BrewMometer™

Operation, Assembly & Maintenance Manual

Congratulations on your purchase, and thank you for selecting the BrewMometer™ brand bimetal thermometer 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 assembly, calibration, and installation procedures, and use of the BrewMometer™. brand bimetal thermometer.

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

IMPORTANT !!

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

Assembly & Installation:

The BrewMometer™ is available in male ½" NPT (National Pipe Taper) to fit in most commercially available brew pots having a ½" female pipe coupling welded into the sidewall, and also a weldless version which is ideal for pots where no such fitting currently exists. It can be adapted to any pot or tank up to ¼" thick wall. The o-ring seal provides unequalled sealing capability and the unique o-ring retainer and specially made threaded connector allows the BrewMometer™ to be tightened firmly to the pot. Other weldless designs use a "sandwich" of o-rings which are prone to leaks, and "wobble" on the pot. In addition, two styles are offered: a fixed back dial and an adjustable back model that can be adjusted to virtually any convenient viewing angle.

Prior to installing the BrewMometer, select a position on the pot that is high enough to stay out of the heat of the burner, but low enough to measure approximately in the middle of the liquid for a better average temperature.

Caution: As with all bimetal thermometers, do not install the thermometer in a location on the pot where it will be subjected to excessive heat from high BTU propane burners. Always keep the flame low enough that it does not roll over the corners of the pot. Doing so will damage the seals in the hermetically sealed case causing the inside to fog. This failure is not covered under warranty. If you cannot comfortably hold your hand on the case of the thermometer during operation is too hot (about 140F max). A minimum distance of 6" from the bottom of the pot is recommended, but does not guarantee it will be below 140F. If the surface is still too hot, installing a heat shield (not provided) under the thermometer is recommended. Lastly, avoid direct spray of water on the thermometer and do not immerse it in water for cooling of cleaning.

½" NPT Threaded BrewMometer™

The ½" NPT BrewMometer™ utilizes ½" NPT (National Pipe Taper) male threads for easily adapting to brew pots where an adapter fitting has already been welded into the pot. Simply wrap the threads with 3-4 turns of a high quality Teflon™ pipe tape and thread onto the pot. Take care not to move or damage the calibration screw on the back of the thermometer and DO NOT over-tighten the fitting. You are not sealing against a large pressure, so a snug fit is all that is required.

Caution: When threading a stainless fitting onto another stainless fitting, it is absolutely necessary to use a thread sealing tape (Teflon™ type) to prevent thread galling (cold welding), which is not covered under warranty. If you feel any grinding whatsoever while tightening stop immediately as this is beginning to gall 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.

Weldless BrewMometer™

The weldless BrewMometer™ is very easy to install in a pot with a wall thickness up to ¼" thick. Determine the desired location for the BrewMometer™ and mark the center point with a permanent marker. Drill a 3/16 pilot hole and then enlarge it to ½" (+0.015, - 0.010) using a "step drill" as shown in Fig. 1. It is also possible to use a standard twist drill, but drilling in thin sheet metal with a twist drill usually results in oblong holes with rough edges and broken drills. Step drills are available through any hardware store or home improvement stores and produce a much higher quality hole with an automatically chamfered edge. After the hole is drilled, ensure both sides of the hole are free from burrs, which will cut the o-ring leading to potential leaks. The step drill can be used to chamfer (deburr) the hole on either side or you can use a file. **NOTE that the o-ring goes on the OUTSIDE of the pot. Installing it on the inside of the pot will cause it to leak!!**

Assemble the BrewMometer™ as shown in Fig. 2, tightening the nut snugly using wrenches, but do not use excessive force. Do not use pipe tape on the weldless model.

Caution: Use wrenches on BOTH sides of the pot – **do not tighten by holding the dial face** of the thermometer or you will damage the thermometer. Be careful not to hit the small calibration screw on the back side of the thermometer.

