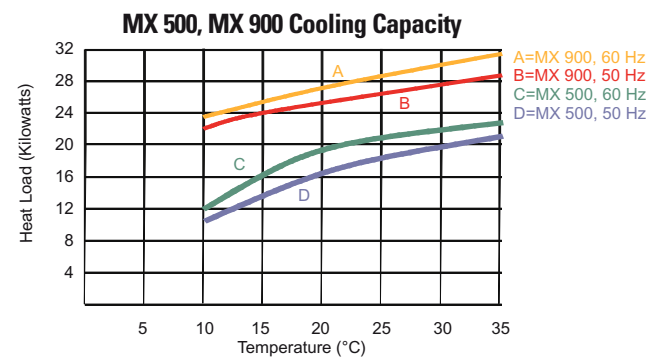
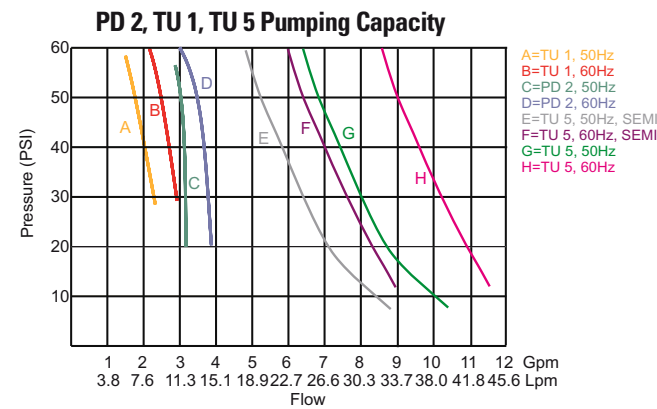
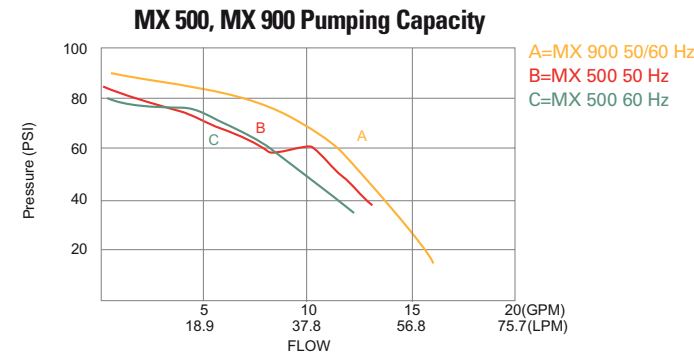
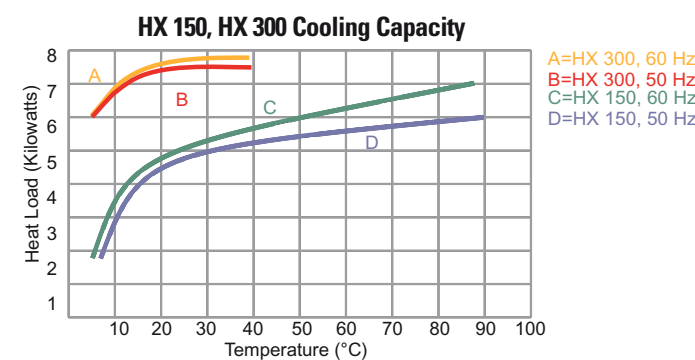


