5800-E02

In-line Brix Monitor

Cat.No. 5800

CM-BASEα-Plus(A)

Cat.No. 5801

CM-BASEα-Plus(D)

Instruction Manual

PRODUCT REGISTRATION & WARRANTY CARD
https://www.atago.net/registration/
english/registration.php

ATAGO®

CONTENTS

1. Precautions for Use

Introduction

Thank you for purchasing the CM-BASEα-Plus In-line Refractometer. Before using your CM-BASEα-Plus, read this instruction manual carefully, and keep it on hand for future reference.

For safe use --- Be sure to observe the following.

To prevent injury and damage to property, safely operate the CM-BASEα-Plus by observing the precautions outlined in this manual. The explanation of the indications and symbols of the precautions are as follows. Read and understand them before continuing on to the following pages.

Explanation of indications

⚠ WARNING	If this indication is neglected and the instrument is handled incorrectly, serious injury or death may result.
⚠ CAUTION	If this indication is neglected and the instrument is handled incorrectly, injury and/or property damage may result.

Explanation of symbols

⚠	This symbol denotes an item of which to be warned or cautioned. The contents of warning are described in detail in or near the △.
⊘	This symbol denotes an action that must not be performed (a prohibited item). The contents of prohibition are described in detail in or near the ○.
❗	This symbol denotes an action that must be performed. The contents of instruction are described in detail in or near the ●.

Handling of this instrument

⚠ WARNING

◇ When measuring a substance harmful to the human body, be aware of its properties and wear protective gloves, mask, etc.

◇ Immediately turn off the power (DC24V) if the unit begins to overheat, smoke or emit an abnormal smell. Fire or malfunction may result if the instrument continues to be used. Contact your ATAGO Distributor for an inspection.

◇ Do not attempt to repair, modify, or disassemble the instrument yourself. Improper servicing may result in fire, electrical shock, or burns.

◇ If the instrument is dropped or is subjected to a strong shock, have it inspected by an Authorized ATAGO Service Center.
Fire or malfunction may result if the instrument is used.

⚠ CAUTION

◇ Do not apply water or sample to any part of the instrument other than the surface of the prism.
Applying water to any other part of the instrument may result in a malfunction.

◇ Do not measure very hot or highly acidic samples. This may damage the prism, which would result in inaccurate measurements.

Handling of this instrument (Continued)

⚠ CAUTION

◇ Do not measure a sample that can damage the prism or sample inlet unit. When the power is turned on, do not measure a sample that is below 10˚C or above 95˚C.

◇ If the sample could possibly stain the prism, immediately clean the prism according to the procedure described on page 22.

◇ The CM-BASEα-Plus power (DC24V) should be turned off when it is not to be used for a long period of time.

◇ When transporting the instrument, pack carefully.

◇ Carefully read this instruction manual and fully understand the function and operation of each part of the instrument before use.
◇ Check that each part of the instrument operates normally before use.
◇ Perform the necessary inspections and reference adjustments according to the instruction manual.
◇ The manufacturer shall not be held responsible for any damage that results from using the instrument for other than its intended purposes (measurement of Brix, sugar content, liquid concentration).
◇ The prism in contact with the sample is a consumable item.
◇ ATAGO shall not be held responsible if the use of the instrument has an undesired effect on the measured materials.

Handling of plug

⚠ WARNING

◇ Supply the CM-BASEα-Plus with DC24V only (allowable fluctuation is ±10 %). Short-circuit, smoke, or fire may occur if other voltages are used.

◇ Do not use a power cable that is damaged, cut, broken, or altered. Use may result in fire, electrical shock, or burn.
For repair service of the power cable, contact an Authorized ATAGO Service Center.

⚠ CAUTION

◇ Do not insert or pull out the connector and plug with wet hands.

Connection of optional component

⚠ WARNING

◇ Turn off the power (DC24V) prior to connecting cables to the individual units.

Conditions to be observed when using

Environmental conditions

◇ Use the instrument at an altitude below 5,000m (above sea level).
◇ Use the instrument indoors.
◇ Use the instrument where the temperature is between 5 to 40˚C.
◇ Do not leave the instrument in a location exposed to direct sunlight or near a heating unit where the temperature may rise.
◇ Do not change the environmental temperature of the instrument suddenly.
◇ Do not place the instrument in a place where it may be subject to strong vibrations.
◇ Do not use the instrument where there is much dust.
◇ Do not leave the instrument where the temperature is extremely low.
◇ Do not leave the instrument in a damp place.
◇ Do not place or drop heavy objects on the instrument.
◇ Use this instrument under the condition where humidity is 80% at 31˚C or lower, falling linearly to 50% at 40˚C.
◇ Main supply voltage fluctuation should not to exceed ±10% the nominal voltage.
◇ Installation categories (Overvoltage Categories): II
◇ The pollution degree is 2 (according to IEC60664).

Handling

◇ Do not drop the instrument or subject it to any strong shock.
◇ The power cable may be damaged by:
- Bending the cable.
- Pulling the cable.
- Twisting the cable.
- Placing the cable under heavy objects.
- Catching the cable between objects.

Daily maintenance

◇ If the instrument becomes dirty, wipe it with a soft cloth.
◇ Do not use benzine, paint thinner, etc. to clean the instrument.

2. Refractive Index and Brix

The In-line Refractometer CM-BASEα-Plus is a refractometer that detects the Refractive Index of a sample and outputs the Brix(%) value on the display.

(1) What is refractometer?

When a straw is placed into a glass filled with water, the straw appears to bend. When a straw is placed into a glass filled with sugar water, the straw appears to bend much more sharply than in the case of water alone. This phenomenon is known as the refraction of light. The refractometer is an instrument that measures the Refractive Index by utilizing this principle (the Refractive Index increases in proportion to the concentration of the solution), and was developed by Dr. Ernst Abbe at the end of the 19th century.

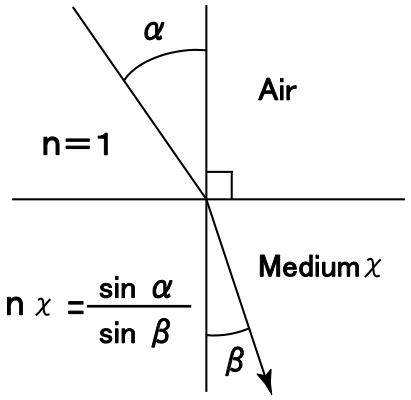
(2) What is the Refractive Index?

If the Refractive Index of air under atmospheric pressure is 1, then when light enters medium x, the ratio of the sine of the incident angle <alpha> measured against the phase boundary to the sine of the refracting angle <beta> is called the Refractive Index of the medium x.

