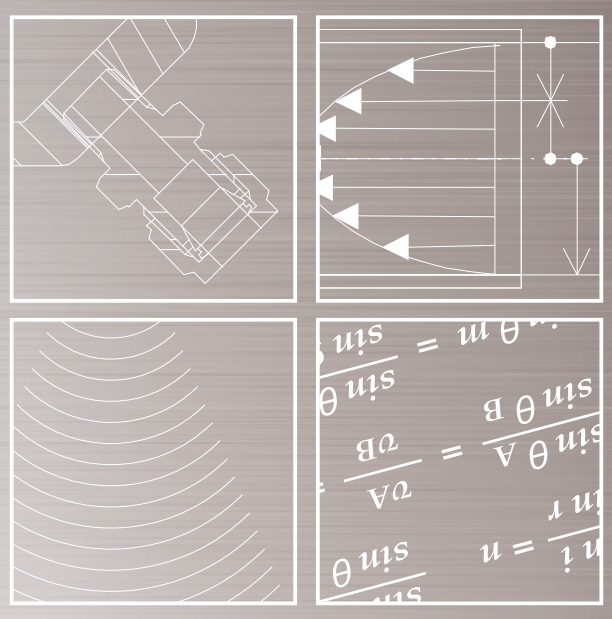


26 Applications

A Deep & Entertaining Discussion
About In-line Refractometers

In-line Refractometer Guide

To users who have been dissatisfied
with other types of in-line meters



The Complete In-line Refractometer Guide!

A Comprehensive Collection of 26 Applications

Everything from canned coffee, beer, and other beverages, the food industry, industrial applications such as resists, to wastewater—all 26 applications collected in one book!

The Definitive In-line Refractometer Guide!

This guidebook is the bible of selecting in-lines refractometers. You will soon know everything you need to know about in-lines refractometers!



Contents

In-line Refractometer Guide 26 Applications

In-line Applications

- | | |
|--------------------------------------|---|
| A3 Beverages | A11 Vinegar |
| A4 Canned Coffee | A12 Wastewater
(in Food Manufacturing) |
| A5 Beer | A13 Surface Treatment Agents/
DMF (Dimethylformamide) |
| A6 Gelatin &
Gummy Candies | A14 Release Agents |
| A7 Soy Milk & Tofu | A15 Hydrogen Peroxide and
Sodium Hydroxide |
| A8 Tomato Purée | A16 Resists |
| A9 Ketchup | A17 Plating Solutions
(Sulfuric Acid) |
| A10 Brine | A18 Application Examples |

Beverages

Fruit juice, carbonated beverages, tea-based beverages, sports drinks, coffee milk, dairy-based probiotic beverages;

There are many varieties of drinks that come to mind when it comes to "beverages." With the exception of tea and sports drinks, on the whole, beverages contain about 10g of sugar per 100g.

Drinking too many beverages is directly linked with an over-consumption of sugar, so there are people who limit their beverage intake.

Sugar level, as well as concentration (Brix) can be measured with in-line refractometers.

The Brix level of sports drinks is around 6%, and about 0.5% for tea-based beverages (unsweetened).

In beverage production, the areas where in-line refractometers are most actively used are in blending tanks, which mix raw ingredients and water, and for managing concentration right before bottling to avoid defective products.

Furthermore, when changing out the product, checking the concentration allows manufacturers to confirm whether or not the product changed promptly.

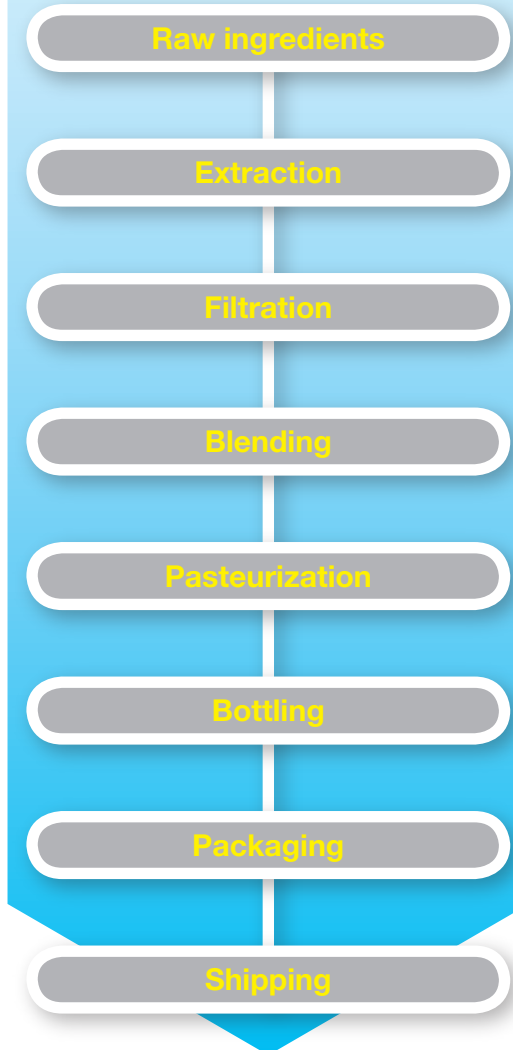
As for carbonated beverages, the concentration is often monitored after carbonation, which occurs between blending and bottling.

Aside from the production line, in-line refractometers are also used to manage the proper concentration of sodium hydroxide and hydrogen peroxide used for disinfecting and sterilizing the production line's piping system.

In-line refractometers may seem like a huge, costly investment, but by implementing and using them to ensure product quality, consumer trust and gain confidence can be obtained over the course of time, and "brand image" can be firmly established. Moreover, financial loss due to defective products is reduced. Given their great cost-effectiveness, plus the even greater benefits they provide, surely it can be said that in-line refractometers are one of the indispensable elements of quality control?



An example of black (English) tea-based beverage manufacturing process



All ATAGO products are designed and manufactured in Japan.

ATAGO CO., LTD.

<http://www.atago.net/> overseas@atago.net

Headquarters: The Front Tower Shiba Koen, 23rd Floor
2-6-3 Shiba-koen, Minato-ku, Tokyo 105-0011, Japan
TEL : 81-3-3431-1943 FAX : 81-3-3431-1945



HACCP GMP GLP

ATAGO products comply with HACCP, GMP, and GLP system standards.

ATAGO U.S.A., Inc.

TEL : 1-425-637-2107

customerservice@atago-usa.com

ATAGO INDIA Instruments Pvt.Ltd.

TEL : 91-22-28544915, 40713232

customerservice@atago-india.com

ATAGO THAILAND Co.,Ltd.

TEL : 66-21948727-9

customerservice@atago-thailand.com

ATAGO BRASIL Ltda.

TEL : 55 16 3913-8400

customerservice@atago-brasil.com

ATAGO ITALIA s.r.l.

TEL : 39 02 36557267

customerservice@atago-italia.com

ATAGO CHINA Guangzhou Co.,Ltd.

TEL : 86-20-38108256

info@atago-china.com

ATAGO RUSSIA Ltd.

TEL : 7-812-777-96-96

info@atago-russia.com

ATAGO NIGERIA Scientific Co.,Ltd.

TEL : 234-707-558-1552

atagonigeria@atago.net

* Specifications and appearance are subject to change without notice.

Copyright © 2017 ATAGO CO., LTD. All rights reserved.

[ENV02] 17061500GR Printed in Japan

Canned Coffee

The first cup just after waking up, the cup after work, and the cup after a meal--have you guessed the beverage that alters the very fabric of time and space and uplifts your spirit?

It is said that Japan is the largest consumer of canned coffee, but the aspect foreigners find most surprising is the high-level quality of its taste.

There are an abundance of varieties, and what's more, they preserve that high-quality taste with a flavor that is on par with freshly brewed coffee.

Japanese canned coffee manufacturers are in constant pursuit of that delectable flavor, and to maintain that same tastiness, in-line refractometers are used at many stages in the process.

In canned coffee manufacturing, the concentration of every variety, such as black, lightly sweetened, and café au lait is measured.

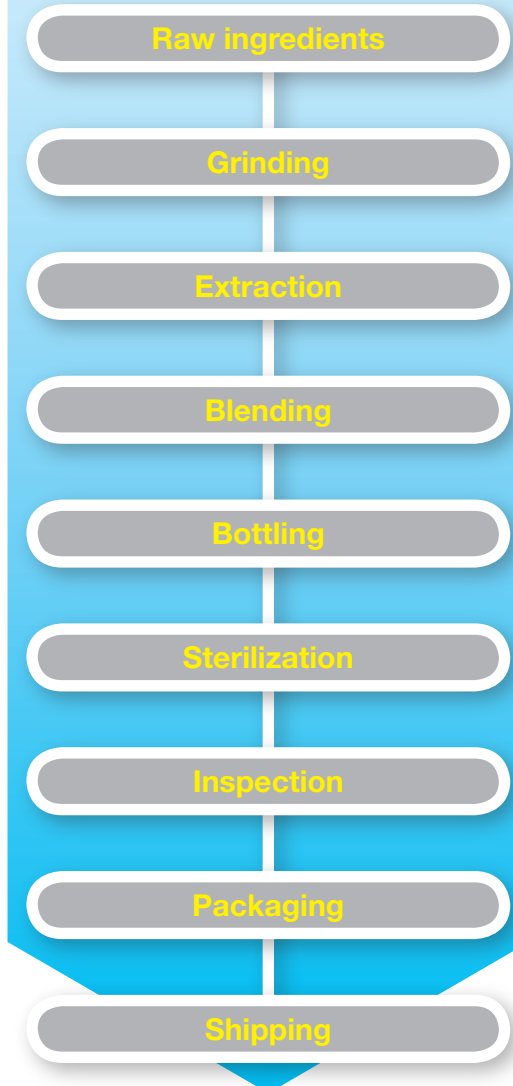
By using in-line refractometers, manufacturers can prevent mishaps such as putting in the wrong raw ingredient or inserting the wrong amount during the blending process.

Additionally, through performing a final check before bottling, manufacturers can avoid the risk of dealing with waste disposal when a mistake is discovered after bottling.

Currently, all kinds of means are used to strengthen canned coffee's brand image and increase recognition, such as creating and instilling the brand with a high-end, elite quality.



An example of the manufacturing process



Knowledge Checkpoint

When installing an in-line refractometer for the final check before bottling, by affixing it to an ambient temperature section of the line (piping system) prior to bottling and sterilization, phytic acid (slime) build-up that occurs after sterilization can be avoided.

Beer

Composed of raw ingredients such as malt derived from sprouted barley, hops, brewer's yeast, and water, beer is universally cherished for that distinct aroma of its hops and that cool, refreshing, fizzy feeling produced by its carbonation.

Beer has a lengthy, ancient history, dating back to the 4th millennium BC. Sources have been found that indicate it has been made since the Mesopotamian era.

Accounts of beer making in ancient Egypt are also well-known.

Beer is divided into different categories such as top-fermenting ales and bottom-fermenting lagers, depending on the brewing method and the type of yeast.

Going further still, depending on the brewing method, beers are categorized into different styles. Among top-fermenting beers, there are pale ales, stouts, Altbier, and wheat beer. Bottom-fermenting beers include pilsners, which are the most deeply, culturally rooted in Japan.

Generally speaking, the flavor of "beer" greatly differs, depending on the brewing method.

Perhaps such vast flavor variety is the connection to beer's long-standing appeal.

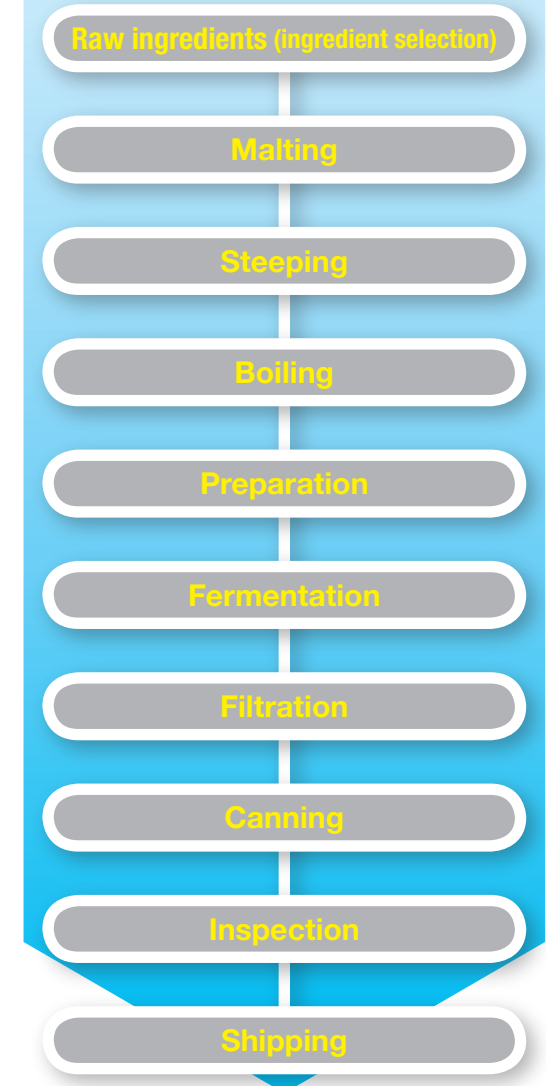
In the beer brewing process, at the preparation and fermentation stages, the degree of alcohol fermentation undergone by the wort is controlled via concentration management through Brix. Proper timing is crucial--alcohol fermentation is checked and stopped at just the right moment to always produce the same delectable "flavor" and "alcohol concentration."

In-lines fit into the beer brewing process in a number of places. They can be installed atop the production line, connected with bypass piping, or installed directly on the tank. There are many possible ways of connecting them within production lines.

For other measurement requests such as carbon dioxide volume measurement, electrical conductivity measurement, or any other measurement aside from concentration, please contact ATAGO.



An example of the manufacturing process



Gelatin & Gummy Candies

Imagine the sound of quivering gelatin, "wibbly wobbly, jiggly wiggly." Gelatin comes in many forms, from a confectionery made to be an easily ingested food with highly beneficial nutrients, to a stewed, jellied dish as a cuisine.

Originally, it is a confectionery made from a combination of fruit juice, gelatin, and sugar.

Variations are made by adding other ingredients such as fruit, spices, and acidulants.

Jelly beans, gummy candies and the like are foods made from processed gelatin.

In-lines are used in the gelatin manufacturing process at the stage where raw ingredients are mixed and blended to adjust the concentration.

In the gummy candy manufacturing process, in-lines are used at the stage where raw ingredients are blended and heated to make a concentrate to check its condition.

Other uses include managing the concentration of the cleaning solution when washing out the piping system, and confirming whether it has been switched to water and all the cleaning solution has been completely rinsed away when flushing the pipes out with water.

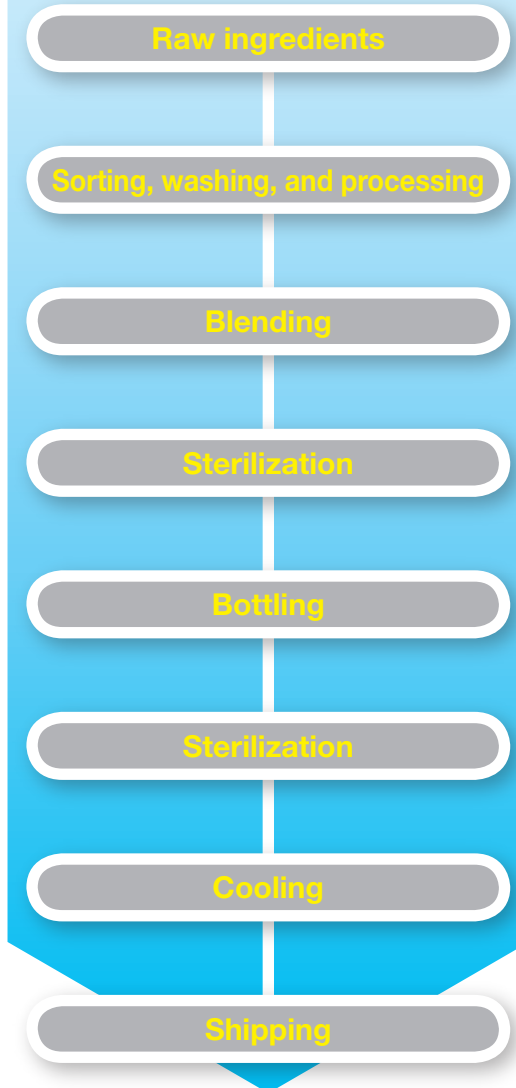
ATAGO has an assortment of in-line models that are capable of handling high temperature measurement during the manufacturing process, and when performing CIP cleaning procedures which involve circulating high temperature cleaning solution through the piping system. For details, please contact ATAGO.

Knowledge Checkpoint

The Brix level of gelatin is about 15 to 20% and the Brix level of gummy candy is nearly 80%.



An example of the manufacturing process



Soy Milk & Tofu

Tofu contains many necessary nutrients for us humans, while soy milk is liquid produced when soy beans are boiled and crushed. The protein in soymilk is said to be nutritious and of a high quality. In fact, the beautifying effects of the isoflavones in soy beans are famous.

