

**CRAFT
BREWERS
CONFERENCE**
& BrewExpo America®



#CraftBrewersCon

“THE OTHER CASCADE”

A journey into “nitro” beer and dispense

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WHAT IS NITRO BEER?

“Nitro”, or “nitrogenated” beer, is a beer carbonated with much lower levels of CO₂ than a “typical” beer that also contains a small amount of dissolved nitrogen.

Nitro beer contains 1.1 – 1.7 v/v (approx 2.2 – 3.4 g/L) of CO₂, plus a very small amount of dissolved N₂

A “typical” beer contains 2.3 – 2.8 v/v (approx. 4.6 – 5.6 g/L) of CO₂ (and no N₂)



A HISTORY OF NITROGENATION



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- **DEVELOPED AT THE ST. JAMES'S GATE BREWERY IN DUBLIN BY GUINNESS MATHEMATICIAN/BREWER MICHAEL ASH**
- SOLVING THE "DRAUGHT PROBLEM"**
- CREATION OF THE "ASH CAN"**
- GUINNESS DRAUGHT STOUT DEBUTS IN 1959, BECOMING THE FIRST NITROGENATED BEER IN HISTORY**



NITRO BEER TASTES DIFFERENT

WHY?



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NITRO BEER HAS LESS DISSOLVED CO2

1. Less dissolved CO2 = Less carbonic acid = acid taste receptors on tongue register less “sourness”.

- BEER TASTES LESS “SHARP”

2. Less dissolved CO2 = Less stimulation of pain receptors on tongue. (“Chemesthesis”)

- BEER FEELS LESS “TINGLY”

3. Less large CO2 bubbles in foam head.

- LESS AROMA COMPOUNDS DELIVERED TO NOSE

THE PROPERTIES OF N2 ITSELF

1. SMALLER BUBBLES!

- Science is complex and not completely understood
- N2 bubbles detach from nucleation points before reaching a large size
- pH of solution thought to influence bubble size (N2 beers are less acidic)
- Less bubble coalescence (a process by which two or more gas bubbles in a liquid collide and form one larger bubble)

**SMALLER BUBBLES =
THICKER FOAM =
CREAMIER MOUTHFEEL**

THE PROPERTIES OF N2 ITSELF

2. MORE STABLE FOAM

- A. “Disproportionation”, or decaying foam
- Larger bubbles get bigger and burst, while smaller bubbles get smaller
 - Affected by solubility of gas inside bubble
 - CO2 is much more soluble than N2, it moves between bubbles faster, leading to a faster decaying head of foam
- B. Smaller N2 bubbles result in slower drainage of liquid between bubbles
- Foam stability is related to the rate at which liquid drains from between bubbles

**MORE STABLE FOAM =
PROLONGS CREAMY
MOUTHFEEL!**



NITROGEN HAS BEEN SHOWN TO SUPPRESS SOME FLAVOR ATTRIBUTES

BITTERNESS

HOP AROMA

PERCEIVED SWEETNESS MAY INCREASE

- Consider which styles to dispense on nitro
- Consider adjusting in the brewhouse to compensate





IN THE BREWERY

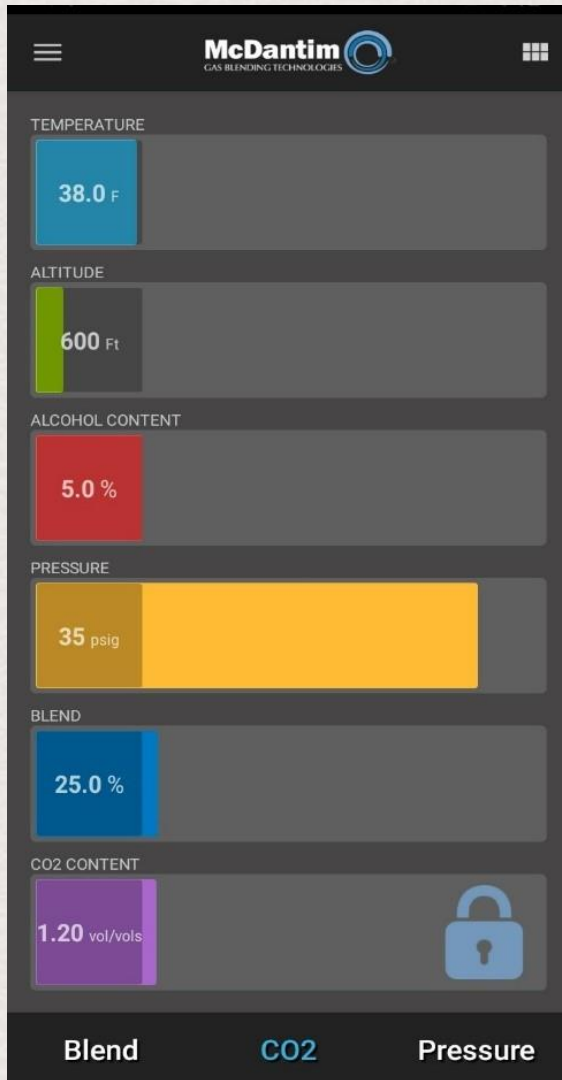
- NITROGEN IS ADDED AT HIGH PRESSURE AND AT COLD TEMPS
- BRITE TANKS WITH HIGHER PSI THRESHOLDS ARE NEEDED – 30 PSI
- CO2 VOLUMES ARE KEPT AROUND 1.1, WITH A FINAL BLEND OF 25% CO2/75% NITROGEN
- BRITE TANKS ARE PURGED WITH NITROGEN RATHER THAN CO2, SO CO2 ISN'T FORCED INTO SOLUTION AT THE HIGHER PRESSURE

