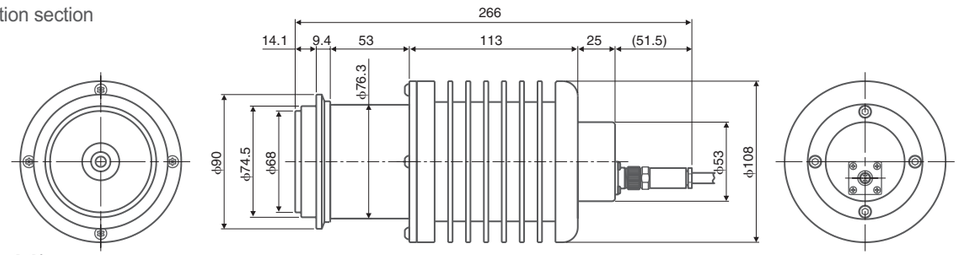
Specifications

Measurement items	One of Refractive Index (nD), Brix (temperature compensation according to sucrose solution), concentration (%) (temperature compensation according to samples), and temperature
Measurement range	Refractive Index (nD) 1.32000 to 1.55700, Brix 0.00 to 100.00%
Minimum indication	Refractive Index (nD) 0.0001 or 0.00001, Brix 0.1% or Brix 0.01% (by selection)
Measurement accuracy	Refractive Index (nD) ±0.00010, Brix±0.05%
Measurement temperature	5 to 100°C (Clean-in-place (CIP) up to 130°C for no more than 30 minutes)
High and low limit settings	High and low control limits can be set by the keys.
Display items	Refractive Index (nD), Brix, concentration (%), temperature (°C)
Output items	Either Refractive Index (nD), Brix or concentration (%), and temperature (°C)
Output method	RS-232C, DC4 to 20mA
Alarm output	Open-collector output for high and low limit settings (alarm output)
Power supply	AC100 to 240V, 50/60Hz
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: SUS316 O-ring: Kalrez®
Light source	LED (D line approximation)
Pressure resistance	1.0MPa (detection section)
Relative humidity	5 to 40°C, 30 to 90%RH
International protection class	Detection section: IP66, Calculation display section: IP65
Dimensions and weight	Detection section: 10.8×26.6×10.8cm, 3.3kg ,Calculation display section: 19.2×10×24cm, 3.3kg

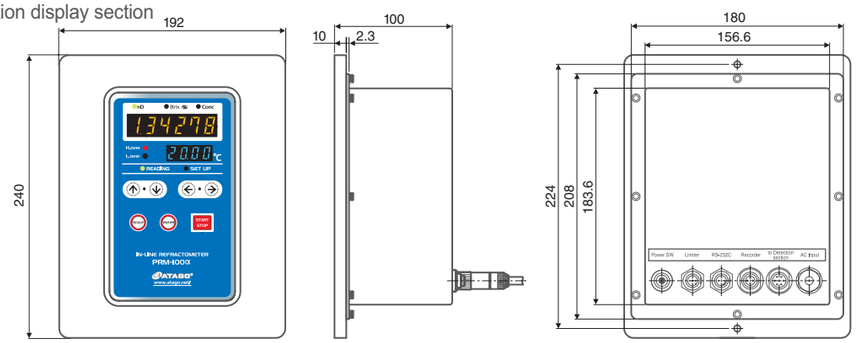
Physical Dimensions

Detection section



Weight:3.3kg

Calculation display section



Weight:3.3kg

All ATAGO refractometers are designed and manufactured in Japan.

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

ISO9001 REGISTERED H.Q. & Factory

* Specifications and appearance are subject to change without notice.

In-line Refractometer
PRM-100α

Cat.No. 3574

Preventive quality measures means inspecting the whole process. Continuous monitoring with a process refractometer.

The PRM-100α works by measuring the light refraction between the prism on the detection section and the liquid running through the pipe where it is installed. This instrument can be mounted directly on the pipe or on a bypass. Process refractometers are indispensible in food, beverage and pharmaceutical plants for checking actual product, as well as serving to measure and control concentrations of industrial solutions such as cutting oils, quenches, and washes. The unit reads samples in refractive index, Brix, or a user-defined concentration, and also displays temperature. Data outputs allow you to automatically control mixing ratios.