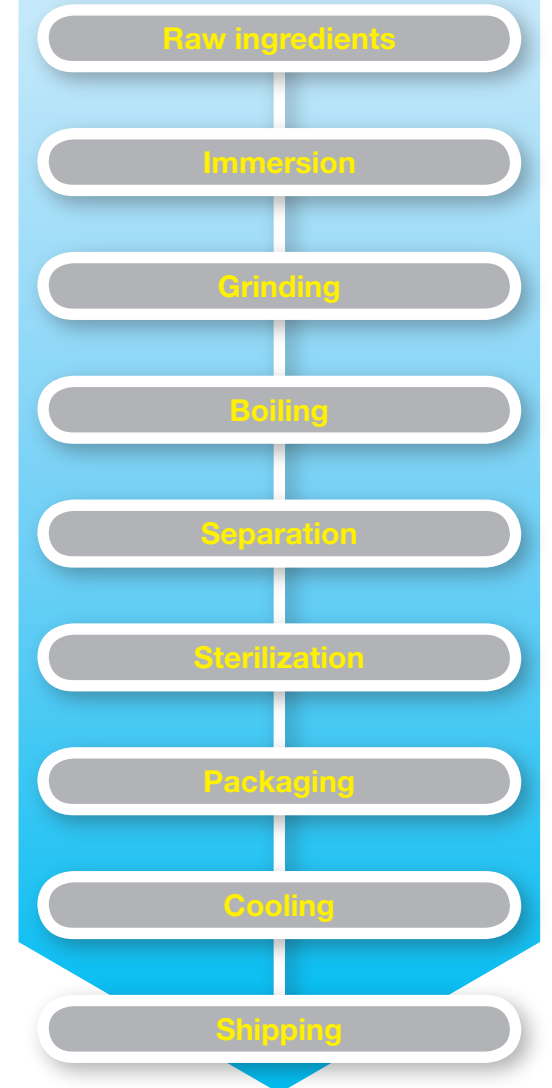
To produce tofu, soy beans are soaked in water for a time and then, while adding more water, the beans are grounded to make a paste (Namago). This paste is then boiled and strained, separating it into soy milk and "okara", or bean curd. Bittern (a coagulant) is added to the soy milk which turns it into tofu and of course frying this creates fried tofu.

The concentration of the paste (Namago) is undetermined because it is influenced by various factors such as moisture content of soy beans and the amount of water absorbed by the beans during soaking. The concentration is adjusted by adding water while confirming its firmness. It is important to measure the concentration of dissolved soy solids as that determines the type of soy milk; whether it be plain soy milk, processed soy milk, or consumable soy milk.

It is possible for some soy content buildup to develop in in-line systems around the sample stage after a period of time due to the liquid paste (Namago) having leftover pulp from when it was squeezed. When the liquid paste (Namago) is measured using one of ATAGO's in-line systems it is possible to attach a US- α , an ultrasonic cleaner, to remove any build up and produce more stable results. On the other hand, when it is installed for the soy milk production line, stable readings can be achieved without using US- α as it is typically filtered and centrifuged.



An examples of the soy milk production process



Tomato Purée

Tomatoes are a vegetable with such great nutritional value that it can almost be said that, "even malnourished people become robust and their strength improves when it's tomato ripening season."

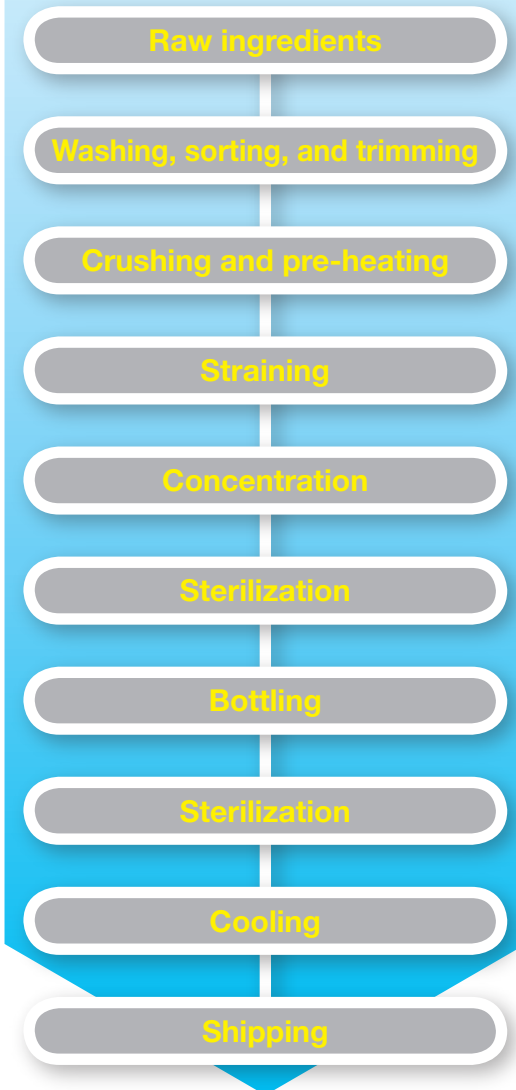
This physically revitalizing appeal which is recognized all over the world, is certainly attributed to their high nutritional value. Moreover, people may find tomatoes' exquisite balance of sweetness and sourness to be simply irresistible to their taste buds.

Tomato purée is a concentrate made by crushing tomatoes and straining them through a sieve. It is also used as a raw ingredient for ketchup.

In-lines are used in the tomato purée manufacturing process for checking whether the sugar level (Brix) of the tomato juice made from raw ingredients is within standard values. In-lines are also placed directly on the manufacturing tank to observe and manage conditions before bottling.



An example of the manufacturing process



Knowledge Checkpoint

Tomato purée is defined as a substance with more than 8% unsalted soluble solids, but less than 24%. Tomato purée with unsalted soluble solids greater than 24% is called, "tomato paste."

Ketchup

Ketchup is made by adding onion, carrot and other savory fragrant vegetable broth and flavorings such as herbs, spices, salt, sugar, and vinegar to tomato purée (tomato concentrate) and heating it to concentrate.

Ketchup's sweetness, sourness, and saltiness influence the flavor of cuisine, and its thickness can influence how well ingredients mingle together in dishes such as pasta. This is why the extent to which ketchup is boiled down is extremely important.

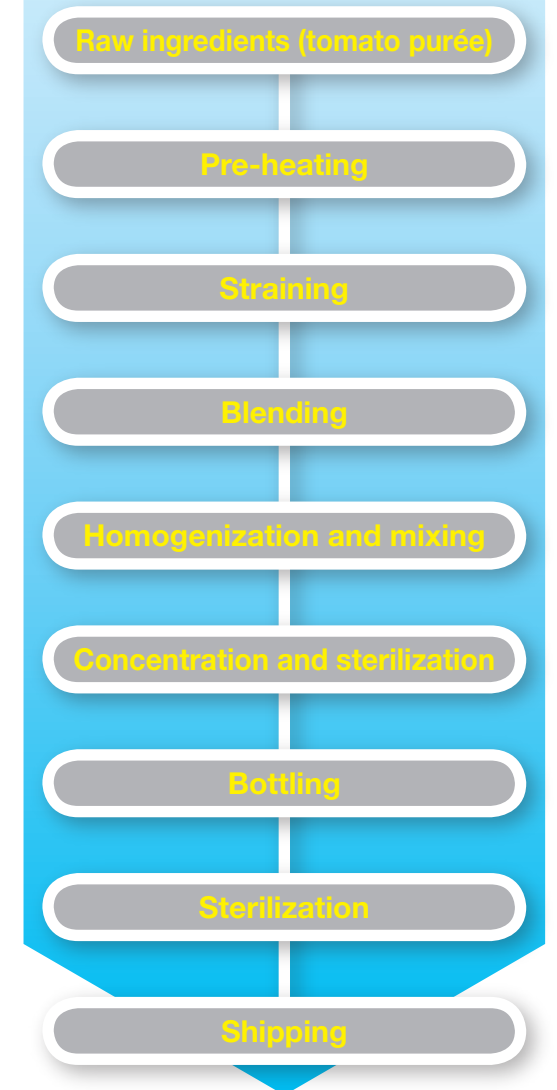
In-lines are used to preserve this crucial flavor.

In-line refractometers are used in the ketchup manufacturing process to manage many processes such as checking whether the concentration level is within standards right before bottling. If the concentration level is outside of standards, there are in-lines refractometers that can be configured with alarm settings programmed for upper and lower limits to automatically stop the manufacturing line, thereby preventing the production of non-standard products.

For manufacturing lines that produce multiple types of products, in-line refractometers can be used for confirming whether the products switched properly and checking whether it promptly switched after cleaning.



An example of the manufacturing process



Knowledge Checkpoint

Ketchup is defined as a substance with more than 25% unsalted soluble solids. A substance with more than 9% unsalted soluble solids, but less than 25% is called, "tomato sauce."

Brine

Essential for fisheries, pasta, instant ramen noodles and more!

An overabundant intake of salt is linked to a risk of lifestyle diseases such as high blood pressure and heart disease. From a different aspect, salt plays an important part in our bodies. Salt has a role in adjusting the amount of moisture of our bodies; chlorine, which is composed of salt, is the primary component of stomach acid and supports digestion, and within saliva, salt enlivens the function of digestive fluids. Consequently, if the salt concentration within our bodies is insufficient, this renders us incapable of absorbing nutrients and diminishes the metabolic function within cells. This results in a lack of appetite, weakened muscle contraction, and also weakened legs.

Such is the vital role salt plays as a necessity for life. However, still more, in terms of taste perception, insufficient salt leads to bland dishes that fall short on flavor. Salt is a crucial element in expertly drawing out the flavor of ingredients.

In-line refractometers are used for adjusting and adding the right amount of salt for finishing off a product.

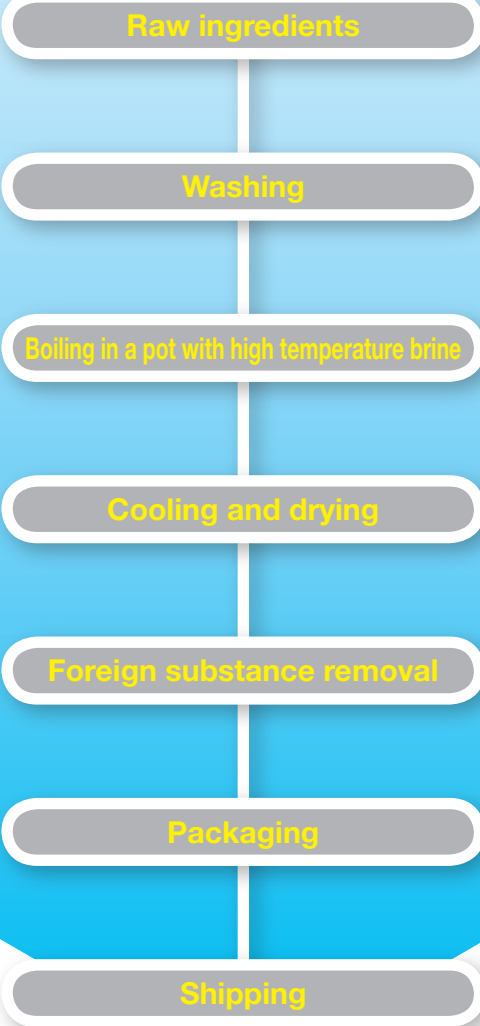
As for fishery related industries, in-lines are used to manage the brine concentration used for boiled young sardines. The concentration of the 80°C brine solution inside the pot is controlled at approx. 3.5%.

Furthermore, in regards to manufacturing products such as instant ramen noodles, the concentration of the brine solution mixed with the noodles is managed with an in-line refractometer that is directly attached to the tank.

ATAGO has a wide variety of in-line refractometer models such as those that connect to the piping system and can be incorporated into the production line, models that attach directly to the tank, as well as models that can be clipped on to the edge of a tank, all of which are capable of handling the needs of any industry or application.



An example of the young sardine manufacturing process



Vinegar

Vinegar is said to be quite good for the body.

There are many kinds of vinegar such as grain vinegar made from rice, wheat, corn, and the like, and fruit vinegar made from fruits.

Although vinegar is a type of liquid seasoning, it has countless beneficial effects including constipation relief, high blood pressure prevention, appetite stimulation, fatigue alleviation, and anti-microbial effects.

Recently, there has been an increase in products that are easier to adopt into our lifestyle, such as drinking vinegars (shrubs).

As stipulated by the "Japan Agriculture & Forestry Standard Laws for Table Vinegar" per JAS (Japanese Agricultural Standard), in general, vinegar is a substance made from alcohol brewed from raw ingredients of grains or fruits, with the addition of acetic acid bacteria (AAB), that has undergone acetic acid fermentation.

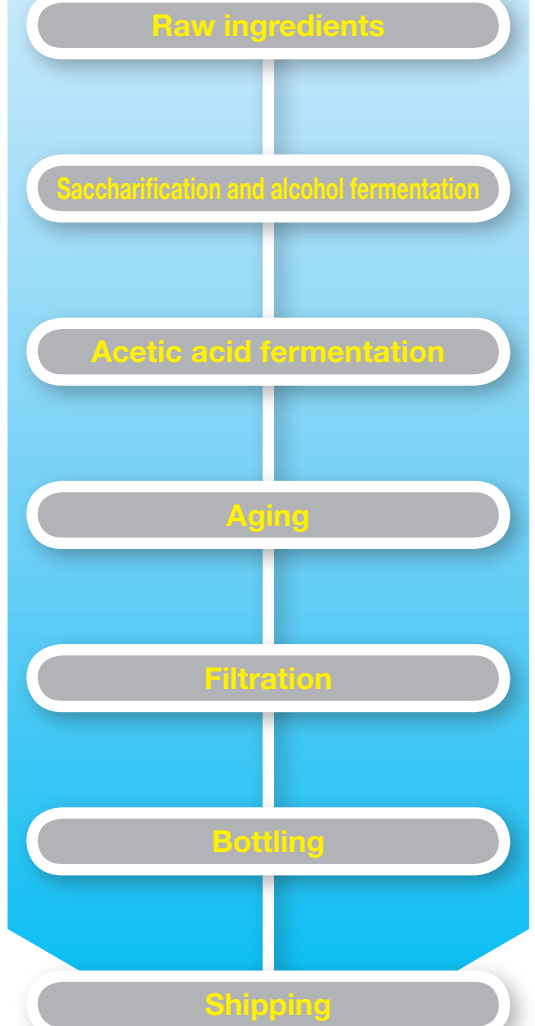
In-line refractometers are used in the vinegar manufacturing process to check the progression and state of acetic acid fermentation, and to confirm whether the production line was promptly switched over when changing products and after cleaning.

We receive many satisfied comments from users such as through implementing in-line refractometers, "it can be definitely confirmed whether a product was switched out, and product disposal due to defects has been reduced."

Although vinegar is a strong acid that can cause metal to rust, at ATAGO, it is possible to customize in-line refractometers with materials that are highly resistant against acid, such as titanium. Please contact ATAGO for more details.

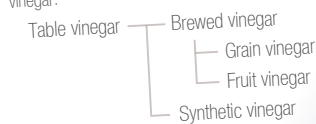


An example of the manufacturing process



Knowledge Checkpoint

There are numerous varieties of table vinegar, stemming from raw ingredients and manufacturing methods. There is also "processed vinegar" and "moromi vinegar." (A type of vinegar made from the sake lees of Awamori, an alcoholic beverage unique to Okinawa, Japan.) which are not types of table vinegar.



Wastewater (in Food Manufacturing)

It goes without saying that manufacturing products will produce wastewater.

Proper treatment of that wastewater is an absolute must.

On the self-governing level and such, manufacturers independently establish safety standards for waste fluid. Harmful waste fluids and high concentration wastewater effects the ecosystem and its potentially detrimental effects on our bodies cannot be ignored.

In food manufacturing related industries, there are waste fluids produced when refining sugar and manufacturing beverages, as well as waste fluids from cleaning solutions.

In regards to the process of wastewater treatment, concentration management is indispensable.

When organic substances contained in wastewater are broken down by bacteria, even if they are not sufficiently broken down and many components remain, by regularly managing the concentration of wastewater, this can be detected and prevent the release of high concentration wastewater.

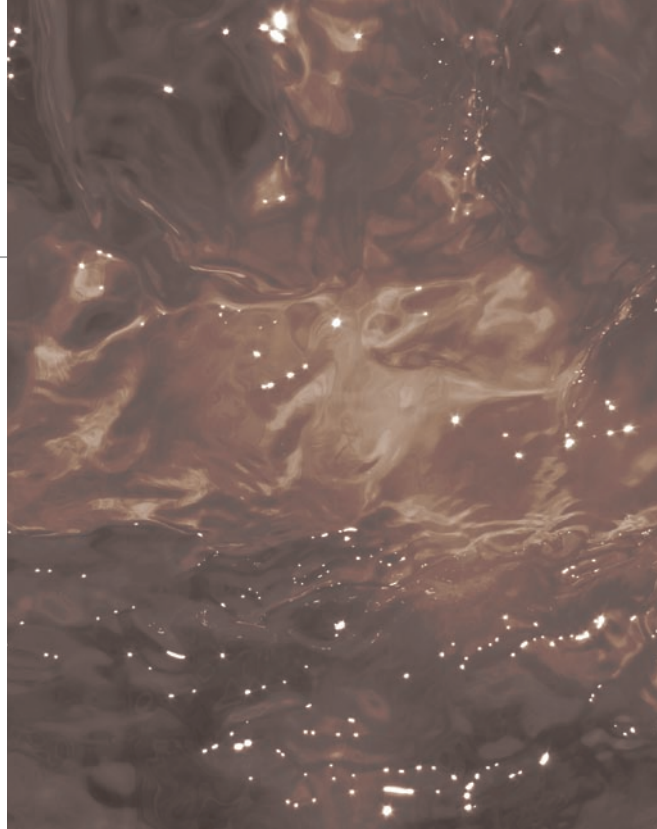
In recent times, serious consideration is being given to environmental issues, and wastewater treatment is a problem that corporations simply cannot avoid.

Although there are cases in which concentration is managed through manual measurements, when considering the risks and other drawbacks, there are multitudes of cases where an in-line refractometer is by far a much more cost effective option.