The Refractive Index varies with the wavelength of light and temperature and is represented as follows:

n_D^t

n : Represents the Refractive Index
t : Temperature (˚C)
D : D-line of natrium (589nm)



For example, Refractive Index of water at 20˚C under the D-line is:
n_D^{20} = 1.33299 (Generally expressed as nD = 1.33299.)

Note The Refractive Index is based upon the supposition that the Refractive Index in a vacuum is 1 and is called the absolute Refractive Index. Generally, however, this index is seldom used.

(3) Brix(%) scale

The CM-BASEα-Plus is programmed with the Brix(%) scale, based on the Refractive Index of water (nD = 1.33299) as the reference (0%). The Brix(%) scale represents the weight of sucrose expressed by percentage (sucrose weight in grams contained in 100 grams of sucrose solution). Therefore, this scale corresponds with the sucrose concentration. For samples such as water-soluble cutting oil, it is possible to create a conversion table in advance to show the relation between the sample's concentration % and Brix %, and convert the Brix measurement value into its concentration. However, it is very common to create a concentration standard using Brix values, and monitor with Brix values in everyday operations.

☞ The relationship between Brix(%) and the Refractive Index (nD) is outlined on page 24.

(4) Temperature correction

The Refractive Index of a substance varies with temperature. Thus, when using a refractometer to measure the Refractive Index of a liquid, the measurement value will vary with the sample temperature.

The CM-BASEα-Plus always detects the prism temperature. The value of the measurement is automatically corrected for temperature by a built-in processor, so that the displayed value is equal to the value measured at 20˚C (provided that the sample temperature is within the range of 10 to 95˚C).

3. Unpacking and Installation

(1) Unpacking

① Unpack the CM-BASEα-Plus and confirm that there is no external damage.
② Check that the following items are included.

CM-BASEα-Plus(A) Cat.No. 5800

- Main unit 1
- Power and Recorder output cable 1
- O-ring (Silicon) 1
- O-ring (EPDM) 1
- Bracket..... 1
- Instruction manual (this book) 1
- Inspection certificate 1

CM-BASEα-Plus(D) Cat.No. 5801

- Main unit 1
- Power and RS-232C cable 1
- O-ring (Silicon) 1
- O-ring (EPDM) 1
- Bracket..... 1
- Instruction manual (this book) 1
- Inspection certificate 1

(2) Installation

⚠ WARNING

◇ Do not supply power (DC24V) until cable connection has been established.

① The CM-BASEα-Plus should be supplied with DC24V (allowable fluctuation is ±10%).
② The CM-BASEα-Plus should be installed in a location with an ambient temperature of 5 to 40 ˚C.
③ Because the CM-BASEα-Plus incorporates highly precise components, DO NOT install in locations exposed to direct sunlight or near a heating source, or in an environment that is dusty or exposed to corrosive gasses.
④ The CM-BASEα-Plus should be installed in a location that is free from vibration. When installing, take special care to avoid any strong shock to the instrument.
⑤ Do not touch the prism surface with your hand. Finger-prints left on the prism surface may cause sample to build up on the prism.
In the event of contact with the prism surface, clean carefully with a soft tissue soaked with ethyl alcohol.
In order to prevent scratches, never clean the prism surface using abrasive materials.

4. Names and Functions of Components

① Liquid Crystal Display (LCD)
Displays the measured values.

② ZERO key
Press to perform zero-setting.

③ Indicator Lamp (Green)
The light flashes during zero-setting, and stays lit during measurement.

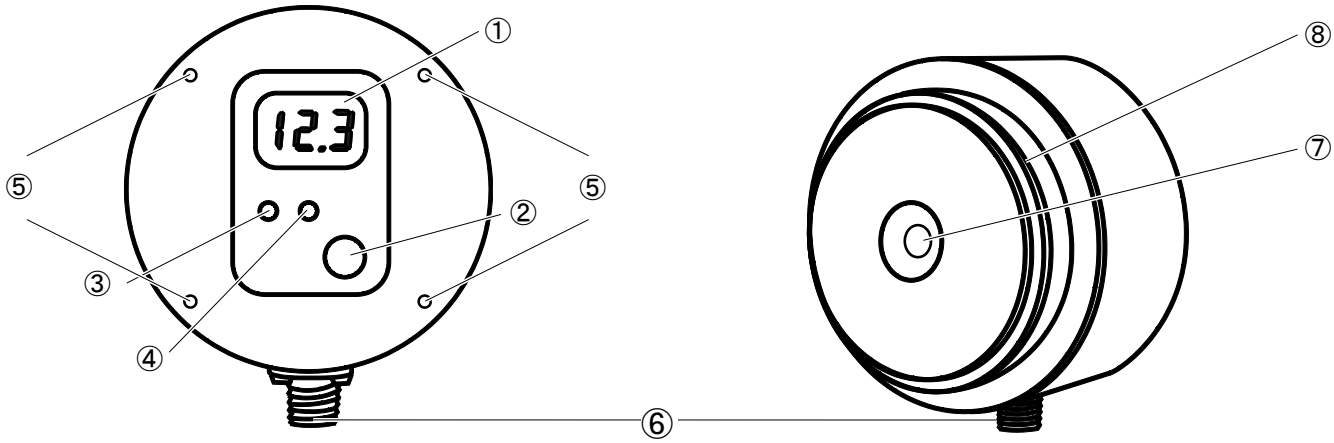
④ Indicator Lamp (Red)
The light comes on/flashes when an error occurs.

⑤ Screw mounting holes
Used to mount the main unit to the bracket, stand (optional), etc.

⑥ Connector
Terminal to connect the power (DC24V) and output cable.

⑦ Prism
Corrosion resistant optical glass, with a polished surface to reflect light.

⑧ Prism stage
Connected to the sample inlet and fastened by a clamp band.



5. Mounting the Main Unit to the Bracket or Stand

WARNING

◇ Turn off the power (DC24V) before mounting.
Electrical shock may occur if the unit is mounted with the power (DC24V) connected.

Screw mounting holes (Fig. 5-1)
The main unit have four mounting screw holes. Use the mounting screw holes to mount the main unit to the bracket (included), stand (optional), etc.

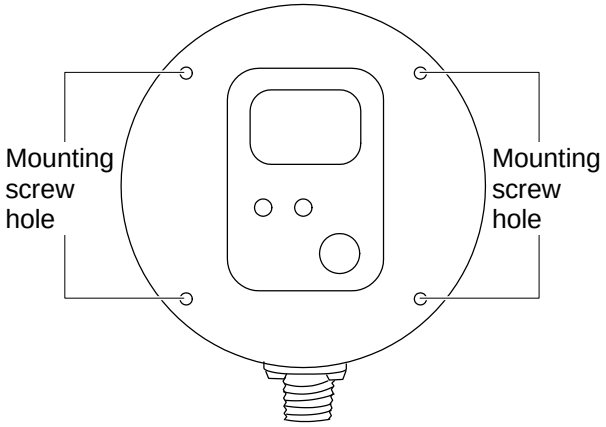


Fig. 5-1

Screw mounting example (Fig. 5-2)
① Main unit
② Bracket
③ Washer (M4)
④ Socket head cap screw with spring washer M4x8

memo Washers (M4) and socket head cap screws with spring washers M4x8 are included with the bracket.