POINT 1

Maintain consistent quality of your products, and view the results in a variety of ways

On-site	To a PLC		On a PC
Display on Refractometer	DC 4-20mA	Alarm Output	RS-232C via HyperTerminal

The easy-to-read display and multiple output options allow you to monitor operations throughout the plant.

POINT 2

Instantly detects contaminants or CIP processes

CIP washes will almost certainly show a different nD or Brix reading, allowing you to see when these solutions are fully replaced with your regular sample.

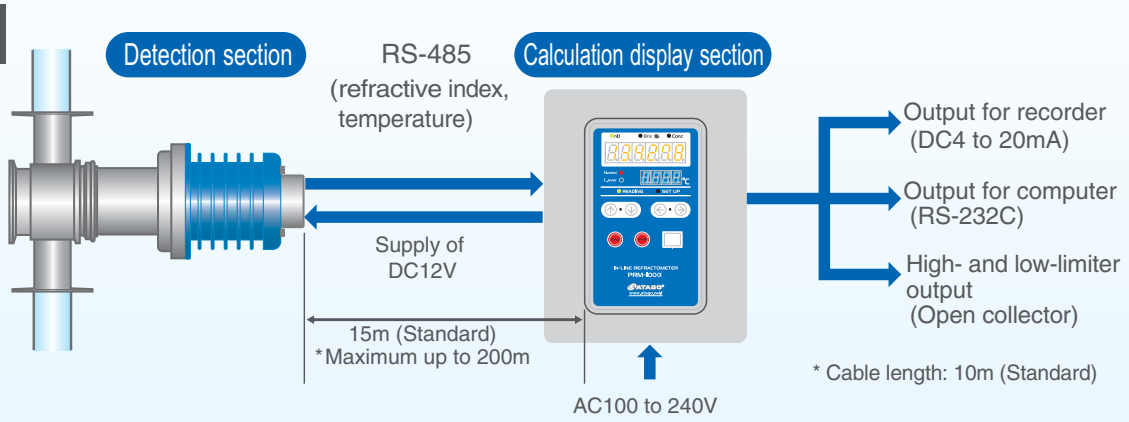
CIP SIP

POINT 3

Measures difficult samples more effectively

The improved accuracy of the PRM-100α allows you to take better readings on samples that commonly give process refractometers problems. These include dark, viscous, or turbid samples, or those containing bubbles.

Construction

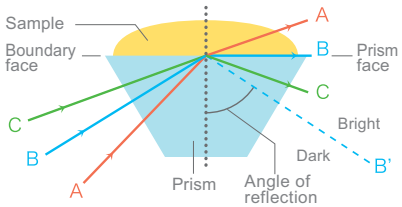


Although the upper limit of the measurement temperature is 100°C, the liquid exceeding 130°C can be poured in the cleaning case.

*The momentary difference between the sample liquid temperature and the cleaning liquid temperature must be kept at less than 80°C.

Measurement Principles

Refractometry is based on the principle that as the density of a substance increases, its Refractive Index rises proportionately.



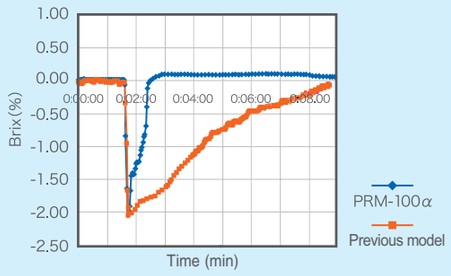
Detection section

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.
Response Time to a Sudden Temperature Change.



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

The prism has a special coating to prevent deposits of sample from building up.

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

Keeping the Prism Clean

1. Prism Coating

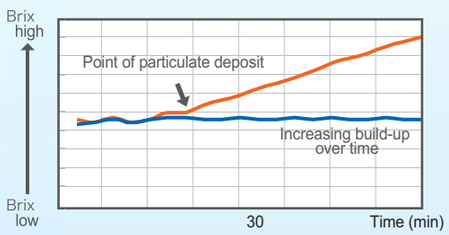
In any in-line device, particulate matter in a sample may start to adhere to the sensor and build up over time, causing false readings - refractometers are no exception. The PRM-100α has a special coating on the prism surface which prevents deposits from adhering.

