Therminator™

Operation, Assembly & Maintenance Manual

Congratulations on your purchase and thank you for selecting the Therminator™ brand stainless steel wort chiller from Blichmann Engineering. We are confident that it will provide you years of service and many gallons of outstanding beer. This manual will familiarize you with the use of the Therminator™, assembly, and sanitation procedures.

****** PLEASE READ THOROUGHLY PRIOR TO USE FOR IMPORTANT SAFETY INFORMATION ******

IMPORTANT !!

Warning: Sections labeled "Warning" can lead to serious injury or death if not followed. Please read these thoroughly and understand them completely before use. If you do not understand them or have any questions, contact your retailer or Blichmann Engineering (www.BlichmannEngineering.com) before use.

Caution: Sections labeled "Caution" can lead to equipment damage or unsatisfactory performance of the equipment. Please read these sections thoroughly and if you have any questions, contact your retailer or Blichmann Engineering before use.

Assembly:

Threaded fittings

The Therminator™ utilizes ½" NPT (National Pipe Taper) male threads for the wort side of the exchanger (top fittings on the back and front of the exchanger) that will readily mate up with your preferred type of hose connector. The cooling water side of the exchanger (bottom fittings on the back and front of the exchanger) is fitted with ¾" male garden hose threads (GHT). High quality hose quick connect fitting adapters from Blichmann Engineering are available through your retailer.

Caution: If you are using stainless NPT adapter fittings on the wort side of the exchanger (½" NPT) it is necessary to use a thread sealing tape (Teflon™ type) to prevent thread galling (welding), which is not covered under warranty. If you feel any grinding while tightening stop immediately as this galling the threads! Threads, once galled, will not come apart! The key to long thread life is not over tightening, and using an adequate amount of thread sealing tape. If you are using brass or plastic adapter fittings, the use of thread sealing tape is still recommended, but optional. No sealing tape is needed on the cooling water side of the exchanger since it employs non-tapered garden hose threads.

Warning: Always properly secure all hoses with hose clamps or appropriate clamping device for the adapter fittings you are using **before use**. Use hose rated for the pressure and temperature of the wort and cooling water. Failure to do so can result in a hose coming off during use possibly causing severe burns and or property damage. See Fig. 1 for typical installation of hoses.

Mounting Bracket:

The unit is supplied with a heavy gauge stainless steel "universal" mounting bracket. It can be installed facing forward, to the rear, facing up or down to best meet your needs. Install the bracket between the nuts as shown in Fig. 2 below. Do not mount the unit by the fittings!

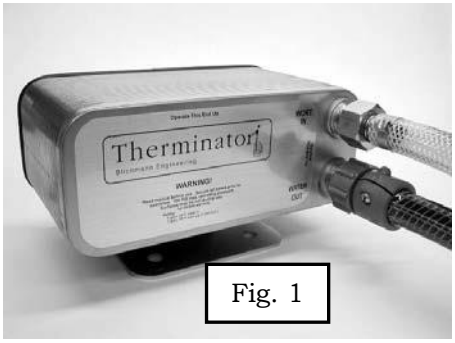


Fig. 1

Shown with optional Blichmann Engineering QuickConnector™ fittings on the wort in/out.

Fig. 2

Cleaning & Sanitation:

Caution: do **NOT** use any cleaner or sanitizer containing **chlorine** such as bleach. Over time, this will pit and erode stainless steel. DO NOT use caustic (lye, Drain-o etc) to clean the chiller – these cleanerswill damage the copper braze material. Powdered Brewery Wash is just as effective and MUCH safer to use. Any other non-chlorine sanitizer is acceptable to use. Iodophor™ or StarSan™ (see warning below) both work very well and do not require rinsing.

Prior to the first use, soak the unit in PBW (Powdered Brewery Wash) with the fittings facing up so all air is purged from the exchanger and all surfaces get wetted. Rocking the unit side-to-side will purge any entrapped air. Rinse well and then soak in a solution of your favorite non-chlorine sanitizer. Drain and allow to drip-dry. **Do not store the unit full of sanitizer**, and do not soak for extended periods in cleaning solutions (1/2 to 1 hour is usually plenty).

