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Automatic Polarimeter

AP-300

Instruction Manual *Cat.No.5291*

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1. Precautions for use

Introduction

Thank you for purchasing the "Automatic polarimeter AP-300". Before using your AP-300, read this instruction manual carefully and understand how to use it. After reading this manual, keep it on hand for future reference.

In this manual "For safe use " describes the important items necessary for safety. Read it carefully.

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

This operation manual describes the items which you are required to observe in order to use the AP-300 safely to prevent injury to you and other people and damage to your property. The explanation of the indications and symbols of those items are as follows. Understand them first and then read the following pages to use your AP-300 correctly.

Explanation of indications



WARNING

If this indication is neglected and the instrument is handled incorrectly, the user may be seriously injured and may result in death.



CAUTION

If this indication is neglected and the instrument is handled incorrectly, the user may be injured and the user's property may be damaged.

Explanation of symbols



This symbol denotes an item which you are warned (or cautioned) of.
The contents of warning are described in detail in or near the Δ .



This symbol denotes an action which you must not do (a prohibited item).
The contents of prohibition are described in detail in or near the $\bigcirc$.



This symbol denotes an action you must do.
The contents of instruction are described in detail in or near the $\bullet$.

Handling of this instrument



WARNING

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



- ◇ If the instrument begins to smell abnormally, overheat, or emit smoke, turn off the power switch and disconnect the power plug immediately.
Fire or malfunction may result if the instrument is continued to be used.
Ask 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 ATAGO distributor.
Fire or malfunction may result if the instrument is used.



CAUTION

- ◇ Do not apply water or sample over any the main body.
Application on the main body of the instrument may result in a malfunction.



1. Precautions for use

Handling of this instrument (Continued)



CAUTION

◇ When transporting the instrument, place it in its original box.



◇ Always turn off the power switch after use.



◇ If you intend to turn off and turn on the power switch, wait one minute or more. If you turn on the power switch again immediately after you turn it off, the instrument may malfunction.



- ◇ 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.
- ◇ Check the necessary operations such as zero setting according to the instruction manual.
- ◇ The manufacturer shall not be held responsible for any or all damages as a result of use of the instrument for those other than its intended purposes (to measure angle of rotation or to measure the international sugar scale).
- ◇ Ensure that if use of the instrument has undesired effects on the consumption of the measured materials, etc., ATAGO shall not be held responsible for the result.

Handling of plug



WARNING

◇ Be sure to use the power cable included with the AP-300.
If a power cable other than the one included is used, the rated voltage and polarity of the power may change, and may cause smoking or fire.



◇ Do not insert the power plug in an outlet other than AC100 to 240V.
Inserting the power plug in any other outlet may result in shortcircuiting the unit, smoking or fire.



◇ Do not use the power cable if damaged or broken.
If used, fire, electrical shock, or burns may result.
For a new power cable, contact your ATAGO distributor.



CAUTION

◇ Do not insert or disconnect the power plug with wet hands.



◇ Be sure to hold and pull the plug when disconnecting the power cable from the outlet.
If the cable is pulled improperly, the plug may be broken, and may result in fire or electrical shock



1. Precautions for use

Connection of optional component (printer, etc.)



CAUTION

- ◇ When connecting optional components, be sure the unit is turned off and disconnect the power plug from the outlet.
If you connect any optional components while the power is on, an electrical shock may result.



●Items to be observed when using●

Environmental conditions

- ◇Use the instrument at an altitude below 5,000 m (above sea level).
- ◇Use the instrument indoors.
- ◇Use the instrument on a flat level surface.
- ◇Use the instrument where the temperature is between 5 to 40°C.
- ◇Use the instrument where the humidity is below 90%RH.
- ◇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 product 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 of a relative humidity (humidity of 80% at a temperature of 31°C or lower falls linearly to 50% at 40°C).
- ◇Main supply voltage fluctuation should not to exceed $\pm 10\%$ 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 if mis-handled in any of the following manner.
 - 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. Unpacking and installation

(1) Unpacking

- (1) Remove the main unit from the box and check the exterior for any damage.
- (2) Check that the following items are included.

◎Automatic Polarimeter AP-300

●Main unit of AP-300	1
●AC power cable	1
●100mm observation tube and 200mm observation tube.....	1each
●Splash tray	1
●Replacement fan filter (A set of 6 pcs)	1
●Observation tube setting bar	2
●Inspection certificate	1
●Instruction manual (this book)	1

(2) Installation

- (1) Use a power output of AC100 to 240V (50Hz/60Hz) .
- (2) Since AP-300 consists of precision parts, do not place it in a location where it will be exposed to direct sunlight or near a heat source, where it may be subject to strong vibrations, or where dust or corrosive gas will be produced.
- (3) Place AP-300 on a vibration-free level surface. When installing, do not drop or subject it to any strong shock.

3. Names and functions of components

(1) AP-300 main body (Figs.3-1, 3-2)

[1] Sampling chamber cover

Protects the sampling chamber from outside light.
When measuring a sample, open the cover and place the observation tube, filled with a sample, on the sample stage.

[2] Display panel

Displays measurement values and various data.

[3] Control panel

Used to enter commands by using the numeric keypad and by pressing the ZERO, QUIT, MENU, SCALE keys and the START key.

[4] Intake cooling fan

This fan circulates air to cool the internal temperature of the AP-300.

[5] RS-232C input/output ports

Uses to connect the AP-300 to a computer system.

[6] Printer output port

Uses to connect the DP-AD digital printer (optional) to the AP-300.

[7] Main power socket

Uses to connect the AC power cable.

[8] Main power switch

Turns the power to the AP-300 on and off.
Press "I" to turn it on, "O" to turn it off.

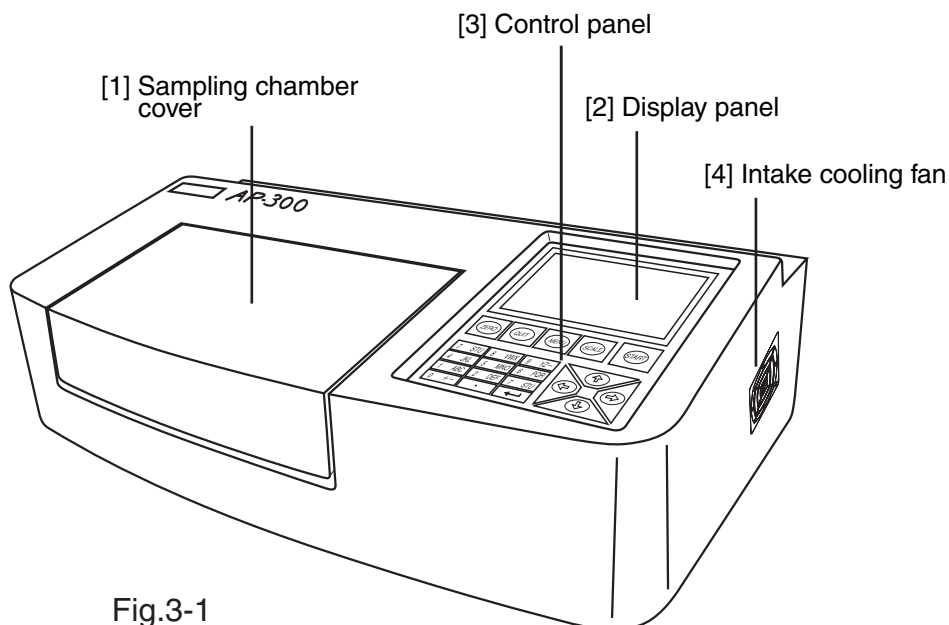


Fig.3-1

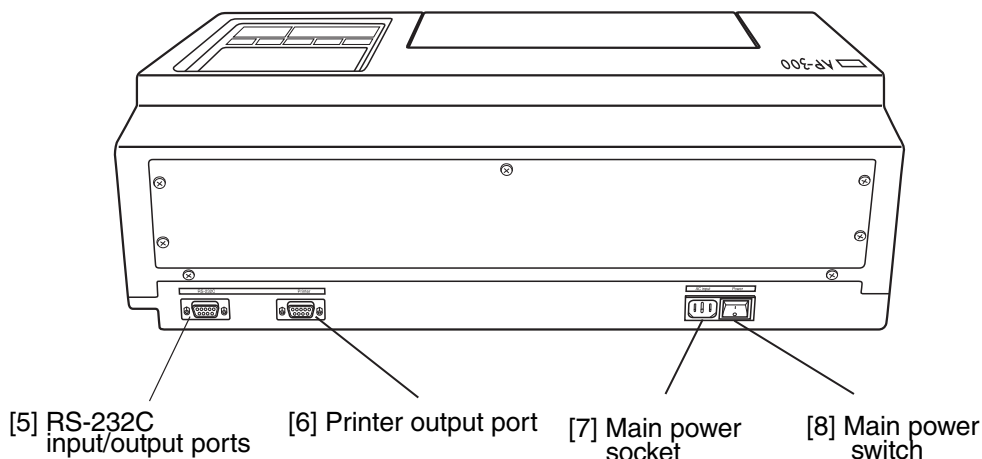


Fig.3-2

3. Names and functions of components

(2) The Sampling Chamber (Fig.3-3)

- [1] Sampling chamber cover
- [2] Temperature sensor
- [3] The support for the observation tube setting bars

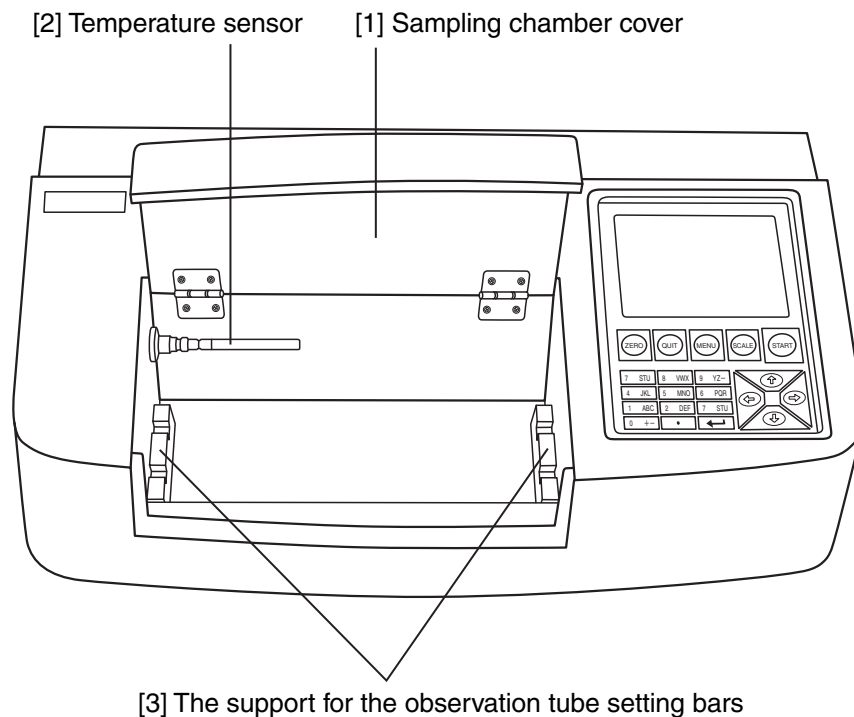


Fig. 3-3

(3) AP-300 Control Panel

(3)-1 Standard Display of a Measurement Value for the Angle of Rotation (Fig.3-4)

- | | |
|--|---|
| [1] Mode number
Indicates the measuring method currently selected. | [9] SCALE key
Changes the scale being displayed. |
| [2] Date and time
Indicates the current date (year/month/day) and time. | [10] MENU key
Displays the menu screen. |
| [3] Name of scale
Indicates the name of scale currently selected. | [11] ZERO key
Uses for zero setting. |
| [4] Measurement value
Indicates the measurement value for the angle of rotation of the sample. | [12] QUIT key
Cancels data entries. |
| [5] Measurement wavelength (λ)
Indicates the wavelength of the measurement. | [13] START key
Starts a measurement. |
| [6] Length of observation tube (L)
Indicates the length of the observation tube. | [14] Numeric keypad and $\leftarrow$ (Enter) key
Uses to enter numeric values. |
| [7] Temperature (TEMP)
Indicates the temperature of the sample chamber. | [15] Arrow keys
Uses to move the cursor and to select or change settings. |
| [8] Type of observation tube (TUBE)
Indicates the type of the observation tube for the measurement. | |

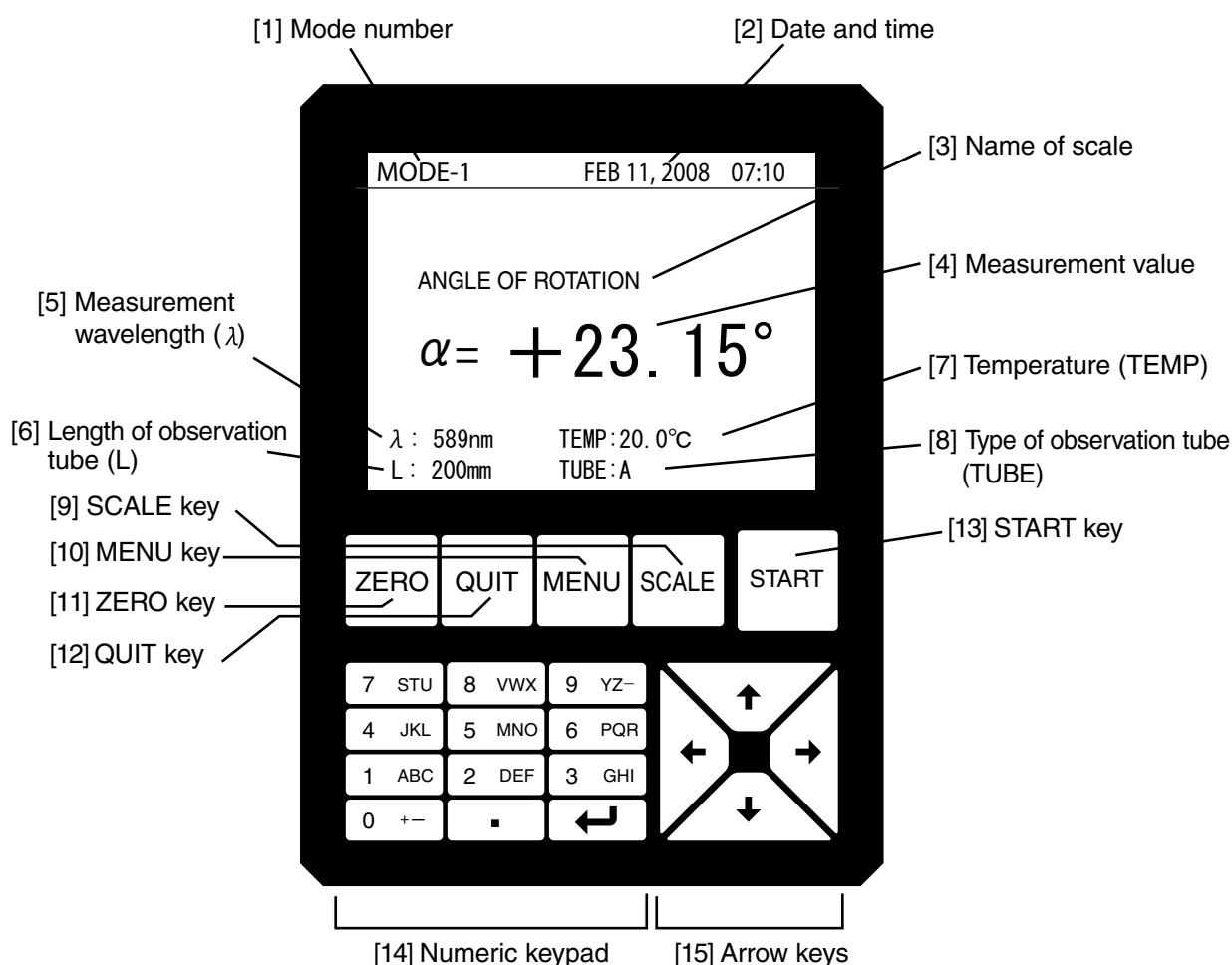


Fig.3-4

3. Names and functions of components

(3)-2 Display of a Measurement Value for the International Sugar Scale (Fig.3-5)