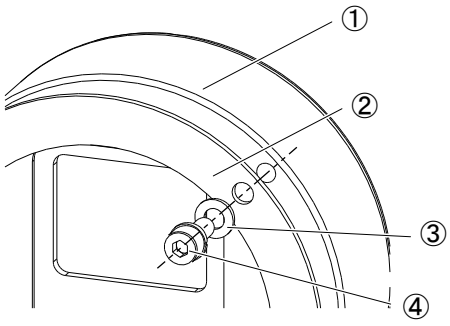


Fig. 5-2

Main unit mounted to the bracket or stand (optional) (Fig. 5-3,Fig. 5-4)

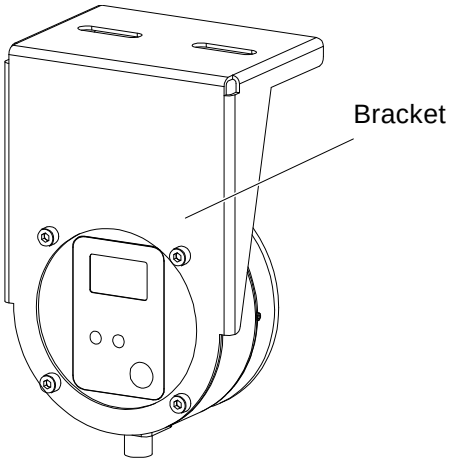


Fig. 5-3

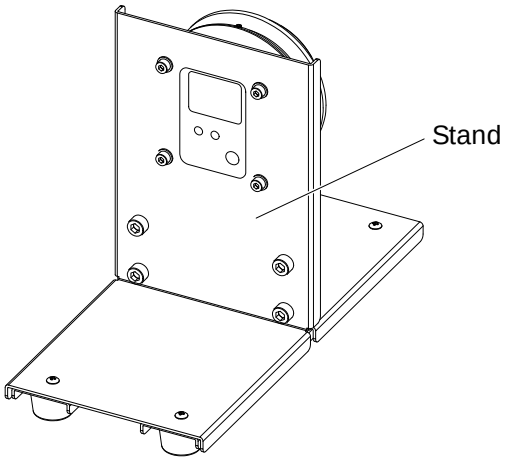


Fig. 5-4

Install the bracket with the main unit to the device, tank, etc.

Note Install the bracket so that the prism surface of the main unit is at a right angle to the ground.

☞ For information on ordering the stand (optional), see page 23 "14.Consumable Parts and Optional Items".

6. Mounting the Sample Inlet Unit

WARNING

◇ Turn off the power (DC24V) before mounting. Electrical shock may occur if the unit is mounted with the power connected.

CAUTION

◇ Ensure that the prism is clean and free of any damage and/or scratches. Completely remove any sample before installing the CM-BASEα-Plus to piping or equipment.

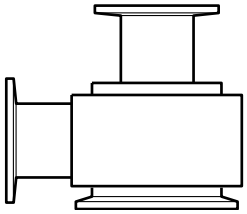
When installing the CM-BASEα-Plus, be sure to note the following points.

① The size of the prism stage of the CM-BASEα-Plus is a 3S ferrule.
② Install the CM-BASEα-Plus so that the prism surface is at a right angle to the ground.
③ Connect the unit to the piping so that the sample flow directly contacts the prism surface. The direct flow of samples (and self cleaning solutions) in contact with the prism will keep substances from adhering to the prism surface.
④ The sample solution must remain in the temperature range of 10 to 95 ˚C.
⑤ During operation, build up of solids, dirt and/or grease may form on the prism surface. When this occurs, the prism surface must be manually cleaned (See page 22.). For ease of cleaning, the CM-BASEα-Plus should be installed in such a manner so that the unit can be easily removed from the piping or solution tank.

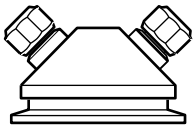
Sample inlet units are available as pipe fittings: straight type and L type.
The straight type should be installed on straight sections of piping. The L type inlet should serve as the joining piece for piping intended to align in an L shape.

There are three ways to connect a sample inlet to a pipe: IDF/ISO clamp union (ferrule), IDF/ISO screw union (screw), and JIS Flange.
Other sample inlets available include small diameter series compression fitting (outer diameter 10mmφ) and hose connector (outer diameter 12mmφ).

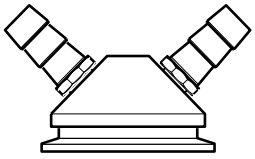
Straight type



L type



Compression Fitting



Hose Connector

Mounting procedure (Fig. 6-1, Fig. 6-2, and Fig. 6-3)

① Install the CM-BASEα-Plus so that the prism surface is at a right angle to the ground.
② Attach the sample inlet unit to the CM-BASEα-Plus with O-ring inserted between them, and fasten them together with the clamp band.
③ Install the inlet unit so that the sample solution runs from the lower nozzle to the upper nozzle to prevent air bubbles from forming.
④ When connecting the tubes to the hose connector, clamp them with a tie band. The tie bands provided with the hose connector are made of plastic. If chemicals corrosive to plastics are used, substitute with tie bands made of other material.
⑤ The prism surface may become contaminated with solids, dirt and/or grease. If this happens, the prism surface must be cleaned by hand. (See page 22.) The sample inlet unit should be installed in such a manner that it can be easily removed to allow access to the prism for cleaning.