THE DISPENSE GAS BLEND

- Blend mimics % of each dissolved gas – 25% CO₂ & 75% N₂
- Dispensing with this blend at target applied pressure keeps the small amount of dissolved N₂ in solution
- Dispensing with this blend at target applied pressure keeps the CO₂ in solution as the brewer intended
- Blend is specific to nitro beer only! Changes in the blend will affect CO₂ carbonation levels

** Blended gas, at a blend specific to each system's carbonation levels and total resistance, is also used to push beer through long draw draught systems without overcarbonating the beer. Refer DQM Chapter 4 for more info.

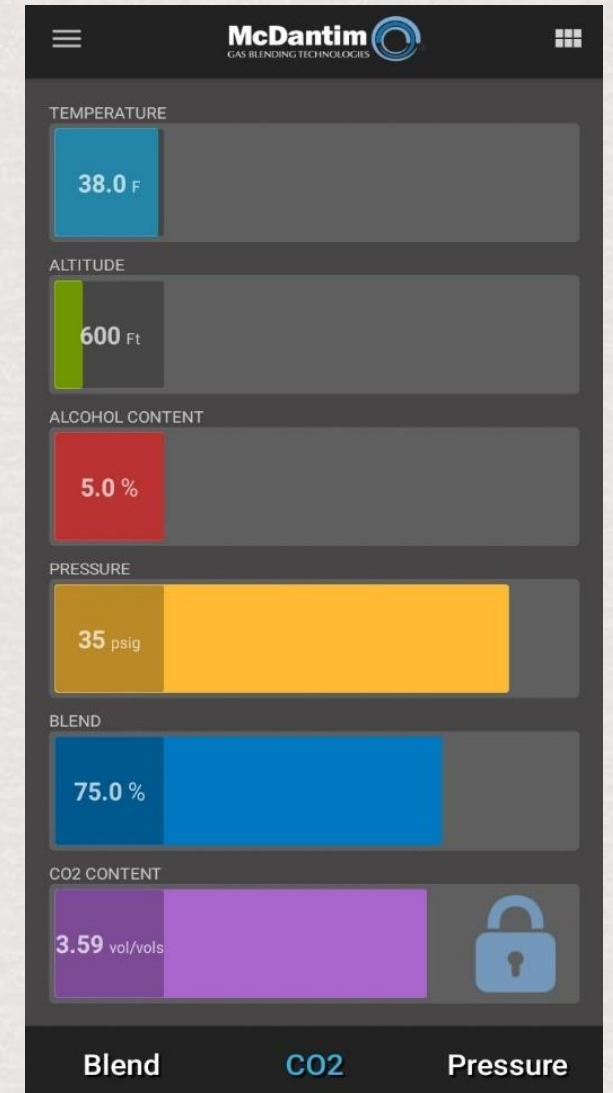
CORRECT BLEND



McDANTIM “EASYBLEND” APP

<https://mcdantim.com/tools/calculator>

INCORRECT BLEND



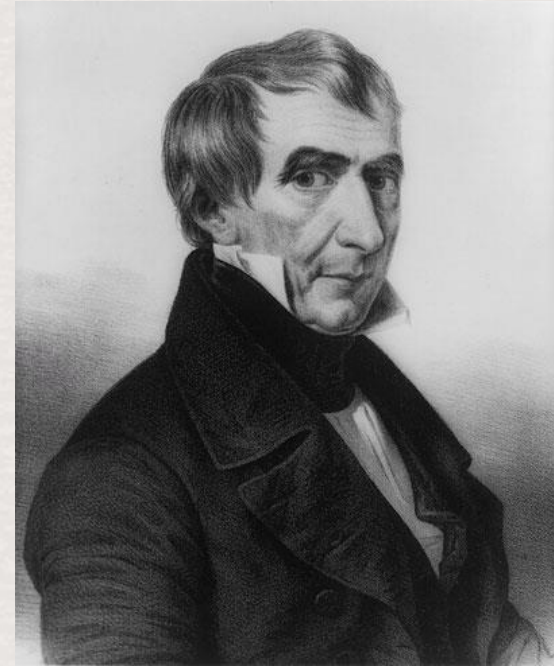
CALCULATING TARGET APPLIED (SERVING) PRESSURE

