessor-based circular chart recorder. The "one-pen" stylus printhead produces an analog trace and prints alphanumeric chart data on a blank heat-sensitive chart. Chart speed and range are configurable.

The recorder includes a display and keypad. This option lets you display the real time value of the process variable for each pen channel.



## Available Options



Nickel-plated wire rod shelves



Stainless steel slotted shelves



Glass observation panel(s) in door(s)



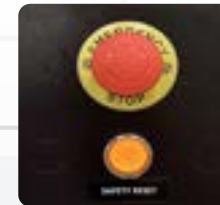
24-hour, 7-day digital process timer



Light tower with audible alarm



Temperature deviation alarm with visual and audible alerts



Emergency Stop Pushbutton



Pneumatic or Electro-Mechanical door lock



Maintenance Lockout



Fused Disconnect with Lock Out / Tag Out System



Swivel casters with levelling feet



Scan for more options



Blue M is a brand of Thermal Product Solutions, LLC.

»Blue M »Gruenberg »Lindberg/MPH »Lunaire  
»Redline Chambers »Tenney »Wisconsin Oven

[www.bluem.com](http://www.bluem.com)

2821 Old Route 15 | New Columbia, PA 17856-9396 | USA | P: (570) 538-7200 | F: (570) 538-7380

# CONTROL SYSTEMS



Scan for additional F4T specifications and options

The Watlow F4T Temperature Controller with INTUITION™ temperature process controller combines the flexibility of a modular I/O controller with best-in-class ease of use.

## ► Watlow F4T Controller Features

- 4.3-inch, color touch panel with high-resolution, graphical user-interface
- 1 to 4 control loops with TRU-TUNE+ adaptive control algorithm for superior controllability
- 40 ramp and soak profiles with real-time clock and battery backup.
- Ethernet Modbus® TCP connectivity
- High-speed USB 2.0 host port
- Modular design, which offers numerous types of field pluggable modules for maximum flexibility and easiest compatibility
- Optional Data Logging capability
- Optional Graphical Trend Chart
- TPS provides panel mounted USB and Ethernet ports located on the front control panel of the equipment
- Temperature stability: Typical  $\pm 0.1^{\circ}\text{F}/^{\circ}\text{F}$  ( $\pm 0.1^{\circ}\text{C}/^{\circ}\text{C}$ ) rise in ambient max



Scan for additional PM Plus specifications and options

Watlow's PM PLUS™, the enhanced EZ-ZONE® PM, is now more intuitive and features an enhanced interface for easier programming and readability with a SMOOTH-TOUCH™ keypad creating an industry leading user experience.

## ► Watlow PM Plus Controller

- Integrated functions and high amperage power control output lower ownership costs
- Current monitoring detects heater current flow and provides alarm indication of a failed output device or heater load
- Features a wide range of serial communications capabilities
- User-selectable heat/cool, on-off, P, PI, PD, PID or alarm action
- Auto-tune with TRU-TUNE+ adaptive control algorithm
- Configuration communications with software saves time and improves reliability of controller setup
- Temperature stability:  $\pm 0.1^{\circ}\text{F}/^{\circ}\text{F}$  ( $\pm 0.1^{\circ}\text{C}/^{\circ}\text{C}$ ) rise in ambient max



Blue M is a brand of Thermal Product Solutions, LLC.

»Blue M »Gruenberg »Lindberg/MPH »Lunaire  
»Redline Chambers »Tenney »Wisconsin Oven

[www.bluem.com](http://www.bluem.com)

2821 Old Route 15 | New Columbia, PA 17856-9396 | USA | P: (570) 538-7200 | F: (570) 538-7380

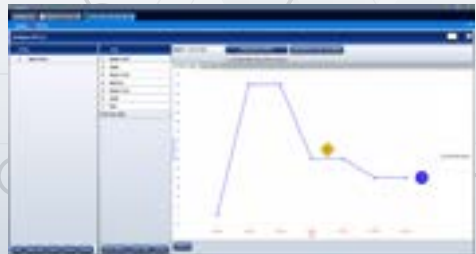
# SOFTWARE PACKAGES

## COMPOSER® Software

COMPOSER® is Watlow's new, easy-to-use software for configuring and customizing controllers. Use it to optimize Watlow's F4T, D4T, EZ-ZONE® RM and EZ-ZONE PM products for specific applications. Task-specific views simplify all aspects of commissioning new controllers including managing the inputs and outputs from pluggable flex modules, setting up functions such as control loops and alarms and creating and editing profiles.