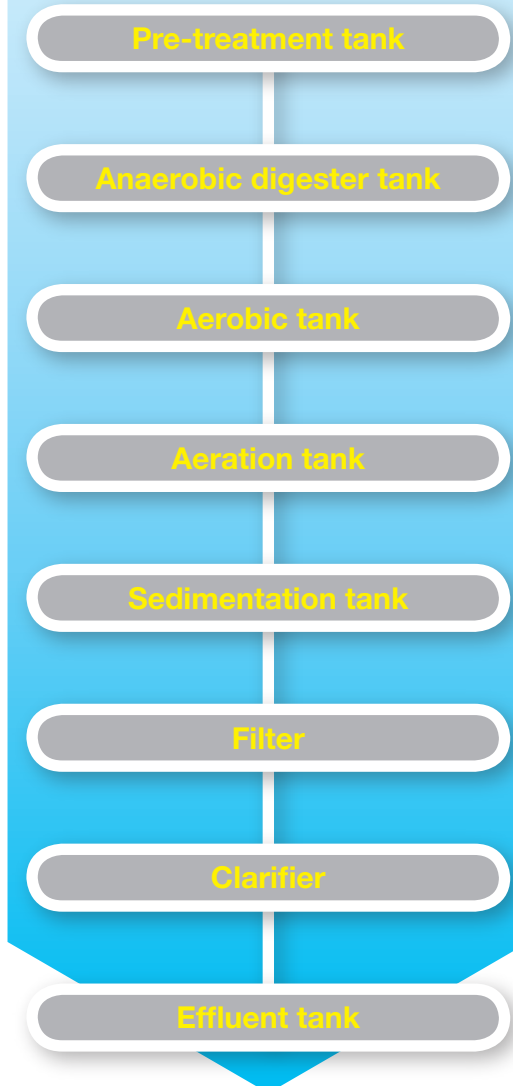
How about taking a moment to reassess facility expenses such as labor costs and consider implementing an in-line refractometer?

Knowledge Checkpoint

There are instruments which utilize other measurement principles for managing concentration, but refractometers manage concentration in real-time and do not require any consumable parts or accessories. Once an in-line refractometer is installed, it can be used for a long while with no trouble at all.



An example of the wastewater treatment process



Surface Treatment Agents

"Surface treatment" refers to a physical and chemical treatment applied to the surface of solid materials for aesthetic, ornamental, hardening, and enhanced corrosion resistance purposes.

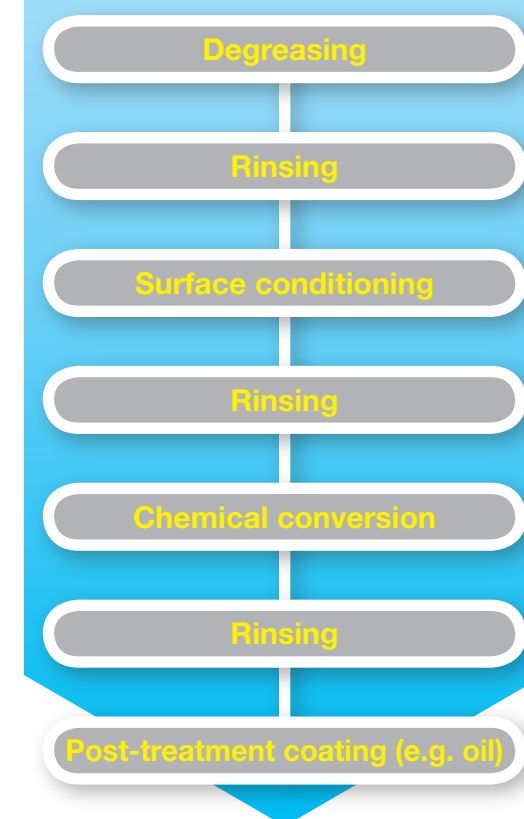
Types of treatments include cleaning, polishing, etching, and coating, but to demonstrate the maximum effectiveness of surface treatment, it must be performed with the same, standard concentration.

Therefore, using in-line refractometers to check whether the concentration is as usual is immensely important.

Depending on the kind of surface treatment agent, there are some that are prone to adhere to the surface of the in-line refractometer's detection section.

In these cases, ATAGO recommends installing one of our in-line refractometers along with the US-α, an ultrasonic cleaning device, as a set to prevent build-up.

An example of the surface treatment process



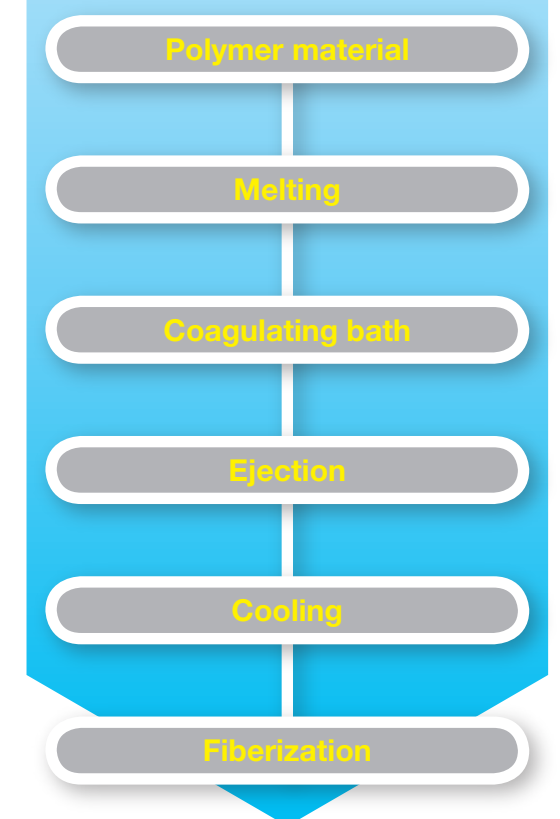
DMF (Dimethylformamide)

It may not be a name you are very familiar with, but DMF is used in the synthesis of acrylic fibers and is often used as a solvent in wet spinning.

It is also a solvent used in the manufacturing of rubber gloves. Inline meters are used to verify complete removal of DMF by measuring the cleaning tank's concentration at the last step of cleaning line.

The in-line refractometer is used to check that the DMF has been completely removed for environmental and health reasons.

An examples of the solvent treatment process



Release Agents

In the process of making products such as cast-metal objects (casting), a chemical called a "release agent" is used to aid in smoothly and easily removing the product from the mold.

There are many advantages in managing the concentration of release agents.

If the concentration is low, product defects can occur, such as color stains on the product, or a section of the cast-metal object may chip off.

If the concentration is high, de-molding can become difficult, requiring force to remove the product from the mold, which can warp the product.

At facilities using in-line refractometers to manage the concentration of release agents for metal casting, the process is partially automated. When abnormal values occur, the alarm lamp lights up. A system is set up to alert the workers.

Although there are many facilities where measurement is done manually, by implementing in-line refractometers, values can be checked without the hassle of moving to a measurement site. Furthermore, through alarm systems and the like, it is possible to be aware of abnormalities even while away from the production line.

It becomes a strategy for resolving lot mishaps and defects that arise when concentration values are unmonitored and de-molding worsens and galling occurs.

At a certain facility that has in-line refractometers installed as sensors for their release agent mixing and pumping device, these in-line refractometers are used to manage the concentration of the release agent at the stage right before the molten metal is poured into the mold and when it is filtered and collected after being used.

Electrical conductivity meters had previously been used at this facility, but since build-up was prone to accumulating on the electrodes, this led to frequent maintenance, so refractometers were implemented.

If both an in-line refractometer and a portable refractometer, PAL are implemented, it is possible to perform cross-checks.

By managing the concentration of release agents, in conjunction with preventing defective products and errors, productivity can be improved.



An example of the release agent process

Die cleaning

Release agent application

Clamping

Molten metal injection

Die opens

Ejection

Hydrogen Peroxide and Sodium Hydroxide

In modern Japan, many aseptically packaged products are used. A sterile filling and packaging system that makes it possible to preserve food such as milk, other dairy products, dessert, soft drinks, and highly viscous, liquid foods for a long time has been established. Many kinds of containers are used in this process; paper containers, glass, bottles, cans, plastic containers, PET bottles, and others.

For example, in the bottling process of beverage production, a low concentration of hydrogen peroxide is sprayed inside a paper carton to sterilize it. At this point, it is necessary to use in-line refractometers to manage the optimal concentration for sterilization.

If the concentration is too strong, there may be residual disinfectant on the paper carton. If the concentration is too weak, the anti-microbial effectiveness will decrease.

As with these aspects mentioned above, every day, beverage manufacturers work toward strengthening their quality control procedures to deliver safe products to their consumers.

Some beverage manufacturers use hydrogen peroxide with a concentration of 35% to clean paper cartons.

The same solution is used for one week and during this period, in-line refractometers are used for checking whether there are any changes in the concentration.

Aside from hydrogen peroxide, sodium hydroxide (caustic soda) is also used as a sterilizing solution.

Other beverage manufacturers implement in-line refractometers to measure the concentration (approx. 50%) of the sodium hydroxide used to clean their beverage production line.

At this particular manufacturer, the concentration of the beverage itself is also managed with in-line refractometers.

Moreover, water is flushed through the piping system when the line is changed over from sodium hydroxide to beverages, and in-line refractometers can be used to confirm whether all of the sodium hydroxide has been flushed out (0% concentration).

From cleaning to beverage concentration management, in-line refractometers are capable of handling it all. Everything can be managed with a single unit--another advantage of implementation.

Along with stabilizing product quality, managing concentration with in-line refractometers also contributes toward delivering safe and reliable products to consumers.



An example of the sterilization process

Flash pasteurization *

*(high-temperature short-time sterilization)

Cooling

Container sterilization

Bottling

Sealing

Resists

Resists are rarely seen directly in our daily lives.

Nonetheless, they are used in many familiar, common, places such as on top of electronic PCBs and semi-conductors which power electronic and electrical products, LCDs (liquid crystal), and printed materials.

Resists are primarily used as a protective film, and they are applied for purposes such as short-circuit prevention.

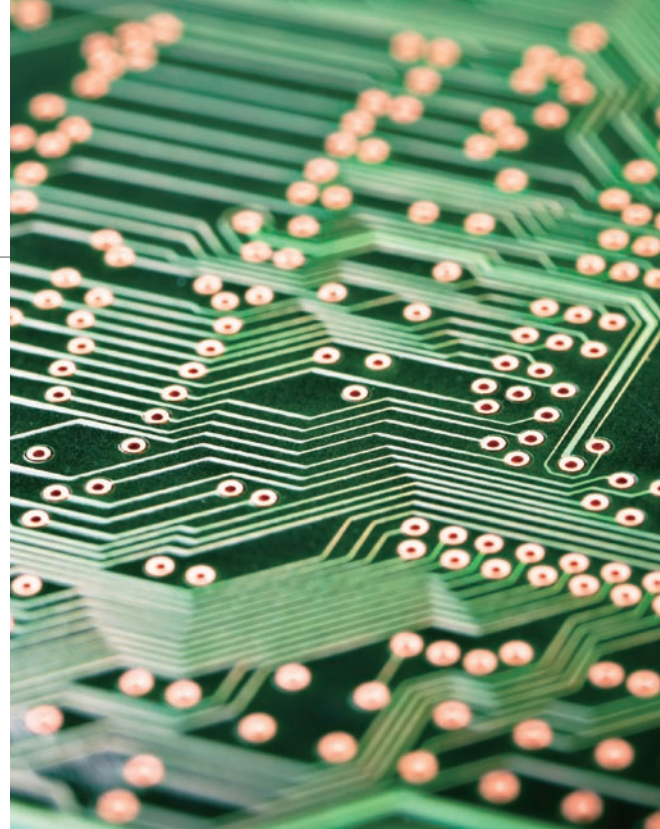
The green type that protects PCBs is the most well-known, but green isn't the only resist color. In fact, there are many kinds of colors.

The color variation of resists isn't simply meant for design purposes; they have practical uses such as concealing the PCB wiring and obfuscating the circuit design.

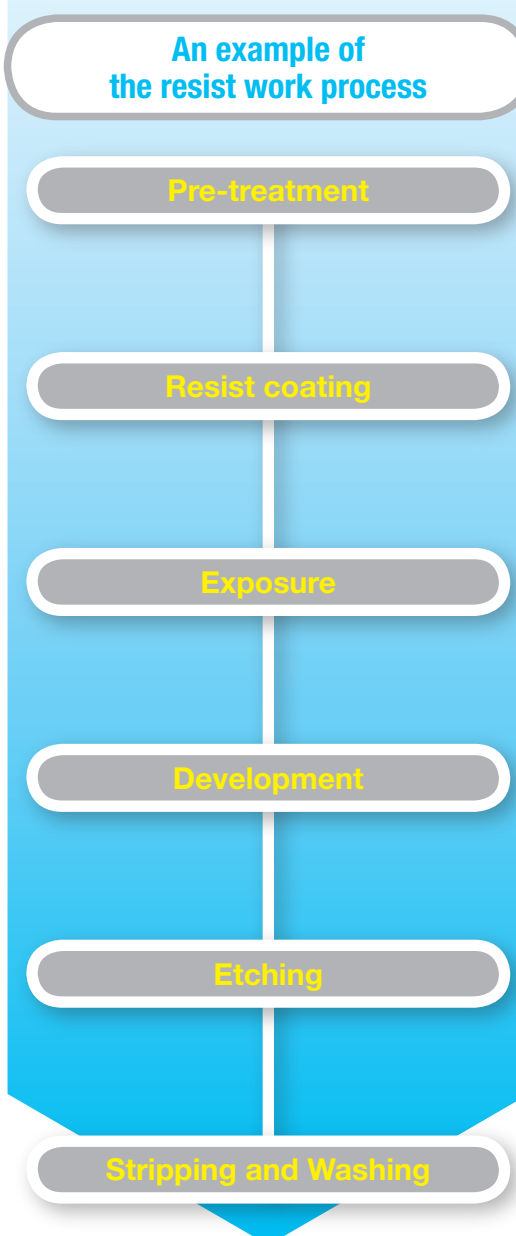
Other uses include being utilized as essential photo spacers in liquid crystals which are indispensable to all sorts of fields. Photo spacers control the LCD's cell gaps at a highly advanced degree, thereby enhancing the resolution.

For instance, when resists are used as photo spacers for advanced control, a high degree of control means precisely controlling the thickness of the cell gaps, which is linked with resolution performance. The concentration of the cell gap thickness is measured using in-line refractometers.

Resists are absolutely invaluable to items that are closely tied to our modern lives such PC and tablet monitors, and LCD TVs. This market continues to develop every day. Implementing in-line refractometers and stabilizing product quality is surely linked with great progress and expansion.



An example of the resist work process



Plating Solutions (Sulfuric Acid)

Plating is widely used in familiar, everyday items such as in smartphones and tablets, PCs, automobiles, and accessories.

"Mekki" is the Japanese word for plating. Although the term may seem like it originated from a foreign loanword, mekki is actually Japanese in origin.

Plating has an unexpectedly long history. Overseas, it has been used since the BC era, and in Japan, it has also been used since long ago, from the Kofun period.

Plating has many expansive roles such as improving appearance, corrosion resistance, and abrasion resistance, and for function and performance. Just as plating serves many purposes, there are also many kinds of plating techniques.

Plating techniques are largely divided into two categories: a well-known "wet-plating" method that involves placing an item to be plated in a liquid, and a "dry-plating" method that creates a plating under vacuum conditions.

Dividing the methods further still, the wet-plating method includes electroplating and electroless plating, and the dry-plating method includes vacuum deposition and sputtering (sputter deposition). There are also other techniques such as hot-dip galvanization.

In-line refractometers are used to manage the concentration of sulfuric acid used in plating solution.

By managing the process and adjusting the components, the condition of the plating solution can be stabilized and a uniform finishing can be maintained.

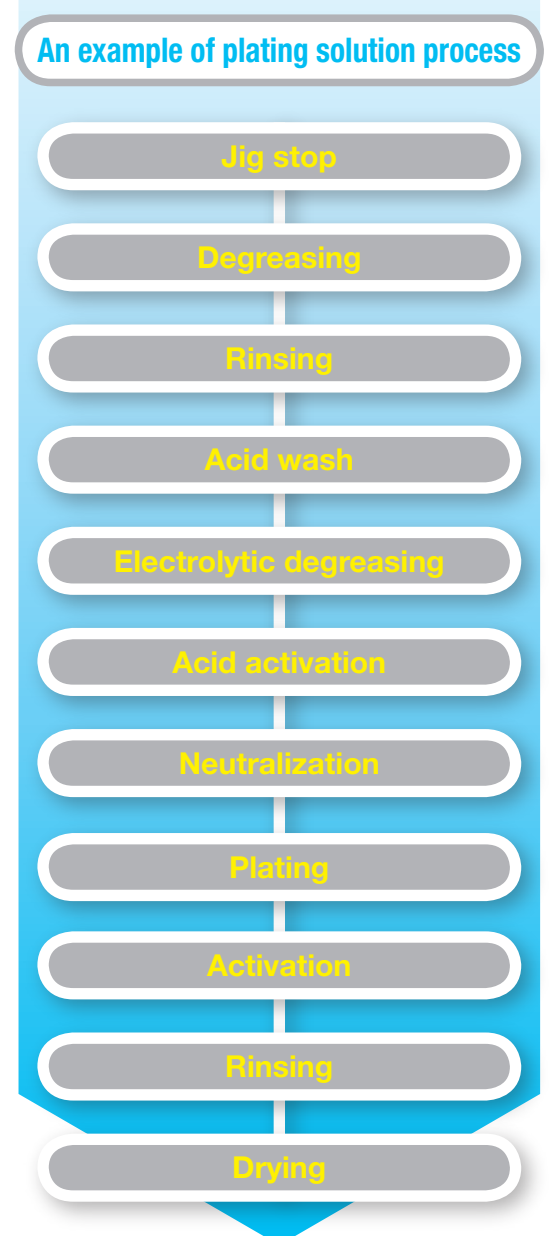
As for implementing in-line meters, refractometers aren't the only choice; there are also electrical conductivity meters. However, electrical conductivity meters involve hassles such as sensor replacement and safety issues when operated. For these sorts of reasons, the reality is that many customers choose refractometers.

When measuring sulfuric acid, there may be issues with the chemical resistance of the materials of the wetted-section (section in direct contact with the solution), but the materials of ATAGO products can be customized.