Before each use: If properly cleaned after the previous use, all that is required is to soak the exchanger in a sanitizing solution. Iodophor, StarSan or similar no-rinse sanitizers work well. Soak it with the fittings facing up so all air is purged from the exchanger and all surfaces get wetted. Rocking the unit from side to side will help purge any remaining air from the exchanger. Drain thoroughly.

After each use: **Immediately after use**, rinse the wort side of the exchanger with hot tap water utilizing a hose/faucet adapter (not included, but available from Blichmann Engineering as an accessory item) as shown in Fig. 3. Rinse in the **opposite** direction of normal wort flow first to expel any hop or trub particles that may have entered the exchanger. Then reconnect and rinse in the normal wort flow direction. A couple minutes each way is sufficient. Remove the adapter fittings if used and scrub with a soft brush, taking care to remove all sealing tape if used. A ½ to 1 hour soak in hot PBW is recommended after this rinsing to remove any stubborn deposits and proteins. Rinse thoroughly, then soak the unit in a

Fig. 3

sanitizing solution as previously described. Drain and allow to drip-dry. Do not store the unit full of sanitizer due to potential galvanic corrosion issues. An alternate method to sanitize the unit is to immerse it in boiling water for 10-15 minutes, which will completely sterilize it.

Fig. 3a

Storage: Store the Therminator™ as shown in Fig. 3a with the ends open and facing down. This will allow any remaining water to drain to the bottom and evaporate through the openings which will prevent mildew. It is normal for there tobe a bit of trapped water at the fittings, but this will evaporate in a few days.

Caution: StarSan users – this is an acid based sanitizer, and although it will not harm copper for short periods, it will harm the unit if exposed for extended periods. Prior to storage rinse the unit thoroughly (both wort and cooling water sides) with hot tap water to remove the residual sanitizer from the unit.

Periodic maintenance: Over time, salts from your cooling water and wort can accumulate on the surfaces of the exchanger lowering the efficiency and increasing the chances for contamination. After approximately 6 uses or every 6 months, soak the unit in a mild (5%) food grade citric or phosphoric acid solution for ½ to 1 hour, filling and draining periodically to ensure fresh solution reaches the interior of the exchanger. Rinse thoroughly, drain, and drip-dry. If you are using StarSan (an acid sanitizer) this is not necessary.

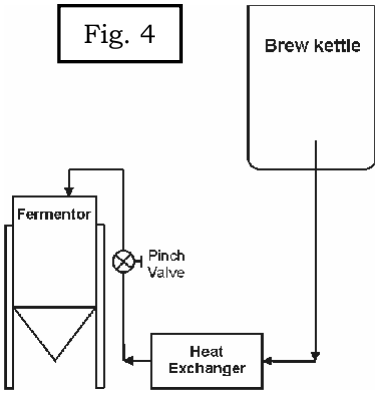
Installation & Operation:

For the exchanger to perform properly, it is critical that all surfaces of the exchanger be continuously flooded with cooling water and wort. If air is trapped in the unit, not only will the exchanger performance drastically drop, but also you will be oxidizing your wort. It is also permissible to operate the unit with the fittings facing vertically, but the wort inlet should be facing downward. While other installation configurations may work, thee recommended positions allow air to naturally purge from the unit. If you see bubbles of air in your wort hoses, it is likely due to loose fittings or hose clamps allowing air to enter the system. Tighten as needed.

If you wish to control the cooling water flow rate through the unit, it is permissible to install a valve on the **inlet** side of the exchanger. Or simply control the flow using the garden hose bib.

It is highly recommended that you install a filter in front of the chiller (stainless scouring pad, screen type filters, Y-strainer or similar pre-filter) to ensure particulate matter remains in the brew pot and does not plug the hoses, pump or exchanger. When boiling is finished, start a strong whirlpool with your stir paddle by stirring clockwise vigorously. Cover and let it sit for 10-15 min to settle the hops & trub in the center of the brew pot. Then begin draining and chilling the wort. This will also enhance the flavor and clarity of your finished beer.