US-1
Ultrasonic Cleaning Device

2. Ultrasonic Cleaning Device (Optional)

In the case of a sample that consistently adheres, we recommend the US-1 ultrasonic cleaning device. The vibration generator is mounted directly, facing the prism (see above right).

ATAGO representatives will advise according to your testing environment.



Calculation display section

Converts signals received from the detection section into Brix or concentration values, automatically compensating for the temperature, and displays the readings on the LCD.

NEW Improvement of accuracy
Brix ±0.05%, nD ±0.00010

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

NEW Options to display readouts to the first or second decimal place

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.

Power supply included in the calculation display section

Optional Alarm Output for when the reading goes outside the user's set range.

Use the optional 4-20mA output to communicate with a PLC and control production automatically!

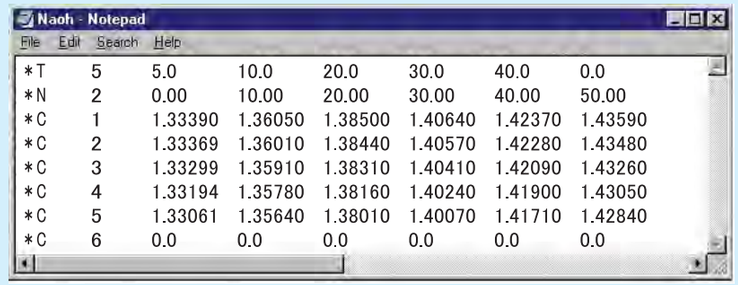
The cable to the detection section can conveniently be extended to 200m for remote access (15m standard).

Easy Programming!

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.



Watch it! The PRM-100α will monitor every step

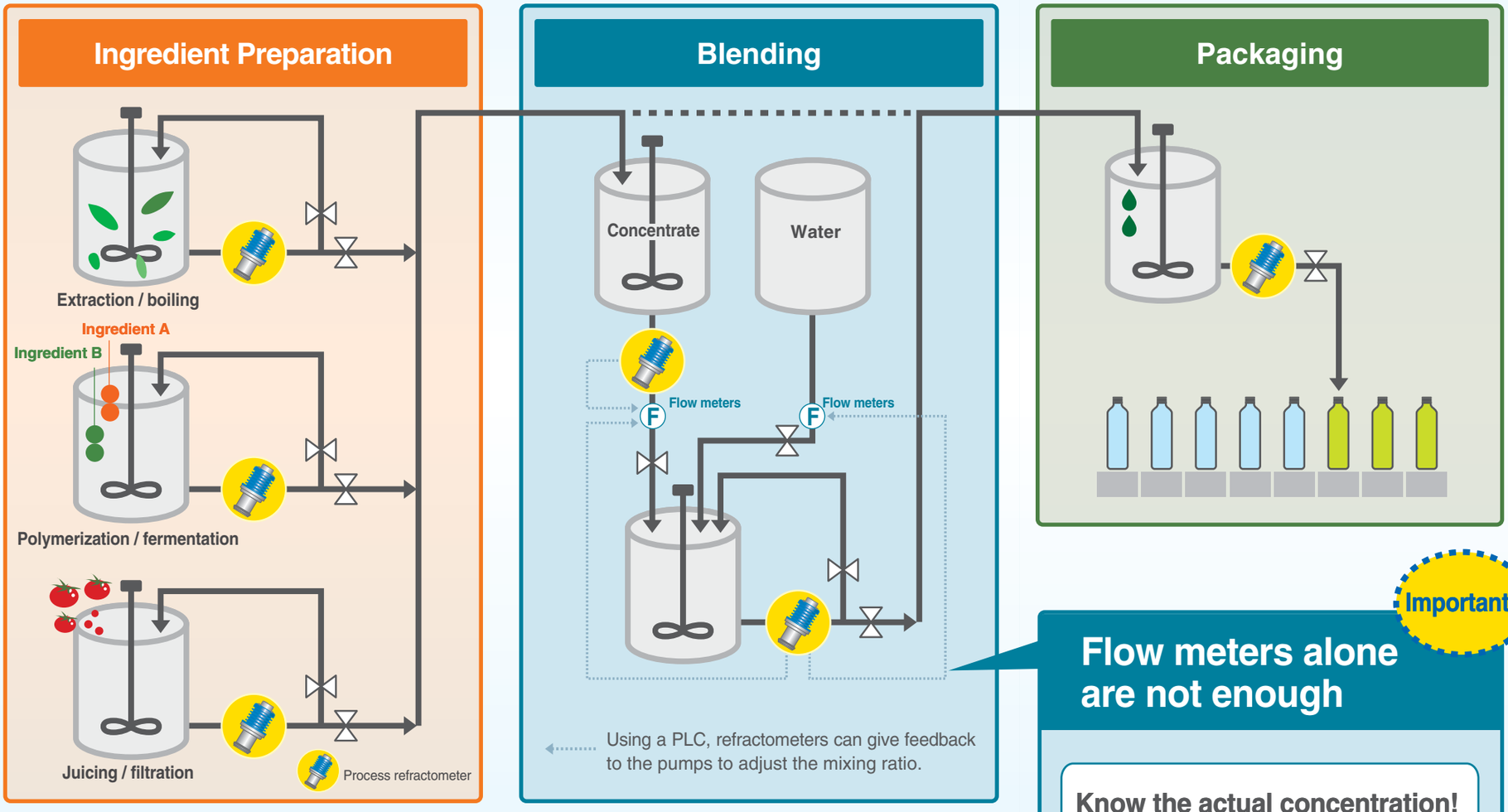
Save money and prevent a bad batch!