For details, contact ATAGO.



An example of plating solution process



Application Examples

Preparation



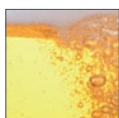
Concentrates & syrups

Measure the Brix of the concentrate to estimate ratios for reconstitution.



Fermentation (wine, beer, soy sauce)

Brix decreases as sugars are converted to alcohol.



Breweries

Measure wort levels when boiling (on a bypass from the main tank).



Dairy

Evaluate solids in condensed and evaporated milk, as well as other processed dairy products.



Sugar cane & sugar beets

Check Brix during both extraction and refining.



Starch & sizing liquids for paper manufacturing

Sizing liquids prevent ink from smearing on paper. The concentration must be adjusted according to the type of paper.

Bottling



Soft drinks & fruit juices

Check consistency before final fill and shipment.



Coffee extracts

Evaporation will raise the Brix to your target level.



Invert sugar, cornstarch

Use the user scale to differentiate between batches of Brix and invert sugar.



Coolants & antifreeze

Glycols must be prepared to the proper strength to ensure a sufficiently low freeze point.



Sodium hydroxide solution

Sodium hydroxide and other alkaline solutions are used for wash solutions, soap manufacturing, and neutralizing acids.



Medicines

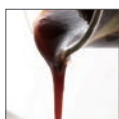
Check the final concentration of liquid medicines to ensure compliance.

Blending Process



Beverage concentrate

Monitor and adjust Brix when evaporating to make concentrate, or diluting to single-strength.



Sauces and seasonings

Useful in controlling ratios when combining sample from different lines.



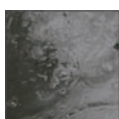
Polymers

Polymerization affects the refractive index of a compound; refractometers can track the progress of this reaction.



Water-based cutting oils and lubricants

Managing concentration is essential to prevent overheating or foaming.



Cleaning fluids, wastewater

Control the dilution ratio, moisture level, or contamination level of draining fluids for metal and electronic materials.



IPA, DMF, hydrogen peroxide solutions

The concentration of strong solvents in-process can require careful monitoring to avoid potential hazards.

Others

Sugar Wastewater Check

Automate a system that redirects suitable water for recirculation or waste, based on the solids content. Ensure that wastewater sugar levels are kept at or below a set standard.

Multiple products in one line

Minimize waste and turnaround time by noticing a concentration shift between different products.

CIP-to-Sample

The readings can be used to infer when CIP solution has left the pipe completely. This significantly reduces the risk of producing a contaminated batch. It can also help minimize the amount of product discarded.

At manufacturing facilities, all kinds of liquid flows through various lines of pipes, fittings, and the like.

Liquid that flows through the line is processed and blended, ultimately becoming a finished product once passes the bottling stage.

The condition and concentration of the liquid changes at each and every stage of the process.

Monitoring and managing whether the processing, blending, and concentration changes are conducted as planned allows for immediate detection of any manufacturing issues and prevents out-of-spec products, thereby resulting in accurate, reliable quality control for the utmost "safety."

Contents

In-line Meters	B02
Prevent Defective Products at Every Stage of the Manufacturing Process	B04
Refractometers	B06
Build-up Prevention	B08
Versatile Functions and Features	B11
In-line Refractometer Lineup	
PRM-100α	B16
PRM-2000α	B18
PRM-TANKα	B20
CM-800α	B22
CM-BASEα	B24
CM-BASEβ	B26
PAN-1DC	B28
US-α	B30
Optional Accessories	B32
Sample Inlet	B33
Sample Inlet List	B34
In-line Refractometer Terminology	B38

Prevent Defective Products at Every Stage of the Manufacturing Process

Initial investments in in-line refractometers can avoid wasting resources

or a reputation-damaging recall!

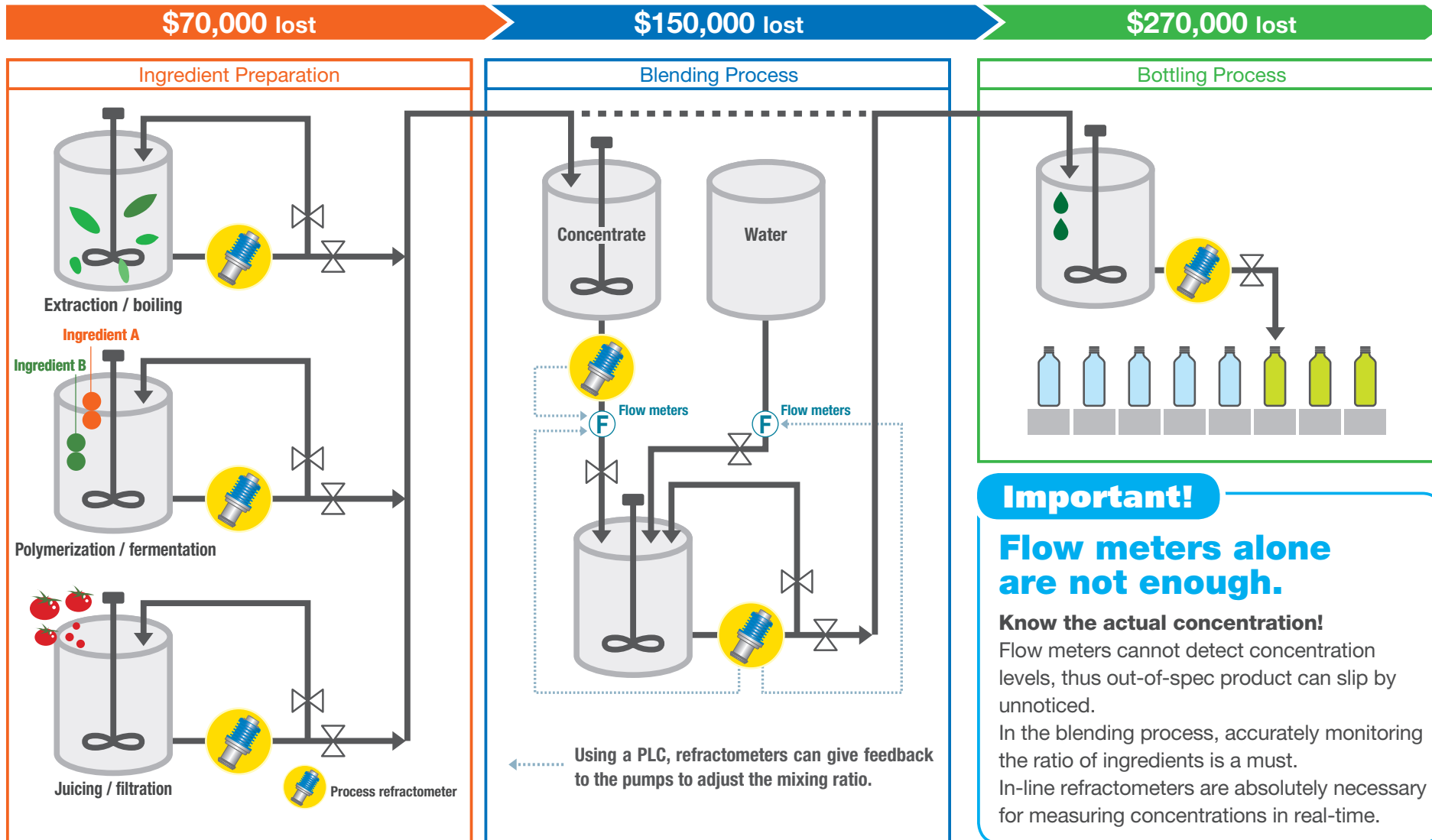
Example 1,000,000 units at \$1 each ... **Save money and prevent a**

bad batch!

Prevent Defective Products in the Ingredient Manufacturing Process

Prevent Defective Products in the Blending Process

Prevent Defective Products in the Bottling Process



Important!

Flow meters alone are not enough.

Know the actual concentration!

Flow meters cannot detect concentration levels, thus out-of-spec product can slip by unnoticed.

In the blending process, accurately monitoring the ratio of ingredients is a must.

In-line refractometers are absolutely necessary for measuring concentrations in real-time.

Each stage that a bad batch passes through costs a plant progressively more money. In this example, if an entire lot of product has to be discarded, the loss is \$270,000 in production cost, plus \$315,000 in expected profit. Furthermore, the consequences of a bad batch slipping through entirely could cost millions if a recall is required!

Causes for Defective Batches

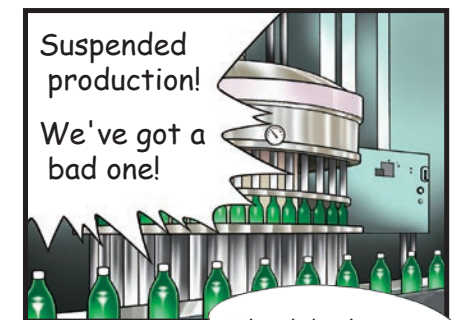
- CIP contamination
- Equipment failure and incorrect operation
- Mistake during a batch test
- Defective batch from a previous stage
- Unknown cause

In-line Refractometer Solutions

- Detects the concentration change in real-time.
- Fully automated measurements leave no risk for human errors.
- If you test at every production stage, you can identify a defective batch before it continues down the line.
- Discover the cause of defective batches by analyzing saved data.

Stay a step ahead of danger

That is the highest priority. I wanted my finished products to be consistently up to standards. Back then, we could never figure out what caused unsuitable batches. One day, we made a decision to track and keep any kind of data that could help us. That data showed us that even seemingly impossible mistakes can happen. To avoid any mistake, it is necessary to anticipate every possible mistake-causing scenario. When we track and keep the data, our factory immediately transforms into a facility that identifies the potential problems early and never produces a defective products.



©Ishinomori Production Inc.

Refractometers

Principles of Refractometers

The refraction of light is a phenomenon wherein the direction that light is traveling changes as it passes through different mediums.

Through this phenomenon, we can observe as light's direction changes and the "bent" appearance of substances even in the seemingly familiar, ordinary places in our day to day lives. For example, imagine the lens of a pair of glasses and a pool. When looking through the lens, an object appears larger or smaller than it is in reality.

When standing inside a pool, as you peer downward from the water's surface, your legs will look shorter than they actually are. As light moves from medium A (in this case, air) to medium B (lens and the pool's water), it refracts.

Furthermore, it is known that light's refraction changes depending on the concentration of a liquid.

The refractive index, which is a value that expresses the degree of refraction, is proportional to the density (mixture ratio) of a component.

Therefore, if there is 10g of sugar contained in 100ml of an aqueous solution and 20g of sugar contained in 100ml of an aqueous solution, the latter will have a higher refractive index value.

This difference in refractive index due to concentration variance has also been confirmed in solutions other than sucrose.

The properties of both the phenomenon known as the refraction of light and differing refractive index depending on concentration, are used as the principles of refractometers.

In addition to measuring the refractive index of a liquid, refractometers also display the concentration, converted from the refractive index.

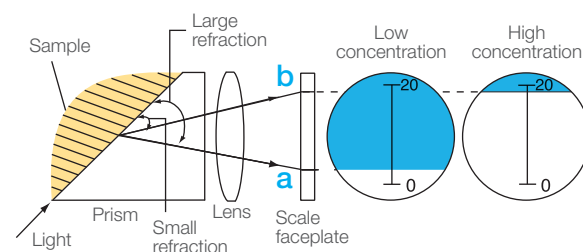
Among refractometers, there are mainly those that utilize the transparent (refractive) system and those that utilize the reflective system for measurement.

ATAGO's PRM series and CM series are refractometers that use the reflective system. Light generated from a light source within the detection section passes through the prism, hits the sample on the wetted section (prism surface) and is reflected back once more through the prism, and is then detected by the light-receiving sensor.

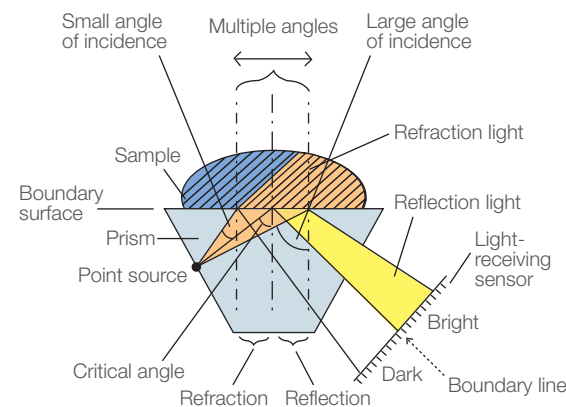
This light-receiving signal is converted into the refractive index. The temperature of the sample is also simultaneously measured by the temperature sensor placed near the wetted section.

At factories that manufacture liquid products such as beverages and medicine, many processes are added to the ingredients (raw liquid) that serves as the base for the product, and there a great variety of manufacturing lines ranging from some that mix two

Principles of Refractometers-Transparent (Refractive) System



Principles of Refractometers-Reflective System



kinds of ingredients together and more, up until the final product. There are indeed all sorts of processes such as juicing, filtration, boiling, diluting, mixing (blending), and fermentation, but the concentration of the sample changes at each and every one of these stages.

For example, after the boiling stage, it is expected that the sample will become more concentrated (concentration will increase).

By monitoring the concentration, it is possible to check the sample's condition and to what extent it boiled down. Among all these processes that the product undergoes, if only the final product is inspected, when defective products are produced, it is impossible to know at what stage of the process this occurred.

In the amount of time that passes before these defective products are discovered, a number of them have been manufactured, leading to an even greater loss.

For this reason, installing in-line refractometers at every stage of the manufacturing process and being instantly aware of the occurrence of defective products results in preventing tremendous loss before it happens.

A Comparison Between Refractometers and Other Principles

Aside from refractometers that utilize the refraction as a measurement principle, there are many kinds of measuring instruments used in process management of liquid manufacturing lines.

Density / Specific Gravity Meters

Density / specific gravity meters have good measurement sensitivity, and there are high accuracy models that have greater accuracy than refractometers. However, since they require a longer measurement time than refractometers, they are slow to respond to transitions such as concentration changes of liquids. Still more, they are not adept at measuring liquids that contain cloudy particulates.

Electrical Conductivity Meters

Electrical conductivity meters measure the ease in which an electric current flows through a liquid.

Electrodes are immersed in a liquid and the electrical conductivity between the liquid and electrodes is measured. Due to the nature of this principle, measurement is limited to liquids

that contain electrolytes such as brine, lye, and hydrofluoric acid. The lower the concentration of a liquid's solid components, the higher the resolution, making electrical conductivity suitable for low concentration liquids, but as concentration increases, accuracy decreases.

Organic types of liquids which do not contain electrolytes cannot be measured with electrical conductivity meters. As such, refractometers are ideal for measuring liquids that contain dissolvable solid components other than electrolytes.

For example, when monitoring a liquid that contains dissolved salt and sugar, an electrical conductivity meter will measure only the salt, which is an electrolyte. However, as the sugar is not an electrolyte, it will be difficult to detect. Using an in-line refractometer, the total concentration of both the salt and sugar can be measured, making in-line refractometers convenient and useful for monitoring the overall concentration of a liquid.

Mass Flow Meters

Mass flow meters are convenient for measuring both the flow rate and the concentration of a liquid sample.

The concentration is converted from density. Low accuracy models are common.



There is a risk for the measuring instrument of a production line that the sample (liquid) Moreover, there are cases where it is more difficult to clean off build-up on measuring installed in the main line. The following sections will explain build-up prevention tips,

which flows through the pipes may adhere to the sensor section. instruments that have been inserted in the main production line than on instruments not solutions, and strategies for ATAGO's in-line refractometers.

A Completely Flat Sample Stage

The wetted section (the prism surface and prism stage) which contacts the sample inside the sample stage of the PRM series and CM-800α has been completely and entirely flattened. To eliminate even the slightest of gaps between the prism surface and prism stage, during manufacturing, the sample stage is repolished down to one-hundredth of a millimeter (0.01 mm). By making the sample stage completely flat, sample build-up on the prism surface is kept at a minimum.

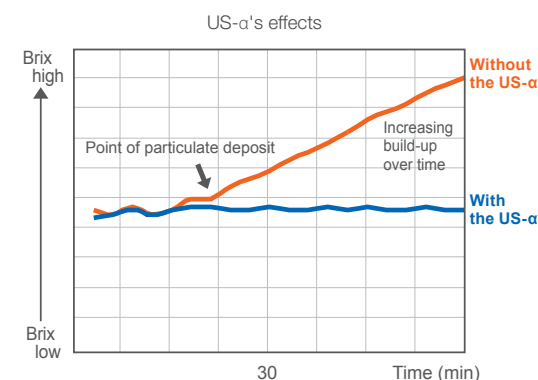


Ultrasonic Cleaner for Build-Up Prevention (optional accessory)

Depending on the properties of the sample, there are cases where build-up on the prism surface is utterly unavoidable. For these types of cases, the ultrasonic cleaner, US-α is available. The US-α is a device that attaches directly facing the detection section of an installed process refractometer, and through the vibrations of its ultrasonic waves, prevents and reduces build-up on the in-line refractometer's prism surface.



Ultrasonic Cleaner US-α



* Even now, repeated experiments and inspections are being conducted with a variety of samples.



US-α attached to the sample inlet

Prism Wiper (optional accessory)

The prism wiper is an optional accessory that attaches directly facing the detection section of an in-line refractometer installed in the piping system for manually wiping build-up off the prism surface. When necessary, the wiper can be manually operated and the prism wiper's rubber tip wipes build-up off of the prism surface. There is no need to stop the production line and remove the in-line refractometer every time in order to clean the prism surface.



Prism Wiper

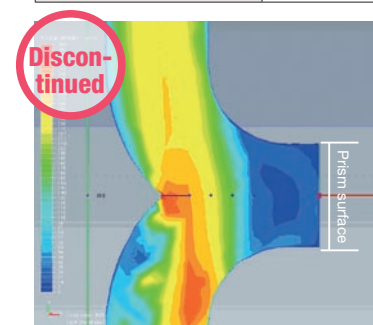


Recommended for incredibly high viscosity samples that tend to adhere to surfaces such as the detection section.