HENRY'S LAW – “The solubility of a specific gas in a liquid is directly proportional to the partial pressure of the same specific gas above the liquid”

DALTON'S LAW OF PARTIAL PRESSURES – “The total pressure exerted by a gaseous mixture is equal to the sum of each individual component in the mixture”

WHAT THIS MEANS – The amount of gas being applied into the headspace of the keg – at a given temperature & elevation – will determine what happens to the carbonation level in the beer

**BLAME
THESE
GUYS!**



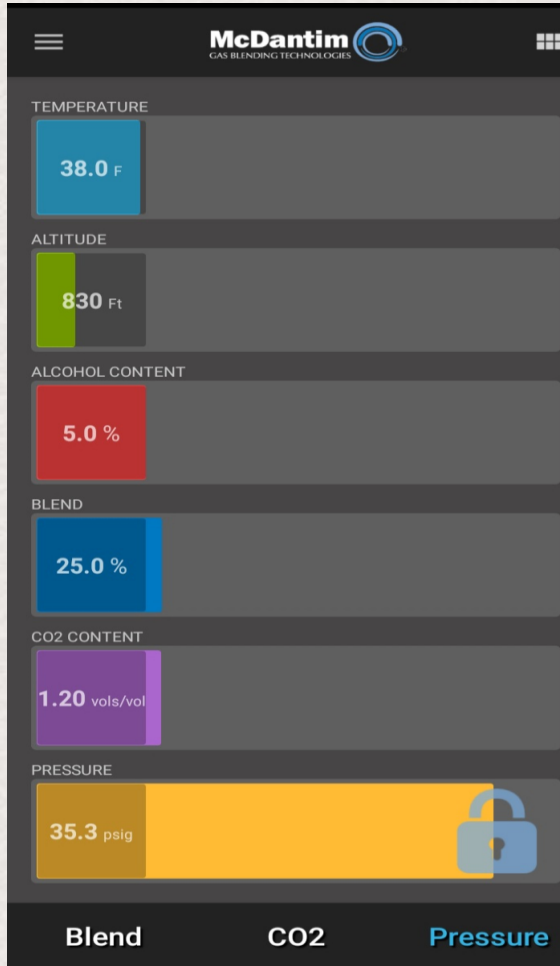
DETERMINING THE TARGET APPLIED PRESSURE FOR NITRO BEER

- The correct applied pressure using 25/75 blend maintains the solubility of both CO₂ & N₂ – at the given temperature and elevation
- High pressure needed to dissolve N₂ into beer during brewing process – must maintain high applied pressure during dispense to keep N₂ dissolved
- High applied pressure during dispense with 25/75 blend maintains CO₂ in solution as the brewer intended
- Calculate target applied pressure using v/v (g/L) (provided by the brewer or distributor), temperature & elevation with equilibrium chart for blended gas, or a calculator such as McDantim EasyBlend

RANGE IS 30 – 38 PSI

*The high applied pressure required to keep both gases in solution needs to be balanced within the draught system to ensure a correct flow rate. The special faucet provides additional resistance to flow, balancing the system.