- | | |
|--|---|
| [1] Mode number
Indicates the measuring method currently selected. | [9] SCALE key
Changes the scale being displayed. |
| [2] Date and time
Indicates the current date (year/month/day) and time. | [10] MENU key
Displays the menu screen. |
| [3] Name of scale
Indicates the name of scale currently selected. | [11] ZERO key
Uses for zero setting. |
| [4] Measurement value
Indicates the measurement value of the international sugar scale of the sample. | [12] QUIT key
Cancels data entries. |
| [5] Measurement wavelength (λ)
Indicates the wavelength of the measurement. | [13] START key
Starts a measurement. |
| [6] Length of sample tube (L)
Indicates the length of the observation tube. | [14] Numeric keypad and $\leftarrow$ (Enter) key
Uses to enter numeric values. |
| [7] Temperature (TEMP)
Indicates the temperature of the sample chamber. | [15] Arrow keys
Uses to move the cursor and to select or change settings. |
| [8] Type of observation tube (TUBE)
Indicates the type of the observation tube for the measurement. | |

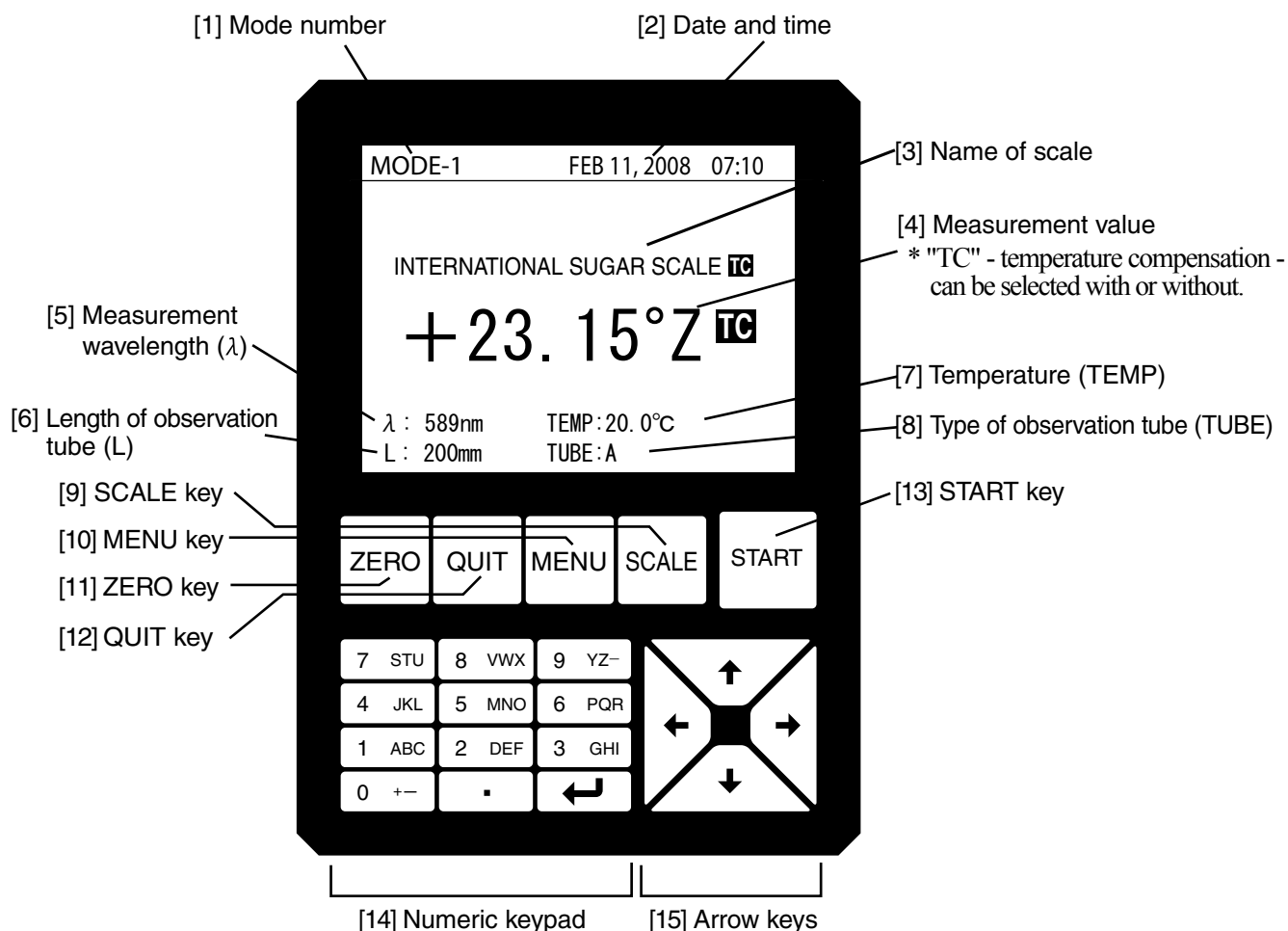


Fig.3-5

3. Names and functions of components

Please refer to P.40 to view the setting method for displaying the correct Specific Rotation values.

(3)-3 Display of a Measurement Value for the Specific Rotation (Fig.3-6)

- | | |
|---|---|
| [1] Mode number
Indicates the measuring method currently selected. | [9] Concentration (CONC)
Indicates the preset value (page 38) for calculating the Specific Rotation. |
| [2] Date and time
Indicates the current date (year/month/day) and time. | [10] SCALE key
Changes the scale being displayed. |
| [3] Name of scale
Indicates the name of scale currently selected. | [11] MENU key
Displays the menu screen. |
| [4] Measurement value
Indicates the measurement value for the specific rotation of the sample. | [12] ZERO key
Uses for zero setting. |
| [5] Angle of rotation
Indicates the angle of rotation of the measurement. | [13] QUIT key
Cancels data entries. |
| [6] Measurement wavelength (λ)
Indicates the wavelength of the measurement. | [14] START key
Starts a measurement. |
| [7] Length of observation tube (L)
Indicates the length of the observation tube. | [15] Numeric keypad and $\rightarrow$ (Enter) key
Uses to enter numeric values. |
| [8] Temperature (TEMP)
Indicates the temperature of the sample chamber. | [16] Arrow keys
Uses to move the cursor and to select or change settings. |

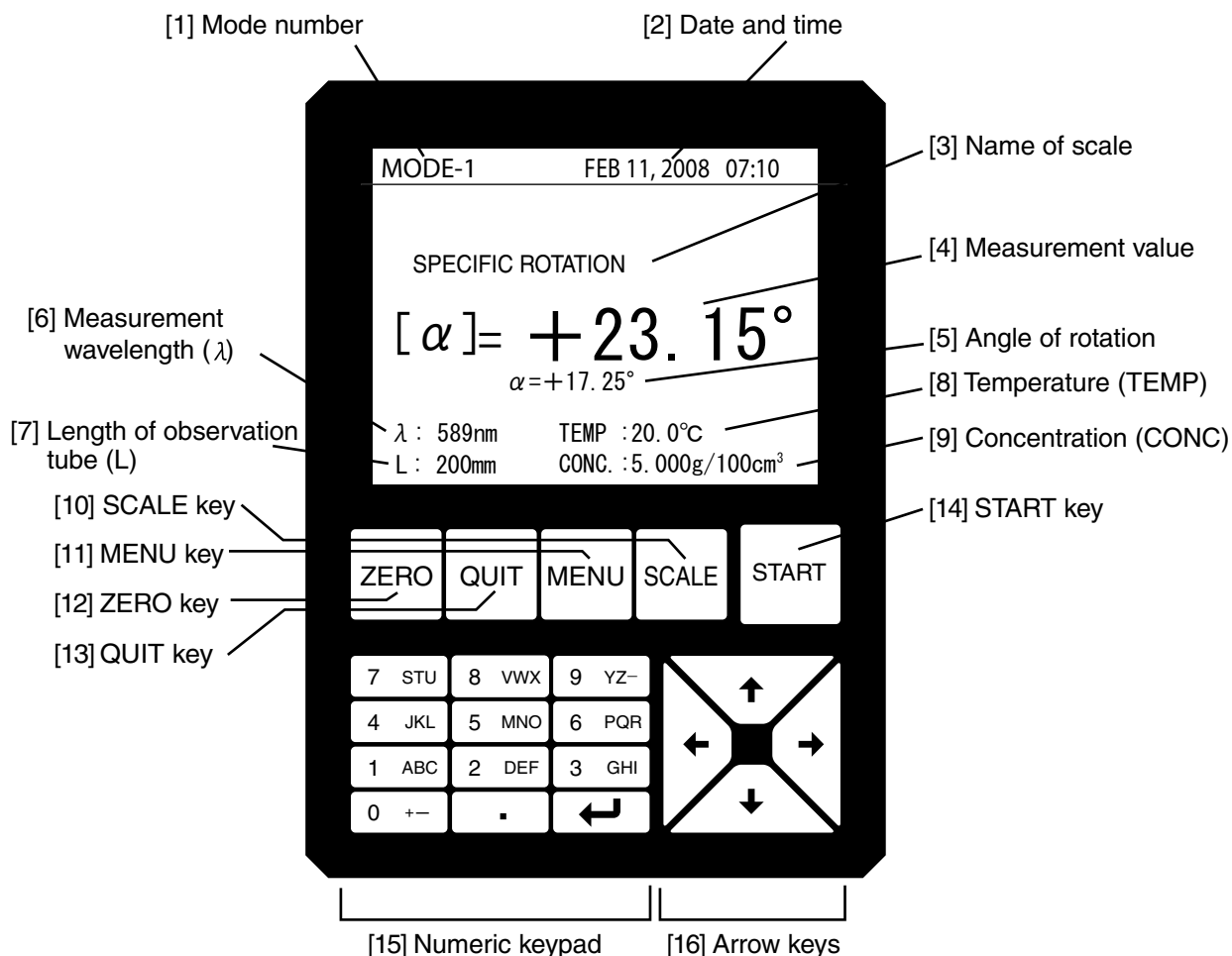


Fig.3-6

3. Names and functions of components

Please refer to P.40 to view the setting method for displaying the correct Concentration values.

(3)-4 Display of a Measurement Value for the Concentration (Fig.3-7)

- | | |
|---|---|
| [1] Mode number
Indicates the measuring method currently selected. | [9] Specific rotation (S.R.)
Indicates the preset value (page 38) for calculating the Concentration. |
| [2] Date and time
Indicates the current date (year/month/day) and time. | [10] SCALE key
Changes the scale being displayed. |
| [3] Name of scale
Indicates the name of scale currently selected. | [11] MENU key
Displays the menu screen. |
| [4] Measurement value
Indicates the measurement value for the concentration of the sample. | [12] ZERO key
Uses for zero setting. |
| [5] Angle of rotation
Indicates the angle of rotation of the measurement. | [13] QUIT key
Cancels data entries. |
| [6] Measurement wavelength (λ)
Indicates the wavelength of the measurement. | [14] START key
Starts a measurement. |
| [7] Length of observation tube (L)
Indicates the length of the observation tube. | [15] Numeric keypad and $\leftarrow$ (Enter) key
Uses to enter numeric values. |
| [8] Temperature (TEMP)
Indicates the temperature of the sample chamber. | [16] Arrow keys
Uses to move the cursor and to select or change settings. |

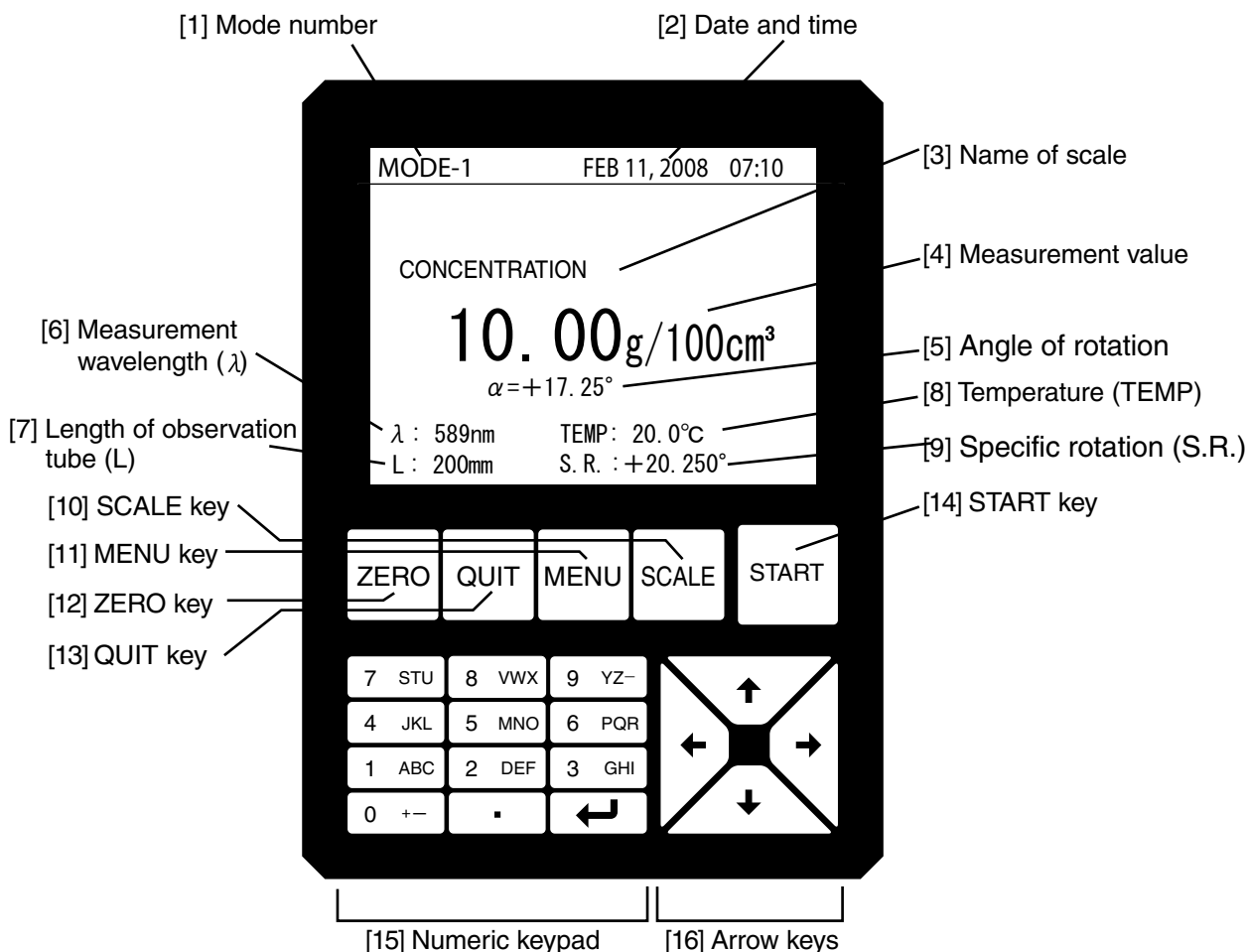


Fig.3-7

3. Names and functions of components

Please refer to P.41 to view the setting method for displaying the correct Purity values.