Improved Sample Inlet

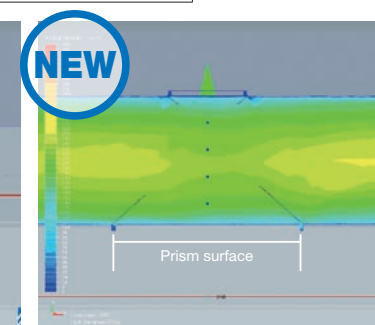
The former π type pipe has been discontinued. The current straight type and L type sample inlet fittings have been improved.

Sample flow (20°C) Viscosity coefficient = low



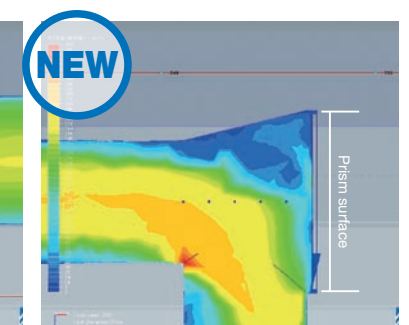
Former π type pipe

The flow velocity of the sample around the prism is slow.



Straight type pipe

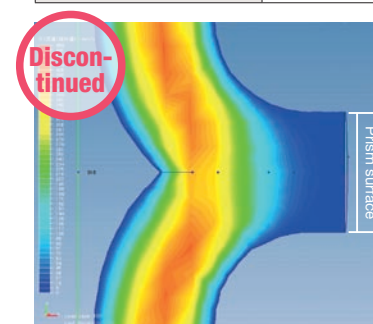
It is possible to increase and stably measure the flow velocity around the prism.



L type pipe

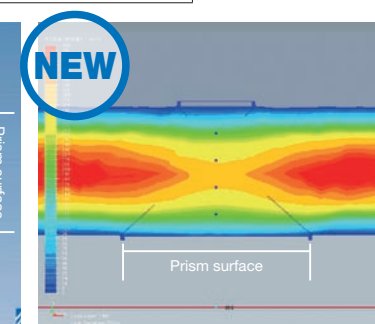
It is possible to maintain and stably measure the flow velocity around the prism.

Sample flow (20°C) Viscosity coefficient = high



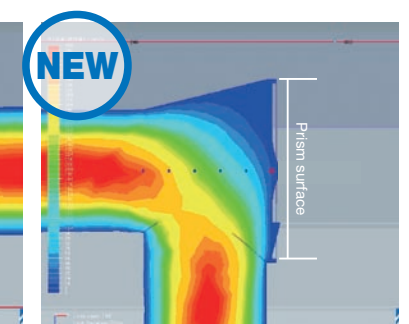
Former π type pipe

When the viscosity is high, the flow velocity near the wall's surface will drop, making it difficult for the sample to flow around the prism.



Straight type pipe

Although high viscosity is causing the flow velocity of the wall's surface to drop, sample is flowing freely around the prism without stagnation.



L type pipe

The enhancements from the former π type pipe can be readily seen in how the flow velocity around the prism is maintained.

ATAGO has examples of proven strategies to prevent years of build-up from accumulating. As an example of our many records of proven strategies, we will introduce feedback from some of our customers who have installed the ultrasonic cleaner, US- α .

Sugar Refinery

Sugar Syrup



This customer experienced operational errors from the accumulation of lime calcium (used to remove impurities of raw sugar) deposits on the sensor section of their process refractometer. Therefore, they installed **the ultrasonic cleaner, US- α** . The customer confirmed that there was absolutely no build-up once the pipeline was cleaned, and after 20 days had passed it was still in pristine condition. Occasionally, the customer performs some maintenance such as cleaning with hot water and gently wiping it off just in case, but even now, they are not experiencing any issues with measurement values. They had a refractometer made by another manufacturer which they periodically removed from the pipeline and performed cleaning. By purchasing an ATAGO in-line refractometer along with the US- α , cleanings were reduced, making the process easy and hassle-free.

Auto Parts Company

Surface Treatment Agents



This customer experienced a phenomenon in which their measurement values increased due to surface treatment agents adhering to the sensor section of their process refractometer. The process refractometer was attached to a pipe that was in a high, hard to reach location, but removal was necessary to perform cleaning every single time there was build-up. By using **the ultrasonic cleaner, US- α** , build-up no longer occurs and since there is no need to perform cleaning, work efficiency increased.

Paper Manufacturing Company

Gelling Agent (Coating)



The purpose of a gelling agent is to stabilize the finished coating by applying it on the paper. This customer confirmed that throughout 32 continuous hours of operating the manufacturing line, gelling agent build-up on the sensor section would occur every 5 to 7 hours. Due to the gelling agent's properties, build-up was prone to occur, and the customer fretted over whether or not management with a refractometer was really appropriate for their application. It was at that time the customer found out about **the ultrasonic cleaner, US- α** , and demoed it. Once manufacturing begins, the process cannot be stopped, so the implementation of the US- α has been tremendously helpful in eliminating the occurrence of build-up.

Food Company (e.g. Powdered Milk)

Powdered Milk



The production line is operated for about 10 days in a month and produces 38 tons of powdered milk at one time. The concentrate's concentration is measured with a process refractometer, but it must be removed and wiped clean every 6 to 7 hours for the CIP process when severe build-up occurs, and once a month for routine cleaning. Alkali used in the CIP process eliminates acids, but calcium and magnesium remain. Through the implementation of **the ultrasonic cleaner, US- α** , even if cleaning is not done frequently, measurement values are correctly displayed, and the customer is fully utilizing the convenience and usefulness of the US- α .

Chemical Company

DMF (Dimethylformamide)



DMF is a solvent used in acrylic fiber synthesis. Up to now, concentration control required that the unit be cleaned once every 30 minutes, but in tests using our **the ultrasonic cleaner, US- α** , the instrument was able to measuredly stably for 10 consecutive hours without cleaning, improving factory efficiency.

Versatile Functions and Features

Sample inlet (fittings) / Temperature compatible / Temperature compensation / Detection section and calculation display section / User-scales / Data output / Alarm

Various Sample Inlets (Fittings for Coupling with Piping System)

In addition to the sample inlets printed on pg. B34 to B38, ATAGO has suitable fittings for specialized cases such as fittings that meet VARIVENT standards and fittings which are interchangeable with other manufacturers' in-line products. There are a number of cases highlighting successful installation of various fittings. For details, please contact ATAGO.

Compatible with a Wide Range of Temperatures

ATAGO's PRM series and CM series are compatible with a wide range of temperatures. Many kinds of samples can be measured as-is. Compatible temperatures (for PRM-2000 α): -35°C to 165°C. Also capable of withstanding CIP and SIP procedures.

* When switching from measurement sample to cleaning solution, the temperature difference of the solution must be within 80°C.

Temperature Compensation

ATAGO's PRM series and CM series use the refraction of light as a measurement principle. Light's refractive index changes according to temperature, even at the same concentration of the very same substance. Thus, if the temperature of a liquid sample varies, the measurement value will change. To handle these temperature changes, the Brix scale is equipped with an automatic temperature compensation (ATC) feature according to sucrose. It is an immensely convenient and useful feature because correctly adjusted measurement values are displayed, even when measuring at different temperatures. Provided that the temperature is from 5°C to 100°C (*1), no matter what temperature the liquid sample is at, Brix value at 20°C can be displayed. As for the PRM series' user-scales, temperature compensation according to the sample is possible. In addition to sucrose, the PRM-2000 α is equipped with temperature compensation according to high-fructose corn syrup and unsweetened beverages.

*1 CM-BASE α : 10 to 50°C, PRM-2000 α : 5 to 90°C

Detection Section and Calculation Display Section (PRM Series)

The PRM series is divided into 2 parts: 1. the "detection section" that is incorporated into the piping system or connected directly to the tank, and 2. the "calculation display" section which is

affixed to devices such as the control box. The detection section and the calculation section are connected with one cable that can be extended to a maximum length of up to 200m (a 15m cable is included as a standard accessory). Refractive index and temperature data from the detection section is sent to the calculation display section via the RS-485's digital signal. The calculation display section supplies power to the detection section.

User-scales (PRM series)

Aside from Brix and refractive index, the PRM series has customizable user-scales for displaying the specific concentration of a sample. By using the liquid sample's "refractive index vs. concentration (at every temperature)" data and transmitting it via RS-232C as a .txt file, user-scale data can be saved.

Data Output

Recorder output

The PRM series and the CM series (optionally available for some models) are equipped with a DC4 to 20mA power supply output feature for recorder output use. The PRM series and CM-800 α outputs measurement value and temperature data and the CM-BASE α (A) outputs measurement value data. It is possible to set designated value ranges with the DC4 to 20mA, or set the output range.

RS-232C output

The PRM series and the CM series (excludes certain models) are equipped with an RS-232C data output feature for computer use.

Alarm (PRM series)

The PRM series is equipped with a function that outputs a signal for an alarm when measurement values that exceed the pre-set ranges are detected. Out of spec sample (product) of a factory's manufacturing line is instantly discovered, making this a supremely useful and convenient feature. Alarm output can be configured for maximum and minimum values of management ranges for products that are up to standards in a manufacturing process that has incorporated an in-line refractometer, or for when a few seconds of unacceptable measurement values are continuously measured. Using a relay driver, it is possible to detect and regulate the occurrence of abnormal values through measures such as turning on the alarm LED light, or sending input to a sequencer.

Product Lineup

	In-line Refractometer			In-line Brix Monitor					Digital Immersion Refractometer	
Product Structure	Separate detection section and calculation display section model			Integrated model: A unit equipped with an operating panel and display section in the front and a sensor/detection section in the back.					Integrated model: Optimized for easy installation.	
Model	PRM-100α	PRM-2000α	PRM-TANKα	CM-800α	CM-800α-EG	CM-800α-PG	CM-800α-SW	CM-BASEα	CM-BASEβ	PAN-1DC
Cat.No.	3574	3641	3575	3564	3531	3532	3533	(A): 3603 (D): 3604	(A): 3616 (D): 3626	3606 (M): 3607 (L): 3608 Customizable length: 3609
Measurement items	Refractive index (nD) Brix Concentration	Refractive index (nD) Brix Concentration	Refractive index (nD) Brix Concentration	Brix	Ethylene glycol concentration Freezing point	Propylene glycol concentration Freezing point	Salinity	Brix	Brix	Brix
Measurement range	nD : 1.32000 to 1.55700 Brix: 0.00 to 100.00%	nD : 1.32069 to 1.36500 Brix: 0.000 to 20.000%	nD : 1.31700 to 1.51000 Brix: 0.00 to 85.00%	0.00 to 80.0%	0.0 to 90.0% -50 to 0°C / -58 to 32°F	0.0 to 90.0% -50 to 0°C / -58 to 32°F	0.0 to 28.0%	0.0 to 33.0%	0.0 to 33.0%	0.0 to 42.0%
Resolution	nD : 0.0001 / 0.00001 Brix: 0.1 / 0.01%	nD : 0.00001 Brix: 0.01 / 0.005 / 0.001%	nD : 0.0001 / 0.00001 Brix: 0.1 / 0.01%	0.01 / 0.1%	0.1% 1°C / 1°F	0.1% 1°C / 1°F	0.01 / 0.1%	0.1%	0.1%	0.1%
Measurement accuracy	nD : ±0.00010 Brix: ±0.05%	nD : ±0.00001 Brix: ±0.007% (nD : 1.32069 to 1.33681, Brix: 0.000 to 2.000%) nD : ±0.00010 Brix: ±0.050% (nD: from 1.33682 up, Brix: from 2.001% up)	nD : ±0.0001 Brix: ±0.1%	±0.1%	±0.4% ±1°C / ±1°F	±0.4% ±1°C / ±1°F	±0.1%	±0.5%	±0.5%	±0.2%
VARIVENT	○	○	-----	○	○	○	○	○	-----	-----
PROFIBUS	○	○	○	○	○	○	○	○ * (D) only	○ * (D) only	○
Product Details	Continuously monitors items such as the refractive index, Brix, concentration and moisture, and mixture ratio of a variety of liquids. Customizable user-scales.	A model capable of measuring a range of up to 20% Brix at a high accuracy of ± 0.05%. Customizable user-scales.	A model with a detection section capable of being directly connected to a tank and measuring the concentration inside the tank in real-time. Customizable user-scales.	A Brix monitor capable of measuring a range of 0 to 80% Brix. Equipped with automatic temperature compensation (ATC).	An ethylene glycol concentration model of the CM-800α. The freezing point can also be displayed.	A propylene glycol concentration model of the CM-800α.	A salinity model of the CM-800α.	Compact size. 2 models: Model (A) with recorder output, and model (D) with RS-232C output.	A model designed like a CM-BASEα that can be mounted on the edge of a tank, optimized for easy installation.	An easy to install model that is simply mounted on the edge of a tank. Capable of continuous Brix output via RS-232C.

Detection Section

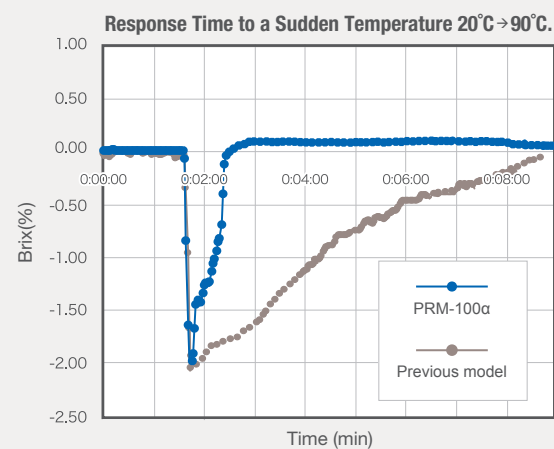
PRM-100α

Mounts into a piping system and measures the refractive index of the liquid inside. The refractive index and temperature data signals are sent via RS-485 to the display section.

NEW A significantly improved thermo-sensor quickly adapts to sudden temperature changes, keeping measurements stable.

More Resistant to Temperature Change!

Brix measurements stabilize more than twice as quickly as the previous model when temperature rapidly rises or drops (see image below).



The air-cooling fin transfers heat away, with no need for external coolants.

Capable of withstanding temperatures from -5°C to 160°C.

The prism surface has undergone processing to make it completely and entirely flat, preventing the build-up of solids and ensuring long-term, reliable measurements.

NEW The Kalrez® O-ring is highly resistant to heat and solvents.

Calculation Display Section

PRM-100α

Signals received from the detection section, such as Brix and concentration values are converted, undergo arithmetic processing (e.g. automatic temperature compensation), and are digitally displayed on the seven-segment LED display section. It is also equipped with outputs for recorder and computer use, and a high- and low- limiter output.

NEW Improved accuracy: Brix ±0.05%, nD ±0.00010.

NEW Wider-than-ever 0.0 to 100.0% Brix range.

NEW Options to display minimum readouts to the smallest decimal place. Brix: 0.1% or 0.01%, nD: 0.0001 or 0.00001.

NEW Easy-to-See Display Panel. The LED display offers improved visibility from a distance over a conventional LCD. Measurement values are displayed in orange, and temperature in blue.

Calculation display section with built-in power supply.

Optional alarm output for when the reading goes outside the user's set range.

Use the optional DC4-20mA output to communicate with a PLC and control production automatically!

The cable to the detection section can conveniently be extended to 200m for remote access (Length: 15m standard).



PC-Programmable User Scale (Conc).*

Programming a user scale is no longer a hassle!

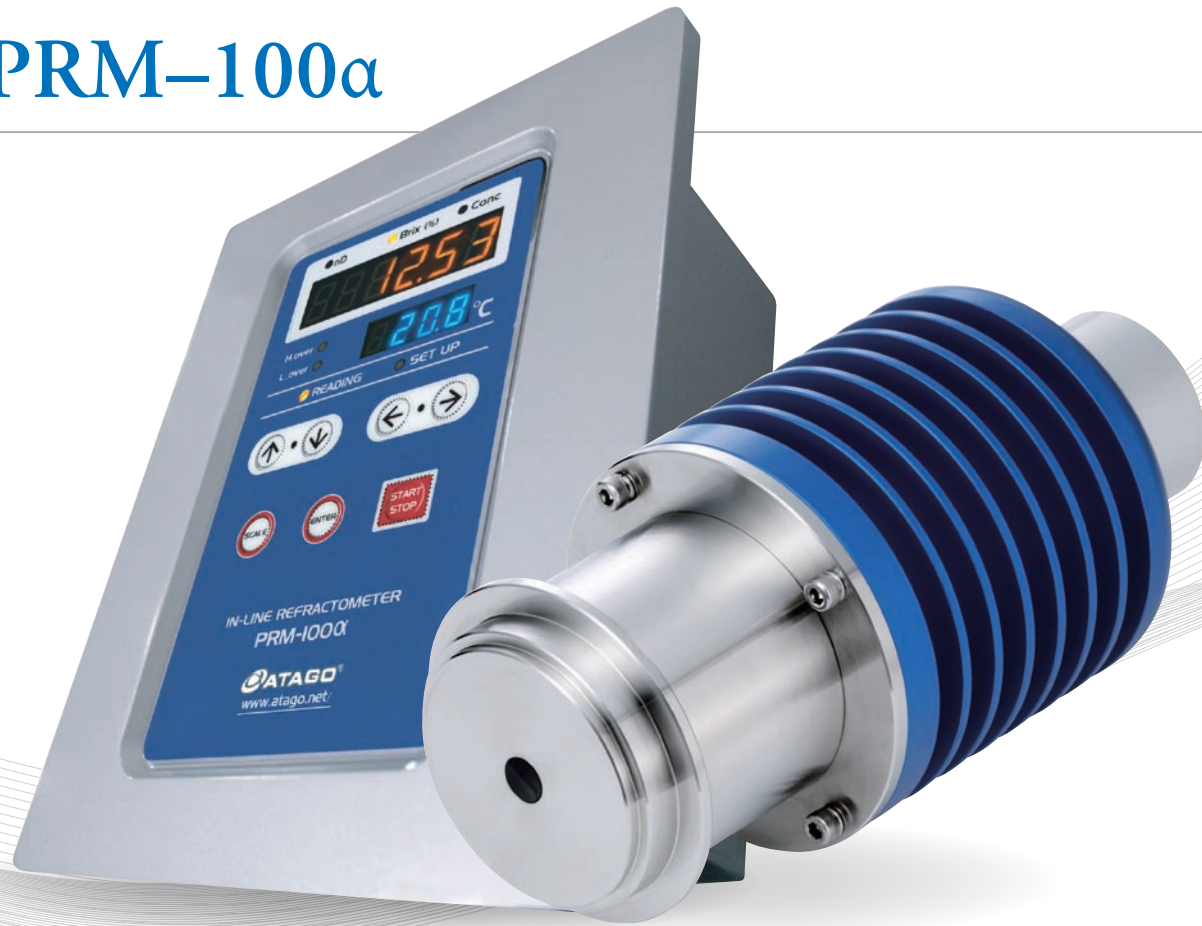
Simply create a refractive index data table, using known concentrations in a .txt file, and send it to the refractometer via RS-232C on any PC Win95 or newer.