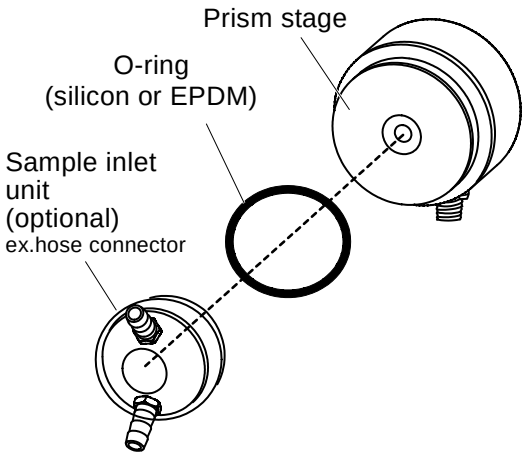


Fig. 6-1

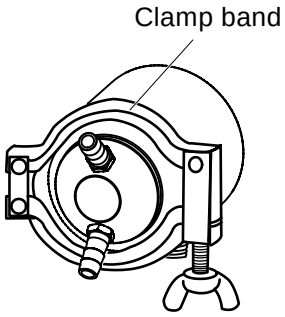


Fig. 6-2

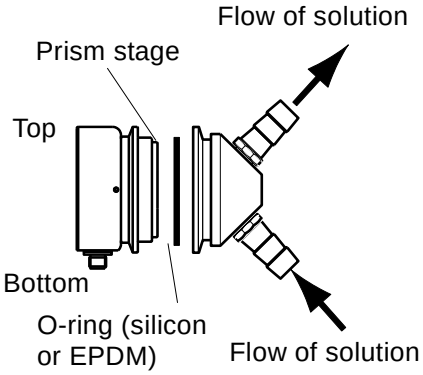
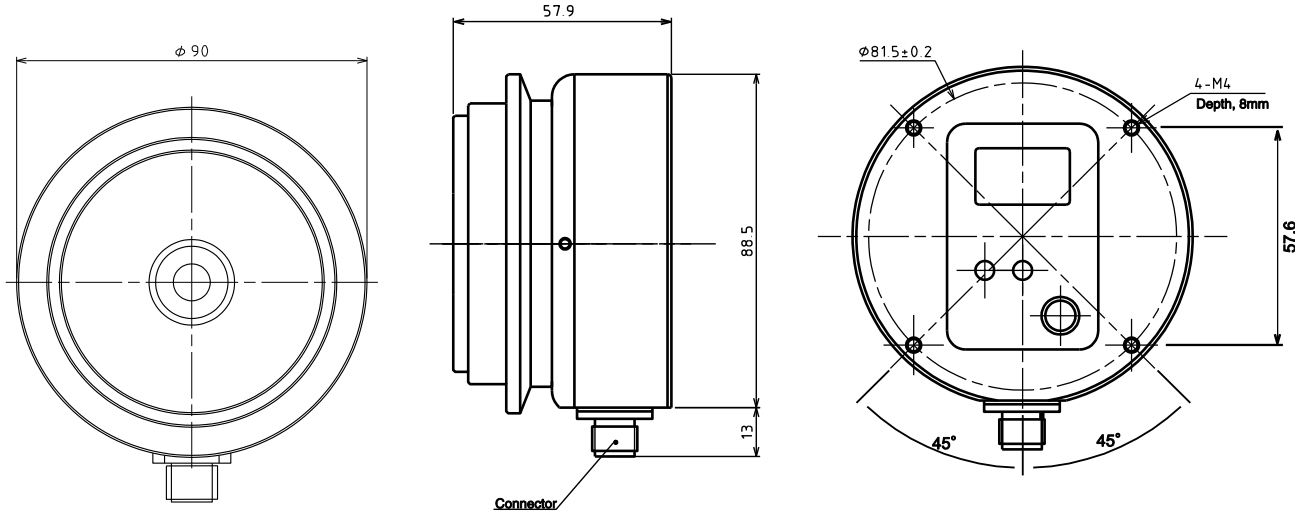


Fig. 6-3

Dimensions

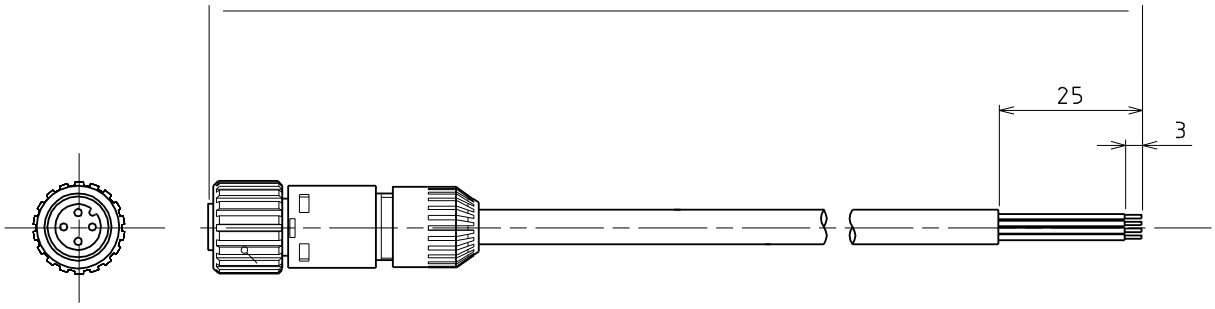


7. External Output

WARNING

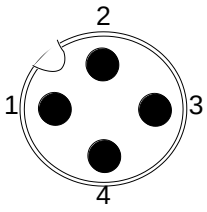
◇ Turn off the power (DC24V) when connecting the cable from the terminal.

The CM-BASEα-Plus(A) transmits data via 4-20mA signals. The CM-BASEα-Plus(D) transmits data to a computer via RS-232C.



(1) CM-BASEα-Plus(A)

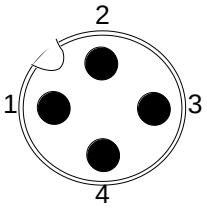
The provided cable connects to the base of the CM-BASEα-Plus(A), and it provides power (DC24V) to the instrument and transmits Brix data via DC 4-20mA. Brix values ranging from -2.0 to 93.5% are communicated as DC ranging from 4 to 20mA respectively.



Connector pin number	Code color	Signal name
1	Red	DC24V
2	Black / White	DC4 to 20mA GND
3	Black	DC24V GND
4	Red / White	DC4 to 20mA

(2) CM-BASEα-Plus(D)

The provided cable connects to the base of the CM-BASEα-Plus(D), and it provides power (DC24V) to the instrument and transmits Brix and temperature data via RS-232C.



Connector pin number	Code color	Signal name
1	Red	DC24V
2	Black / White	RS-232C GND
3	Black	DC24VGND
4	Red / White	RS-232C

Communication parameters
BAUDRATE : 2400bps
DATA LENGTH: 7bit
PARITY : Even
STOP BIT : 1bit

Transmit data
aa.a,bb.b

aa.a represents Brix value. The Brix display range is "-2.0 to 93.5".
When Brix value is less than -2.1, LL.L will be displayed.
When Brix value is more than 93.6, HH.H will be displayed.
bb.b represents temperature.