(3)-5 Display of a Measurement Value for the Purity (Fig.3-8)

- | | |
|--|---|
| [1] Mode number
Indicates the measuring method currently selected. | [9] Brix (BRIX)
Indicates the preset value (page 39) for calculating the Purity. |
| [2] Date and time
Indicates the current date (year/month/day) and time. | [10] SCALE key
Changes the scale being displayed. |
| [3] Name of scale
Indicates the name of scale currently selected. | [11] MENU key
Displays the menu screen. |
| [4] Measurement value
Indicates the measurement value for the purity of the sample. | [12] ZERO key
Uses for zero setting. |
| [5] POL
Indicates the POL value of the measurement. | [13] QUIT key
Cancels data entries. |
| [6] Measurement wavelength (λ)
Indicates the wavelength of the measurement. | [14] START key
Starts a measurement. |
| [7] Length of observation tube (L)
Indicates the length of the observation tube. | [15] Numeric keypad and $\leftarrow$ (Enter) key
Uses to enter numeric values. |
| [8] Temperature (TEMP)
Indicates the temperature of the sample chamber. | [16] Arrow keys
Uses to move the cursor and to select or change settings. |

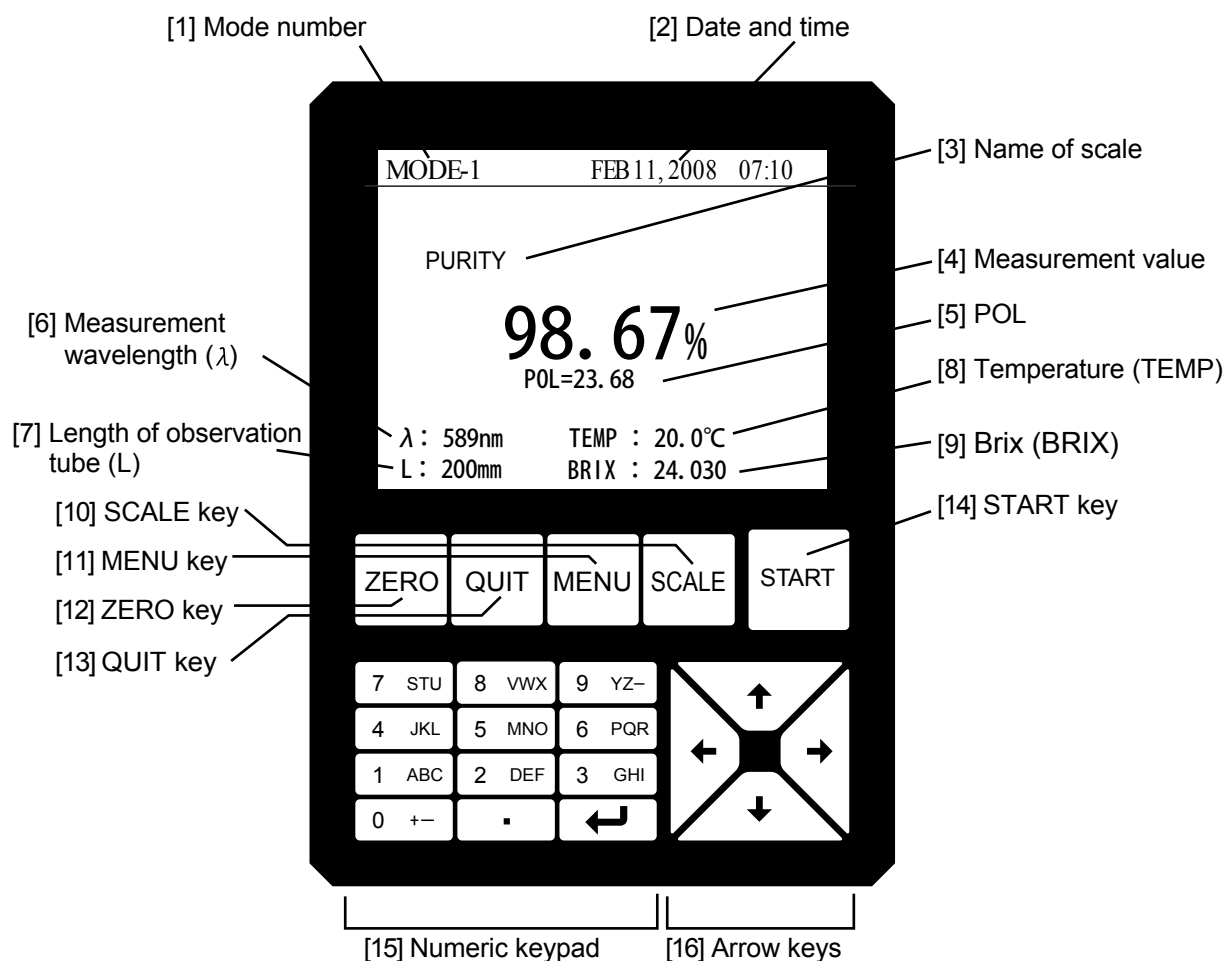


Fig.3-8

3. Names and functions of components

(3)-6 Display of a Measurement Value for the Limit Bar Setting (Fig.3-9)

- | | |
|--|--|
| <p>[1] Mode number
Indicates the measuring method currently selected.</p> <p>[2] Date and time
Indicates the current date (year/month/day) and time.</p> <p>[3] Limit Bar
Indicates the high and low limits entered for the measurement.</p> <p>[4] Sample
Indicates the sample selected for the measurement.</p> <p>[5] Measurement value
Indicates the measurement value.</p> <p>[6] Measurement wavelength (λ)
Indicates the wavelength of the measurement.</p> <p>[7] Length of observation tube (L)
Indicates the length of the observation tube.</p> <p>[8] Temperature (TEMP)
Indicates the temperature of the sample chamber.</p> | <p>[9] Type of observation tube (TUBE)
Indicates the type of the observation tube used for the measurement.</p> <p>[10] SCALE key
Changes the scale being displayed.</p> <p>[11] MENU key
Displays the menu screen.</p> <p>[12] ZERO key
Uses for zero setting.</p> <p>[13] QUIT key
Cancels data entries.</p> <p>[14] START key
Starts a measurement.</p> <p>[15] Numeric keypad and $\leftarrow$ (Enter) key
Uses to enter numeric values.</p> <p>[16] Arrow keys
Uses to move the cursor and to select or change settings.</p> |
|--|--|

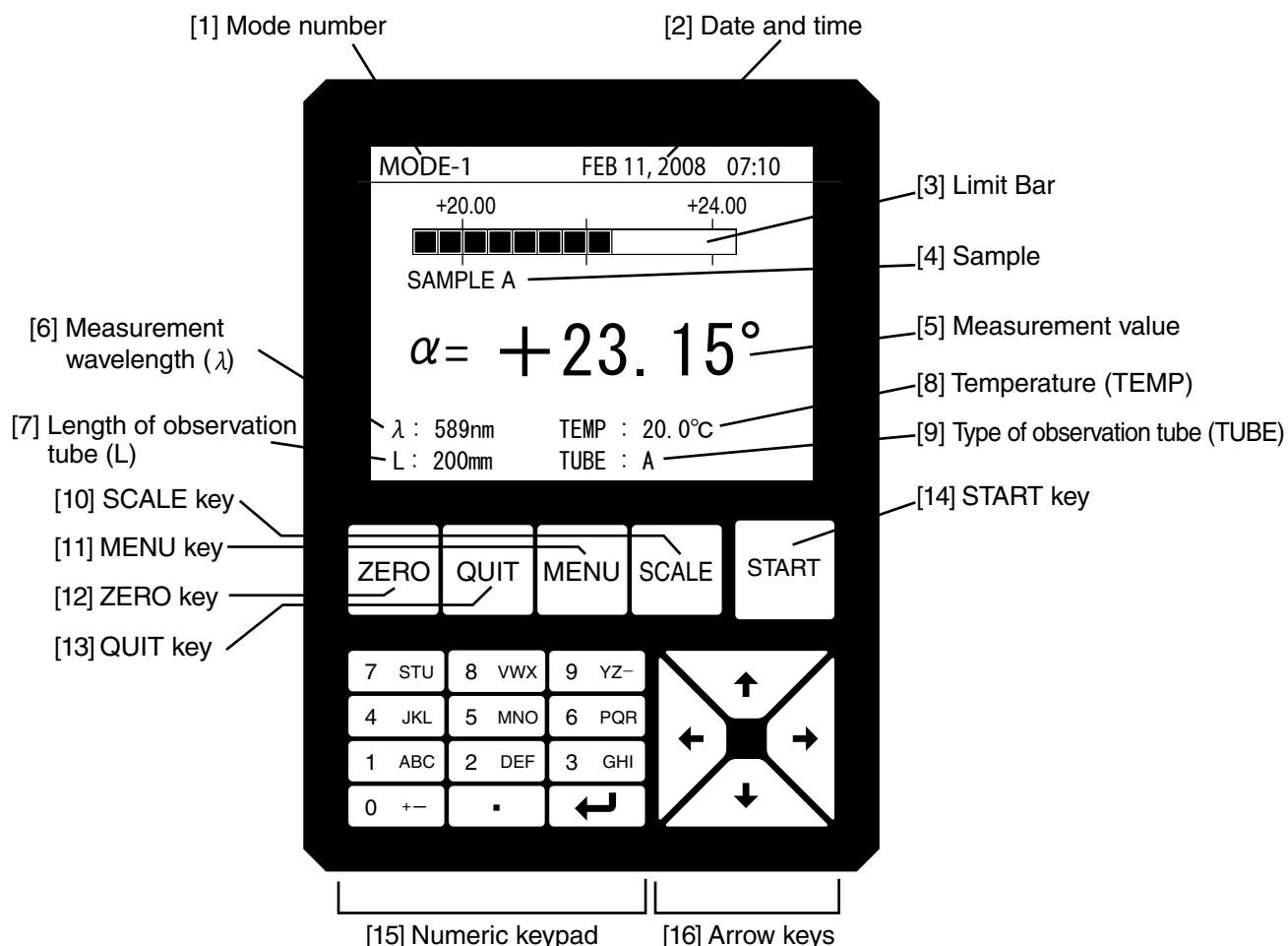


Fig.3-9

4. Making the connections

(1) Connecting the AC power cable (Fig.4-1)

Insert the connector of the AC power cable to the AC power input terminal located at the back of the AP-300.

* Do not plug the AC power cable into the power outlet yet.

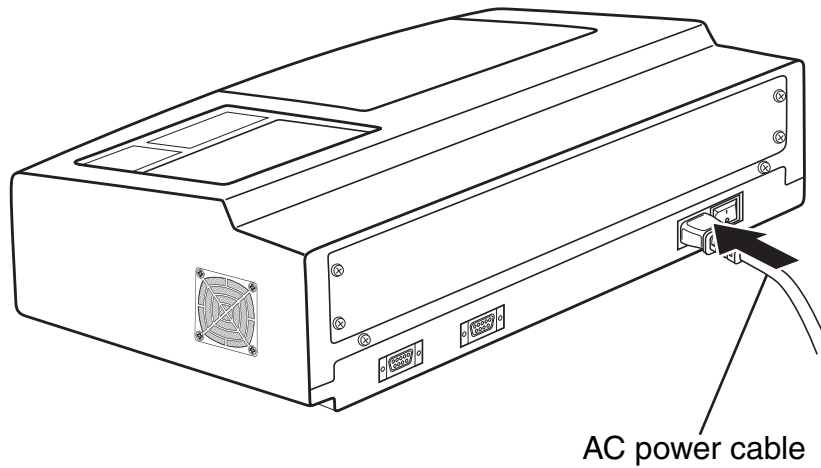


Fig.4-1

5. Power-on



CAUTION

◇ After turning off the power switch, wait for more than one minute before powering on. If the switch is turned on again immediately after turning off, a malfunction may occur.

Power on the unit as follows:

a) Plug the AC power cable into an indoor AC100 to 240V power outlet. At this time, be sure to connect the ground wire (Fig.5-1).

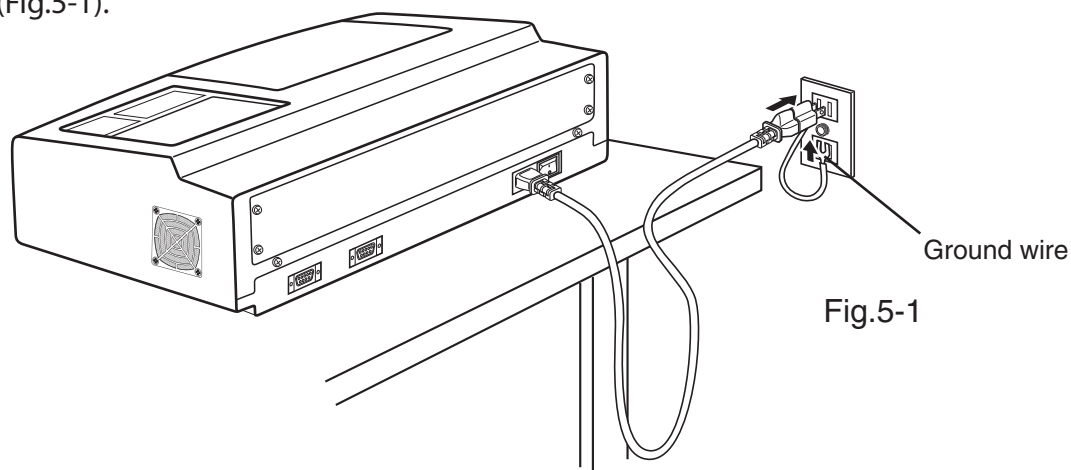


Fig.5-1

b) In order to turn on the power, move the power supply switch on the back of AP-300 to the "I" position.
c) After AP-300 is on, it will display the screen as shown in Fig. 5-2, then the display changes to one of measurement display screens three seconds later.

d) When the digital printer DP-AD is connected, turn on the power by sliding the power switch to the "I" position after turning on AP-300.

Nothing is printed when the power supply of AP-300 and DP-AD is just switched on. Printing will be started after the zero setting or measurement is completed by pushing the ZERO or the START key. (Printing is started even when PRINT (START key) is pushed in the HISTORY function.)

*** After the power is supplied to the AP-300, allow 30 minutes for the unit to warm up before conducting zero setting or starting a measurement.**



Fig.5-2

In the situation where the power switch is turned on and the liquid-crystal-display screen is not displaying properly, turn off the power. Wait for at least 1 minute, and then turn on the power switch again.

6. Display screens frequently used in this manual

(1) measurement display screen

The "measurement display screen" used in this manual refers to the following 12 types of screen:

(1)-1 Without the Limit bar (Fig.6-1)

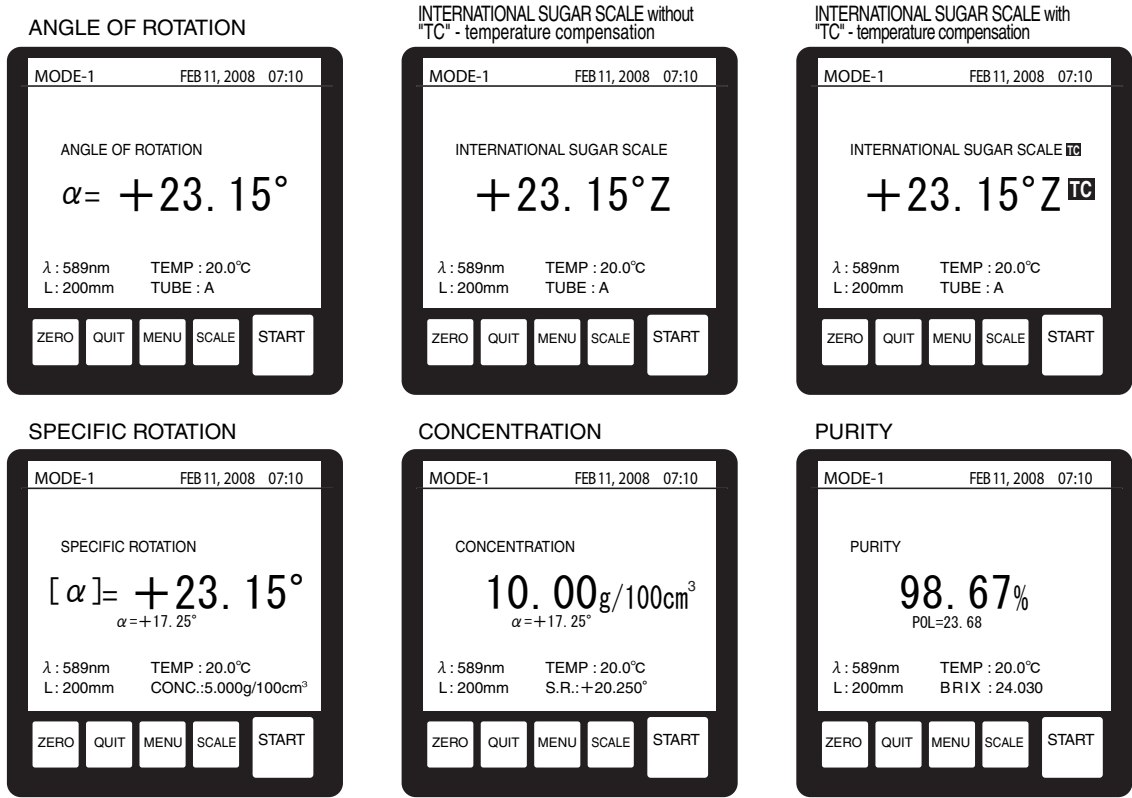


Fig.6-1

(1)-2 With the Limit bar (Fig.6-2)

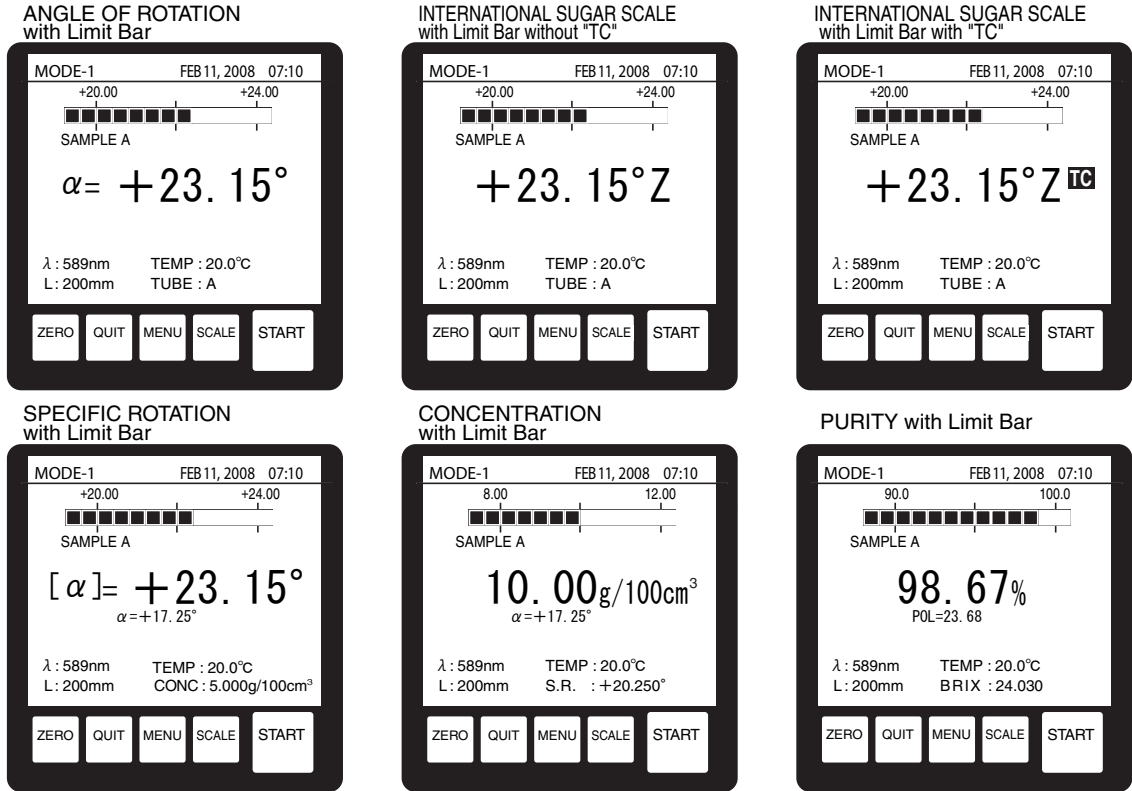


Fig.6-2

6. Display screens frequently used in this manual

(2) SET UP MENU screen (Fig.6-3, Fig.6-4)

The "SET UP MENU screen" used in this manual refers to the following screen.