Fig. 4

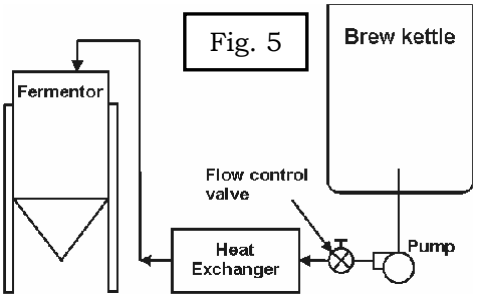


For gravity flow chilling:

This procedure is used for systems where elevation (gravity) is utilized to move the wort from the boil kettle to the fermentor. Install the exchanger as shown in Fig. 4 ensuring that the exchanger is laid on its side and is lower than the brew pot and at the same level as the bottom of the fermentor (or below it). If it is raised higher, the wort will quickly drain from the exchanger exposing a portion of the plates and lowering the capacity of the unit. Using a hose "pinch-valve" (shown in Fig. 4) **after** the exchanger is a good way to control the flow rate of wort through the unit. Do not place the pinch valve before the exchanger or it may not remain full of wort.

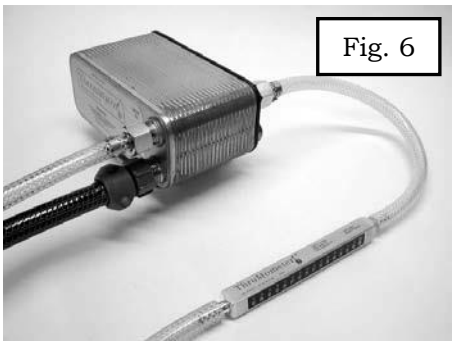
For pump chilling:

This procedure is used for systems where a pump is utilized to move the wort from the boil kettle to the fermentor. Install the exchanger as shown in the diagram below ensuring that the exchanger is laid on its side and is lower than the brew pot and at the same level as the bottom of the fermentor (or below it). If it is raised higher, the wort will drain from the exchanger exposing a portion of the plates and lower the capacity of the unit. Place the exchanger **after** the pump to reduce the possibility of pump cavitation. It is also advisable to have the pump and valve on the hot side of the exchanger (pumping hot wort) to reduce the possibility of bacterial contamination.



ThruMometer:

We highly recommend using the ThruMometer in-line thermometer from Blichmann Engineering (shown in Fig. 6) to properly set the exchanger to the ideal outlet temp (68°F) and cooling water flow rate as described in the procedure below. The low cost, high precision, fast response, and mirror smooth interior (easy to sanitize), make it far superior to any in-line thermometer on the market. Go to www.BlichmannEngineering.com for details.



Setting flow rates:

Warning: Ensure all hoses are properly secured as described above. Surfaces of the exchanger, fittings and hoses may be hot during use.

Before pumping or draining hot wort through your heat exchanger, turn the cooling water on to the maximum flow rate, which will purge all air from the water side of the exchanger. Slowly increase the hot wort flow rate until you reach the desired outlet temperature. If using the ThruMometer™ in-line thermometer and you never see a change in color on the thermometer elements, carefully touch the side of the ThruMometer™ and determine if the temperature is above 88°F or below 58°F. If above 88°F, slow down the beer flow rate. If below 58°F, increase the wort flow rate. If it is still too cold, slow down the water flow rate, leaving the wort flow rate at maximum.

Notes for Southern Climates:

Brewers in southern climates have a particular challenge chilling wort due to the elevated ground water temperature. Cooling water temperatures can exceed 80°F in the summer, making chilling wort to the ideal temperature (68°F) impossible. However, the incredible cooling capacity and efficiency of the Therminator™ chiller will allow the wort to be chilled much closer to the ground water temp, at a faster rate, and using less water than any chiller on the market. Obviously, wort flow rate and wort outlet temperature are trade-offs. A good rule of thumb (assuming 5gpm of water flow) is that the Therminator™ will chill about 3-5°F above the cooling water temperature at moderate wort flow rates (about ¾-1gpm), and about 10°F above the cooling water temperature at higher wort flow rates (about 1.5-2 gpm). Heat exchanger performance is not linear, so it is difficult to predict exact performance at conditions not shown in the graph below. Bear in mind that the performance graph is based on cooling the wort to 68°F.