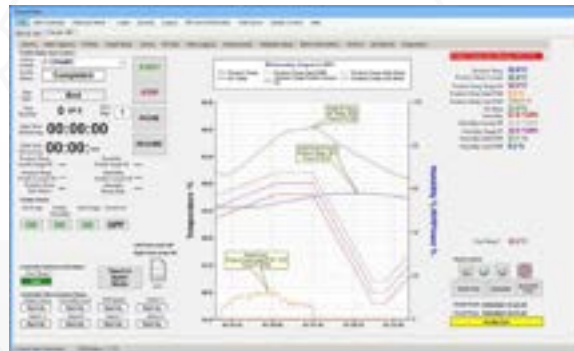
Scan here for additional Watlow Composer specifications, software and demos, and training and education information.



- ✓ Function block diagram with live data and error indication
- ✓ Depicts the configuration visually making it easy to understand and explain to others
- ✓ Multi-language support
- ✓ Provides backup of settings to restore if settings are changed or controller is replaced
- ✓ Lets users adjust window sizes and positions to work efficiently
- ✓ Data trending and batch management configurations are available

## ProcessView Software

ProcessView Data Acquisition Software for Watlow's F4T, Legacy F4, and EZ-Zone® PM Controller Networks. The Software is dedicated to adding value just with Watlow F4T, Legacy F4, and EZ-Zone PM Controllers, which means there is no programming required and it outperforms other more expensive software packages on the market. ProcessView is a great replacement for legacy Watview® Software.



- ✓ Designed to work with Windows 7/10/11 operating systems allowing the use of newer PC technology
- ✓ Supports up to 50 Watlow F4T's, Legacy F4 and or EZ-Zone PM Controllers embedded on a local network
- ✓ Enabling the software's security features provides compliance to **21 CFR Part 11** industries such as Pharmaceutical, Medical and Clinical markets

### Dedicated Overview Screen:

Each Controller/Chamber on the network shows real-time trend, process data, event output status and current Profile status. Profiles can be started, stopped, paused or resumed from this screen. Profile Events can be manually turned on or off if enabled.

### Software Alarm Screen:

Each input sensor (temperature, humidity, etc.) can have a Software Alarm associated with it independent of the alarms hard coded in the controller. Both visual and audible notifications can be enabled in the software.

### Security Screen:

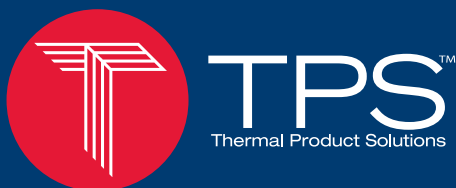
All menus and screens can be password protected with 3 different role levels (Supervisor, Technician and Operator) with unique passwords.

### Audit Trail Viewer:

All audit trail entries can be viewed with the audit trail viewer screen. Each audit trail entry is time stamped and answer the "How", "Why", "Who", "When" for the change. Audit trails are encrypted and can be printed or exported for auditor inspections in a readable CSV format.

### Real-Time Data Log File Viewer Screen:

Displays data as it is being logged to the PC file for peace of mind and to make sure the correct data is being logged. Events are also recorded in the Data Log file along with Batch Information and Min/Max process values for each input. Notes can be added by the operator real-time as the profile or batch is running. Multiple electronic signatures can be added to data log files for tamper-proof security.



Blue M is a brand of Thermal Product Solutions, LLC.