Example 1,000,000 units at $1 each

Initial investments in refractometers can avoid wasting resources or a reputation-damaging recall!

$70,000 lost → **$150,000 lost** → **$270,000 lost**

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	Refractometer Solutions
CIP contamination	Detects the concentration change in real-time.
Equipment failure	
Mistake during a batch test	Fully automated measurements leave no risk for human errors.
Defective batch from a previous stage	If you test at every production stage, you can identify a defective batch before it continues down the line.
Unknown cause	Detects the concentration change in real-time.

Important!

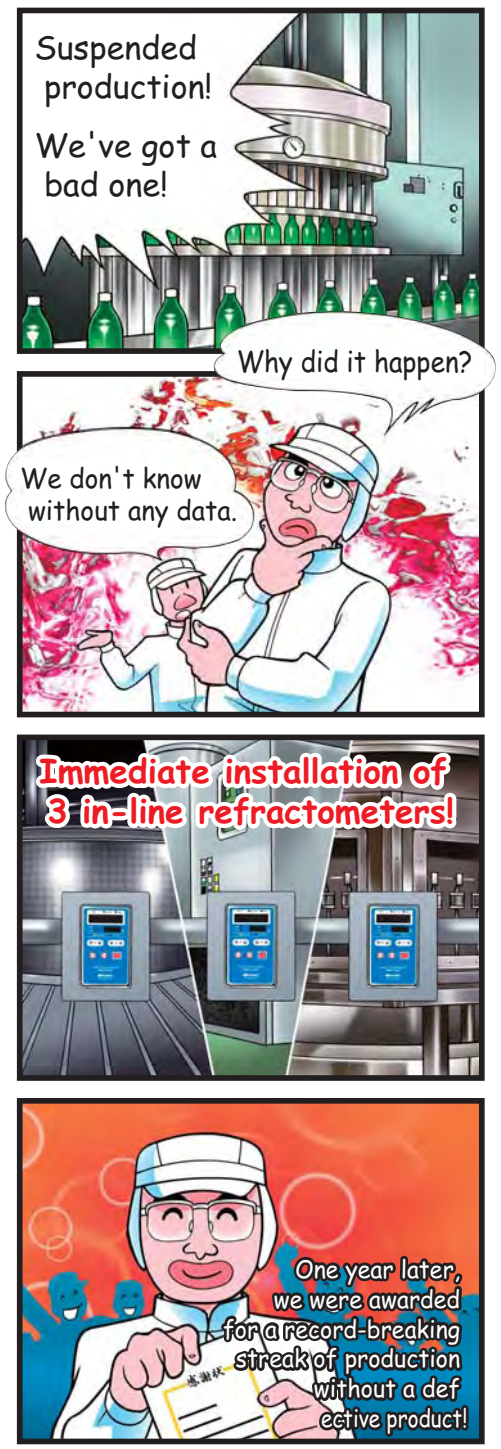
Flow meters alone are not enough

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

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.



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.

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.

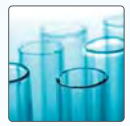
Packaging

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.