*Direct concentration is displayed without the need to convert from refractive index or Brix.

Programmable concentration setting

File	Edit	Search	Help				
*T	5	5.0	10.0	20.0	30.0	40.0	0.0
*N	2	0.00	10.00	20.00	30.00	40.00	50.00
*C	1	1.33390	1.36050	1.38500	1.40640	1.42370	1.43590
*C	2	1.33369	1.36010	1.38440	1.40570	1.42280	1.43480
*C	3	1.33299	1.35910	1.38310	1.40410	1.42090	1.43260
*C	4	1.33194	1.35780	1.38160	1.40240	1.41900	1.43050
*C	5	1.33061	1.35640	1.38010	1.40070	1.41710	1.42840
*C	6	0.0	0.0	0.0	0.0	0.0	0.0

PRM-100α



Stay a Step Ahead of Danger with In-line Process Refractometer.

This premium model features lab-grade accuracy across the full range of refractive index, Brix, or user-defined concentration scale. Data can be transmitted to a PLC for system automation. This model can be installed in the pipe lines of refill tanks, cleaning solution tanks, dilution, mixing, and blending tanks of manufacturing plants that produce liquid products such as the food and medicine industries, as well as those used in all kinds of industrial applications. This makes the unit capable of continuously monitoring items such as the refractive index, Brix, concentration and moisture, and mixture ratio of a variety of liquids. It has been enhanced with a wider than ever Brix measurement range of 0.00 to 100.00% and an accuracy of $\pm 0.05\%$.

Specifications

In-line Refractometer PRM-100α

Cat.No.	3574
Measurement items	Refractive index (nD), Brix (temperature compensation according to sucrose), concentration (Conc) (User scale), and temperature (°C)
Measurement range	Refractive index (nD): 1.32000 to 1.55700, Brix: 0.00 to 100.00%, Temperature: -5.0 to 160.0°C
Resolution	① Refractive index (nD): 0.0001 Brix: 0.1% ② Refractive index (nD): 0.00001 Brix: 0.01%(Factory default setting) * by selection ③ Temperature: 0.1°C
Measurement accuracy	Refractive index (nD): ± 0.00010 Brix: $\pm 0.05\%$ * When measuring standard solutions (sucrose) under stable temperature conditions. Temperature: $\pm 0.1^\circ\text{C}$
Temperature compensation range	5 to 100°C
Display system	Seven-segment LED
Output method	Recorder output (DC4-20mA), RS-232C output, and alarm output when high- and low-limit values are exceeded.
Power supply	AC100 to 240V, 50/60 Hz
Cable	Detection section - Calculation display section (power supply 12V and RS-485) Length: standard 15m (maximum up to 200m)
Materials in contact with the solution	Prism: Sapphire, Prism stage: SUS316L
Pressure resistance	0.98MPa (detection section)
Ambient temperature	5 to 40°C
Power consumption	30VA
International protection class	IP67 Water resistant
Dimensions and weight	Detection section: 10.8×26.32×10.8cm, 3.2kg Calculation display section: 19.2×10×24cm, 3.3kg

User scale

User scale (concentration) can be programmed with a PC.

*T	*N	*C	*C	*C	*C
5	2	1	2	3	4
5.0	0.00	1.33390	1.33369	1.33299	1.33194
10.0	10.00	1.36050	1.36010	1.35910	1.35780
20.0	20.00	1.38500	1.38440	1.38310	1.38160

Alarm function

Equipped with an alarm output function that transmits a signal when pre-set high- and low-limit values are exceeded.

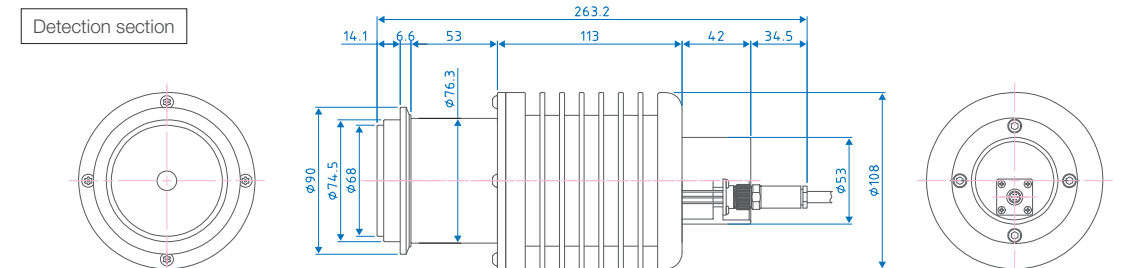


Improved thermo-sensor performance.

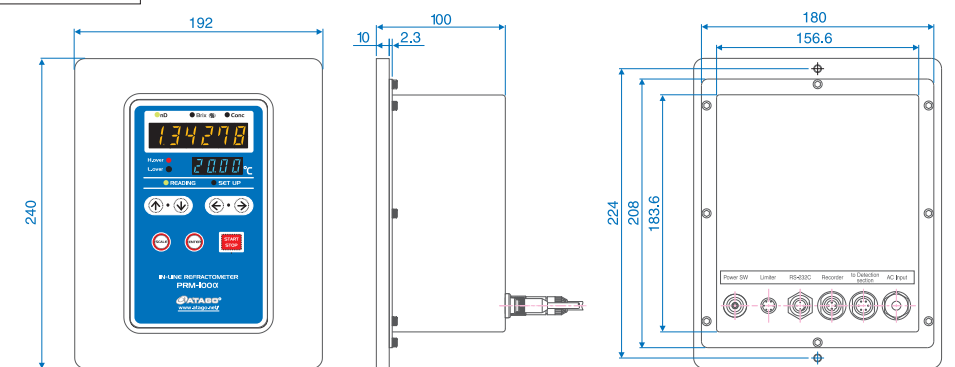
The thermo-sensor quickly adapts to sudden temperature changes, making stable measurement possible.



Dimensions (unit of length: mm)

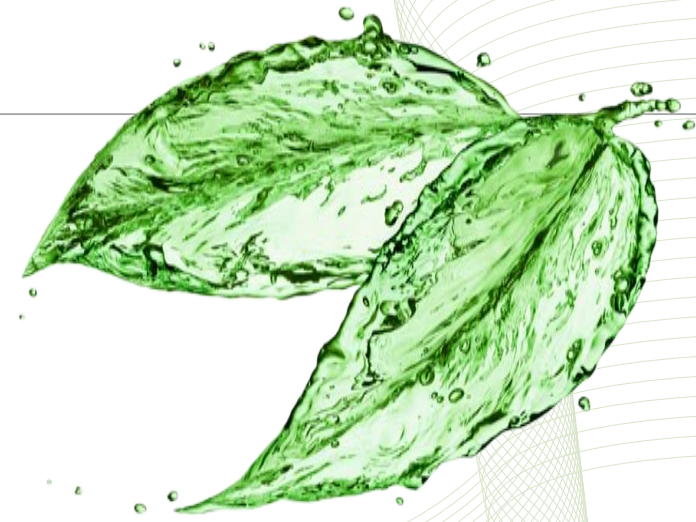


Calculation display section



*For details on the detection section and calculation display section, please refer to pg. B14-B15.

PRM-2000α



Ideal for low concentration samples - High accuracy

Capable of measurement at temperatures between -35 to 165°C.

Introducing an ideal in-line unit for low concentration samples. Featuring a Brix range of 0 to 20%, with a high accuracy of $\pm 0.050\%$, our newest in-line unit, the PRM-2000α is ideal for precision measurement of low concentration samples, as well as fruit juices and other beverages. Moreover, the PRM-2000α has an even higher accuracy of $\pm 0.007\%$ for samples with a low Brix range of 0.000 to 2.000%. Capable of measurement at temperatures between -35 to 165°C (during SIP / CIP).

Specifications

In-line Refractometer PRM-2000α

Cat.No.	3641
Measurement items	Refractive index (nD), Brix (Temperature compensation corresponding to 3 types of samples: sucrose, high-fructose corn syrup, and sugar-free beverages [2% or less]), concentration (Conc) (User scale), and temperature (°C).
Measurement range	Refractive index (nD): 1.32069 to 1.36500, Brix: 0.000 to 20.000%, Temperature: -35.0 to 165.0°C
Resolution	① Refractive index (nD): 0.00001 Brix: 0.001% (Factory default setting) ② Refractive index (nD): 0.00001 Brix: 0.005% ③ Refractive index (nD): 0.00001 Brix: 0.01% * by selection ④ Temperature: 0.1°C
Measurement accuracy	Refractive index (nD): ± 0.00001 Brix: $\pm 0.007\%$ (Refractive index (nD): 1.32069 to 1.33681, Brix: 0.000 to 2.000%) Refractive index (nD): ± 0.00010 Brix: $\pm 0.050\%$ (Refractive index (nD): from 1.33682 up, Brix: from 2.001% up) Temperature: $\pm 0.1^\circ\text{C}$ * Accuracy may vary when measuring samples above or below Brix 2% due to temperature compensation and high accuracy specifications.
Temperature compensation range	5 to 90°C
Display system	Seven-segment LED
Output method	Recorder output (DC4-20mA), RS-232C output, and alarm output when high- and low-limit values are exceeded.
Power supply	AC100 to 240V, 50/60 Hz
Cable	Detection section - Calculation display section (power supply 12V and RS-485) Length: standard 15m (maximum up to 200m)
Materials in contact with the solution	Prism: Sapphire, Prism stage: SUS316L
Pressure resistance	0.98MPa (detection section)
Ambient temperature	5 to 40°C
Power consumption	30VA
International protection class	IP67 Water resistant
Dimensions and weight	Detection section: 10.8×33.57×10.8cm, 4.1kg Calculation display section: 19.2×10×24cm, 3.3kg

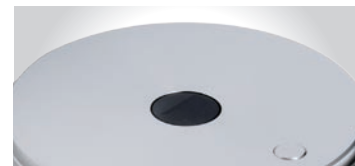
High accuracy

Capable of continuous measurement at a high accuracy of $\pm 0.007\%$ for Brix range of 0 to 2%, and at $\pm 0.050\%$ for Brix range of 2 to 20%.



Exceptional cleanliness

A completely flat sample stage allows for improved, exceptional cleanliness.



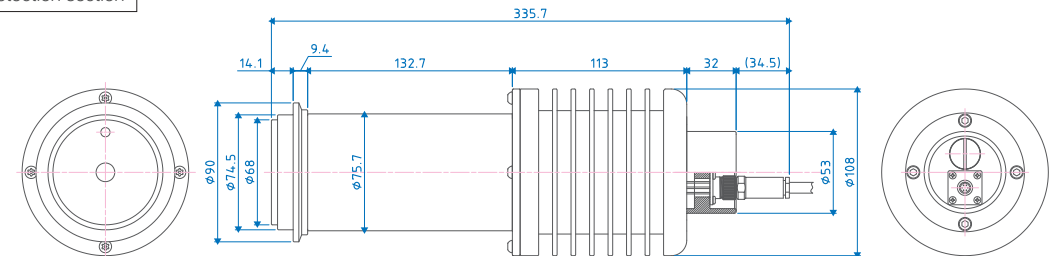
CIP and SIP compatible

Capable of measurement at temperatures between -35 to 165°C (during SIP / CIP).

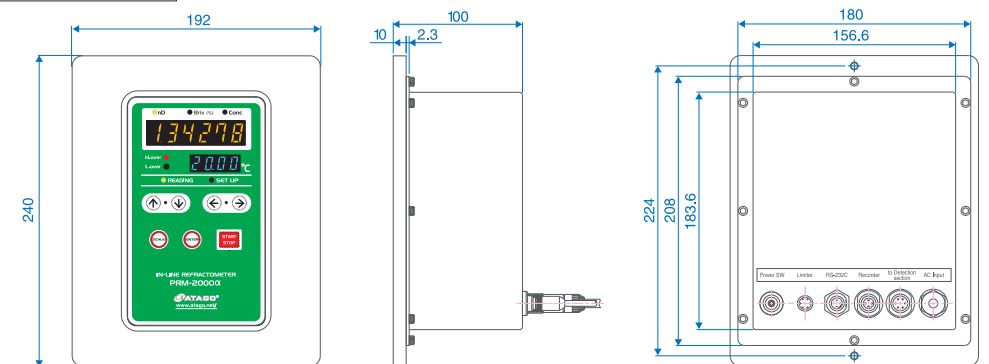


Dimensions (unit of length: mm)

Detection section



Calculation display section



* For details on the calculation display section, please refer to pg. B15.

PRM-TANK α



Directly connects to a tank.
Real-time measurement of the tank's internal concentration.

The PRM-TANK α Process Refractometer features a new design of the detection unit, which is to be mounted on the wall of a vessel. It is ideal for a variety of vessel types, such as distillers, condensers, blenders, fermenters, extractors, and filtration tanks. The flat sample stage prevents sample buildups, keeping the prism clean over an extended period of time.

Specifications

In-line Refractometer PRM-TANK α

Cat.No.	3575
Measurement items	Refractive index (nD), Brix (temperature compensation according to sucrose), concentration (Conc) (User scale), and temperature (°C)
Measurement range	Refractive index (nD): 1.31700 to 1.51000, Brix: 0.00 to 85.00%, Temperature: -5.0 to 110.0°C
Resolution	① Refractive index (nD): 0.0001 Brix: 0.1% (Factory default setting) ② Refractive index (nD): 0.00001 Brix: 0.01% * by selection ③ Temperature: 0.1°C
Measurement accuracy	Refractive index (nD): ± 0.0001 Brix: $\pm 0.1\%$ *When measuring standard solutions (sucrose) under stable temperature conditions. Temperature: $\pm 0.1^\circ\text{C}$
Temperature compensation range	5 to 100°C
Display system	Seven-segment LED
Output method	Recorder output (DC4-20mA), RS-232C output, and alarm output when high- and low-limit values are exceeded.
Power supply	AC100 to 240V, 50/60 Hz
Cable	Detection section - Calculation display section (power supply 12V and RS-485) Length: standard 15m (maximum up to 200m)
Materials in contact with the solution	Prism: Crystal, Prism stage: SUS316L
Pressure resistance	0.98MPa (detection section)
Ambient temperature	5 to 40°C
Power consumption	30VA
International protection class	IP67 Water resistant
Dimensions and weight	Detection section: 25x29.7x25cm, 12.3kg Calculation display section: 19.2x10x24cm, 3.3kg

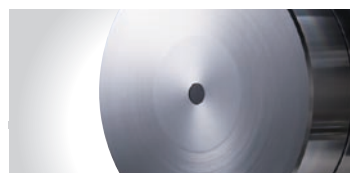
Connect directly to a tank

This model directly connects to a tank and measures the concentration inside the tank in real-time.



Completely flattened detection section

The best possible solution for sample build-up worries! The completely flattened sample stage also enables the unit to endure long periods of measurement.



Compatible with all kinds of samples

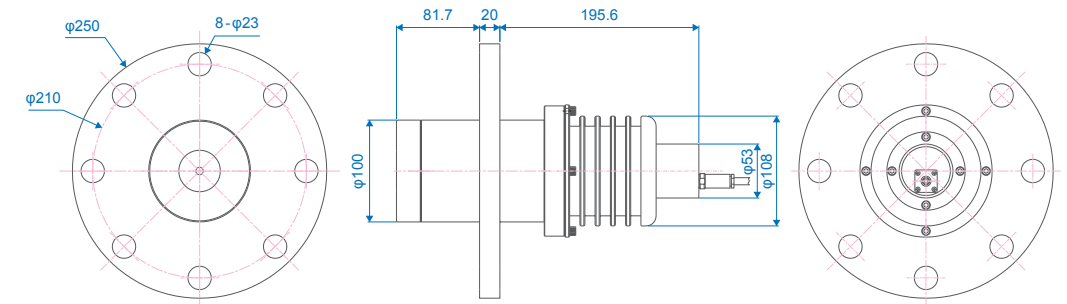
This model is capable of measuring up to 85.00% Brix.