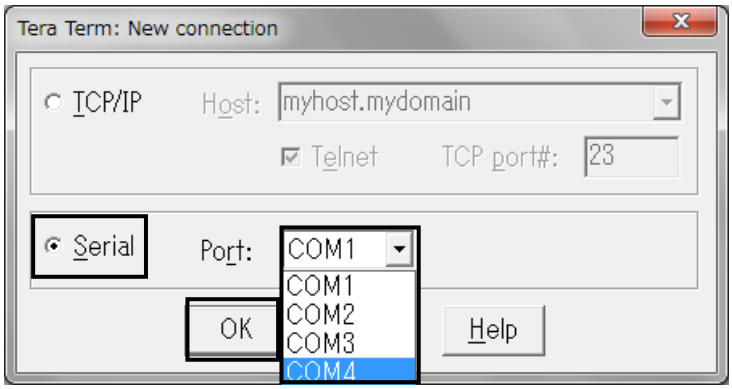
Computer Output

① Computer - Data Setting

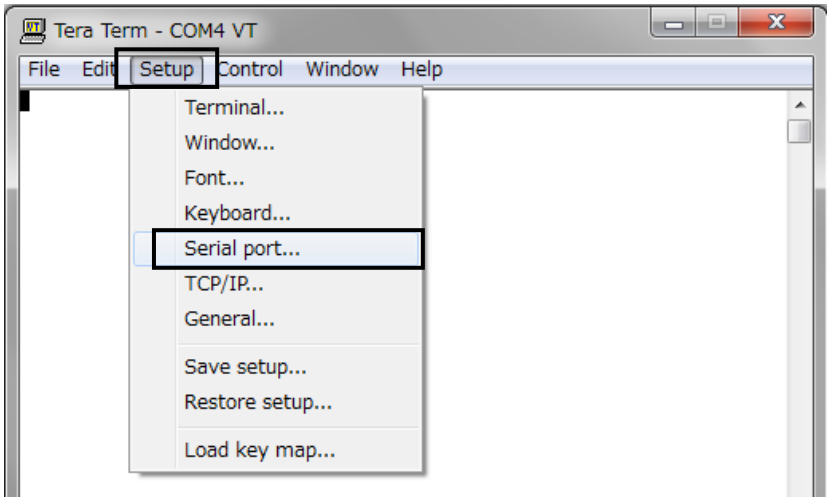
Download a terminal emulator for PC serial communication.
Here, the open-source software “Tera Tarm” is used as an example.

Download Tera Term from a website, such as the one below:
https://ttssh2.osdn.jp/index.html.en

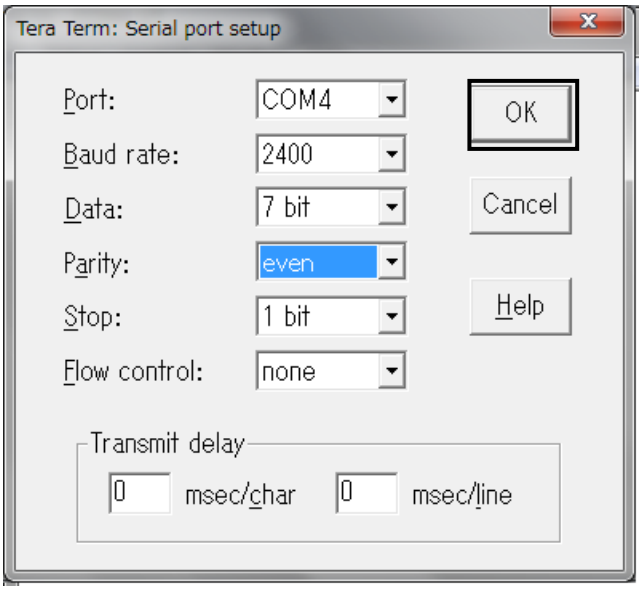
(1) Start Tera Term.
Select "serial" on the New connection dialogbox.
Select the port number.
Click OK.
※ Check the port number.
"Control Panel" → "System and Security" → "Device Manager" → "Port"



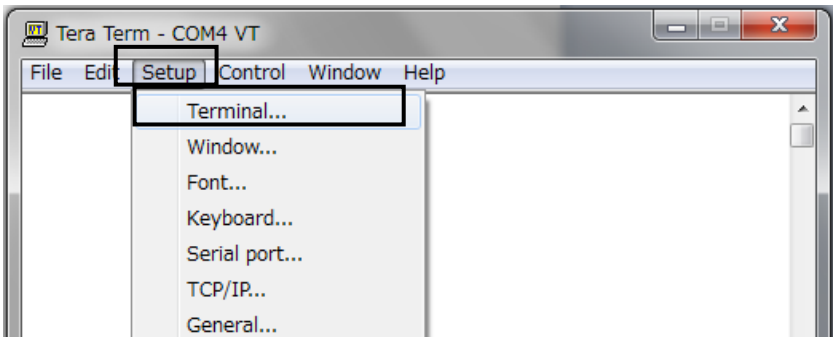
(2) Click Setup, and then Serial port.



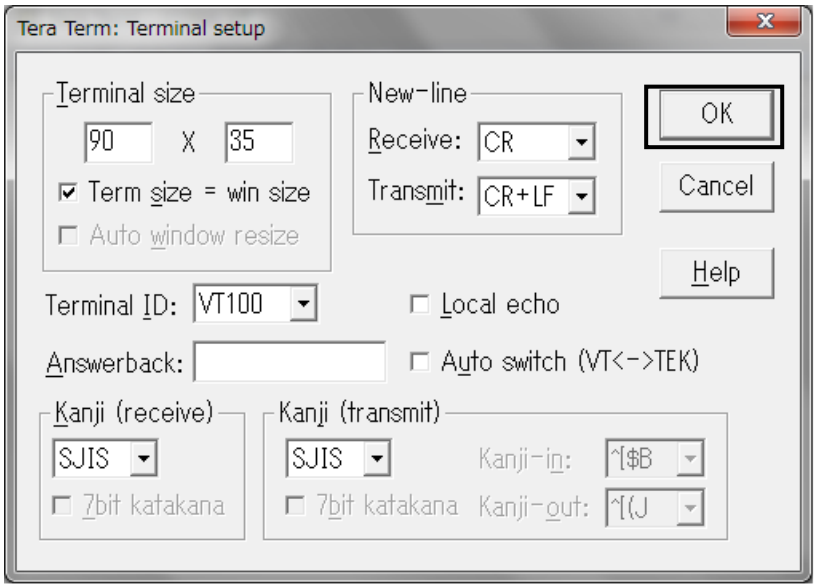
(3) The serial settings are conformed to the instrument settings.
Enter the port number selected in step (1).
Click OK.



(4) Click Setup, and then Terminal port.



(5) Enter the settings as shown below and Click OK.



② Data Output From Main Unit to PC
Every time a measurement is taken, a new row of data appears in the Tera Term window.

Fixed range (No zero suppression) : ○○.○,△△.△ CR / LF

○○.○ : Brix(%)

The Brix(%) output range is "-2.0 to 93.5".

Example

Output Data	Brix(%)
6.3	6.3
25.0	25.0
LL.L	-2.1 or less
HH.H	93.6 or higher

△△.△ : Temperature

Example

Output Data	Temperature(˚C)
9.5	9.5˚C
23.5	23.5˚C

8. Power Supply

⚠ WARNING

◇ NEVER connect the CM-BASEα-Plus to power other than DC24V (allowable fluctuation is ±10%).