The "SET UP MENU 2/2" will be displayed when the MENU key is pressed on the "SET UP MENU 1/2" screen, and vice versa.



Fig.6-3

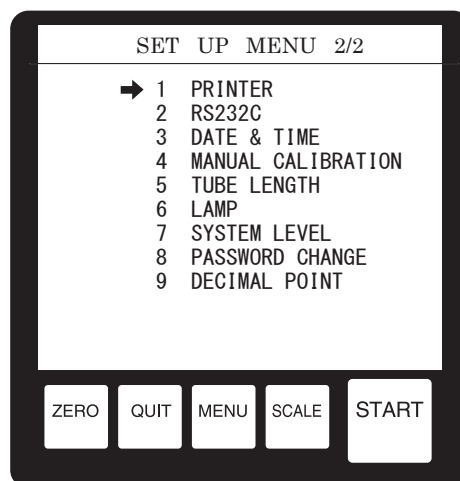


Fig.6-4

(3) ZERO SET screen (Fig.6-5, Fig.6-6)

The start-up screen of ZERO SET

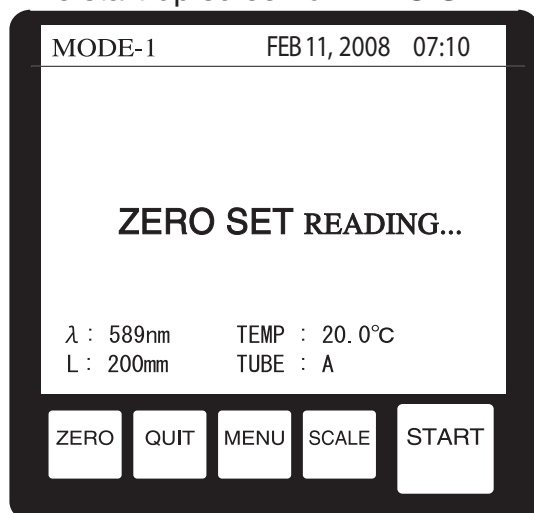


Fig.6-5

The close-out screen of ZERO SET

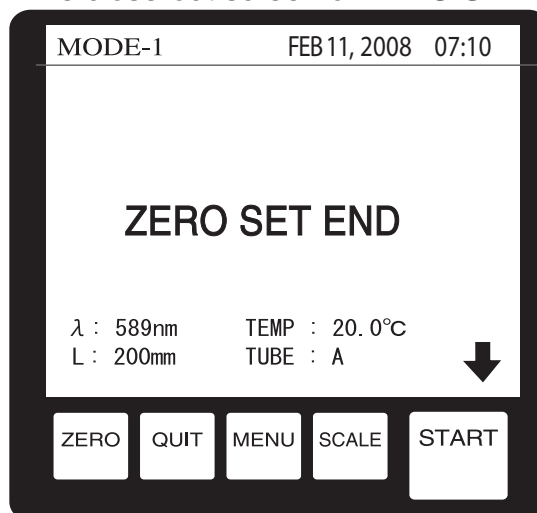


Fig.6-6

7. Setting a Password

The Password function allows you to limit the AP-300 Automatic Polarimeter to specific users or to identify users. The AP-300 has two different functions: the user level and the system level.

By using the two functions in combination, users can choose the appropriate setting according to their working conditions. Users may choose not to use the password function and operate the AP-300 with the default settings. However, it is recommended to change the factory default administrator password printed in the instruction manual, after installing the AP-300 in order to protect the password from being disclosed.

(1) Password Function

(1)-1 User Level

The AP-300 Automatic Polarimeter allows you to store up to 9 different passwords (ID's) as its users; five for the administrator, three for users, and one for guest.

Use the administrator's password when changing any of the operation and/or function settings. The use of users' or guest's password is limited to sample measurement operations.

Administrator	Any operation
User	Power on, measurement, zero setting, and operation in MENU screen 1/2
Guest	Measurements only

* "Power-on" means entering of password on default setting screen when turning on the AP-300 by using the ON/OFF switch at the back.

(1)-2 System Level

The AP-300 Automatic Polarimeter may be installed for different management levels of use.

The system level is a level in management standards of the AP-300. The bigger the number is, the stricter the management level is.

System Level	Password required operation and setup items.
Level 3	A any operation.
Level 2	Zero Setting, operation or changing information in MENU screen 1/2 and 2/2, and setting a password and setting up the system level.
Level 1	Operation or changing information in MENU screen 1/2 and 2/2, and setting a password and setting up the system level.
Level 0	Setting a password and setting up the system level.

Combination Use of the Level and the System Level

System Level	Object user for operation and settings by entering password (Operation & setup item specific)					
	Power-on	Measurements	Zero Setting	MENU screen 1/2	MENU screen 2/2	Setup of password and system level
Level 3	-Administrator -Users	-Administrator -Users -Guest	-Administrator -Users	-Administrator	-Administrator	-Administrator
Level 2	○	○	-Administrator -Users	-Administrator	-Administrator	-Administrator
Level 1	○	○	○	-Administrator -Users	-Administrator	-Administrator
Level 0	○	○	○	○	○	-Administrator

* Operations marked with "○" do not require password and can be performed in any user level.

7. Setting a Password

(2) How to Set a Password

Be sure to determine an administrator and a 4-digit password to be used in advance.

(2)-1 Changing the Default Value After Switching on the AP-300 for the First Time (Changing the Administrator Password):

The factory default password settings are "2222" for administrator password and "0" for the system level.

Enter the factory default value, "2222" once before changing the password.

a) Switch on the AP-300

The angle of rotation screen will be displayed on the screen for three seconds, which then will be replaced by the Measurement screen (Fig.7-1).

b) Press the MENU key.

The display will change to the SET UP MENU screen (Fig.7-2). By using the $\downarrow$ or $\uparrow$ key, move the arrow to "8 PASSWORD CHANGE". Then, press the $\leftarrow$ key.

c) The "PASSWORD" entry screen will be displayed (Fig.7-3).

Enter the factory default password, "2222" by using the numeric keypad.

Press the $\leftarrow$ key four times to enter "2222".

"****" will be shown on the display (Fig.7-4).

d) When "2" is entered four times, the PASSWORD CHANGE screen will be displayed automatically (Fig.7-5).

When a wrong number is entered by mistake, "ERROR" will appear on the display (Fig.7-6), which will then be replaced by the "SET UP MENU 2/2" screen automatically.

e) Move the arrow ($\rightarrow$) to "1 ADMIN 1" and press the $\leftarrow$ key (Fig.7-5).

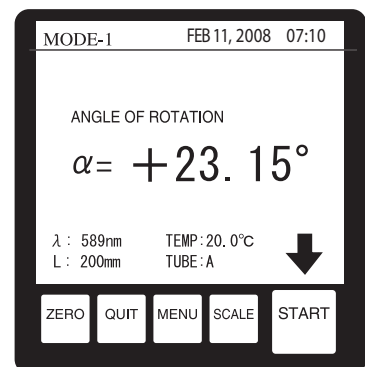


Fig.7-1

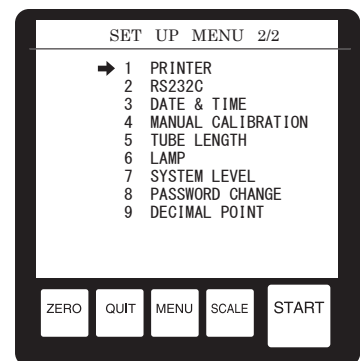


Fig.7-2

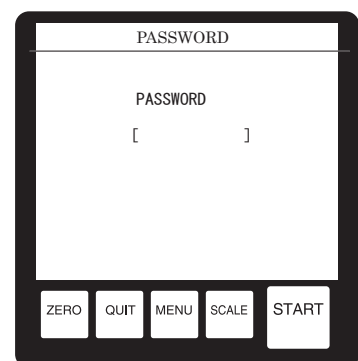


Fig.7-3

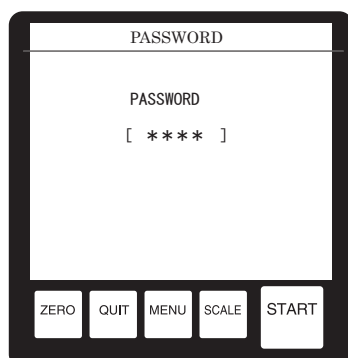


Fig.7-4

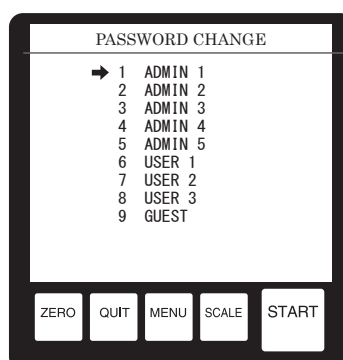


Fig.7-5

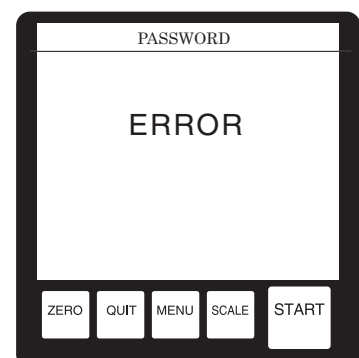


Fig.7-6

7. Setting a Password

- f) The PASSWORD CHANGE screen will be displayed (Fig.7-7).
Enter a 4-digit number as a new password by using the numeric keypad.
Then, enter the same 4-digit number again to confirm it (Fig.7-8).
The screen shown in Fig. 7-5 will appear on the display upon completion.
The administrator password has now been changed successfully from the default value to the new one.
The same password must be entered twice. If you enter different passwords, "ERROR" (Fig.7-6) will appear on the display and it will return to the previous screen (Fig.7-5).

Notes:

The same password can not be used by different users.
If your desired password causes an error indication, although you are following the steps correctly, the password you are trying to enter may already be used by other users. Pick a different password and then try again.

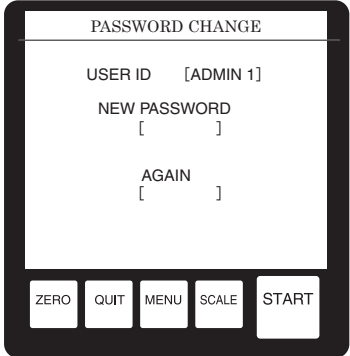


Fig.7-7



Fig.7-8

(2)-2 How to Set a password for USER or GUEST.

- a) Check to see if the arrow (→) is pointing to "8 PASSWORD CHANGE" in the SET UP MENU screen (Fig.7-2), and then press the ← key.
b) The "PASSWORD CHANGE" screen will be displayed (Fig.7-5).
Select "6 USER 1", and then press the ← key.
c) The USER ID entry screen will be displayed (Fig.7-9).
Enter a 4-digit number in the space shown as [] below "NEW PASSWORD". Next, enter the same 4-digit number in the space shown as [] below "AGAIN".
d) The display will return to the PASSWORD CHANGE screen (Fig.7-5).
Set a password for USER 2, and USER 3, and GUEST the same way. Upon completion, press the QUIT key to return to the measurement display screen.

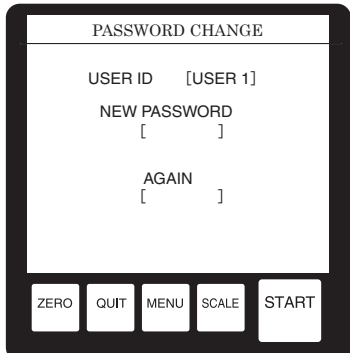


Fig.7-9

Notes:

- *No default passwords for users or a guest is registered prior to shipment.
- *When a measurement that requires a password entry is performed, a user ID will be printed out.

7. Setting a Password

(2)-3 How to Set a System Level

Once a password is entered correctly, the display will return to the SET UP MENU screen (Fig. 7-10).

Otherwise, press the MENU key when the measurement display (or ZERO SET END) screen is on the display.

a) Using the ↑ or ↓ key on the screen shown in Fig.7-10, move the arrow to "7 SYSTEM LEVEL" (Fig.7-11).

b) Press the ← key.

The SYSTEM LEVEL screen will appear on the display (Fig.7-12).

c) Using the numeric keypad, select a number between 0 and 3 (Fig.7-12).

d) Press the ← key.

If a printer is connected, the system level will be printed out automatically at this time.

The display will return to the SET UP MENU screen automatically. Press the QUIT key to return to the measurement display screen.

Notes:

- * Even in Level 0, which is the lowest level, changing passwords or system levels requires the administrator password.
- * Managing users by the system level and passwords only provides management functions. It is not meant to provide management techniques or to guarantee a management system. Users are advised to set their own security policies according to the usage.
- * The system level and password functions will cease to be effect when used with a remote communication function.

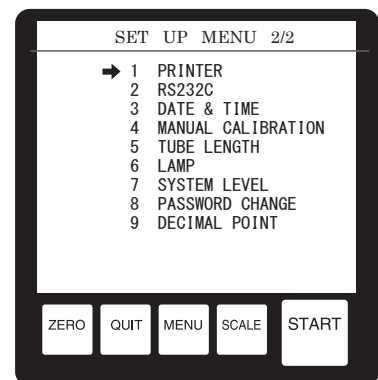


Fig.7-10

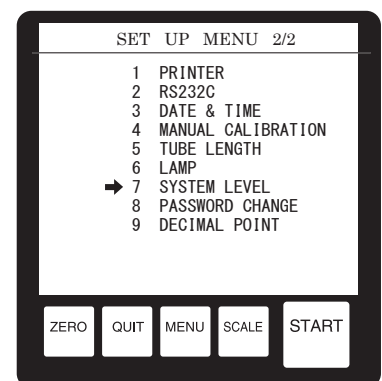


Fig.7-11

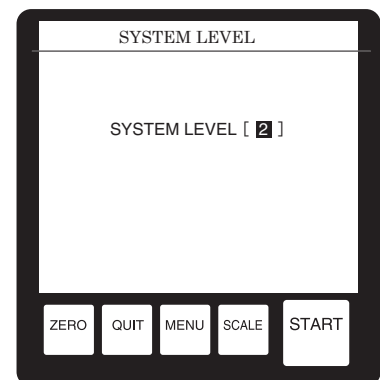


Fig.7-12

8. Setting the date and time

Follow these steps to set the date and time on the AP-300.