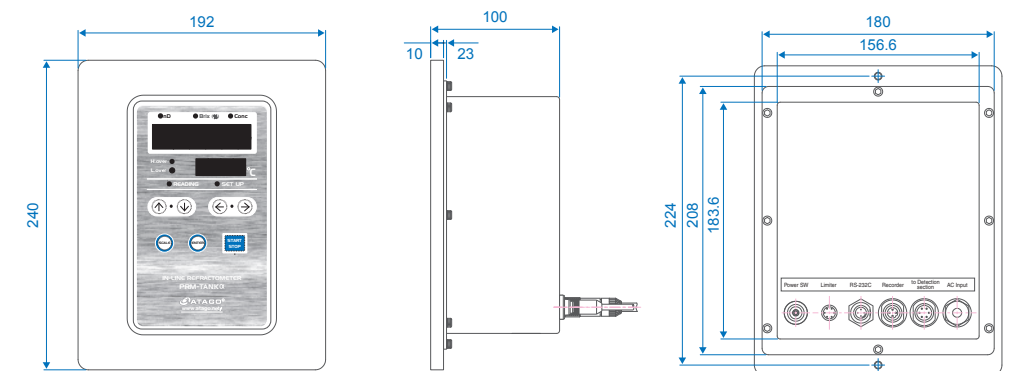
* When installing the unit outside, there are certain conditions that must be met, such as keeping the unit out of direct sunlight. Please contact ATAGO for consultation.

Dimensions (unit of length: mm)

Detection section



Calculation display section



* For details on the calculation display section, please refer to pg. B15.

CM-800α



A simple, integrated model capable of withstanding temperatures between -15 to 160°C, featuring a completely flat sample stage.

This new addition to the CM series is compatible with the PRM-100α fittings. Fittings are available in a wide variety of shapes and sizes. The accuracy is ±0.1% across the entire range of 0-80% Brix.

Specifications

In-line Brix-Monitor CM-800α

Cat.No.	3564
Measurement items	Brix (ATC according to the sample liquid), Temperature (°C / °F)
Measurement range	Brix: 0.00 to 80.0%, Temperature: -15 to 160°C / 5 to 320°F
Resolution	Brix: 0.01 or 0.1% (With an option to display measurements between 0.00 and 9.99% to the 2nd decimal place.), Temperature: 1°C / 1°F
Measurement accuracy	Brix: ±0.1%, Temperature: ±1°C / ±1°F
Temperature compensation range	5 to 100°C
Display system	Seven-segment LED
Output method	Recorder output (DC4-20mA), as well as RS-232C output (Refractive index output is standard with RS-232C; it is optional with recorder.)
Power supply	DC24V * An optional accessory, "AC Adapter AD-32" is available to convert AC100V to DC24V.
Materials in contact with the solution	Prism: Sapphire, Prism stage: SUS316L
Pressure resistance	0.98MPa
Ambient temperature	5 to 40°C
Power consumption	Power consumption when using DC24V: 3VA; when using AC100-240V: 15VA.
International protection class	IP67 Water resistant
Dimensions and weight	16×16.7×11cm, 2.4kg (Main Unit only)

Highly resistant to build-up

The materials in contact with the solution are made out of durable SUS316L, and the sample stage has been made fully flat, resulting in a unit that's highly resistant to build-up.

Defective products will never slip through

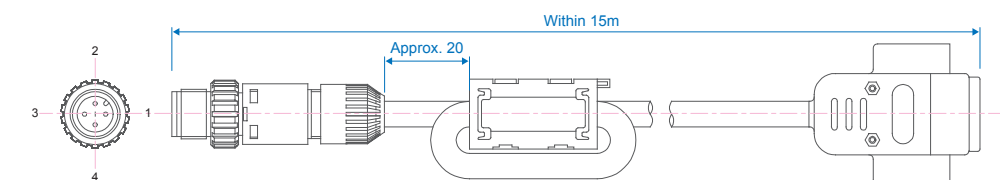
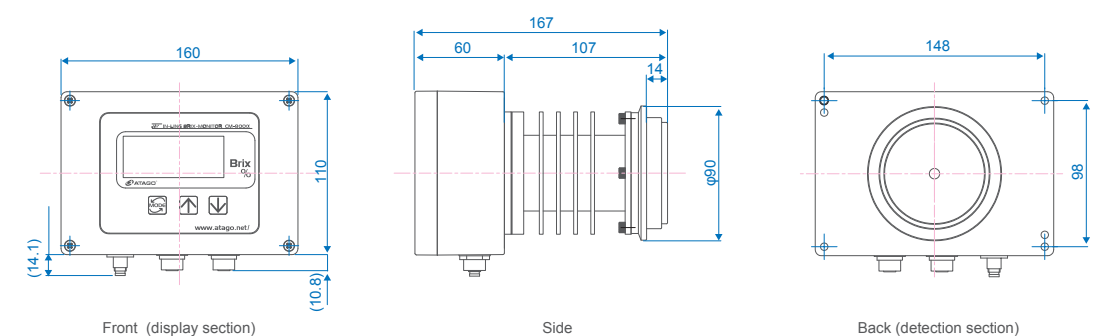
A variety of output methods means defective products will never slip through undetected. Recorder output (4-20mA) and RS-232C output can be set-up and linked with an external device for automatic control.

Compatible with a wide range of temperatures

Capable of measurement at temperatures between -15 to 160°C, meaning the unit is perfectly capable of handling CIP and SIP processes.



Dimensions (unit of length: mm)



Connector pin number	Signal	Connector pin number	Signal
1	TXD	3	S.GND
2	RXD	4	F.GND
		5	S.GND
		7	Flap
		8	Flap

CM series



In-line Ethylene Glycol Monitor
CM-800α-EG
 Cat.No. 3531
 • E.G.
 • Freezing point

In-line Propylene Glycol Monitor
CM-800α-PG
 Cat.No. 3532
 • P.G.
 • Freezing point

In-line Salinity Monitor
CM-800α-SW
 Cat.No. 3533
 • Salinity

* For optional accessories for the CM-800α series, please refer to pg. B32.

CM-BASE α



Continuous measurement with a compact size of Φ 90mm. Ideal for monitoring concentration of samples such as water soluble cutting oil.

A compact in-line model with simple specifications, capable of continuous measurement of samples such as water-soluble cutting oil. Capable of monitoring concentration and mixing ratio. Output is possible with recorder (DC4-20mA) or RS-232C.

Specifications

In-line Brix-Monitor CM-BASE α

Cat.No.	① CM-BASE α (A) 3603 ② CM-BASE α (D) 3604
Measurement items	Brix (temperature compensation according to sucrose)
Measurement range	0.0 to 33.0%
Resolution	0.1%
Measurement accuracy	$\pm 0.5\%$
Temperature compensation range	10 to 50°C
Display system	LCD
Output method	① CM-BASE α (A) recorder output (DC4-20mA) ② CM-BASE α (D) RS-232C output
Power supply	DC24V
Cable	① CM-BASE α (A) power/analog output cable: standard length: 2m (Can be extended up to a maximum of 100m.) ② CM-BASE α (D) power/RS-232C output cable: standard length: 2m (Can be extended up to a maximum of 15m.)
Materials in contact with the solution	Prism: Sapphire, Prism stage: SUS316L
Pressure resistance	0.98MPa
Ambient temperature	5 to 40°C
International protection class	IP64 Water resistant
Dimensions and weight	9 \times 9 \times 5.8cm, 820g (Main Unit only)

Simple and easy to use

Once the unit is powered on (DC24V), the display light turns on, and the unit begins measurement. A red light indicates when abnormal measurements occur.



Equipped with bias adjustment feature

By pressing and holding the ZERO key, the ± 2.0 measurement value range can be adjusted.

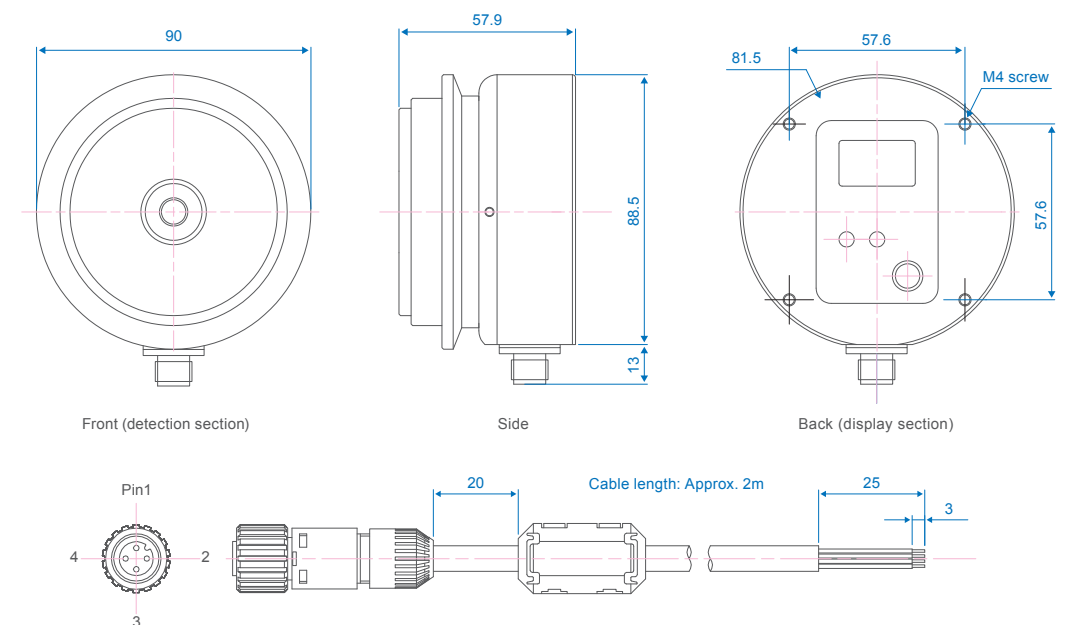


2 types of models are available, depending on the output method.

2 models: 1. The CM-BASE α (A) which outputs Brix values via DC4-20mA signals, and 2. The CM-BASE α (D) which outputs Brix values and temperature via RS-232C.



Dimensions (unit of length: mm)



CM-BASE α (A)

Brix values are output via DC4-20mA signals. Brix values ranging from -2.0 to 33.5% are communicated as DC ranging from 4 to 20mA, respectively. The cable can be extended to a custom length of up to 100m.

Connector pin number	Cord color	Signal
1	Red ●	DC24V input
4	Red / White ●○	DC4 to 20mA output
3	Black ●	GND (DC24V)
2	Black / White ●○	GND (DC4 to 20mA)

CM-BASE α (D)

Brix values are output via RS-232C. The cable can be extended to a custom length of up to 15m.

Communications parameters	Baud rate: 2400bps Data length: 7bit	Parity: Even Stop bit: 1bit	19.5, 20.3
Transmit data	Brix, temperature	Brix 19.5% Temp. 20.3°C	

Connector pin number	Cord color	Signal
1	Red ●	DC24V input
4	Red / White ●○	RS-232C output
3	Black ●	GND (DC24V)
2	Black / White ●○	GND (RS-232C)

CM-BASEβ



Attach the
CM-BASEα to
the edge of a tank



In order to meet the needs of our users, the CM-BASEβ has been designed to attach to the edge of a tank or pot. This model is recommended for various applications for the industrial field, such as cutting oil.

Specifications

In-line Brix-Monitor CM-BASEβ

Cat.No.	① CM-BASEβ (A) 3616 ② CM-BASEβ (D) 3626
Measurement items	Brix (temperature compensation according to sucrose)
Measurement range	0.0 to 33.0%
Resolution	0.1%
Measurement accuracy	±0.5%
Temperature compensation range	10 to 50°C
Display system	LCD
Output method	① CM-BASEβ (A) recorder output (DC4-20mA) ② CM-BASEβ (D) RS-232C output
Power supply	DC24V
Cable	① CM-BASEβ (A) power/analog output cable: standard length: 2m (Can be extended up to a maximum of 100m.) ② CM-BASEβ (D) power/RS-232C output cable: standard length: 2m (Can be extended up to a maximum of 15m.)
Materials in contact with the solution	Prism: Sapphire, Prism stage: Aluminum
Ambient temperature	5 to 40°C
International protection class	IP64 Water resistant
Dimensions and weight	9 × 9 × 5.77 + 20cm, 900g (Main Unit only)

Lightweight body

Body materials are made with lightweight, durable aluminum, keeping costs down and making the unit even easier to use.

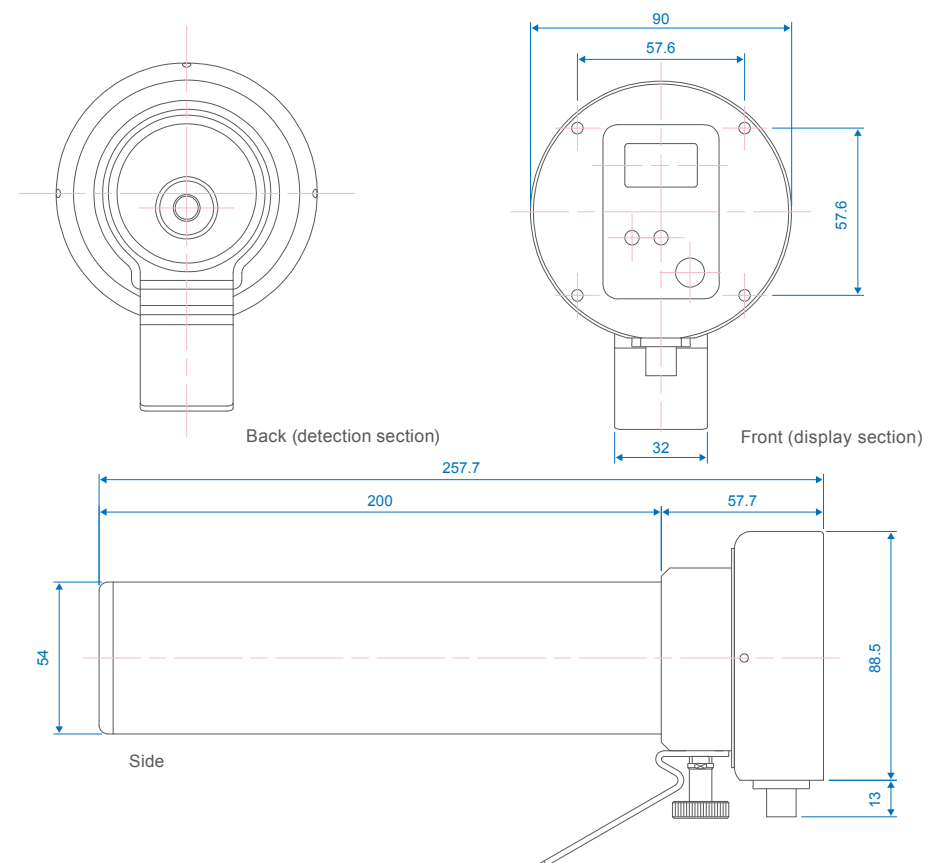


Plenty of output methods

Featuring the same attachment method as the PAN-1DC, but with the capability to output data via DC4-20mA signals.



Dimensions (unit of length: mm)



* For details on cables and output, please refer to pg. B25.

PAN-1DC



Simply clip onto the edge of a tank.
Continuous data output via RS-232C.

No special equipment is needed for installation. The unit can be set-up simply by clipping it onto the edge of a pot or tank. The concentration of industrial oils, agents, cleaning solutions, and foods (liquids) is monitored in real-time. Brix and temperature measurement values are automatically updated every 30 seconds. No need to replace batteries—connecting a single power/RS-232C cable can provide power supply (DC24V) input, as well as Brix value output (via RS-232C).

Specifications

Digital Immersion Refractometer PAN-1DC

Cat.No.	PAN-1DC : 3606 PAN-1DC (M) : 3607 PAN-1DC (L) : 3608
Measurement items	Brix (%), temp (°C)
Measurement range	Brix: 0.0 to 42.0% (ATC), temp: 10.0 to 99.9°C
Resolution	Brix: 0.1%, temp: 0.1°C
Measurement accuracy	Brix: ±0.2%, temp: ±0.5°C
Temperature compensation range	10 to 95°C
Output method	RS-232C output
Transmit data	Temperature, Brix Example) Temperature 20.3°C Brix 19.5% } 20.3, 19.5
Power supply	DC 24V (Allowable fluctuation is ±10%)
Ambient temperature	10 to 45°C
Power consumption	0.6VA
International protection class	IP67 Water resistant (Display: IP65)
Dimensions and weight	PAN-1DC : 8 × 30 × 7.2 cm, 680g (Main Unit only) PAN-1DC (M) : 8 × 40 × 7.2 cm, 710g (Main Unit only) PAN-1DC (L) : 8 × 60 × 7.2 cm, 780g (Main Unit only)

Automatic continuous measurement!

Once START is pressed, the unit continues to take measurements every 30 seconds.

Simply clip onto the edge of a tank.

No special equipment is needed for the set-up.

Rugged construction for reliable long-term performance!

The immersed part is made of SUS 316L stainless-steel.

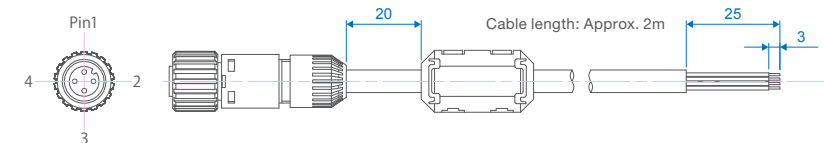
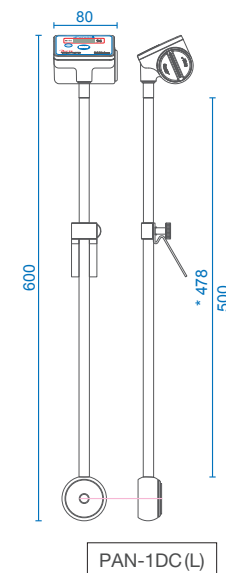
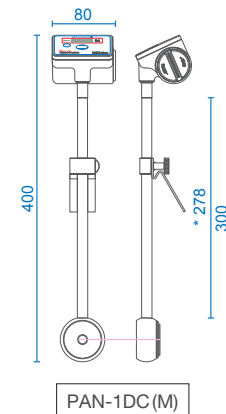
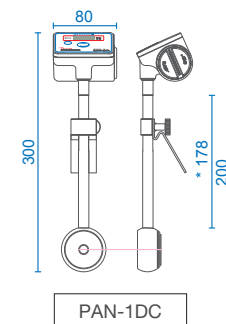


Dimensions (unit of length: mm)

• Special Order Option •

The PAN-1DC's rod length can be extended up to 120cm in 10cm increments. Contact ATAGO for details.