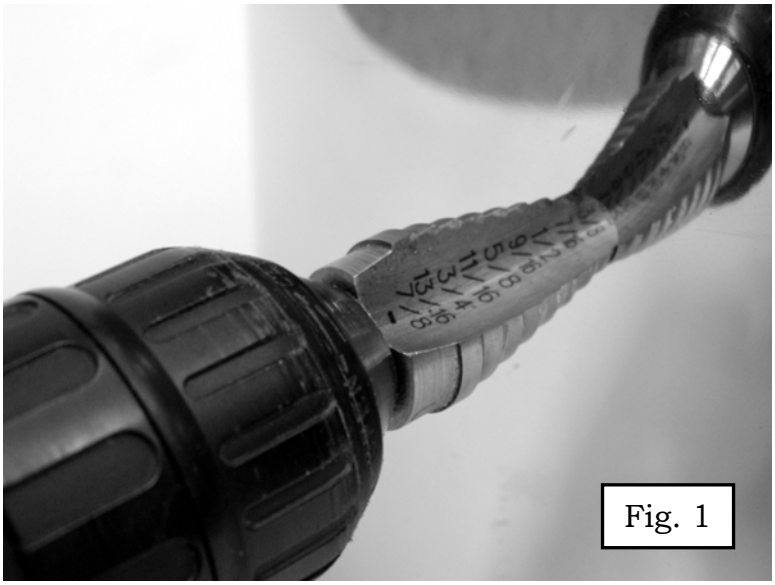

Fig. 1

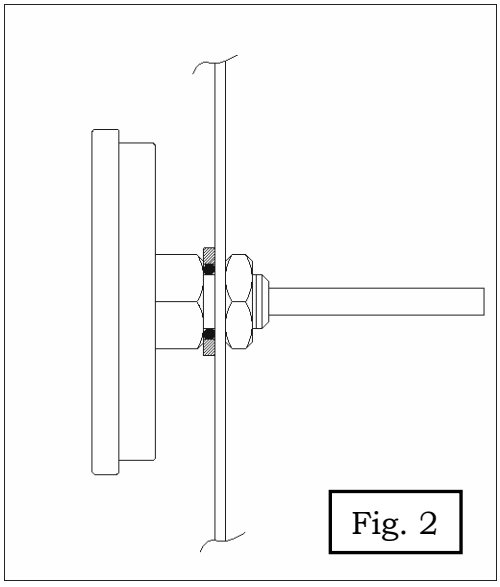

Fig. 2

Adjusting the BrewMometer™ Faceplate (adjustable models only)

The adjustable faceplate BrewMometer™ (shown in Fig. 3) can be adjusted to virtually any convenient viewing angle. To change the viewing angle, simply turn the pivoting mechanism to the desired position as shown in Fig. 4. Then rotate the dial face to the desired viewing angle as shown in Fig. 5. If the pivoting mechanism is too stiff to move, loosen the screws slightly to allow motion. The temperature reading may shift a degree or two when adjusting the viewing angle, but this is a temporary phenomenon and will equalize in a minute or two.

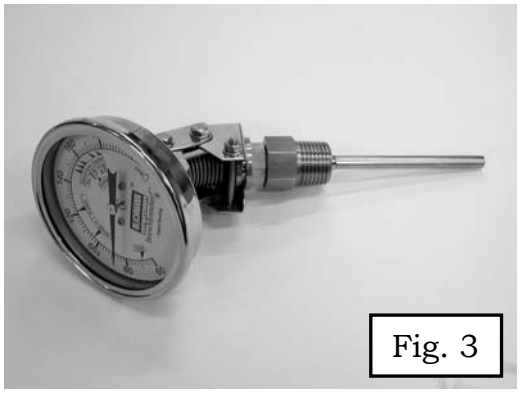

Fig. 3

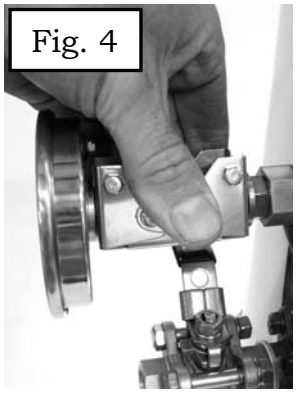

Fig. 4

Fig. 5

Calibration:

Impact and vibration during shipping can sometimes result in the thermometer losing calibration (will not read accurately). Two methods can be used to check the calibration of the thermometer.

The easiest, and usually most accurate method, is to calibrate the thermometer with another known, highly accurate thermometer. Most digital thermometers utilize thermocouples and have a tolerance of about +/- 3°F. In practice, digital thermometers are usually accurate to within +/-1°F. Mercury filled glass laboratory thermometers are ideal if available. Place both thermometers in hot tap water and allow sufficient time for both thermometers to read a steady temperature, swirling constantly. If the BrewMometer™ does not read the same temperature as the calibration thermometer, use a small wrench to turn the calibration screw until they read the same.

An alternate method is to calibrate in boiling water. To check the calibration, fill the pot with de-ionized or distilled water and bring it to a full rolling boil. Do not use tap water. Tap water contains minerals that change the boiling point of water. If the BrewMometer™ does not read exactly 212°F (at sea level), use a small wrench to turn the calibration screw until the thermometer reads exactly 212°F. Note: in higher altitudes, water boils at a lower temperature. Subtract 0.9°F for every 500ft you are above sea level. For example, if you are at 1500ft above sea level, water will boil at 212-0.9X3=209.3°F (3=1500/500). Therefore, set the BrewMometer™ to this setting in lieu of 212°F. Although this is not an exact formula, it provides an acceptable level of precision.