- a) Press the MENU key twice when the measurement reading screen or the ZERO SET END screen is displayed on the display panel.

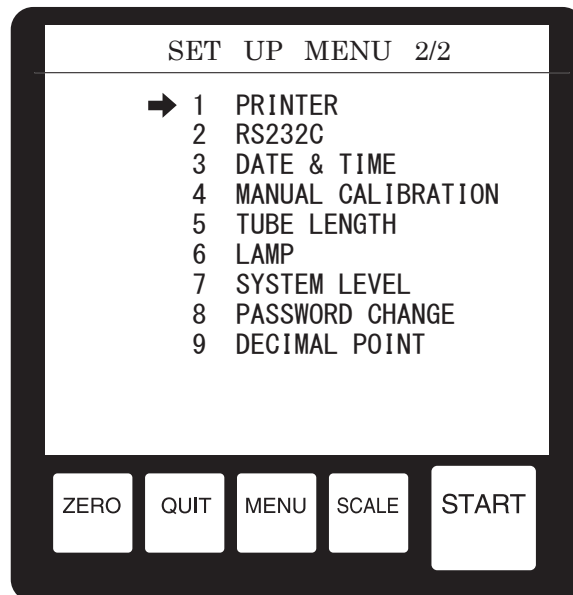


Fig.8-1

- b) The screen shown in Fig.8-1 will be displayed on the display panel. Press the ↓ or ↑ to move the arrow (→) on the screen to "3 DATE & TIME", then press the ← key (The same can be done by pressing the "3 GHI" key, and then the "←" key on the numeric keypad ("3" + "←"), without using ↓ or ↑).

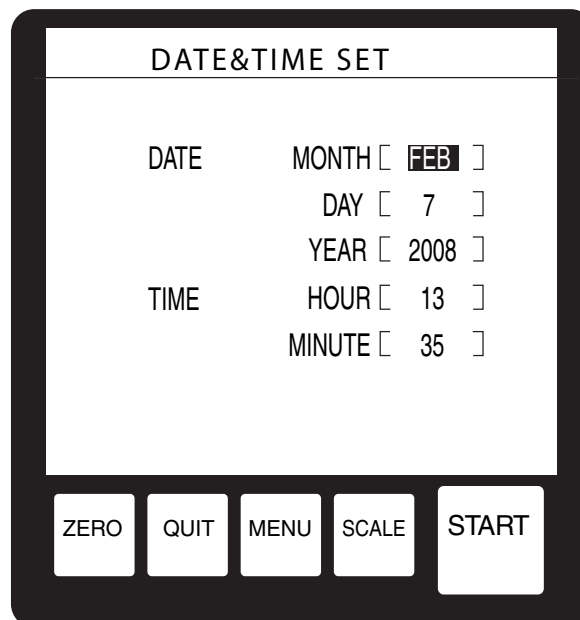


Fig.8-2

- c) The screen shown in Fig.8-2 will be displayed. You will see the setting next to MONTH highlighted. Enter number of month. In the case of April, enter "4", Then press the ← key.
- d) Next, you will see the setting next to DAY highlighted. Follow the same steps to set the rest of the settings. If you make a mistake press the QUIT key to return to the beginning.
- e) Press the ← key when you complete the settings (The last setting is minute). You will hear a beep and the display panel will return to the screen shown in Fig.8-1. Then press the QUIT key.
- f) The display panel returns to the measurement value screen indicating that the new settings have now been saved successfully.

9. Setting the measurement display screen and the number of decimal places displayed

(1) Setting the measurement display screen

If the displayed screen is not the desired one, press the SCALE key repeatedly until the desired screen is displayed (Fig.9-1).

The last screen displayed when the power is turned off will also be displayed when the unit is turned on again.

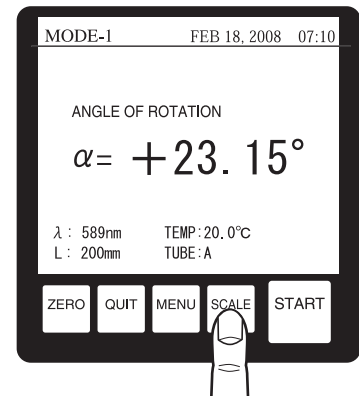


Fig.9-1

(2) Changing the number of decimal places displayed

a) On the measurement display screen or ZERO SET END screen, press the MENU key twice (Fig.9-2).

b) Press the down ↓ or up ↑ key to point the right-pointing arrow → to "9 DECIMAL POINT." Press the enter ↵ key.

c) Press the down ↓ or up ↑ key to select the desired decimal place option. Press the enter ↵ key (Fig.9-3).

The screen will return to SET UP MENU after a beep. Press the QUIT key to return to the measurement display screen.

Exit the DECIMAL POINT setting.

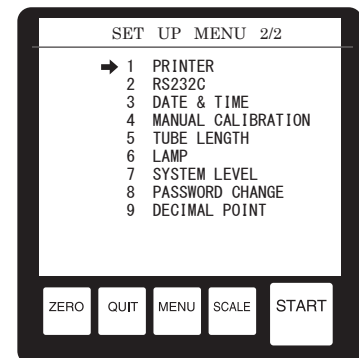


Fig.9-2

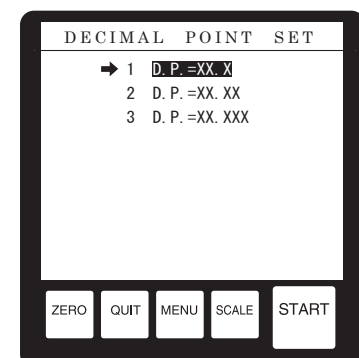


Fig.9-3

10. Setting Up the Mode and Selecting Type of a Tube

(1) Types of modes

The AP-300 has the following three measurement modes.

MODE-1	Manual Measurement Mode: Position the sample tube properly, and then press the START key to begin measuring. Press the START key each time to begin measuring.
MODE-2	Automatic Measurement Mode: Power on the AP-300 and press the START key to begin measuring (Ensuring measurements can be performed successively). Press the QUIT key to deactivate the Automatic Measurement Mode.
MODE-3	Stable Measurement Mode: One measurement is taken when press the START key. When measurement is taken with MODE-3 in a room whose temperature and airflow is stable, measurements will be more stable. Note that it takes longer, about 60 seconds, compared to that of MODE-1, which takes about 45 seconds.

The AP-300 is preset for "MODE-1". Notice that the mode number indicates "MODE-1" when a measurement value screen or the ZERO SET END screen is displayed on the display panel. Take the following steps to change modes.

(2) How to set a mode

- Press the MENU key when a measurement value screen or the ZERO SET END screen is on the display panel. The screen shown in Fig.10-1 will be displayed on the display panel.
- Upon verifying that the arrow (→) is pointing to "1 MODE" press the ← key. If the arrow is not pointing to "1 MODE" press the ↑ or ↓ to move it, and then press the ← key (The same can be done by pressing the "1 ABC" key, and then the "←" key on the numeric keypad ("1" + "←"), without using ↑ or ↓).
- The screen shown in Fig.10-2 will be displayed on the display panel. The setting next to MODE should be selected. Use numeric keypad to select "1" for MODE-1, "2" for MODE-2, or "3" for MODE-3, then press the ← key.
- Select the number next to MEASUREMENT CNT. section. Enter the measurement count by using the numeric keypad, and then press the ← key. Display will return to the SET UP MENU screen after a beep.

MEASUREMENT CNT

A continuous measurement from 2 to 10 times can be set. For instance, when setting is 3, it measures 3 times continuously. It will display and*print the measured value by single measurement, and measurement average will be displayed*printed after 3 measurement, *(When the printer is connected).

This can not be set at MODE-2.

- Press the QUIT key. The display panel will return to measurement display screen. The setting of the mode and the measurement cnt. have been completed successfully.

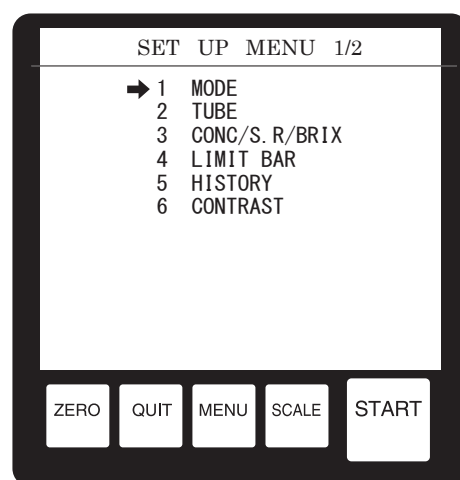


Fig.10-1

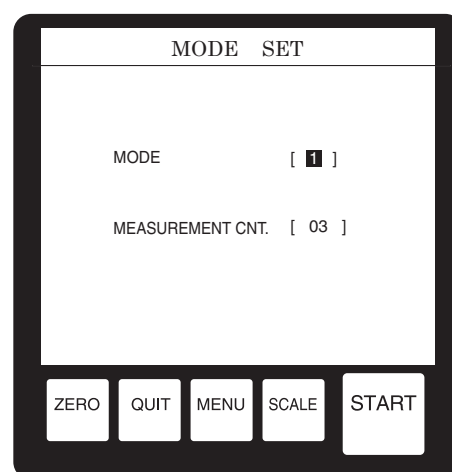


Fig.10-2

(3) Types of Observation Tubes

Up to 10 observation tubes can be registered, marked with letters A through J. Before taking measurements label each one of the observation tubes as "A", "B", "C", etc., and feed the lengths of each observation tube into the AP-300 (For instruction, refer to P.31).

This will enable the automatic indication of the length of the observation tube on the measurement value screen by simply selecting the type (or the appointed "letter") of the observation tube.

(4) Selecting type of a tube

- a) Press the MENU key when a measurement value screen or the ZERO SET END screen is on the display panel. The screen shown in Fig.10-3 will be displayed on the display panel.
- b) Press $\uparrow$ or $\downarrow$ to move the arrow ($\rightarrow$) on the screen to "2 TUBE" then press $\leftarrow$ key (The same can be done by pressing the "2 DEF" key, and then the " $\leftarrow$ " key on the numeric keypad ("2" + " $\leftarrow$ "), without using $\uparrow$ or $\downarrow$).
- c) The screen shown in Fig.10-4 will be displayed on the display panel.
Select TUBE section, select the type of a used observation tube indicated by letters A through J by pressing the numeric keypad, and then press the $\leftarrow$ key.
- d) Press the QUIT key, The display panel will return to Measurement display screen.

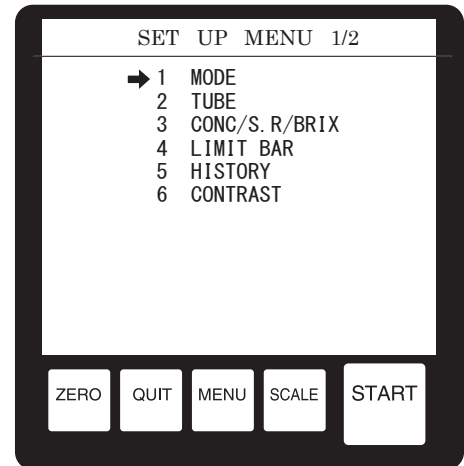


Fig.10-3

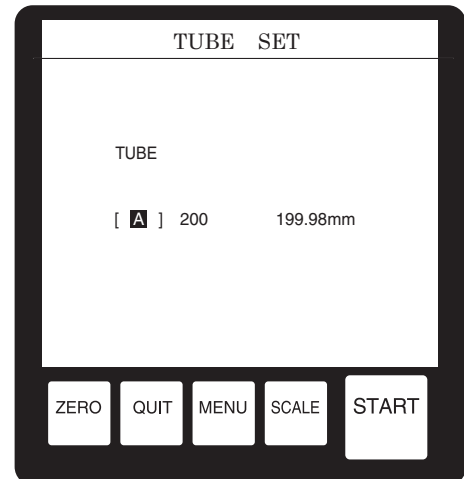


Fig.10-4

11. Setting the Length of an Observation Tube

Up to 10 observation tubes can be registered, marked with letters A through J. Before taking measurements, label each one of the observation tubes as "A", "B", "C", etc., and feed the lengths of each observation tube, such as 100mm and 200mm, into the AP-300. The actual lengths of observation tubes can also be input, such as 199.98mm or 200.01mm instead of 200mm. In such cases, the AP-300 will automatically adjust measurement values (The values of the measurements with observation tubes registered as 199.98mm or 200.01mm, for instance, will be adjusted and correspond to those with 200.00mm tubes). The default settings of all tube lengths, A through J, are 200mm or 200.00mm.

Follow these steps to set the lengths of observation tubes:

- Press the MENU key twice when a measurement value screen or the ZERO SET END screen is on the display panel. The screen shown in Fig.11-1 will be displayed on the display panel.
- Using $\uparrow$ or $\downarrow$, move the arrow ($\rightarrow$) on the screen so that it points to "5 TUBE LENGTH", then press $\leftarrow$ key (The same can be done by pressing the "5 MNO" key, and then the " $\leftarrow$ " key on the numeric keypad ("5" + " $\leftarrow$ "), without using $\uparrow$ or $\downarrow$).
- The screen shown in Fig.11-2 will appear on the display panel. Press $\uparrow$ or $\downarrow$ to shift the arrow ($\rightarrow$) to select the desired observation tube (A~J). Fig.11-2 shows that tube A is selected, as an example.
- The setting for the length of the tube should be highlighted. Enter the length of the observation tube, using the numeric keypad, and then press the $\leftarrow$ key.
- Next, the setting for the actual length of the tube should be highlighted/Enter the actual length of the observation tube, using the numeric keypad (for-instance : 199.97), and then press the $\leftarrow$ key.
- The arrow ($\rightarrow$) will shift down to B, as shown in Fig.11-3. If you wish to continue the $\leftarrow$ key setting for other tubes, repeat the same steps to enter the lengths of observation tubes and the actual lengths of observation tubes.
- To complete the settings, press the $\leftarrow$ key repeatedly until the setting for the actual tube length for tube J is highlighted. Press the $\leftarrow$ key again. The display panel will return to the SET UP MENU screen after a beep. Finally, press the QUIT key to return to the measurement value screen. The tube length settings have been completed successfully.

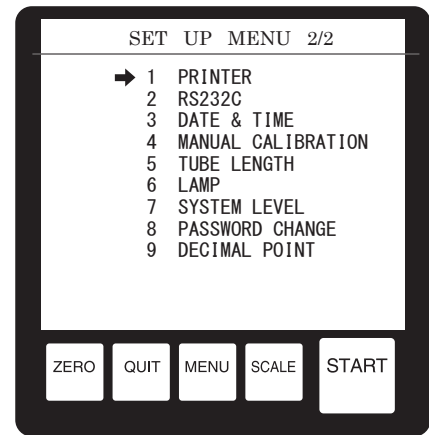


Fig.11-1

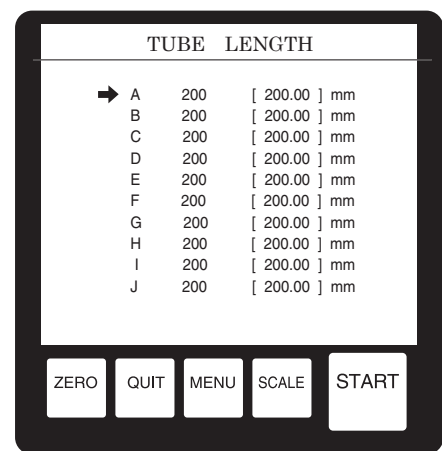


Fig.11-2

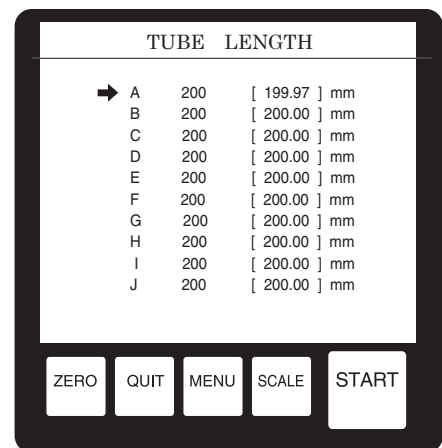


Fig.11-3

*Caution :

In the case of taking a measurement of angle of rotation or international sugar scale, display a measurement value when used 200mm observation tube independently of the length of tube.

12. Setting digital printer (Optional)

(1) How to set printing items on the printer

Printing items on the printer are set with the AP-300. There are 7 print item settings as described below.