◇ NEVER use a power cable that is damaged, cut, broken, or altered. Fire, electrical shock or burns may occur.
To purchase replacement power cables, contact an Authorized ATAGO Distributor.

① Make sure that the cable is properly connected to the port.

② Once the power (DC24V) is turned on to the instrument, either the green light or red light will come on.

Note The CM-BASEα-Plus has no power switch. When power (DC24V) is supplied to the CM-BASEα-Plus, the measurement value display illuminates and the Brix(%) measurement commences.

The green light comes on when a sufficient amount of liquid with a Brix value of -2.0 to 93.5% is passing by the prism. When there is not enough liquid passing by, the red light turns on and error message "LLL" is displayed. When the Brix of the liquid is above 93.6% or more, the red light turns on and "HHH" is displayed.

9. Measuring Brix(%)

⚠ CAUTION

◇ DO NOT measure any sample that can damage the prism or the sample inlet unit. Sample temperature should be kept between 10˚C and 95˚C when the power (DC24V) is turned on.

◇ If the sample solution could potentially stain the prism, immediately clean the prism after measurement (following the instructions on page 22 of this instruction manual).

① When power (DC24V) is supplied to the CM-BASEα-Plus, the Brix(%) measurement starts.
(*) The CM-BASEα-Plus has no power switch.

② The Brix(%) value will be displayed when sample flows onto the prism surface.
(*) CM-BASEα-Plus(D) also outputs temperature as well.

③ If there is no sample on the prism surface (only air), the red light is on and the error message LLL will be displayed.
External output relationship is shown in the table below.

Note See page 21 if the red light is on even though the prism surface is sufficiently covered with liquid.

④ The CM-BASEα-Plus constantly detects the temperature of the prism. When the sample temperature is within the range of 10 to 95˚C, the Brix(%) values are automatically compensated for temperature.

Note A left arrow will appear on the screen when the sample temperature is 9.4˚C or less, or 95.6˚C or more. The Brix values displayed while the arrow is displayed are not properly temperature-compensated.

⑤ For calibration (zero-setting) see page 19.

CM-BASEα-Plus(A)

Brix	Display	Indicator Lamp	DC
−2.1% or less	LLL	Red	4mA
−2.0 to 93.5%	Measured value	Green	4 to 20mA
93.6% or more	HHH	Red	20mA

Temperature	Display	Indicator Lamp	DC
9.4℃ or less	"←" Lighting	Red & Green	—
9.5 to 95.5℃	—	Green	—
95.6℃ or more	"←" Lighting	Red & Green	—

CM-BASEα-Plus(D)

Brix	Display	Indicator Lamp	RS−232C
−2.1% or less	LLL	Red	LL.L
−2.0 to 93.5%	Measured value	Green	Measured value
93.6% or more	HHH	Red	HH.H

Temperature	Display	Indicator Lamp	RS−232C
9.4℃ or less	"←" Lighting	Red & Green	Measured Temperature
9.5 to 95.5℃	—	Green	Measured Temperature
95.6℃ or more	"←" Lighting	Red & Green	Measured Temperature

10. Zero-setting

Note Before zero-setting, confirm that the prism surface is clean.

① Confirm that the sample inlet unit is properly connected to the piping.

② Let tap water flow through the piping.

③ Supply power (DC24V) to the CM-BASEα-Plus referring to the procedure described in Chapter 7. "Power Supply" on page 14.
Green light is illuminated.

④ The current measurement is displayed and output.
(*) Also output temperature CM-BASEα-Plus(D).

⑤ Press the ZERO key.

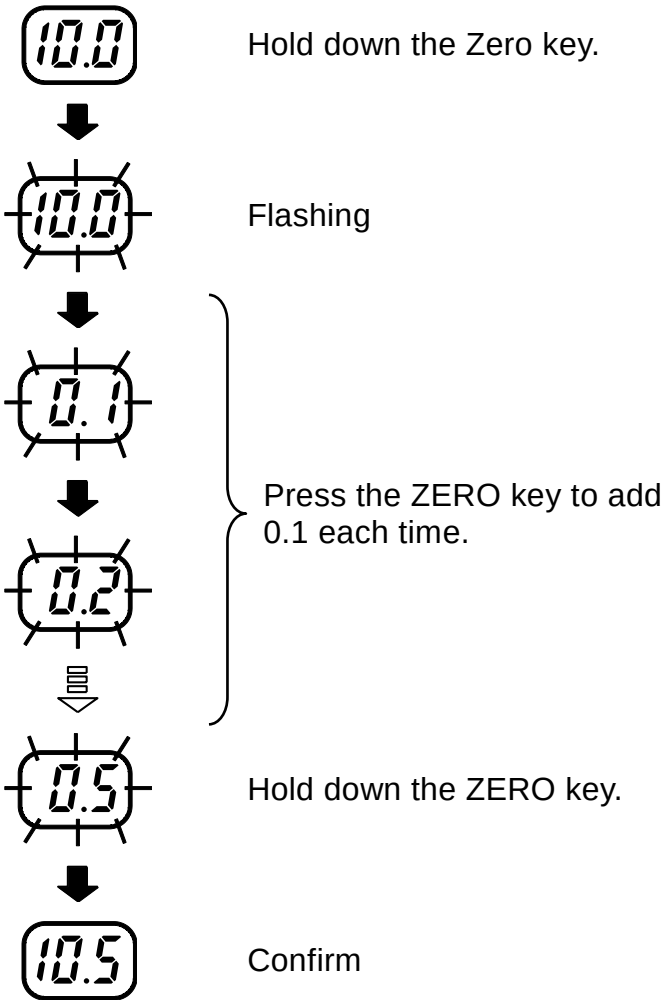
⑥ The green light and “000” on the LCD will flash three times.
Once zero-setting is complete, the green light will remain lit and it will start taking the measurements again.

Note If zero-setting is not successfully completed, the red light will flash and “AAA” will display on the LCD. Pressing the ZERO key once more will turn off the red light and will restart taking measurements. Turn off the power (DC24V), clean the prism, and try zero-setting again with an ample amount of tap water.

11. Bias Adjustment

The bias adjustment feature allows the instrument to display readings that have been adjusted by a fixed value added or subtracted from the actual measured value.
Hold down the ZERO key for approximately 5 seconds to activate the TEST mode, and the displayed value will start flashing.
The displayed value increases by 0.1 each time the ZERO key is pressed.
The value can only increase, not decrease.
Continue to press the ZERO key until the maximum value of +2.0 is reached, and then, it will become -2.0 next. From then on, the value increases from -2.0 by 0.1.

Example:
Displaying 10.0% as 10.5%



A bias setting is retained until subsequent zero-setting, and it will be reset at that time. Recording the bias setting is highly recommended.

12. Error and Display Lamp

(1) During measurement (including when the power is turned on)

●error sign: The red light is on and "LLL" is displayed.