Use of the BrewMometer™

The BrewMometer™ utilizes a unique dial face that guides the homebrewer through the different stages of the brewing process. This helps to eliminate errors and to develop consistency in your brews. Since many of the procedures and properties of beer are subjective, the selected temperatures should be used as guidelines, not hard limits.

Note: An excellent and highly recommended resource for the brewing process can be found in John Palmers book *How To Brew* by Defenestrative Publishing Co – available through most homebrew supply stores. The descriptions of the brewing processes described below are excerpts from this book.

Reading the BrewMometer™ faceplate

The BrewMometer™ faceplate (shown in Fig. 6) contains all of the commonly used brewing processes and associated temperature ranges. Each process contains an "ideal" temperature, indicated by an arrow, and an acceptable range, indicated by a box. The brewing process is indicated inside of the box. Other brewing texts may reference a slightly different ideal temperature and temperature range, depending on the source, but these temperatures are the same for all practical purposes.

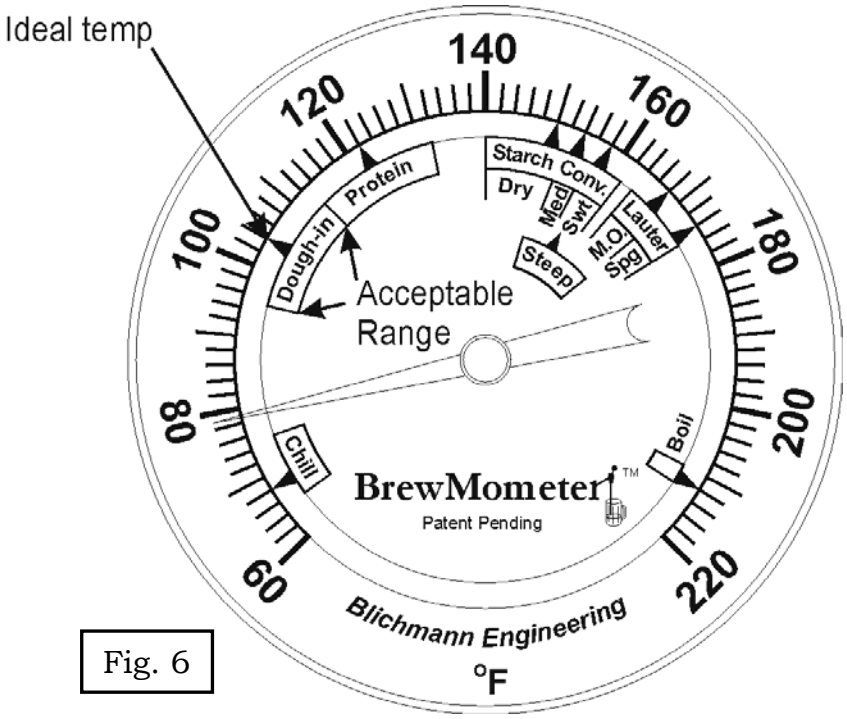

Fig. 6

If you are a partial mash brewer, you will only use some of the steps. All-grain brewers will use more, but not necessarily all of the steps, depending on the equipment available and the recipe.

Dough-in:

This temperature range (95-114°F) is sometimes used by brewers for "Doughing In"- mixing the grist with the water to allow time for the malt starches to soak up water and time for the enzymes to be distributed. The use of a 20 minute rest at temperatures near 104°F (40°C) has been shown to be beneficial to improving the yield from all enzymatic malts. This step is considered optional but can improve the total yield by a couple of points.

Protein Rest:

This rest is most useful when you are brewing with a high proportion (>20%) of unmalted wheat or oats. In general, a protein rest should *not* be used for most recipes utilizing today's fully modified malts. Doing so will further reduce the proteins responsible for head retention and body. Moderately-modified malts benefit from a protein rest (114-132°F) to break down any remnant large proteins into smaller proteins and amino acids as well as to further release the starches from the endosperm. Fully-modified

malts have already made use of these enzymes and do not benefit from more time spent in the protein rest regime. In fact, using a protein rest on fully modified malts tends to remove most of the body of a beer, leaving it thin and watery. Most base malt in use in the world today is fully modified. Less modified malts are often available from German maltsters. Brewers have reported fuller, maltier flavors from malts that are less modified and make use of this rest. A 20 minute rest at 122°F is adequate to break down these undermodified malts.

Starch Conversion:

Starch conversion into simple sugars is performed by 2 basic enzymes, beta amylase and alpha amylase. Beta amylase is most active between 140-152°F and creates a more fermentable wort, but is denatured (permanently damaged) at extended temperatures above this range. Alpha amylase, on the other hand, is most active between 156-162°F and creates a less fermentable wort. However the contribution of alpha amylase is essential to free up more long chain sugars for beta amylase to make into fermentable sugars. Manipulating the mash temperature between the two amylase regions (beta and alpha) allows the brewer to customize the wort in terms of its fermentability. A lower mash temperature, ideally 150°F, yields a thinner bodied, drier beer. A higher mash temperature, ideally 158°F, yields a less fermentable, sweeter beer. A rest at both of these temperatures, or a single rest at an intermediate temperature (152-156°F) will yield a medium bodied beer. This step is where a brewer can really fine-tune a wort to best produce a particular style of beer.