- Printing a date after each measurement
- Printing a time after each measurement
- A start number for to begin a sample
- Whether or not to print the ATAGO AP-300
- Whether or not to print S/N
- Whether or not to print USER ID
- Whether or not to print USER NAME

〈How to set〉

- a) Press the MENU key twice when a measurement value screen or the ZERO SET END screen is on the display panel. The screen shown in Fig.12-5 will be displayed on the display panel.
- b) Press ↓ or ↑ to move the arrow (→) on the screen to "1 PRINTER", then press ← key (The same can be done by pressing the "1 ABC" key, and then the " ← " on the numeric keypad ("1" + " ← "), without using ↓ or ↑).
- c) The screen shown in Fig.12-6, which is the default setting, will appear on the display panel.
- d) The DATE PRINT [ON] should be highlighted. If printing the date is desired, press the ← key. If printing the date is not desired, use the → key to screen [OFF]. Press ← key to turn it back [ON] after having turned it [OFF]. Press " ← " to confirm. The highlighted section will move to TIME PRINT.
- e) Likewise, set up TIME PRINT. Press → key to turn it [OFF] and ← key to turn it [ON]. Press the ← key. The highlighted section will move to SAMPLE CNT.
- f) [0001] should be highlighted. To print sample numbers starting 0001, press the ← key. In order to print starting with a different number, enter the desired number, using the numeric keypad, and then press the key. The highlighted section will move to AP-300. ← Leave it [OFF] when not printing the ATAGO AP-300.
- g) When printing, press ← to turn it [ON]. Press the ← key. The highlighted section will move to S/N.

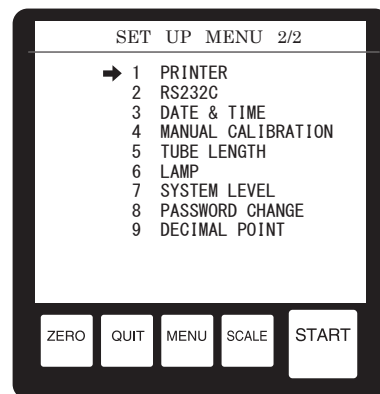


Fig.12-5

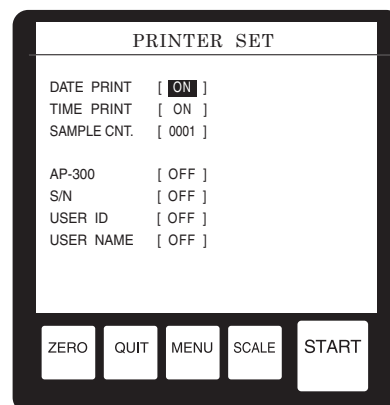


Fig.12-6

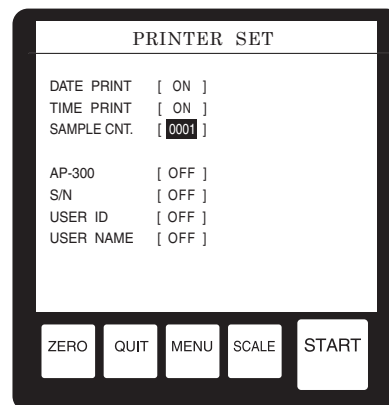


Fig.12-7

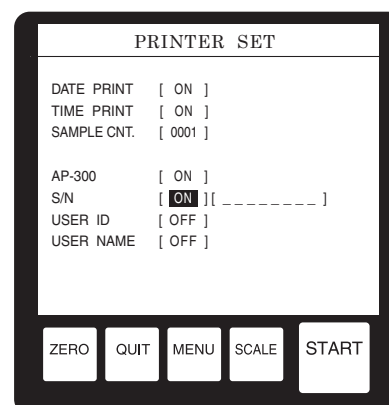


Fig.12-8

12. Setting digital printer (Optional)

- h) Hold the present condition to leave "S/N" [OFF]. Press $\leftarrow$ to set "S/N" to [ON]. A number up to 10 digits can be entered when setting it to [ON] and use the number to distinguish a serial number of a sample, lot number, model number, control number and others. Use the numeric keypad to enter numbers, and then press $\leftarrow$ key. Then, the selected item moves on to "USER ID".
- i) "USER ID" can be set to either "OFF", "ON" or "ID" (ADMIN, USER, GUEST) by using the $\leftarrow$ (or $\rightarrow$) key. The factory default value is set to "OFF" (Fig. 12-9). Press $\leftarrow$ to change the setting from "OFF" to "ON". Press $\leftarrow$ again to change it from "ON" to "ID". Pressing $\leftarrow$ while "ID" is being indicated on the screen does not change anything. To change it back to "OFF", press " $\leftarrow$ ". Press $\leftarrow$ to change the setting to "ON". Enter number up to 10 digits or phrase within 10 letters next (the right side) to "ON" using the numeric keypad (Fig. 12-10). Choose a number that helps distinguish the measurer, for example, a symbol, name, number company name or division name of the measurer's. To set the "ID", press $\leftarrow$ twice. When selecting "ID" (Fig. 12-11), "USER ID" that is distinguished by a password will be printed. If a password is not being entered, "****" will be printed (Press $\rightarrow$ once to change the setting from "ID" to "ON", and twice to "OFF"). Press " $\leftarrow$ " after selecting either one of "OFF", "ON" or "ID". Then, the selected item moves on to "USER NAME".
- j) The factory default value for "USER NAME" is set to "OFF". Press $\leftarrow$ to change the setting from "OFF" to "ON", then, use the numeric keypad to enter the measurer's symbol, name, number, company name, division name, etc (Fig. 12-12). Check the indication on the display screen to confirm the settings, and then press " $\leftarrow$ ". After a beep, the print items will all be set and the display returns to the "SET UP MENU 2/2" screen.

Note:

"ID" means each one of "ADMIN1 through 5", "USER1 through 3" and "GUEST" that are distinguished by a password (Refer to P.21 to P.23).

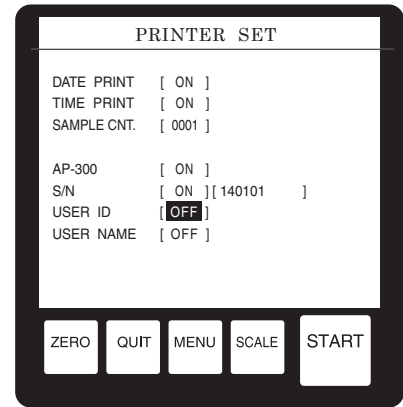


Fig.12-9

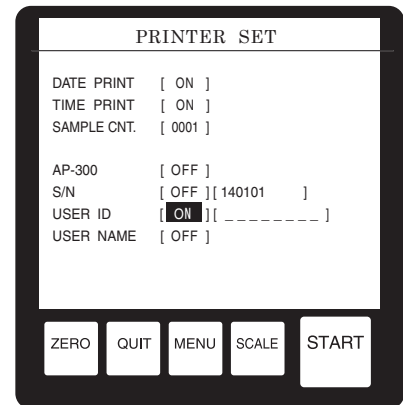


Fig.12-10

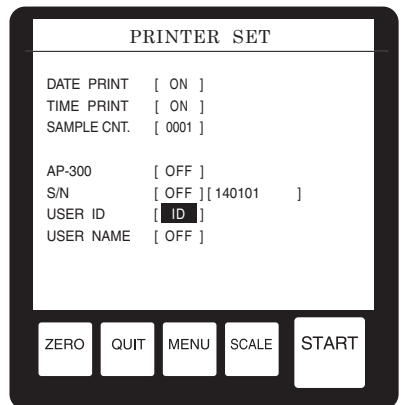


Fig.12-11

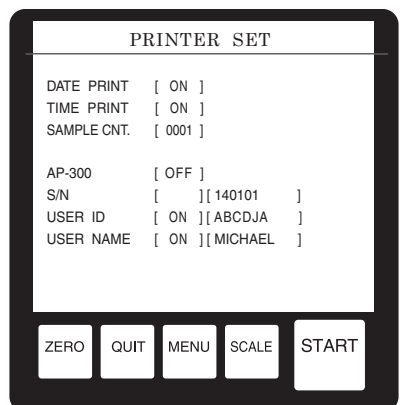


Fig.12-12

(2) Printer Image Example

The following are some of the print image examples under certain settings:

- When "S/N", "USER ID" and "USER NAME" are set to "ON" with the "ADMIN3" password entered.

```

ATAGO AP-300      S/N=HZ86056-34
USER ID=ADMIN3    USER NAME=MICHAEL
No.0001 FEB. 11, 2008  15:36
ROTATION=+23.37°
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
  
```

- When "AP-300", "S/N", "USER ID" and "USER NAME" are set to "OFF".

```

No.0001 FEB. 11, 2008  15:37
ROTATION=+23.37°
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
  
```

- Print example of the average value when "MEASUREMENT CNT" is set to "3".

```

ATAGO AP-300      S/N=HZ86056-34
USER ID=ADMIN3    USER NAME=MICHAEL
No.0003 FEB. 11, 2008  15:39
ROTATION=+23.38°
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
-----
ATAGO AP-300      S/N=HZ86056-34
USER ID=ADMIN3    USER NAME=MICHAEL
AVERAGE ROTATION=+23.37° TEMP=22.5°C
  
```

- When "USER ID" is set to "ID" and every one of the other items is set to "ON" under "System Level 0.1 or 2".

```

ATAGO AP-300      S/N=HZ86056-34
USER ID=***       USER NAME=MICHAEL
No.0003 FEB. 11, 2008  15:41
ROTATION=+23.38°
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
  
```

- When "USER ID" is set to "ID" and every one of the other items is set to "ON" under "System Level 3" with the "ADMIN1" password entered.

```

ATAGO AP-300      S/N=HZ86056-34
USER ID=ADMIN1    USER NAME=MICHAEL
No.0003 FEB. 11, 2008  15:41
ROTATION=+23.38°
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
  
```

Other than Angle of Rotation scale

- INTERNATIONAL SUGAR SCALE with "TC" - temperature compensation

```

No.0001 FEB. 11, 2008  15:37
ISS(TC)=+98.56° ZTC
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
  
```

- INTERNATIONAL SUGAR SCALE without "TC" - temperature compensation

```

No.0001 FEB. 11, 2008  15:37
ISS=+98.56° Z
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
  
```

- SPECIFIC ROTATION

```

No.0001 FEB. 11, 2008  15:37
SPECIFIC ROTATION=+33.52°
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
CONC=12.00g/100cm3
  
```

- CONCENTRATION

```

No.0001 FEB. 11, 2008  15:37
CONC=13.50g/100cm3
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
S. R. =+63.54°
  
```

- PURITY

```

No.0001 FEB. 11, 2008  15:37
PURITY=98.73%
WAVELENGTH=589nm TEMP=22.4°C TUBE=200mm
BRIX=23.70
  
```

* Regardless of the system level, "USER ID" will be printed every time a password is entered on the screen.

13. Installing the Splash Tray and the Observation Tube Setting Bars

CAUTION

The AP-300 Automatic Polarimeter is shipped with protective seals placed over the optical axis holes. The seals are located on the both sides of the sampling chamber to prevent dust from entering and interfering with the sensors. Remove the protective seals before using the AP-300 for the first time and replace them whenever shipping and/or storing the instrument. Place the protective seals over both optical axis holes to ensure proper protection.

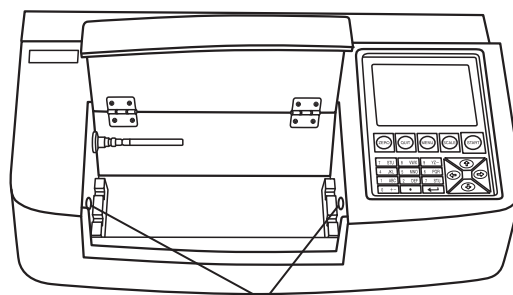
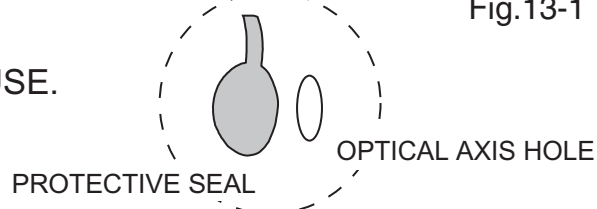


Fig.13-1

CAUTION!
REMOVE PROTECTIVE SEALS BEFORE USE.



(1) Installment Process

The splash tray and the observation tube setting bars have not been placed in the sampling chamber at the time of shipment. Be sure to install them properly before taking measurements.

- Open the sampling chamber cover.
- Place the splash tray on the bottom of the sampling chamber.
- Place the observation tube setting bars into the holding slots on the supports.

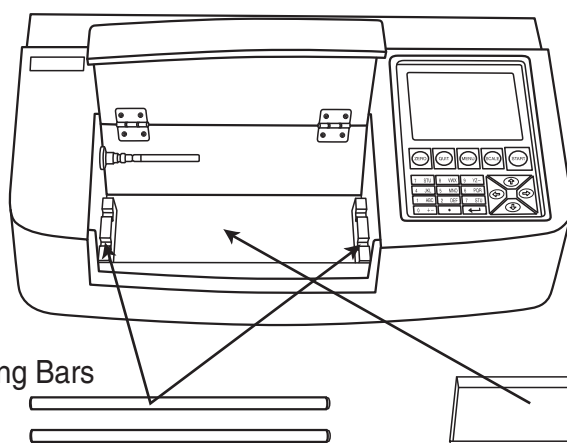


Fig.13-2

Observation Tube Setting Bars

Splash Tray

CAUTION!

Remove the observation tube setting bar and the splash tray for damage prevention when transporting the instrument (AP-300).
Do not hit either end of the observation tube setting bar against right-and-left glass plate when mounting and removing it.

14. Preparing a Sample



CAUTION

- ◇ The observation tube is made of glass material. Be sure not to drop it or handle it roughly.

The AP-300 package includes one 100mm observation tube (Volume 5ml) and one 200mm observation tube (Volume 10ml). For precise measurements, use the 200mm tube to measure samples with higher clarity, and the 100mm tube to measure samples with lower clarity or those that are colored. Contaminants found in a sample, turbidity or coloring of a sample greatly affects measurements, as the AP-300 sends polarized light through long layers of the sample solution filled in the 100/200mm observation tube. Be sure to filter samples that are not clean before measuring. An observation tube consists of the main tube, two pieces of deck-glass, two pieces of rubber packing, and two screw caps (Fig.14-1). The deck-glass, rubber packing, and screw caps are used on both ends of the observation tube.

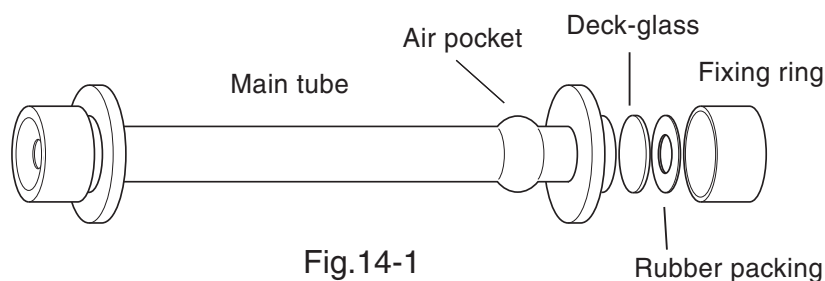


Fig.14-1

Filling an Observation Tube with a Sample (Fig. 14-2)

- Hold the screw cap at one end of the tube with your fingers and turn it counterclockwise to unscrew it. Remove the rubber packing and the deck-glass.
- Hold the tube straight up and pour the sample into it, to a level where the upper surface of the sample extends just past the rim of the observation tube, held by the surface tension. Gently slide the deck-glass over it from the side so that air does not get inside.
- Place the rubber packing over the deck-glass, and then screw the screw cap back on.
 - * If there is air trapped in the observation tube, be sure to keep the air in the air trap.

Note:

An excess amount of air in an observation tube may hinder measurement light from traveling through the sample properly.

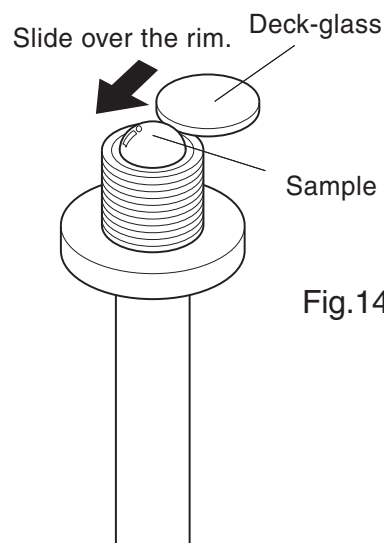


Fig.14-2

- * Place your orders for spare observation tubes, deck-glass, rubber packing, and screw caps, with the representative at the place of purchase, our dealers, or ATAGO distributors.