NESLAB Refrigerated Recirculating Chiller Specifications

| | HX 150 TU 1 | HX 150 PD 2 | HX 300 Semi | HX 300 | MX 500 | MX 900 |
|------------------------------|-------------------|--------------------|------------------------|------------------|---------------------------------|--------------------------------|
| Part number | 388216061604 | 388216041606 | 390299071613 | 390299071603 | 293299751601 | 295229752001 |
| Refrigerant | R404A | R404A | R404A | R404A | R404A | R404A |
| Temperature range | | | | | | |
| C | +5° to +90° | +5° to +90° | +5° to +40° | +5° to +40° | +10° to +35° | +10° to +35° |
| F | +41° to +194° | +41° to +194° | +41° to +104° | +41° to +104° | +50° to +95° | +50° to +95° |
| Cooling capacity | | | | | | |
| 50 Hz | 4.5 kW | 4.5 kW | 7.3kW | 7.3kW | 16.4 kW | 24.0 kW |
| 60 Hz | 4.8 kW | 4.8 kW | 7.5kW | 7.5kW | 19.3 kW | 25.2 kW |
| Heater capacity | 1kW | 1kW | n/a | n/a | n/a | n/a |
| Pump performance | | | | | | |
| 50 Hz LPM | 7.6 LPM @ 2.8 bar | 11.4 LPM @ 3.4 bar | 19.7 LPM @ 3.4 bar | 26 LPM @ 3.4 bar | 24.6 LPM @ 4.8 bar | 47.7 LPM @ 3.4 bar |
| 50 Hz GPM | 2 GPM @ 40 psi | 3 GPM @ 50 psi | 5.2 GPM @ 50 psi | 6.9 GPM @ 50 psi | 6.5 GPM @ 70 psi | 12.6 GPM @ 50 psi |
| 60 Hz LPM | 9.5 LPM @ 3.1 bar | 13.2 LPM @ 3.4 bar | 24 LPM @ 3.4 bar | 34 LPM @ 3.4 bar | 20.4 LPM @ 4.8 bar | 47.7 LPM @ 3.4 bar |
| 60 Hz GPM | 2.5 GPM @ 45 psi | 3.5 GPM @ 45 psi | 6.3 GPM @ 50 psi | 9.0 GPM @ 50 psi | 5.4 GPM @ 70 psi | 12.6 GPM @ 50 psi |
| Compliance | CE, SEMI-S2-0200 | CE, SEMI-S2-0200 | CE, SEMI-S2-0200 | CE | CE, UL, SEMI S2-0200, SEMI F 47 | CE, CSA/NRTL, SEMI S2-0200, UL |
| Temperature stability | | | | | | |
| C | ±0.5° | ±0.5° | ±0.5° | ±0.5° | ±0.5° | ±0.5° |
| F | ±0.9° | ±0.9° | ±0.9° | ±0.9° | ±0.9° | ±0.9° |
| Reservoir Volume | | | | | | |
| gallon | 8.0 | 8.0 | 4.5 | 4.5 | 8.0 | 8.0 |
| liter | 3.03 | 3.03 | 17 | 17 | 30 | 30 |
| Unit dimensions | | | | | | |
| H x W x D in | 39 x 36 x 21 | 39 x 36 x 21 | 39 x 33 x 25 | 39 x 26 x 21 | 48 x 36.25 x 26.5 | 48 x 36.25 x 26.5 |
| H x W x D cm | 99 x 92 x 54 | 99 x 92 x 54 | 99 x 84 x 64 | 99 x 66 x 53 | 122 x 92 x 67 | 122 x 92 x 67 |
| Power Requirements | | | | | | |
| 50 Hz | 208V | 208V | 208-230V | 208-230V | 200 VAC | 200 VAC |
| 60 Hz | 200V | 200V | 200V | 200V | 208 VAC | 208 VAC |
| Deionization filter | Yes | Yes | No | No | No | No |
| Plumbing connections | | | | | | |
| inlet/outlet | 1/2" female NPT | 1/2" female NPT | 3/4" quick disconnects | 3/4" female NPT | 3/4" female NPT | 3/4" female NPT |
| drain | 1/2" female NPT | 1/2" female NPT | 1/2" female NPT | 1/2" female NPT | 3/4" female NPT | 3/4" female NPT |
| Unit weight | | | | | | |
| lb | 220 | 220 | 319 | 314 | 567 | 567 |
| kg | 99.8 | 99.8 | 145 | 142 | 257 | 257 |
| Communications | Analog | Analog | Analog, Digital | Analog, Digital | Analog, RS232 | Analog |



- Low Cost of Ownership**
- Support multiple applications
 - Guaranteed Leak Free
 - Extreme reliability
 - Ensures more uptime

Optional enhancements: Industry Leadership Backed by Custom Service Options

Thermo Electron Corporation has a well-established reputation as a proven provider of temperature control technology, global service and support. With the addition of formerly independent companies NESLAB and HAAKE to the Thermo family, the company has more than 75 years of industry experience. Thermo professionals worldwide develop and support the solutions that help you analyze, detect, measure, and control your applications with increasingly advanced precision.

Thermo understands your business and its cyclical nature. That is why our Fab Performance Services are designed for flexibility, allowing customers to select the level of services required to meet current business needs. Whether you are operating one shift per day or 24/7, Thermo has just the right combination of Fab Performance Services to meet your operational and budgetary requirements.