»Blue M »Gruenberg »Lindberg/MPH »Lunaire  
»Redline Chambers »Tenney »Wisconsin Oven

[www.bluem.com](http://www.bluem.com)

2821 Old Route 15 | New Columbia, PA 17856-9396 | USA | P: (570) 538-7200 | F: (570) 538-7380





## Blue M Warranty

**LIMITED WARRANTY TO ORIGINAL PURCHASERS.** Blue M (“Blue M”) warrants to the original purchaser that Blue M owns and will convey clear title to each product that it manufactures and delivers. Additionally, and provided the original purchaser has paid the full purchase price for a product or service, Blue M warrants that from the date it ships and, if applicable, installs a product, or finishes performing a service, the product Blue M manufactured shall conform to written specifications that Blue M approved, and the product shall be free from defects in material and workmanship for twenty-four (24) months, (with the exceptions of the Ultra Temp and LO/GO series, which have a 12 month warranty). Blue M further warrants that any service it performs shall conform to written specifications that Blue M approved and be free from defects in workmanship for twenty-four (24) months (with the exceptions of the Ultra Temp series, which are covered for 12 months. No service warranty for LO/GO series). If a purchaser purchases a TPS Preventive Maintenance & Calibration plan at the end of the warranty period, these limited warranties shall each be extended by twelve (12) months, (with the exceptions of the LO/GO series) subject to the exclusions below. If, within that time period, the original purchaser notifies Blue M in writing of an alleged non-conformity, and Blue M determines, to its reasonable satisfaction, that a product or service is, in fact, non-conforming, then Blue M shall, at its option and expense, repair or replace the non-conforming product or correct the non-conforming service, either at the original purchaser’s or Blue M’s factory. **Warranty Exclusions.** This limited warranty shall not apply to (i) labor to replace a part in a product located outside of the U.S., (ii) a service Blue M performed outside of the U.S., (iii) any loss or damage resulting from normal wear and tear or alteration, misuse, or abuse, including any loss or damage caused by customer products or processes, (iv) improper installation, operation, maintenance, or repair by the original purchaser or a third party with or without TPS’ permission, (v) improper water quality out of range specifications as noted by TPS, (vi) improperly configured customer controllers or customer training issues, (vii) consumable items, including, but not limited to, filters, drive belts, light bulbs, lamps, wear strips/surfaces, gaskets, fuses, conveyor belts, contactors, valves, spark plugs, and other similar items. If on-site warranty work is required for a product located outside of the continental U.S, Blue M will charge the customer on a time and materials basis, plus reasonable expenses for travel, lodging and meals.

**THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS, STATUTORY OR IMPLIED, AND STATES BLUE M’S ENTIRE WARRANTY AND THE ORIGINAL PURCHASER’S SOLE AND EXCLUSIVE REMEDY RELATED TO PRODUCTS OR SERVICES BLUE M PROVIDED. BLUE M EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES IMPOSED BY COURSE OF DEALING OR USAGE OF TRADE.**

For full details, exclusions, and other information on our warranty please go to: <https://www.bluem.com/warranty-information>

Scan for Additional  
Warranty Information



## International Support

- All models available in 50 & 60 Hertz configurations
- CE, cUL, & UL-508A available
- Authorized reps / servicers in most countries



## TPS MAX Program

The TPS MAX Program allows the customer to purchase future service and/ or parts without the need to have a purchase order approved and released when parts or service are needed. These funds are available to be used on parts or service in the future, saving you and your company costly down-time. Enrollment also entitles you to the many advantages listed below. Enrollment in the TPS MAX Program requires a minimum purchase of \$5,000.00. Amounts above \$5,000.00 will be accepted. Funds do not expire.

10% Off:

- Service Labor (including: training, installation, preventive maintenance)
- Travel Time
- Calibration Services
- Parts
- Mileage
- Ground Shipping on Parts

## Aftermarket Services

**Optimize. Revitalize. Maximize.**

From installation, parts and global support to servicing, testing and yearly maintenance, we are here to ensure your TPS product achieves maximum performance.

GAMP Documentation may include FRS, HDS, SDS, FAT, SAT, and IQ/OQ.

**Services Include:**

- Installation Supervision
- Start-up & Training
- Preventative Maintenance
- Temperature Uniformity
- Instrument Calibration
- GAMP Documentation



Blue M is a brand of Thermal Product Solutions, LLC.

»Blue M »Gruenberg »Lindberg/MPH »Lunaire  
»Redline Chambers »Tenney »Wisconsin Oven

[www.bluem.com](http://www.bluem.com)

2821 Old Route 15 | New Columbia, PA 17856-9396 | USA | P: (570) 538-7200 | F: (570) 538-7380