<situation> No or an insufficient amount of sample is on the prism surface.

↓

solution: Use with a sufficient amount of sample with a Brix of 0.0 to 93.0%.

<situation> A sufficient amount of sample with a Brix of -2.0 to 93.5% is on the prism surface.

↓

solution: Turn the power (DC24V) off and ensure that the prism is clean. If the error persists even when there is a sufficient amount of sample to cover the prism, air bubbles or undissolved solids may be the cause.

●error sign: The red light is on and "HHH" is displayed.

<situation> A sample with a Brix over 93.5% is on the prism surface.

↓

solution: Use with a sufficient amount of sample with a Brix of 0.0 to 93.0%.

<situation> A sufficient amount of sample with a Brix of -2.0 to 93.5% is on the prism surface.

↓

solution: Turn the power (DC24V) off and ensure that the prism is clean. If the error persists even when there is a sufficient amount of sample to cover the prism, air bubbles or undissolved solids may be the cause.

(2) During zero-setting

●error sign: The red light flashes and "AAA" is displayed.

<situation> When pressing the ZERO key, there is no water or an insufficient amount of water, or a substance other than water on the prism surface.

↓

solution: Try zero-setting again with an ample amount of tap water.

↓

<situation> When pressing the ZERO key, with an ample amount of tap water on the prism surface.

↓

solution: Turn the power (DC24V) off and ensure that the prism is clean. Try zero-setting again with an ample amount of tap water.

(3) During measurement or zero-setting

●error sign: Both red and green lights are on and arrow mark "←" is displayed.

<situation> The sample temperature is 9.4˚C or less, or 95.6˚C.

↓

solution: The measurement values displayed are not properly temperature-compensated. Measure the sample which temperature is 10˚C to 95˚C or more.

13. Cleaning the Prism

WARNING

◇ Before running hazardous substance(s) through any system, necessary precautions should be taken to ensure the safe handling of the hazardous substance(s). If using a sample inlet unit, use caution when disconnecting the CM-BASEα-Plus unit.

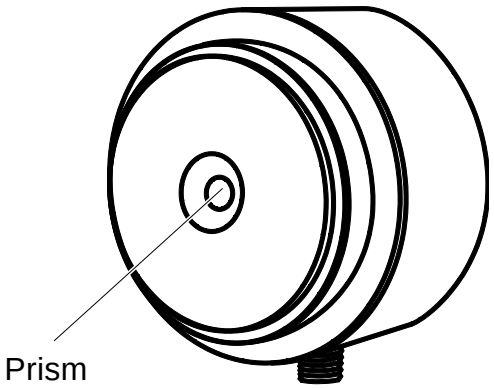
◇ Before cleaning the prism, be sure to turn off the power (DC24V).

① Detach the clamp band that connects the main unit to the sample inlet unit, piping or tank.

② Clean the prism surface carefully with a soft tissue soaked with warm water or ethyl alcohol. If the sample solution contains oil or grease, use ethyl alcohol to ensure the prism surface does not develop a film. Development of a film on the prism could cause erroneous measurements.

③ NEVER clean the prism with an abrasive material. Cleaning the prism with an abrasive material could cause scratches on the prism which could lead to erroneous measurements.

④ After cleaning is complete, re-attach the CM-BASEα-Plus unit to the sample inlet unit, piping or tank.



Clean this prism surface carefully with a soft tissue soaked with warm water or ethyl alcohol.

14. Consumable Parts and Optional Items

(1) Consumable Parts

The following consumable parts are available for the instrument.
These items should be monitored and replaced as necessary. To place an order, please contact an Authorized ATAGO Distributor.

Part name	Part number	Description
Tie band	RE-8507	Maximum temperature: Max. 150˚C Quantity: 10 pieces For water bath connection
O-ring (Silicon)	RE-68100	O-ring used to connect the sample inlet unit to the prism stage unit.
O-ring (EPDM)	RE-68115	
O-ring (Viton)	RE-68002	
Bracket for CM-BASEα	RE-67500	

(2) Optional Items

The following optional items are available for the instrument.
These items can be ordered through an Authorized ATAGO Distributor.

Part name	Part number	Description
Hose connector	RE-67501	Outside diameter of the Hose connector: 12mmφ
Compression Fitting	RE-67503	Compression fitting 10mmφ
Straight type IDF/ISO clamp union (ferrule)	RE-67511	1S
	RE-67512	1.5S
	RE-67521	2S
Straight type IDF/ISO screw union	RE-67523	2S
Straight type JIS Flange	RE-67515	25A
	RE-67525	40A
L type IDF/ISO clamp union (ferrule)	RE-67611	1S
	RE-67621	2S
Stand for CM-BASEα	RE-67690	

15. Relationships between Brix(%) Values and Refractive Index (nD) Values

The relationships between Brix(%) values and Refractive Index (nD) values are listed in this table for your reference.

Relationships between Brix(%) values and Refractive Index (nD) values

%	n_D^{20}	%	n_D^{20}	%	n_D^{20}	%	n_D^{20}	%	n_D^{20}
0	1.33299	20	1.36384	40	1.39986	60	1.44193	80	1.49071
1	1.33442	21	1.36551	41	1.40181	61	1.44420	81	1.49333
2	1.33586	22	1.36720	42	1.40378	62	1.44650	82	1.49597
3	1.33732	23	1.36889	43	1.40576	63	1.44881	83	1.49862
4	1.33879	24	1.37060	44	1.40776	64	1.45113	84	1.50129
5	1.34026	25	1.37233	45	1.40978	65	1.45348	85	1.50398
6	1.34175	26	1.37406	46	1.41181	66	1.45584		
7	1.34325	27	1.37582	47	1.41385	67	1.45822		
8	1.34477	28	1.37758	48	1.41592	68	1.46061		
9	1.34629	29	1.37936	49	1.41799	69	1.46303		
10	1.34782	30	1.38115	50	1.42009	70	1.46546		
11	1.34937	31	1.38296	51	1.42220	71	1.46790		
12	1.35093	32	1.38478	52	1.42432	72	1.47037		
13	1.35250	33	1.38661	53	1.42647	73	1.47285		
14	1.35408	34	1.38846	54	1.42863	74	1.47535		
15	1.35568	35	1.39032	55	1.43080	75	1.47787		
16	1.35729	36	1.39220	56	1.43299	76	1.48040		
17	1.35891	37	1.39409	57	1.43520	77	1.48295		
18	1.36054	38	1.39600	58	1.43743	78	1.48552		
19	1.36218	39	1.39792	59	1.43967	79	1.48811		

Note Refractive Index values correlating to Brix 0 to 85% in the table above have been officially determined by ICUMSA (International Committee of Uniform Method of Sugar Analysis held in 1974).