Our Thermo Direct program includes local, customized service options to help you manage the life of your recirculating chillers and heat exchangers and reduce your downtime risk and costs. Rather than simply respond to service problems as they occur, we will help minimize downtime incidents.

| | FAB Performance Assist | FAB Performance Advantage | FAB Performance Management |
|----------------------------|---|--|--|
| Business Priority | Maintenance Budget | Reduce downtime | Minimize downtime and improve Fab maintenance personnel utilization |
| Program Description | Equipment maintenance training & spare parts management support to optimize budget | Proactive equipment replacement and staging support to remove high-risk equipment from your temperature control installed base | FAB Performance Advantage program features plus: Dedicated Thermo certified service resources onsite to ensure optimal temperature control equipment uptime and performance |
| Cost Controls | <ul style="list-style-type: none"> • Improve maintenance personnel productivity • Improve inventory management & control • Optimize maintenance budget | <ul style="list-style-type: none"> • Contract unit pricing • Reduce Fab spares inventory via shared inventory model • Improve Fab maintenance personnel utilization | <ul style="list-style-type: none"> • Fab maintenance resources reallocated to other critical tasks • Dedicated Thermo certified application support to optimize temperature control system performance • Extended product lifecycles lowering COO |
| Uptime | <ul style="list-style-type: none"> • Extend PM frequency • Fast in-situ repair, or, replacement decisions • Improve maintenance resource utilization | <ul style="list-style-type: none"> • Proactive equipment replacements made during scheduled downtime • Certified Spares** management minimize unplanned downtime risk • Targeted incident prevention | <ul style="list-style-type: none"> • Maximize temperature control equipment up-time • 100% turnkey factory support • Temperature Control Equipment up-time guarantee |
| Dependability | <ul style="list-style-type: none"> • Parts availability guarantee • Priority factory technical support • Trained and certified Fab maintenance staff | <ul style="list-style-type: none"> • Streamline maintenance support via inventory controls and technical support • Factory service technician onsite two times per year for PM/calibrations • Certified Spare** unit availability guarantee | <ul style="list-style-type: none"> • Certified Thermo personnel • Optimize temperature control equipment performance • Minimize critical process equipment temperature variability |

**A Thermo Certified Spare is a product remanufactured and tested to meet new product performance specifications. Certified Spare products include current software, firmware and refrigerant upgrades as well as a new product warranty

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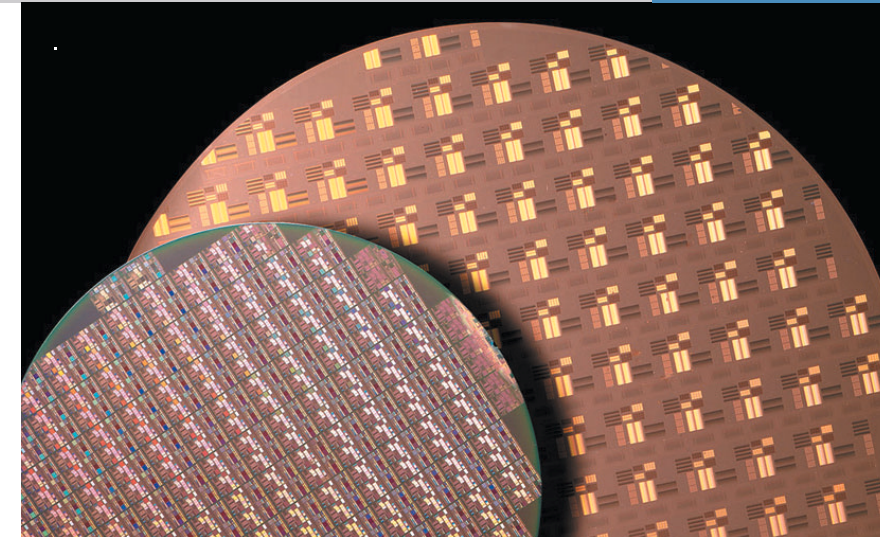
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 BRFABv1.0EB/06TC
www.thermo.com/tcsemi