* Adjustable height range



Connecting the cable to the PAN-1DC's connector located on the side provides power supply (DC24V) input, as well as Brix value output (via RS-232C). A cable with included connector is available as an optional accessory. The cable can be extended to a custom length of up to 15m. For details, please refer to pg. B32.

Connector pin number	Cord color	Signal	Connector pin number	Cord color	Signal
1	Red ●	DC24V input	3	Black ●	GND (DC24V)
4	Red / White ●○	RS-232C output	2	Black / White ●○	GND (RS-232C)

US- α (optional accessory)



Prevent build-up on the prism surface with the ultrasonic cleaner.

* The unit prevents sample build-up, it does not remove sample build-up after it has accumulated.

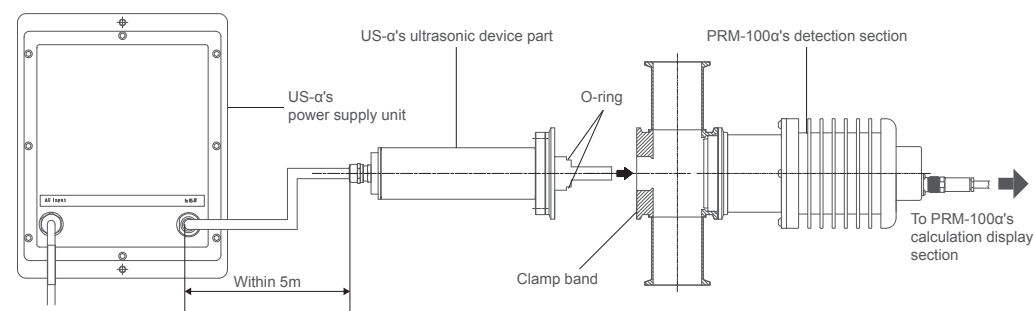
The US- α prevents build-up on the prism surface of the PRM-100 α and PRM-2000 α .
As with other fittings, it can be affixed in the piping system.

Specifications

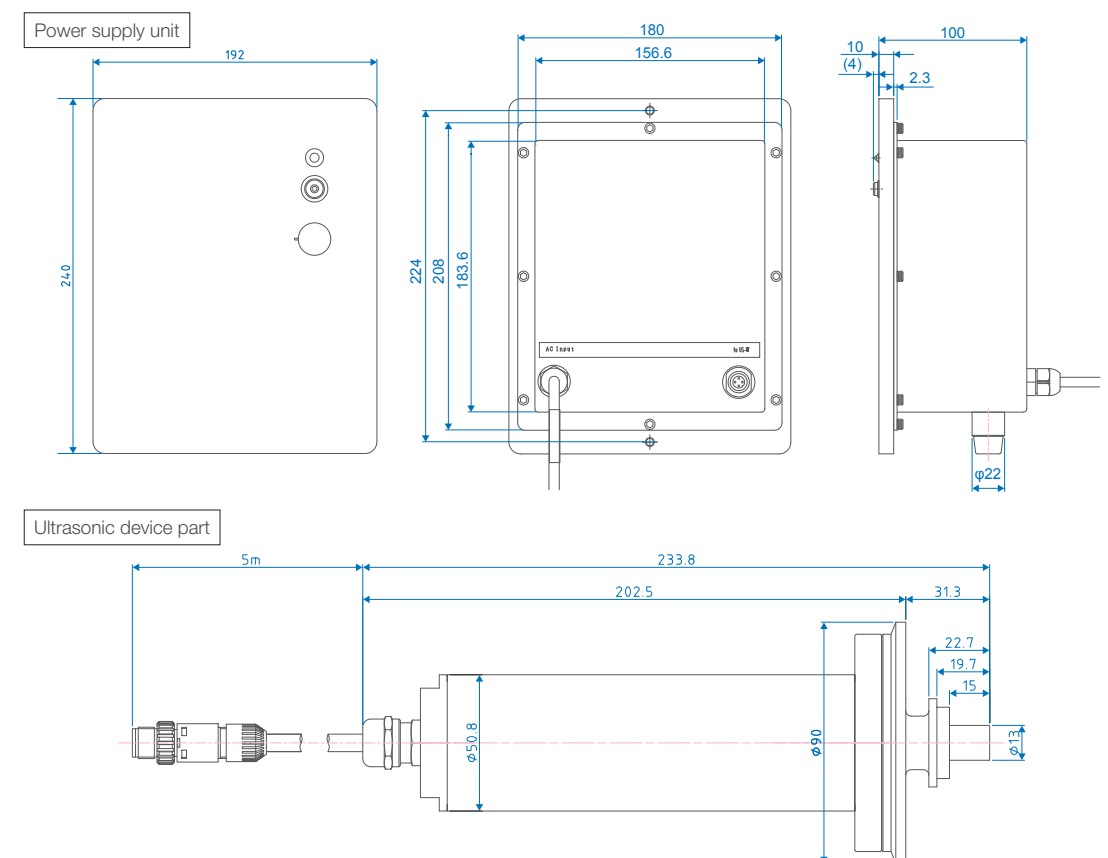
Ultrasonic Cleaner US- α

Cat.No.	For 1S fitting : 9112-1 For 2S fitting : 9112-2 For 3S fitting : 9112-3
Power supply	AC100 to 240V, 50/60Hz
Power consumption	5VA
Cable connector	Between US- α 's ultrasonic device part and power supply unit: (5m)
Dimensions and weight	Ultrasonic device part: 6.6 \times 7.9 \times 6.6cm, 1.4kg or more Power supply unit: 19.2 \times 10 \times 24cm, 3.5kg

Connection example: US- α and PRM-100 α



Dimensions (unit of length: mm)



Optional Accessories



AC adapter (CM series only)

AD-32, AD-33, AD-34

Cat.No.3527 AD-32 (AC100V)

Cat.No.3528 AD-33 (AC110-120V)

Cat.No.3529 AD-34 (AC220-240V)

Used to convert AC100 to DC24V and to supply power. Models compatible for AC100-200V and AC220-240V are also available.

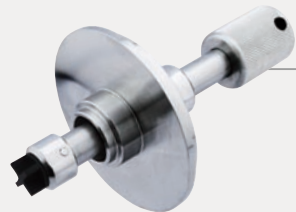


Stand for CM-800α

RE-8607

[Mounted Example]

The picture on the left is an example of the actual in-line Brix monitor (CM-800α) and the AC adapter, AD-32 mounted on the stand.



Prism wiper

RE-67571 for 2.5S fitting

RE-67572 for 3S fitting

For details, please refer to pg. B9.



Cable with incl. connector for PAN-1DC

RE-75101

A cable with an included 9 pin D-sub connector for RS-232C output and AC adapter for power supply (DC24V) input. Standard length is 2m. Cable can be extended up to 15m.

Cables and Consumable Parts

Parts No.	Name	Notes	Applicable Models
RE-5635	Recorder output cable	5m	For CM-800α
RE-5636	Recorder output cable	10m	For CM-800α
RE-5638	Recorder output cable	15m	For CM-800α
RE-5639	Recorder output cable	20m	For CM-800α
RE-5677	RS-232C output cable with 25 pin D-sub connector	15m	For CM-800α
RE-65330	RS-232C output cable with 9 pin D-sub connector	15m	For CM-800α
RE-5647	RS-232C output cable with 25 pin D-sub connector	Length customizable within 15m	For CM-800α
RE-65331	RS-232C output cable with 9 pin D-sub connector	Length customizable within 15m	For CM-800α
RE-65301	RS-232C output cable with 25 pin D-sub connector	Standard length: 10m; can be extended in increments of 1m.	Same as PRMα series
RE-65302	Alarm output cable	Standard length: 10m; can be extended in increments of 1m.	Same as PRMα series
RE-65303	Recorder output cable	Standard length: 10m; can be extended in increments of 1m.	Same as PRMα series
RE-65311	Cable between the detection section and the calculation display section	Standard length: 15m; can be extended in increments of 1m.	Same as PRMα series
RE-69113	Desiccant for detection section	For protecting the interior of the detection section	Same as PRMα series
RE-68002	O-ring	O-ring (between samples inlet and detection section)	Same as CMα and PRMα series
RE-65110	Cable for CM-BASE	Standard length: 2m; can be extended in increments of 1m.	CMα, β series and PAN-1DC

Sample Inlets

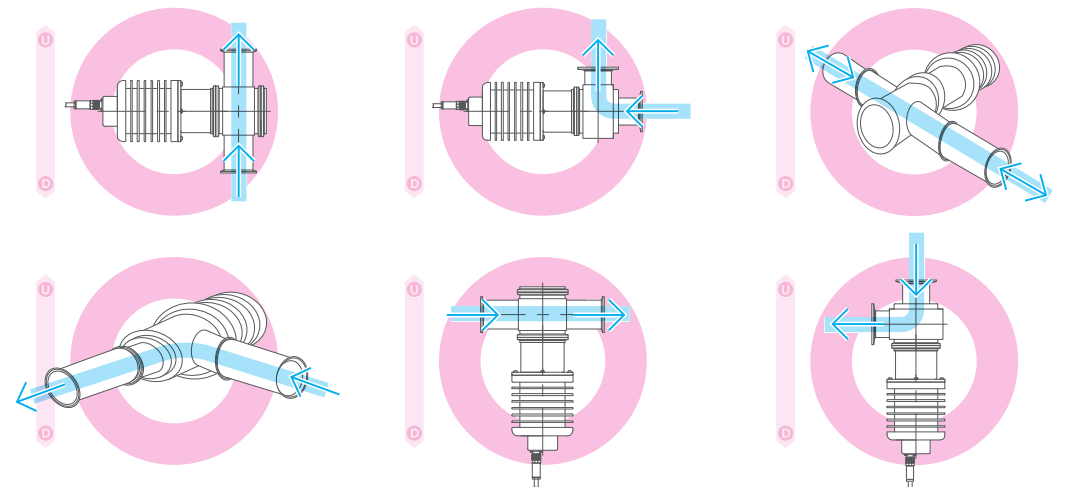
Fitting Sizes List

IDF / JIS G3447 (ferrule and screw)			JIS G3459 (flange)		
Size	Outer diameter	Inner diameter	Size	Outer diameter	Inner diameter
1.0S	25.4	23.0	20A	27.2	23.0
1.25S	31.8	29.4	25A	34.0	28.4
1.5S	38.1	35.7	32A	42.7	37.1
2.0S	50.8	47.8	40A	48.6	43.0
2.5S	63.5	59.5	50A	60.5	54.9
3.0S	76.3	72.3	65A	76.3	70.3
3.5S	89.1	85.1	80A	89.1	83.1
4.0S	101.6	97.6	90A	101.6	95.6
4.5S	114.3	108.3	100A	114.3	108.3

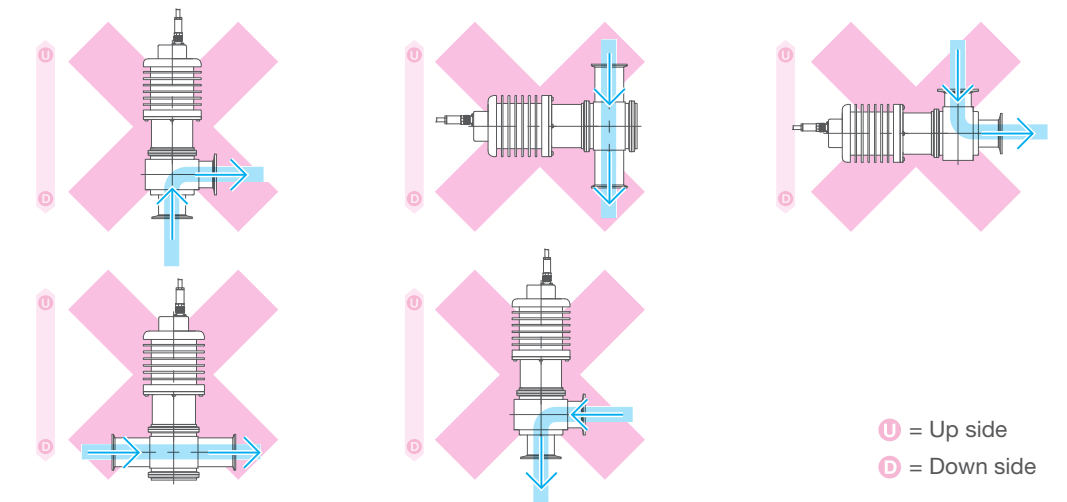
(Unit of length: mm)

Attachment Methods

Correct



Incorrect



U = Up side
D = Down side

Sample Inlet List



Fittings that meet VARIVENT standards are also available. For details, please contact ATAGO.

RE No.	Name	Simplified Dimensions	Connection Example (PRM-100a)	US-α
RE-67501	Hose connector φ12mm			
RE-67503	DBJ φ10mm			
RE-67511	Straight type ferrule 1S with blanking plate			○
RE-67514	Straight type ferrule 1S without blanking plate			
RE-67513	Straight type screw 1S with blanking plate			○
RE-67516	Straight type screw 1S without blanking plate			
RE-67611	L type ferrule 1S			
RE-67613	L type screw 1S			
RE-67512	Straight type ferrule 1.5S with blanking plate			○

* Fittings are generally sold with an in-line refractometer as a set. If you wish to purchase fittings only, please consult ATAGO.

RE No.	Name	Simplified Dimensions	Connection Example (PRM-100a)	US-α
RE-67518	Straight type ferrule 1.5S without blanking plate			
RE-67521	Straight type ferrule 2S with blanking plate			○
RE-67524	Straight type ferrule 2S without blanking plate			
RE-67523	Straight type screw 2S with blanking plate			○
RE-67527	Straight type screw 2S without blanking plate			
RE-67621	L type ferrule 2S			
RE-67623	L type screw 2S			
RE-67522	Straight type ferrule 2.5S with blanking plate			○
RE-67528	Straight type ferrule 2.5S without blanking plate			
RE-67531	Straight type ferrule 3S with blanking plate			○

* Fittings are generally sold with an in-line refractometer as a set. If you wish to purchase fittings only, please consult ATAGO.

RE No.	Name	Simplified Dimensions	Connection Example (PRM-100a)	US-α
RE-67532	Straight type ferrule 3S without blanking plate			
RE-67533	Straight type screw 3S with blanking plate			○
RE-67534	Straight type screw 3S without blanking plate			
RE-67631	L type ferrule 3S			
RE-67633	L type screw 3S			
RE-67570	Straight type flange 25A with blanking plate			○
RE-67573	Straight type flange 25A without blanking plate			
RE-67671	L type flange 25A			
RE-67574	Straight type flange 40A with blanking plate			○
RE-67575	Straight type flange 40A without blanking plate			

* Fittings are generally sold with an in-line refractometer as a set. If you wish to purchase fittings only, please consult ATAGO.

RE No.	Name	Simplified Dimensions	Connection Example (PRM-100a)	US-α
RE-67673	L type flange 40A			
RE-67576	Straight type flange 50A with blanking plate			○
RE-67577	Straight type flange 50A without blanking plate			
RE-67526	Straight type flange 65A with blanking plate			○
RE-67579	Straight type flange 65A without blanking plate			
RE-67675	L type flange 65A			
RE-67583	Straight type flange 80A with blanking plate			○
RE-67584	Straight type flange 80A without blanking plate			
RE-67578	Straight type flange 100A with blanking plate			○
RE-67585	Straight type flange 100A without blanking plate			

* Fittings are generally sold with an in-line refractometer as a set. If you wish to purchase fittings only, please consult ATAGO.

In-line Refractometer Terminology

■ What is VARIVENT®?

The VARIVENT® valves contribute to hygienic and fully cleanable process systems.

The wetted parts of In-line Refractometers may be customized to work with VARIVENT® components.

PRM series and CM series fittings that meet VARIVENT standards are also available.

* VARIVENT® is a registered trademark of GEA Tuchenhausen.

■ What is PROFIBUS?

PROFIBUS is a communication protocol for fieldbus, industrial computer network between the field device and its controller in factory automation applications. PROFIBUS is standardized under such standards as IEC 61158/61784 and EN50170. The PRM and CM In-line Refractometers may become PROFIBUS-compatible by the use of an adapter connected to the RS-232C port.

■ What is SUS316?

SUS316 is a type of enhanced stainless steel that contains chromium (Cr) and nickel (Ni). Molybdenum (Mo) is added, giving it superior corrosion and pitting resistance than SUS304. It has excellent corrosion resistance to a variety of materials, from seawater to all kinds of other mediums.

■ What is SUS316L?

SUS316L is a material with a carbon (C) amount below 0.03%, in contrast to SUS316, which has a carbon amount below 0.08%. Further differences are the amount of Ni contained in SUS316 is 10 to 14%, whereas SUS316L contains 12 to 15%. Therefore, SUS316L is favored over SUS316 for its corrosion resistance that contains superb work hardening (cold forming) and intergranular corrosion resistant properties.

■ What is COP (Clean Out of Place)?

COP is a method of cleaning wherein the machinery installed in the production equipment are removed, disassembled and cleaned. It is used for cleaning machinery and parts with complex structures and components. Machinery that is simple to disassemble and reassemble, and easily cleaned is highly demanded in regards to cleanliness.

■ What is CIP (Clean in Place)?

CIP is a system wherein the production equipment are efficiently and safely automatically cleaned without being disassembled. The machinery isn't simply washed; it's a method of cleaning that also involves the controlling and inhibiting microorganisms.

■ What is SIP (Sterilization in Place)?

SIP is a system wherein the production equipment are sterilized (bacteria are automatically eradicated) without being disassembled. Below are some examples of sterilization methods:

- Physical sterilization through heat (pasteurization)
- Filtration through a filter or membrane
- Irradiation through radiation or ultraviolet rays
- Chemical sterilization through the use of pharmaceuticals

Devices tested and confirmed compatible
HMS Industrial Networks
Anybus Communicator