- * Always use an observation tube that is clean and dry.

15. Measuring a Sample

(1) Conducting Zero Setting

* After the power is supplied to the AP-300, allow 30 minutes for the unit to warm up before conducting zero setting or starting a measurement.

a) Make sure that the sampling chamber is completely empty (Fig.15-1).

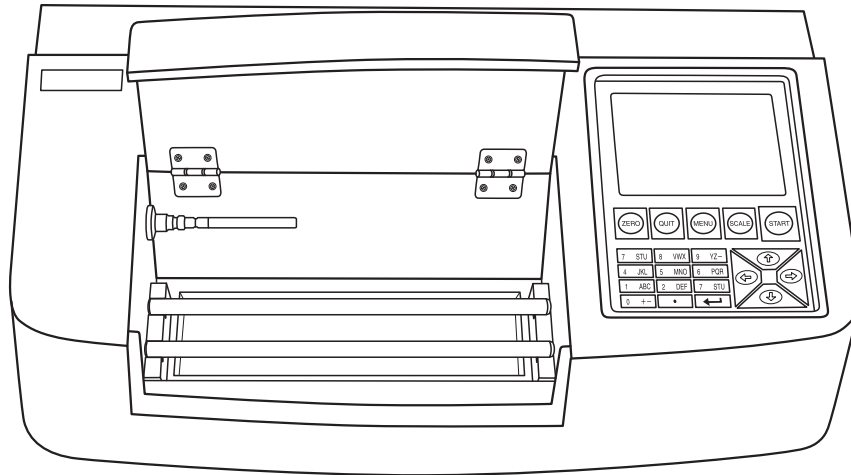


Fig.15-1

b) Press the ZERO key.

c) Close the sample chamber cover.

d) The AP-300 begins zero setting (Fig.15-2). When the process is complete, the ZERO SET END screen will be displayed on the display panel (Fig.15-3).

e) The zero setting has been completed successfully.

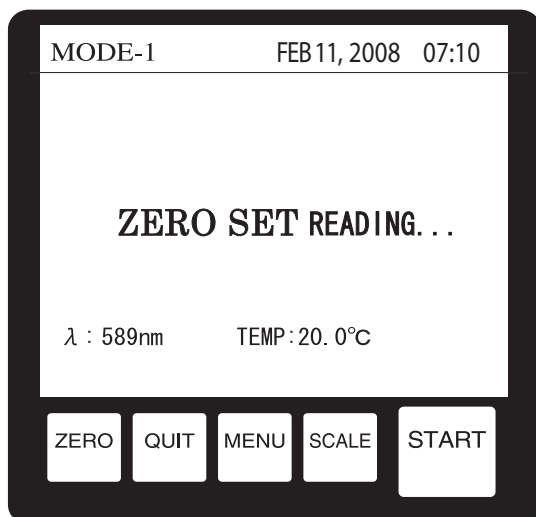


Fig.15-2

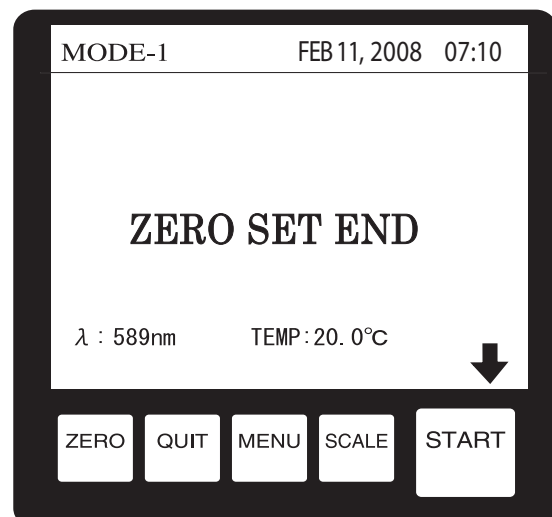


Fig.15-3

(2) Measuring a Sample

*** After turn on the AP-300, allow 30 minutes for the unit to warm up before conducting zero setting or starting a measurement.**

- a) Place a observation tube filled with a sample in the sampling chamber, then close the sample chamber cover (Fig.15-4).

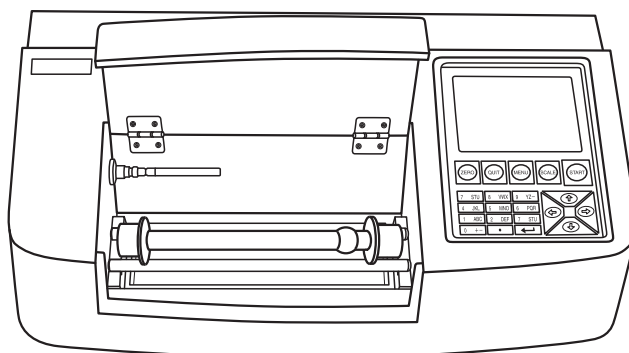


Fig.15-4

- b) Press the START key.
 c) "READING" will be displayed on the display screen, and start measuring (Fig.15-5).
 d) Measurement value will be displayed on the display screen (Fig.15-6).
 e) Average value of the measurements will be displayed when the "MEASUREMENT CNT." is set more than 2 in the MODE setting (Fig.15-7).

Do not press START key during taking the measurements, or the unit sometimes displays the wrong value (*The arrow above the START key flashes when measurements are done).

When the START key is pressed during measurement by accident, press QUIT key to cancel Average Measurement.

***Note :** When you measure high concentration sample, leaves the observation tube on chamber for about 5 minutes. That way, you can take stable readings.

***Note :** The arrow in the bottom right-hand corner of the display panel, which appears following the display of the measurement value, indicates that the AP-300 is not ready for a new measurement.

Wait until the arrow flashes to start a new measurement.

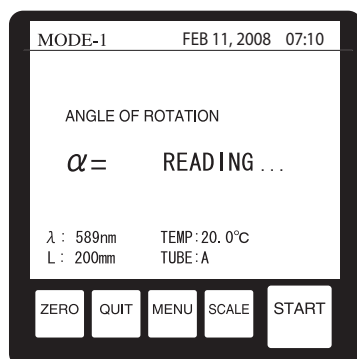


Fig.15-5

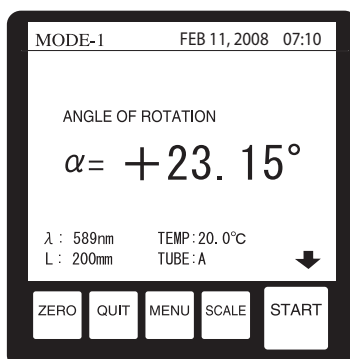


Fig.15-6

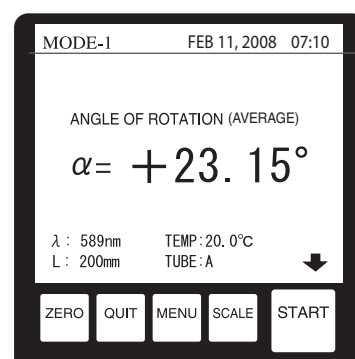


Fig.15-7

When the Error Message is displayed, please refer to P.56.

16. Indicating Specific Rotation, Concentration, and Purity

(1) The Specific Rotation Measurement Value Display

- Press MENU when a measurement value screen or the ZERO SET END screen is on the display panel.
The screen shown in Fig.16-1 will be displayed on the screen.
- On the Specific Rotation Measurement Value display, the concentration value of the sample to be measured needs to be input before taking a measurement. Using ↓ or ↑, move the arrow (→) on the screen so that it points to "3 CONC./S.R./BRX", then press ←key (The same can be done by pressing the "3 GHI" key, and then the "←" key on the numeric keypad ("3" + "←"), without using ↓ or ↑). The screen shown in Fig.16-2 will appear on the display panel.
- The setting inside "[]" under 1 CONC. should be highlighted. Enter the desired concentration value, using the numeric keypad, and then press the ← key. Press the ← key twice to fix the setting.
- The screen returns to the SET UP MENU after a beep.
- Press the QUIT key to return to the measurement value screen.

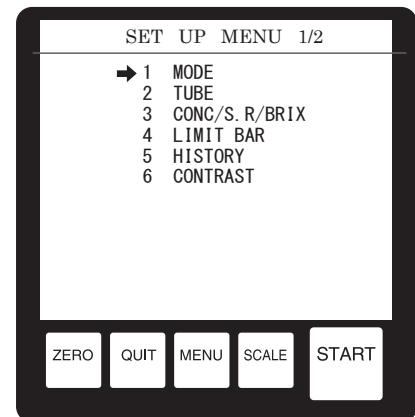


Fig.16-1

(2) The Concentration Measurement Value Display

- Press MENU when a measurement value screen or the ZERO SET END screen is on the display panel.
The screen shown in Fig.16-1 will be displayed on the screen.
- On the Concentration Measurement Reading display, the specific rotation value of the sample to be measured needs to be input before taking a measurement. Using ↓ or ↑, move the arrow (→) on the screen so that it points to "3 CONC./S.R./BRX", then press ←key (The same can be done by pressing the "3 GHI" key, and then the "←" key on the numeric keypad ("3" + "←"), without using (↓ or ↑). The screen shown in Fig.16-2 will appear on the display panel. Leaving the highlighted setting inside "[]" under 1 CONC as it is, press ← key.
- The setting inside "[]" under 2 SPECIFIC ROTATION will be selected (the same can be done by pressing 2 on the numeric keypad, followed by pressing 2 on the numeric keypad, followed by the ← key) (Fig.16-3).
- Enter the desired specific rotation value, using the numeric keypad, and then press the ← key. Press the ← key once again to fix the setting. The display panel returns to the SET UP MENU after a beep.
- Press the QUIT key to return to the measurement value screen.

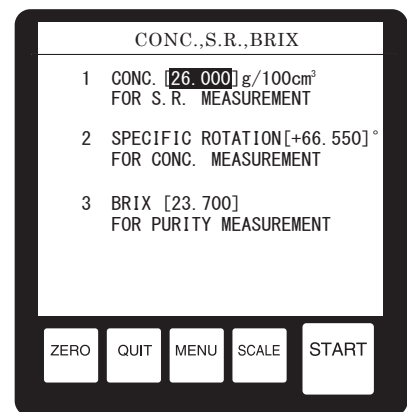


Fig.16-2

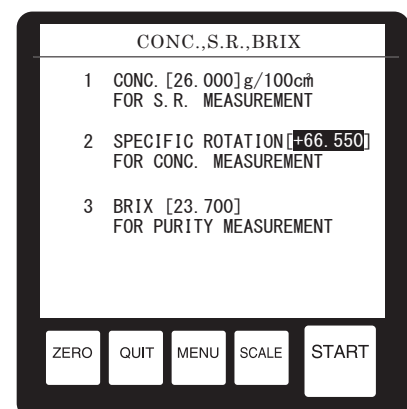


Fig.16-3

16. Indicating Specific Rotation, Concentration, and Purity

(3) The Purity Measurement Value Display

(Measure with the observation tube 200mm long)

- a) Press MENU when a measurement value screen or the ZERO SET END screen is on the display panel.

The screen shown in Fig.16-1 will be displayed on the screen.

- b) On the Purity Measurement Value display, the BRIX value, evaluated on the Refractive Index scale, of the sample to be measured needs to be input before taking a measurement.

Using ↓ or ↑, move the arrow (→) on the screen so that it points to "3 CONC/S.R./BRIX", then press ← key (The same can be done by pressing the "3 GHI" key, the and then the

"←"key on the numeric keypad ("3" + "←"), without using ↓ or ↑).

- c) The screen shown in Fig.16-2 will appear on the display panel.

Press the ← key twice. The setting inside "[]" under 3 BRIX will be selected (Fig.16-4).

- d) Enter the desired BRIX value, using the numeric keypad, and then press the ← key.

- e) The display panel returns to the SET UP MENU after a beep.

- f) Press the QUIT key to return to the measurement value screen.

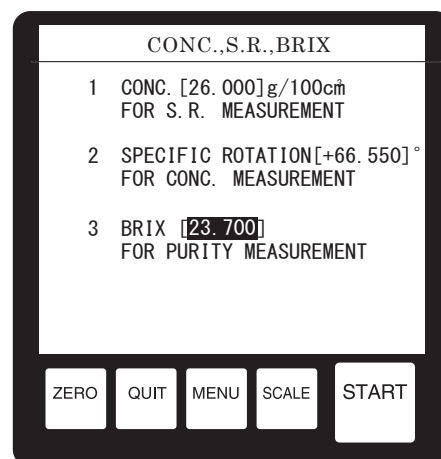


Fig.16-4

17. Setting the Limit Bar

(1) Setting the limit bar

- a) Press MENU when a measurement value screen or the ZERO SET END screen is on the display panel.
 - b) Using ↓ or ↑, move the arrow(→) on the screen so that it points to "4 LIMIT BAR" then press ← key (The same can be done by pressing the "4 JKL" key, and then the "←"key on the numeric keypad ("4" + "←"), without using ↓ or ↑).
 - c) The screen shown in Fig.17-1 will be displayed on the display panel. Select a sample number between 01 and 30 for the sample number, and then press the ← key.
 - d) The setting inside "[]" under SAMPLE NAME should be highlighted. Enter the name of the sample, using the numeric keypad. Press → after entering each letter/number to move the cursor to the right for the next letter/number to be entered (Fig.17-2). Space allows for up to 10 letters. When the whole name has been entered, press the ← key.
 - e) Next, the setting inside "[]" under SCALE should be highlighted. Select a type of measurement scale from among
ANGLE OF LOTATION,
INTERNATIONAL SUGAR SCALE,
INTERNATIONAL SUGAR SCALE TC,
SPECIFIC ROTATION, CONCENTRATION,
and PURITY, using ← or →, and then press the ← key.
 - f) Then, the setting inside "[]" next to HIGH, under LIMIT, should be highlighted. Set the HIGH limit by entering a number, using the numeric keypad, and then press the ← key. Likewise, set the LOW limit, as the highlighted section moves to the setting inside "[]" next to LOW. When finished, press the ← key.
 - g) The display panel will return to the SET UP MENU screen after a beep. Press the QUIT key to return to the measurement value screen. The Limit Bar settings have been completed successfully.
- * When entering numeric values for HIGH and LOW limits, if you wish to enter "+0.7" for instance, press the "0 +-" key, the "." key, the "7 STU" key, and then the ← key, in order. Likewise, to enter "-0.3" press the "0 +-" key, the "0 +-"key again, the "." key, the "3 GHI" key, and then the ← key. In short, press "+" "." and then "7" to enter "+0.7" and "-" "." and then "3" to enter "-0.3".

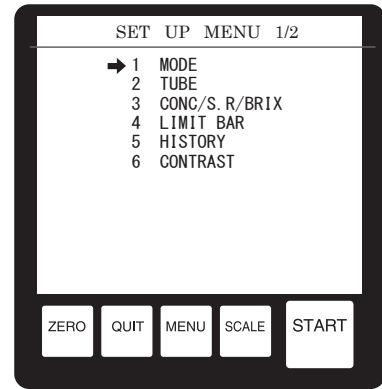


Fig.17-1

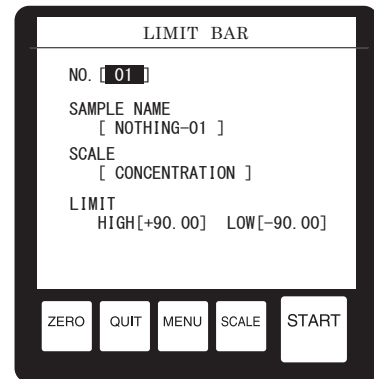


Fig.17-2

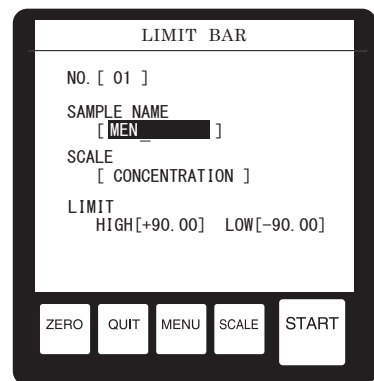


Fig.17-3

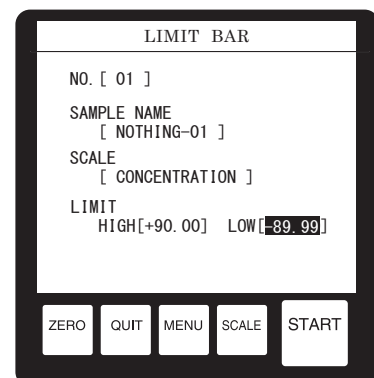


Fig.17-4

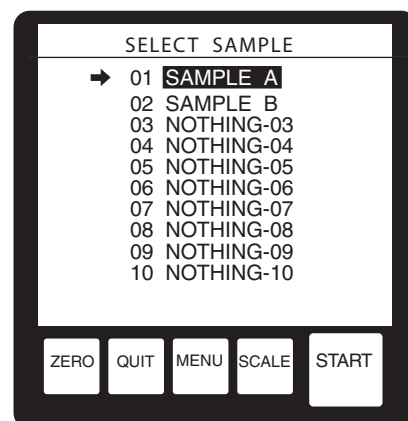
(2) Selecting the Measurement Value Display

- a) Press SCALE repeatedly when a measurement value screen or the ZERO SET END screen is displayed on the display panel until the screen shown in Fig.17-5 appears.