NESLAB Water-to-Water Heat Exchanger Specifications

| | DIMAX 2 | Steelhead 0 | Steelhead 1 | System III | SWX 100 CP 9 | SWX 100 CP 13 |
|------------------------------|--|---|---|--------------------------|-----------------------------|-----------------------------|
| Part number | *622018991803 / 622023991803 | 620000000015 | 620000000005 | 327027991701 | 603099991601 | 603099991602 |
| Temperature range | | | | | | |
| C | +20° to +30° | +30° to 85° | +30° to +101° | +15° to +30° | +15° to +30° | +15° to +30° |
| F | +68° to +86° | +86° to +125° | +86° to +214° | +59° to +86° | +59° to +86° | +59° to +86° |
| Cooling capacity | | | | | | |
| 50 Hz / 60 Hz | 200 kW | 8 kW | 8 kW | 50 kW | 100 kW | 100 kW |
| Number of channels | n/a | 4 (2GPM per channel) | 4 (2GPM per channel) | n/a | n/a | n/a |
| Materials | copper, stainless | brass, copper, stainless | all stainless | brass, copper, stainless | Stainless, nickel | copper, stainless |
| Pump performance | | | | | | |
| 60 Hz LPM | 150 LPM @ 1.6 bar | 30 LPM @ 5.5 bar | 30 LPM @ 5.5 bar | 49 LPM @ 2.4 bar | 95 LPM @ 6.2 bar | 114 LPM @ 8.6 bar |
| 60 Hz GPM | 40 GPM @ 23 psi | 8 GPM @ 80 psi | 8 GPM @ 80 psi | 13 GPM @ 35 psi | 25 GPM @ 90 psi | 30 GPM @ 125 psi |
| Compliance | CE, CSA/NRTL, SEMI S2-0200 SEMI F47, SEMI S2-0703 | CE, IBM Safety standards including EMO | CE, IBM Safety standards including EMO | CE | CE, SEMI 52-0703 | CE, SEMI 52-0703 |
| Reservoir volume | | | | | | |
| gallon | 23 | 5 | 5 | 21.7 | 23.7 | 23.7 |
| liter | 87 | 19 | 19 | 82.1 | 90 | 90 |
| Unit dimensions | | | | | | |
| H x W x D in | 53.6 x 33.2 x 32.1 | 30.25 x 20.25 x 29.25 | 30.25 x 20.25 x 29.25 | 30.50 x 25 x 26 | 45.5 x 36 x 37.5 | 45.5 x 36 x 37.5 |
| H x W x D cm | 136.0 x 84.3 x 81.6 | 76.8 x 51.4 x 74.3 | 76.8 x 51.4 x 74.3 | 90.2 x 63.5 x 66.0 | 115.6 x 91.4 x 95.2 | 115.6 x 91.4 x 95.2 |
| Power requirements | | | | | | |
| 50 Hz | *200-208V / 460V, 3 phase, 8 amps | 200V / 208V, 3 phase, 23 amps | 200V / 208V, 3 phase, 23 amps | 208V, 1 phase 10 amps | 380-460V, 3 phase, 9.6 amps | 380-460V, 3 phase, 9.6 amps |
| 60 Hz | *200V / 380-400V, 3 phase, 8 amps | 200V / 208V, 3 phase, 25 amps | 200V / 208V, 3 phase, 25 amps | 208V, 1 phase 10 amps | 380-460V, 3 phase, 9.6 amps | 380-460V, 3 phase, 9.6 amps |
| Plumbing connections | | | | | | |
| inlet/outlet | 2" female NPT | 1/2" quick disconnects | 1/2" quick disconnects | 1" 37° flare fittings | 1" female NPT | 1" female NPT |
| drain | 1/2" female NPT | 1/2" female NPT | 1/2" female NPT | 3/4" female NPT | 1/2" female NPT | 1/2" female NPT |
| Unit weight | | | | | | |
| lb | 626 | 166 | 166 | 311 | 636 | 636 |
| kg | 284 | 365 | 365 | 141 | 636 | 636 |
| Serial Communications | Analog, Digital, DeviceNet | Analog, Digital | Analog, Digital | Analog, Digital | Analog | Analog |



NESLAB Recirculating Chillers and Heat Exchangers for Semiconductor Applications

Reliable, easy-to-maintain units that minimize total cost of ownership

Typical semiconductor applications:

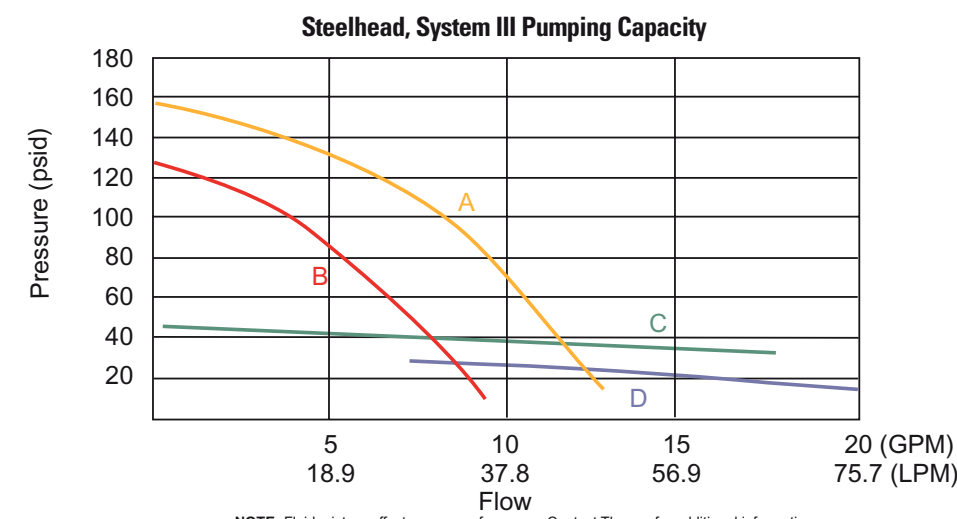
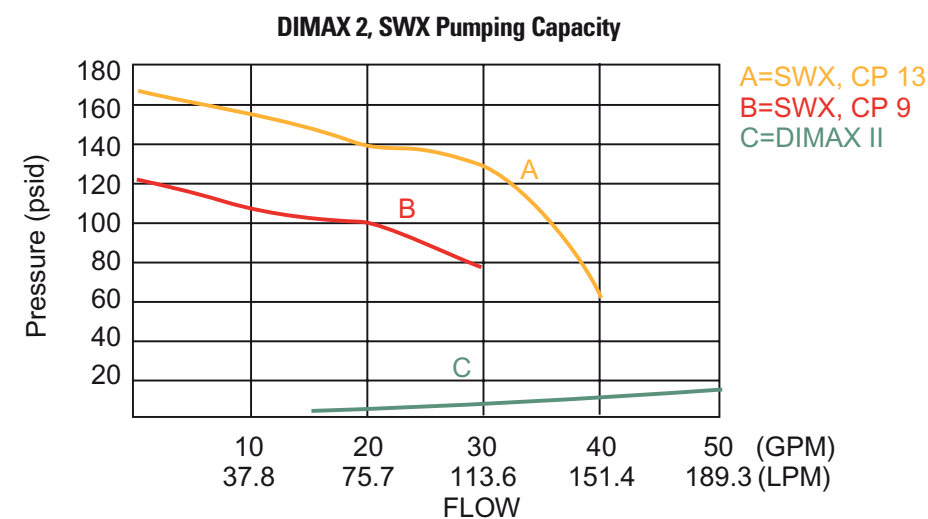
- Processes:**
- Dry etch – plasma (e.g RF/Microwave)
 - Wet etch
 - Dry deposition (e.g. CVD, SACVD, PVD)
 - Wet deposition (e.g. ECP)
 - Ion implantation
 - Plasma asher
 - Planarization

Components:

- Chamber walls
- Cathodes
- Domes
- Upper/lower electrodes
- Chucks/disks
- Ozone generators
- Cleaning baths and plating tanks
- RF power supplies



- Reliable Performance**
- Proven quality
 - Extended DI Life
 - Next Generation AMAT 0/1
 - Medium / High temp. Options



- A=SH0/1, 60 Hz**
B=SH0/1, 50 Hz
C=SYSTEM III, 60 Hz
D=SYSTEM III, 50 Hz

NOTE: Fluid mixture affects pump performance. Contact Thermo for additional information.



- Innovative Technologies**
- Modular Construction
 - Multi-channel support
 - VFD Power conditioning
 - Integrated plumbing assy



Unequaled product quality, performance and overall value.

NESLAB recirculating chillers and heat exchangers from Thermo Electron Corporation are designed to meet the demanding productivity requirements of the semiconductor industry.

Low Operating Cost

- Minimal water usage and energy consumption.

Ease of Use

- Intuitive menu driven configuration.
- Flow is user configurable for optimized temperature control.
- Controller LED shows status and troubleshooting information.

Long Term Reliability

- Robust modular design & construction.
- Proven performance with large installed base.

Backwards Compatibility

- Performance and integration compatible with original NESLAB equipment supplied by the OEM.

Worldwide Factory Support

- Backed by a comprehensive customer support program.

- Flexible and customized service programs available to meet your operational needs.

Remote Control Operation

- RS232, RS485, DeviceNet, Analog I/O available.

Compliance

- SEMI 0200, CE, UL, CSA.