Lauter:

Lautering is the method most brewers use to separate the sweet wort from the mash. A lauter tun consists of a large vessel to hold the mash and a false bottom or manifold to allow the wort to drain out and leave the grain behind.

Mashout - Before the sweet wort is drained from the mash and the grain is rinsed (sparged) of the residual sugars, many brewers perform a mashout. Mashout is the term for raising the temperature of the mash to 170°F prior to lautering. This step stops all of the enzyme action (preserving your fermentable sugar profile) and makes the grainbed and wort more fluid. For most mashes with a ratio of 1.5-2 quarts of water per pound of grain, the mashout is not needed.

Sparging - is the rinsing of the grain bed to extract as much of the sugars from the grain as possible without extracting mouth-puckering tannins from the grain husks. Typically, 1.5 times as much water is used for sparging as for mashing. The temperature of the sparge water is important. The water should be no more than 175°F, as husk tannins become more soluble above this temperature, depending on wort pH. This could lead to astringency in the beer.

Steep:

Steeping differs from mashing in that there is no enzyme activity taking place to convert grain or adjunct starches to sugars. Steeping specialty grains is entirely a leaching and dissolution process of sugars into the wort, much like making tea. If grain with enzyme diastatic potential is steeped, (Munich malt for example) that is technically mashing, and should follow normal mashing procedures using approximately 1.25-2 quarts of water per pound of grain. For steeping, the crushed grain is soaked in hot 150 - 170°F degree water for about 30 minutes to get as much of the available sugar dissolved into the wort as possible. The grain is removed from the water and that water (now a wort) is then used to dissolve the extract for the boil. When steeping, the water to grain ratio should preferably not exceed 1 gallon per pound of grain to avoid possible off-flavors from the grain husks.

Boil:

Boiling is a very important process in brewing beer. It not only sterilizes the wort, it coagulates proteins and harsh tannins, and isomerizes (dissolves) the bittering oils of the hops. A full rolling boil for at least one hour is required to properly perform these functions. The BrewMometer™ faceplate indicates the boiling point of water, but does so in a range. This is to warn you of when your wort will likely begin to boil and help you to prevent messy boil-overs. To quickly knock down the froth from a boil-over, keep a spray bottle of water handy and spray it on the surface of the foam if a boil-over begins to kick up. Note: in higher altitudes, water boils at a lower temperature. Subtract 0.9°F for every 500ft you are above sea level. For example, if you are at 1500ft above sea level, water will boil at approximately 212-0.9X3=209.3°F (3=1500/500). Obviously, different wort specific gravities also changes the boiling point of the wort.

Chill:

After boiling the finished wort, you will need to chill it to a temperature acceptable for yeast propagation as quickly as possible to prevent bacterial contamination. The Therminator™ counterflow wort chiller from Blichmann Engineering is the fastest chiller on the market, chilling 10 gal of wort in as little as 5 minutes!

A generally accepted target for ale yeasts is 68°F. Depending on the cooling water temperature available, this target may not be achievable. For lagers, it is acceptable (and viewed as preferable by some) to pitch the yeast at 68°F and lower the wort temperature 1°F/hr to 50-55°F after signs of initial fermentation begin (CO_2 evolution). According to Chris White of White Yeast Labs, most brewers report little or no flavor effects (esters or fusel alcohols) from starting fermentation at higher temperatures because the substrates required for their production are not yet made. Most of the flavor compounds are produced in the 12-72 hour time period of fermentation. If you are chilling to temperatures colder than 68°F before pitching your yeast, you'll need at least two times the amount of yeast required at 68°F.

NOTE: Do NOT immerse the brew pot and thermometer in an ice bath of water to chill. While this is an acceptable method for a plain pot, the thermal shock will potentially crack the glass and/or cause the face seal to be damaged allowing water to get inside the thermometer.

Warranty

The BrewMometer™ is warranted to be free of defects in materials and workmanship for a period of 1yr from the date of purchase (proof of purchase required).

Specifically EXCLUDED from this warranty are normal wear and tear, damage from abuse and misuse, thread galling or breakage from over tightening or failure to use Teflon™ type thread sealing tape where recommended. Damage to the thermometer from exposure to excessive heat from high BTU burners is also not covered in this warranty. See manual for installation details.

Blichmann Engineering is not responsible for incidental or consequential damages or injury arising from use or misuse of this product.