Others

Wastewater

Automate a system that redirects suitable water for recirculation or waste, based on the solids content!

Multiple products in one line

Minimize waste and turn-around 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.

Free Demonstration Unit Available

User Testimonials

A Beverage Bottler

We are using an in-line refractometer when diluting syrups. We can easily calculate the mixing ratio from the Brix reading, and control the flow using the alarm output for when the levels go out of spec. The refractometer allows us to monitor flow conditions in real-time. Before buying, they had us try a demonstration unit to determine the best location along the production line to mount the sensor.

A Chemical Plant

We own multiple units; one for each line, designated for a particular sample. We have the direct concentration level programmed into the "Conc." scale for displaying readings and sending data. Automating this inspection system has greatly improved efficiency and reduced our costs, and the measurements are quicker than manual interval testing.

A Food Processor

With food safety issues becoming more and more of a focus worldwide, manufacturers are required to adhere to stricter quality control standards, such as HACCP and ISO22000. The continuous refractometer data are more reliable than batch testing because it's basically checking the entire products. We have a meter in place right before packaging to ensure the quality of the final product. We are also using an ATAGO digital bench-top refractometer in the QA lab. Our contact at ATAGO visits our facility regularly to make sure that both units are working fine.

A Sugar Refinery

The advantage of the process refractometer is that it can be mounted directly into the pipe to measure the whole flow. With the data output, a Brix measurement at a particular date and time can be recorded for future reference. We are another unit to measure wastewater. ATAGO helped us select the right sample inlet unit and recommended methods to mount the instrument correctly, based on each application.

A Paper Plant

We have a refractometer to measure the starch solutions. The necessary concentration of the solution varies based on what type of paper we are producing. In-line testers are essential to prevent imperfect batches. It has been several years since we installed the unit, and we always receive excellent customer service from ATAGO whenever we have questions. Recently, our other locations purchased more units for the same purpose.

Why Choose ATAGO?

1 Proud Heritage and Experience

ATAGO has over 70 years of experience in optical instrument manufacturing. With our expertise cultivated over decades, as well as an extensive selection of instruments, we can meet a variety of measurement needs including hightly specialized industries.

2 Industry-Leading Technology

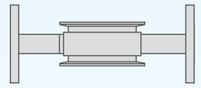
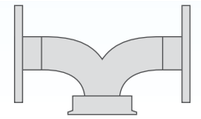
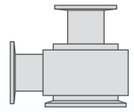
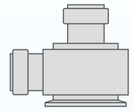
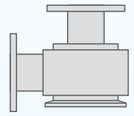
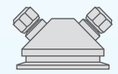
Refraction of light has been our sole specialty throughout the existence of ATAGO, and we strive for perfection in optical systems. We listen to end-user feedback from 154 countries and continuously push the limit of refractometry.

3 Trusted Product Support

We dedicate ourselves on the high durability and low failure rate of ATAGO products. Our repair service is carried out in a timely manner. Calibration certificates are available.

List of Sample Inlet Unit

※ If the unit is installed into a vertical pipe, the current must flow upwards.
※ There must be enough flow to continuously replace sample on the prism in order to ensure accurate readings.
※ ATAGO reps will be happy to discuss options for mounting.

	Connection system	Diameter	Profile	Installation
Straight type	IDF/ISO clamp union (ferrule)	1S～3S		Installed vertically / Installed horizontally
	IDF/ISO screw union (screw)	1S～3S		
	JIS Flange	25A～65A		Fluid flow
π type	IDF/ISO clamp union (ferrule)	1S～3S		Installed vertically / Installed horizontally
	IDF/ISO screw union (screw)	1S～3S		
	JIS Flange	25A～65A		Fluid flow
L type	IDF/ISO clamp union (ferrule)	1S～3S		Installed vertically / Installed horizontally
	IDF/ISO screw union (screw)	1S～3S		
	JIS Flange	25A～65A		Fluid flow
Small diameter series			Compression Fitting 10mmϕ  Hose connector 12mmϕ 	

Inner diameter	
1S:23.0mm	25A:28.4mm
2S:47.8mm	40A:43.0mm
3S:72.3mm	65A:70.3mm

Fitting Options

IDF/ISO clamp union(ferrule)

JIS Flange

The unit must not be mounted vertically as shown, as steady flow may not reach the prism.