If your cooling water is too hot to cool to your desired wort outlet temperature, you will need to use an immersion chiller in an ice-bath in conjunction with your Therminator™ chiller to lower the cooling water temperature the additional degrees. Since the Therminator™ chiller will remove the vast majority of the heat in a very short period of time, much less ice will be consumed. A 20 ft length of 5/8" copper tube immersed in a 5gal pail of ice and water will usually be sufficient. Pre-chilling the cooling water, instead of

post-chilling the wort in another exchanger, reduces the possibility of contamination since the cooling water chiller doesn't need to be sanitized.

Therminator Accessories: are available through your Blichmann Engineering retailer. Designed with the highest quality and attention to detail to give you the best beer possible, with the least hassle.

Back-flush hose assembly

18" long ½" ID hose with Garden Hose thread and ½" QuickConnector™ on the ends.

Makes cleaning your Therminator™ hassle free!

QuickConnector™

Stainless barb available for 1/2" or 3/8" ID hose. Includes silicone o-ring and nickel plated brass nut (does not touch liquid). Tightens by hand!

Makes connecting your Therminator™ a snap!

Therminator™ Accessory Kit

Includes back-flush hose and a pair of QuickConnector™ fittings (your choice of 1/2" or 3/8" barb)

Everything you need for your Therminator™

Troubleshooting:

Not reaching desired wort temperature:

- Use graph on page 6 to estimate cooling capacity with the cooling water temperature and flow rate in your brewery. Water supplies change temperature depending on the season, and flow can change with varying system water usage.
- Be sure exchanger is installed at the low point in the system so it is completely full of wort.
- Be sure unit is operated on its side so all the air is purged from the unit.
- Unit is fouled from water salts – see "Periodic maintenance" section above

Not reaching desired wort flow:

- Use graph on page 6 to estimate flow capacity with the cooling water temperature and flow rate in your brewery. Water supplies change temperature depending on the season, and flow can change with varying system water usage.
- For gravity drain systems, you may not be able to meet the maximum flow needed based on available elevation of the brew pot and restriction of the brew pot drain and hoses. The exchanger itself adds a negligible restriction (about 0.1 PSI or .6" of water column)
- Hose diameter too small causing excessive restriction - use a larger diameter hose.
- Check for blocked or plugged brew pot suction, hose, flow control valve, or exchanger inlet. If plugged, it is recommended that you install a stainless scouring pad or suction screen to the suction (inlet) of your brew pot to ensure particulate matter remains in the brew pot. This will also enhance the flavor and clarity of your finished beer by removing trub from the finished wort.

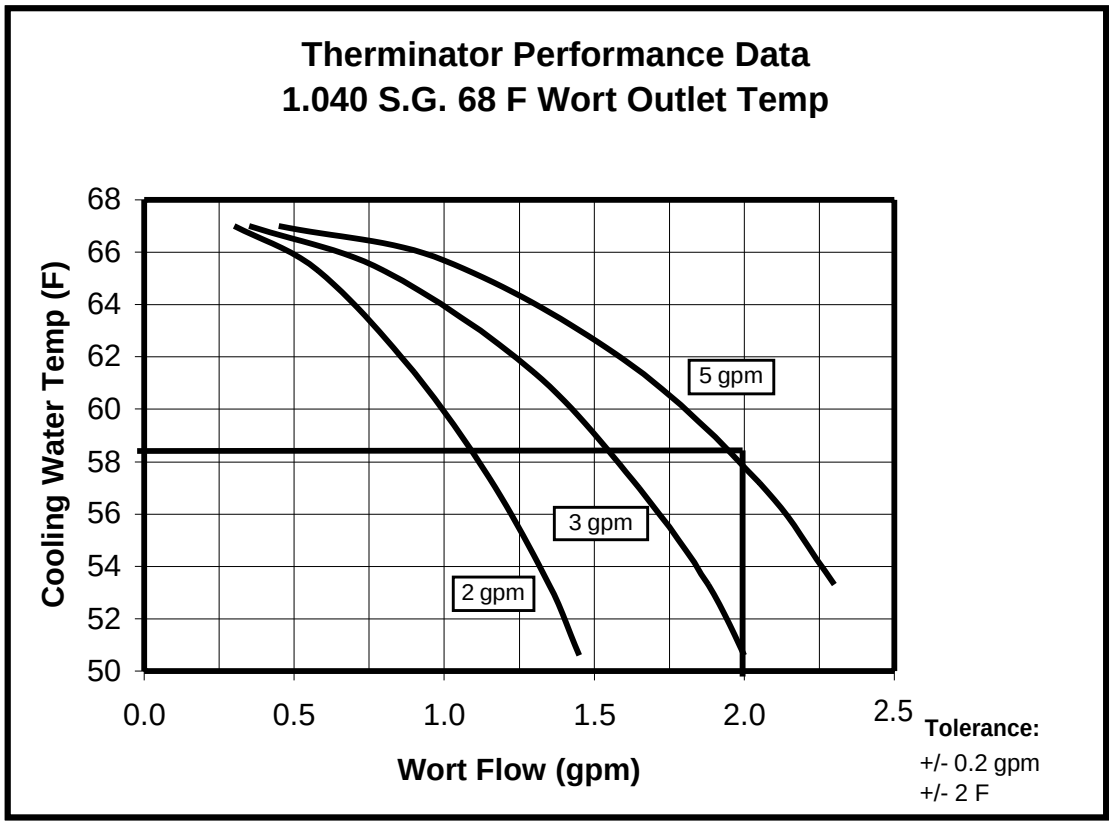
Sanitation (contamination) problems:

- Thoroughly read "Cleaning & Sanitation" section above specifically:
- Ensure unit is cleaned with hot water, PBW, and sanitizer IMMEDIATELY after each use
- If not cleaned immediately after use, soak in a hot PBW (Powdered Brewery Wash) solution for ½ to 1hr, then rinse thoroughly with hot tap water. If you have the means to circulate hot PBW through the exchanger this will result in a more thorough cleaning. Circulate in both directions.
- Clean with mild citric or phosphoric acid solution as recommended to remove water salts
- Sanitize with the fittings up to ensure that all air is purged from the system

- Remove and sanitize adapter fittings after each use
- Ensure hoses, pump and other drain fittings are properly sanitized before use
- Boiling the exchanger before use will sterilize the unit, but if properly cleaned immediately after use this is not necessary.

Estimating Performance:

The graph below is used to predict the gallons per minute (gpm) of wort you'll be able to chill from boiling down to 68°F (ideal fermentation start temp) using water from your garden hose as the cooling media. Wort specific gravities above 1.040 will perform slightly lower than the graph. Specific gravities below 1.040 will perform slightly better than the graph. Note that small changes in inlet cooling water temperature and flow can have a large impact on the wort outlet temperature and flow.



1) Measure the cooling water flow rate in your brewery using a bucket of known volume and a stopwatch. Divide the gallons by the minutes (gal/min). Then measure the cooling water temperature using an accurate digital type thermometer. Record these values. Note: these values will change throughout the year.

2) Choose either the 5.0 gpm, 3.0 gpm, or 2.0 gpm line that best matches your cooling water flow rate. If your flow lies between these lines, it is acceptable to interpolate between them.

3) Go to the point on the Y-axis labeled "Cooling Water Temp (F)" to your cooling water temperature measured in step (1).

4) Draw a horizontal line to intersect the cooling water flow rate line you selected previously (5.0, 3.0, 2.0 gpm) in step (2)

5) Draw a vertical line at the intersection point down to the X-axis labeled "Wort Flow (gpm)" and read the wort chill flow rate you'll get at your brewery!

Example: If you have 58F cooling water and 5 GPM of flow, draw a horizontal line (see dark line in graph above) at 58F over to the 5.0 gpm line. Draw a vertical line (see thick dark line in graph above) from the intersection point down to the X-axis and read 2.0 GPM.