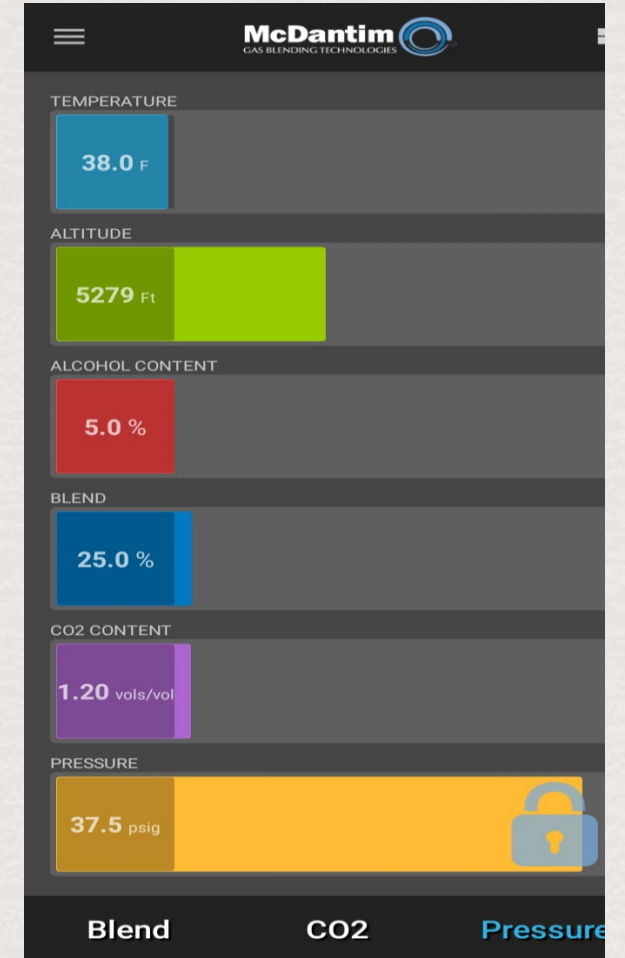
CORRECT APPLIED PRESSURE- Minneapolis



McDANTIM “EASYBLEND” APP

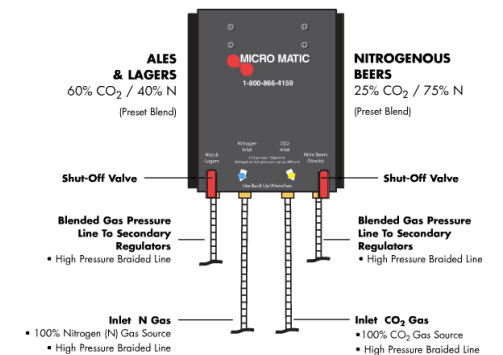
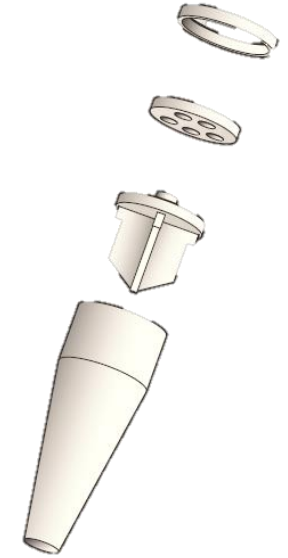
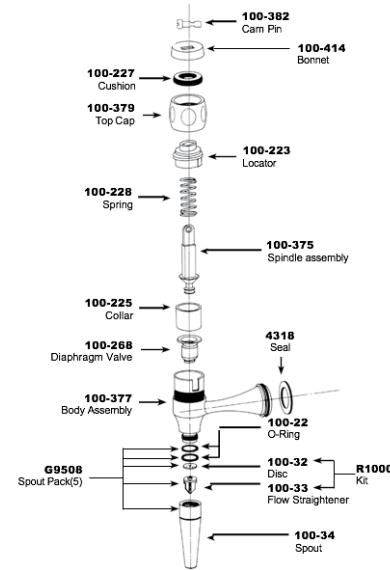
<https://mcdantim.com/tools/calculator>

CORRECT APPLIED PRESSURE - Denver



EQUIPMENT NEEDED

- NITRO FAUCET
- NITRO SPOUT
- SECONDARY REGULATOR
- BLENDED GAS



CLEANING AND MAINTENANCE

NITROGENATED BEERS ARE THE
"CANARY IN THE COAL MINE"

LINE CLEANING – NO CHANGES

FAUCET CLEANING - NO CHANGES

SPOUT CLEANING
REMOVED AT THE END OF SERVICE,
CLEANED, DETAILED, DRIED, AND
RETURNED TO THE FAUCET

THE POUR

- TRADITIONALLY SERVED USING A TWO-PART PROCESS, DUE TO A UNIQUE BIT OF HISTORY.
- GLASSWARE SHAPE PLAYS A KEY ROLE IN THE “SURGE AND SETTLE” PROCESS. FLAT BOTTOMED GLASSWARE IS BEST.
- 45 DEGREE ANGLE TO THE TAP, LETTING THE GAS DO THE WORK.



THE STORY OF THE TWO-PART POUR



THE TWO PART POUR IN ACTION



FURTHER RESOURCES

- Brewers Association Draught Quality Manual, 4th edition
- Brewers Association Resource Hub – Draught Beer

<https://www.brewersassociation.org/resource-hub/draught-beer/>

- Brewers Association Educational Resources – Facts about Serving Nitrogenated beer

<https://www.brewersassociation.org/educational-publications/a-simple-guide-to-serving-better-nitrogenated-beer/>

- Cicerone Certification Program “Road to Cicerone” Keeping and Serving course

<https://www.cicerone.org/us-en/products/road-to-cicerone-keeping-serving-beer-course-0>

- McDantim calculators for draught beer dispense

<https://mcdantim.com/tools/calculator>

- ASBC Handbook Series – Practical Guides for Beer Quality – Foam, by Charles Bamforth

- CBC 2020 Chart Industries (sponsored) webinar – Nitro Brewing using a Chart doser

<https://vimeo.com/421015323/320988ab80>



THANK YOU!

QUESTIONS?

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Please fill in the survey for this seminar! You'll find it in the mobile app with the seminar.

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