16. Specifications

Cat.No	① 5800 CM-BASEα-Plus(A) ② 5801 CM-BASEα-Plus(D)
Measurement scale	Brix(%) (Automatic Temperature Compensation)
Measurement range	Brix 0.0 to 93.0% (indication -2.0 to 93.5)
Minimum indication	Brix 0.1%
Measurement accuracy	Brix ±0.5% (for measurement value of Brix 0.0 to 93.0%)
Measurement temperatures	10 to 95˚C
Temperature accuracy	±2.0˚C
Measurement Interval (Same as output interval)	Approx. 2 seconds per measurement .
Temperature correction values	Based on the temperature correction table for sucrose.
Output	①CM-BASEα-Plus(A) Brix -2.0 to 93.5% = DC4 to 20mA ②CM-BASEα-Plus(D) RS-232C output: Brix and temperature
Source	LED (D-line approximation)
Temperature sensor	Thin film platinum sensor
Materials in contact with the solution	Prism: Sapphire Prism stage : SUS304
Resistible pressure on the prism unit	0.98MPa(10kgf/cm^2)
International Protection Class	IP64
Power supply	DC24V (Allowable fluctuation is ±10%)
Power consumption	0.6VA
Environmental conditions	・Use the instrument at an altitude below 5,000m (above sea level). ・Use the instrument indoors. ・Use the instrument where the temperature is between 5 to 40˚C. ・Use the instrument under the condition where humidity is 80% at 31˚C or lower, falling linearly to 50% at 40˚C. ・Main supply voltage fluctuation should not to exceed ±10% the nominal voltage. ・Installation categories (Overvoltage Categories):II ・The pollution degree is 2 (according to IEC60664).

17. Repair Service and Warranty Period

The CM-BASEα-Plus In-line Refractometer is a precise electronic instrument which incorporates both optical and electrical components. Due to the complex interaction of these components, repairs and/or adjustments of the CM-BASEα-Plus unit must be performed by an ATAGO engineer or a properly trained service technician at an ATAGO Authorized Service Center. Authorized Service Center technicians have completed maintenance courses and have a vast knowledge of ATAGO instruments. Any simple inspection or replacement of parts described in this manual can be performed by the end-user. Only ATAGO engineers and properly trained service technicians are allowed to perform repairs or disassemble the CM-BASEα-Plus. Any attempt to make repairs or disassemble the unit will void the warranty.
The warranty period of the CM-BASEα-Plus is one year from the date of purchase. This warranty covers manufacturer's defects. If any manufacturer's defect is found during the warranty period, the CM-BASEα-Plus will be repaired under warranty. The prism of the CM-BASEα-Plus is considered a consumable item and is not covered under the warranty.
All instruments received for repair are subject to a possible inspection fee. If the unit is inspected and found to be either in good working order or is not covered by the warranty, the customer will be responsible for any inspection fees, repair costs including labor, parts and materials use, and shipping charges.

● Replacement Part Information

Please note that ATAGO cannot guarantee that replacement parts will be available after a unit has been discontinued. ATAGO will make every effort to secure replacement parts for a period of at least seven years after discontinuation of any product.

● Periodic inspection service (charged):

To ensure long-term, precise and stable operation of the CM-BASEα-Plus, we recommend for the unit to be inspected periodically (at least once every two years).
Periodic inspection service can be requested through an Authorized ATAGO Distributor or directly from an Authorized Service Center.
Periodic inspection service includes:

- Inspection, confirmation and replacement of functional parts (if necessary)
- Inspection and adjustment of the span
- Cleaning the prism
- Replacement of the dehumidifying agent

ATAGO CO., LTD.

When contacting your preferred distributor regarding repairs or troubleshooting, please inform them of the serial number of the unit.

18. ATAGO CO.,LTD. Service Centers

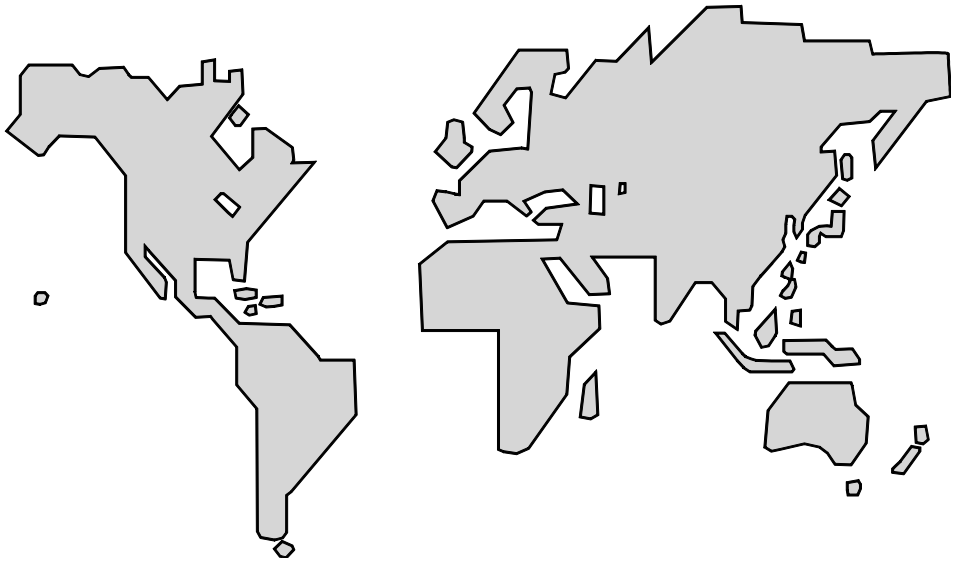
ATAGO has Authorized Service Centers around the world. Below is the list of countries where you can find an ATAGO Authorized Service Center. If your ATAGO instrument requires servicing please contact ATAGO at the following e-mail address.

overseas@atago.net

Please provide your company name, address and telephone number so that we can direct your inquiry to the Authorized Service Center nearest you. The Authorized Service Center in your area will contact you within 1 to 2 business days.

North America
Canada
U.S.A.
Mexico

Europe
Netherlands
Italy
Germany
France
Spain
U.K.
Belgium
Poland
Greece
Russia
Belarus
Ukraine
Serbia
Croatia
Romania



Central America
Costa Rica
El Salvador
Guatemala
Panama

South America
Argentina
Bolivia
Brazil
Colombia
Chile
Ecuador
Paraguay
Peru
Uruguay

Middle East / Africa
Iran
Turkey
Saudi Arabia
Israel
Lebanon
South Africa
Egypt

Asia / Oceania
Australia
China
India
Thailand
Korea
Taiwan
Indonesia
Malaysia
Singapore
Philippines
Bangladesh
Pakistan
Vietnam

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ATAGO THAILAND Co.,Ltd.
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ATAGO ITALIA s.r.l.
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customerservice@atago-italia.com

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ATAGO RUSSIA Ltd.
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ATAGO NIGERIA Scientific Co.,Ltd.
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