Blichmann Engineering Product Warranty

A. Limited Warranty

1. Blichmann Engineering warrants to the original purchaser that this product will be free from manufacturing defects in material and workmanship for a period of one (1) year from the date of purchase by the customer. Proof of purchase is required. Blichmann Engineering's obligation to repair or replace defective materials or workmanship is the sole obligation of Blichmann Engineering under this limited warranty.
2. This product is for home use only. The limited warranty covers only those defects that arise as a result of normal use of the product and does not cover any other problems, including, but not limited to, those that arise as a result of:
    a. Improper maintenance or modification;
    b. Damage due to incorrect voltage or improper wiring by customer;
    c. Operation outside of the product's specifications;
    d. Carelessness or neglect to operate the product in accordance with instructions provided with the product;
    e. Damaging the tamper label on the product;
    f. Damage by over-tightening the fasteners;
    g. Failure to follow cleaning and / or maintenance procedures; or
    h. Exceeding published operational temperatures.
3. Blichmann Engineering reserves the right to request delivery of the defective component for inspection before processing the warranty claim. If Blichmann Engineering receives, during the applicable warranty period, notice of a defect in any component that is covered by the warranty, Blichmann Engineering shall either repair or replace the defective component with a new or rebuilt component at Blichmann Engineering's option.
4. Blichmann Engineering must be notified within seven (7) days of the delivery date of any shipping damage. Customer is responsible for shipping damage outside of this time period. Approval for return must be provided by Blichmann Engineering prior to any return. Customer is responsible for keeping all original packaging material for warranty returns. Blichmann Engineering is not responsible for damage from improperly packaged warranty returns, and these repair costs will be the sole responsibility of the customer. Shipping costs for warrantee returns are covered only for the contiguous United States.
5. Blichmann Engineering's limited warranty is valid in any country where the product is distributed.

B. Limitations of Warranty

1. Any implied warranty that is found to arise by way of state or federal law, including any implied warranty of merchantability or any implied warranty of fitness, is limited in duration to the terms of this limited warranty and is limited in scope of coverage to this warranty. Blichmann Engineering disclaims any express or implied warranty, including any implied warranty of fitness for a particular purpose or merchantability, on items excluded from coverage as set forth in this limited warranty.
2. Blichmann Engineering makes no warranty of any nature beyond that contained in this limited warranty. No one has authority to enlarge, amend, or modify this limited warranty, and Blichmann Engineering does not authorize anyone to create any other obligation for it regarding this product.
3. Blichmann Engineering is not responsible for any representation, promise, or warranty made by any independent dealer or other person beyond what is expressly stated in this limited warranty. Any selling or servicing dealer is not Blichmann Engineering's agent, but an independent entity.

C. Limitations of Liability

1. The remedies provided in this warranty are the customer's sole and exclusive remedies.
2. Except for the obligations specifically set forth in this warranty, in no event shall Blichmann Engineering be liable for direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory and whether or not advised of the possibility of such damages.
3. This warranty does not cover, and in no event shall Blichmann Engineering be liable for, travel, lodging, or any other expense incurred due to manufacturing defects in material and workmanship, or any other reason.
4. Any performance of repairs after the warranty coverage period has expired or performance of repairs regarding anything excluded from coverage after this limited warranty shall be considered good-will repairs and they will not alter the terms of this limited warranty, or extend any warranty coverage period.
5. Venue for any legal proceedings relating to or arising out of this warranty shall be in Tippecanoe County, Indiana, United States, which courts will have exclusive jurisdiction.

D. Local Law

1. This warranty gives the customer specific legal rights. The customer may also have other rights that vary from state to state in the United States or other countries.
2. To the extent that this warranty is inconsistent with local law, it shall be deemed modified, only to the extent necessary to be consistent with such local law.

This product uses food grade materials anywhere the product touches the beverage.
Warning: This product contains or may contain chemical(s) known to the State of California to cause cancer, birth defects, or other reproductive harm.

Check out our other great products!

BLICHMANN™
engineering

Brew with a Champion!

The original Blichmann champions:
Dana, Nicole, and Julie

New! **BOILERMAKER™** *New!*

Brew like a champion with a BoilerMaker™ brew pot! They feature an exclusive stepped bottom and an optional patent pending "button louver" false bottom (see graphic to right). Also available is an optional boil filter with guard (see graphic to left). Custom built with the home brewer in mind, these beautiful pots are constructed from heavy 18 gauge stainless steel and loaded with standard accessories including an adjustable angle BrewMometer, a glass level gauge with clean-out ports, and "snap-in" dip tube! The BoilerMaker™ is clearly in a class of its own.

For more information about our complete lineup of brewing products, please go to our web site

www.BlichmannEngineering.com

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