*As an example, Fig.17-5 shows that "SAMPLE A" and "SAMPLE B" have been registered under "01" and "02" respectively, and that "SAMPLE A" has been selected to be displayed on the measurement value screen.

- b) Using ↓ or ↑, move the arrow (→) on the screen so that it points to the desired sample number, and then Press the ← key. The screen shown in Fig.17-6 will appear on the display panel after a beep.

From this point on, the screen shown in Fig.17-6 will be displayed every time a measurement is performed.



Up to 30 samples can be registered, marked with numbers 01 through 30. To display the rest of the samples (sample 11 and after), press ↓ key.

Fig.17-5

(3) Measuring a Sample

Following the instruction specified on P.36 and P.37, measure the sample when the screen shown in Fig.17-6 is being displayed on the display panel.

Following the measurement, the measurement value will be displayed as shown in Fig.17-6.

When the measurement value exceeds the predetermined high or low limit, the message "OUT OF RANGE" will appear and the measurement value will be displayed in tiny print under the message (Fig.17-7).

The Limit Bar roughly indicates where the measurement value falls on the predetermined

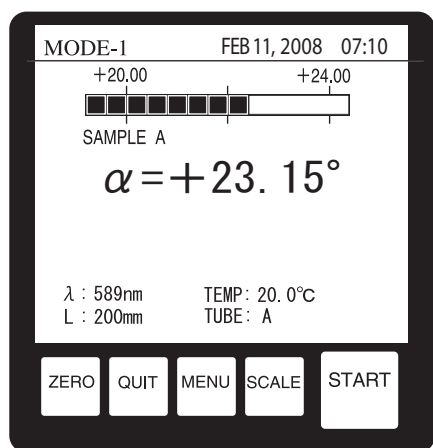


Fig.17-6

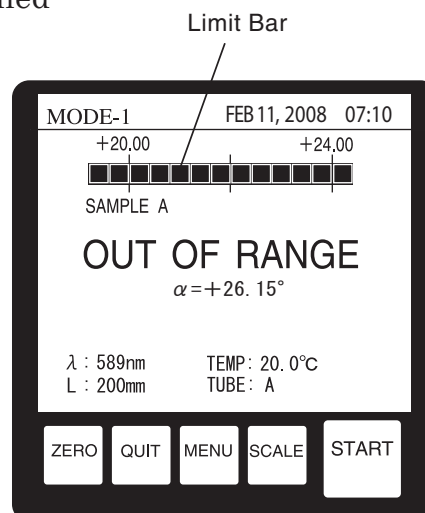


Fig.17-7

18. RS-232C Communication

The instrument comes with a FDA 21 part 11 software for recording measurement data. The software is intended to help ATAGO users of the instrument maintain compliance with Title 21 CFR Part11. It can be used in English. For more information, read the instruction manual of the software .
Please download the FDA 21 Part 11 Software from the URL link (<https://www.atago.net/en/soft-dl-part11.php>).

(1) RS-232C communication cable

For connection of the AP-300 and a personal computer or laptop, use a standard RS-232C communication cable sold in the market.
The RS-232C input/output terminal of the AP-300 is "D-Sub 9-pin female plug". Purchase the RS-232C communication cable accordingly (straight cable). Refer to the following table.

Input/Output terminal of AP-300	RS-232C communication cable	Input/Output terminal of personal computer
D-Sub 9-pin female	D-Sub 9-pin male — D-Sub 9-pin female	D-Sub 9-pin male
D-Sub 9-pin female	D-Sub 9-pin male — D-Sub 25-pin male	D-Sub 25-pin female

*Before purchasing a cable, check the type of the input/output terminal of the personal computer or laptop to be connected.

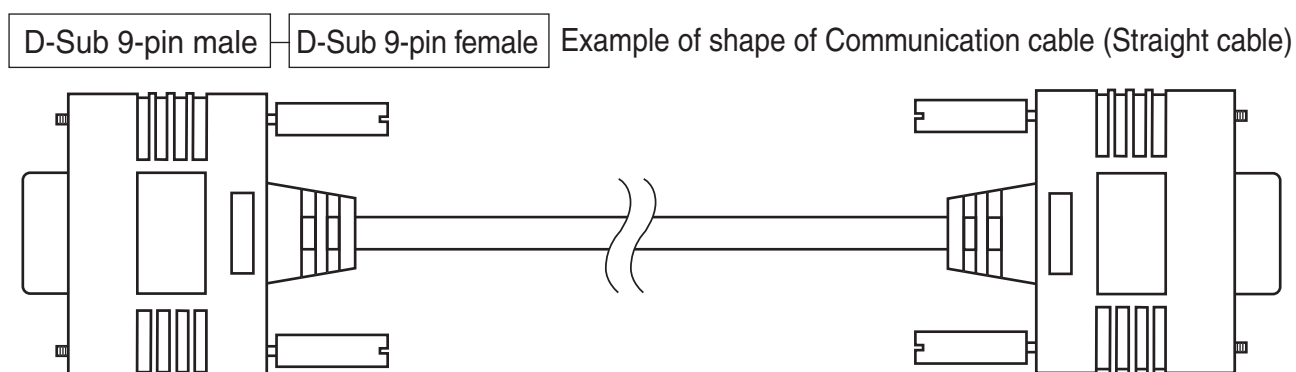


Fig.18-1

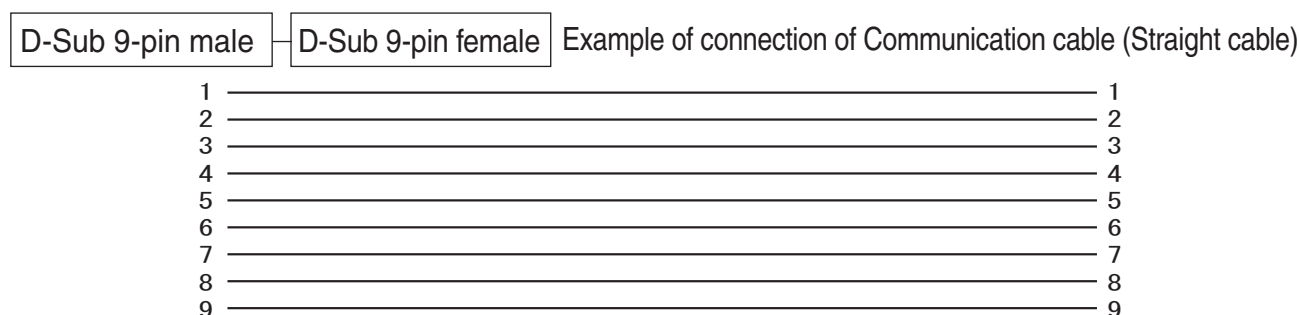


Fig.18-2

(2) Connecting an RS-232C communication cable

When connecting the AP-300 and personal computer with the RS-232C communication cable, check that both machines are turned off.

After connecting the RS-232C communication cable, turn on the AP-300 and personal computer (either one may be turned on first).

(3) Preparation of a personal computer

Download a terminal emulator for PC serial communication.

Here, the open-source software "Tera Term" is used as an example.

Download Tera Term from a website, such as the one below:

<https://teratermproject.github.io/>

a) Start Tera Term.

Select "Serial" on the New connection dialog-box.

Select the port number.

Click OK.

※ Check the port number.

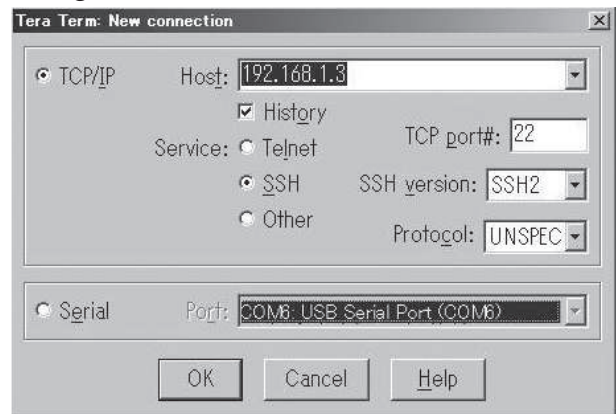
"Control Panel" →

"System and Security" →

"Device Manager" →

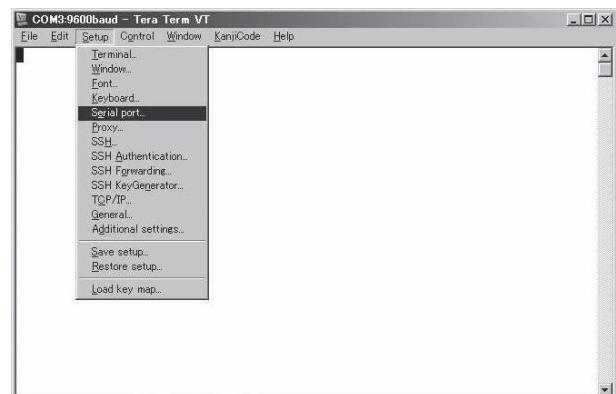
"Port"

Fig.18-3



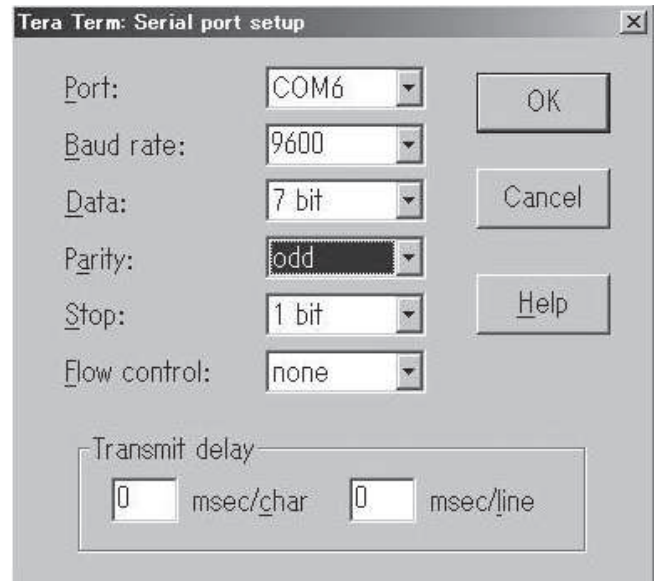
b) Click Setup, and then Serial port.

Fig.18-4



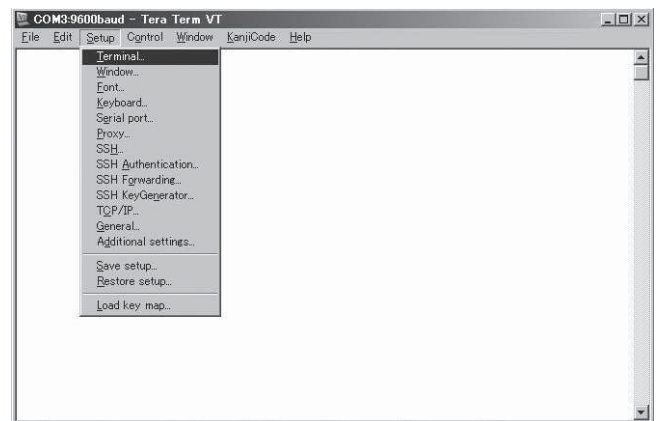
- c) The serial settings are conformed to the instrument settings.
Enter the port number selected in step 1.
Click OK.

Fig.18-5



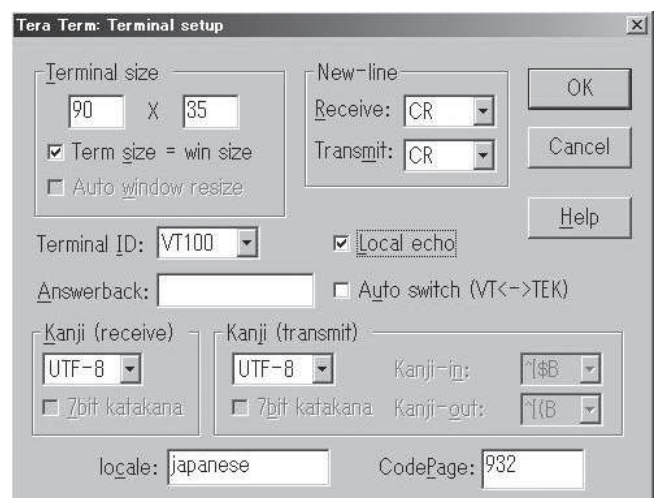
- d) Click Setup, and then Terminal port.

Fig.18-6



- e) Enter the settings as shown below and Click OK.
※ Make sure that the "Local echo" is checked.

Fig.18-7



18. RS-232C Communication

(4) Preparation of the AP-300

The condition of communication between the AP-300 and personal computer or laptop is set below.

This communication condition has been set for the personal computer or laptop in (3) above (See p.44). Apply the same condition to the AP-300.

The following 4 items need to be set.

- BAUDRATE
- DATA LENGTH
- PARITY
- STOP BIT

As an example, the condition shown in Fig.19-9 is set below.

<Concrete method of setting>

- a) Press the MENU key when a measurement value screen or the ZERO SET END screen is on the display panel. The screen shown in Fig.19-8 will be displayed on the display panel.
- b) The unit switches to a screen as shown in SET UP MENU screen. Use the ↓ or ↑ key to adjust the arrow(→) to "2 RS232C", then press the ← key.
- c) The unit switches to a screen as shown in Fig.19-9, which is the default setting. In this figure, the RS232C items are set as shown below.
 - BAUDRATE: 9600BPS
 - DATA LENGTH: 8BIT
 - PARITY: NONE
 - STOP BIT: 1BIT
- d) "9600" of the "BAUDRATE" at the top should be highlighted. If you do not need to change it, press the ← key. If you need to change it, use the ↓ or ↑ key to set a desired value in [], then press the ← key.
- e) "8" of the "DATA LENGTH" should be selected. Set it similarly.
- f) "NONE" of the "PARITY NONE" should be highlighted. Set it similarly. If you made a mistake in setting, press the QUIT key and repeat the setting operation from the first.

- g) "1" of the "STOP BIT" should be highlighted. If you do not need to change it, press the ← key. If you need to change it to "2", use the ↓ or ↑ key to display "2", then press the ← key. The unit makes a "beep" and switches back to a screen as shown in SET UP MENU screen.
- h) While you are in a screen as shown in SET UP MENU screen, press the QUIT key, and the unit switches back to a screen as shown in the measurement. The AP-300 is set by the above operation.

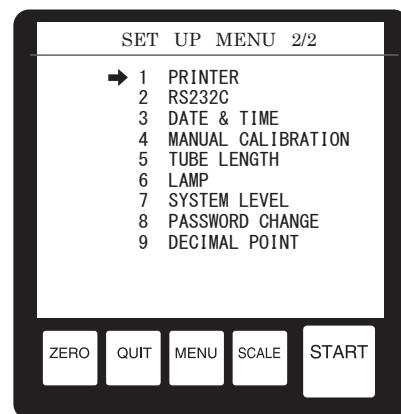


Fig.18-8

BAUDRATE	9600
DATA LENGTH	8
PARITY	NONE
STOP BIT	1

Fig.18-9

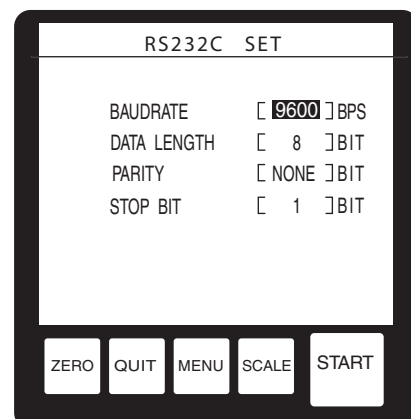


Fig.18-10

(5) Transmission from the AP-300 to the personal computer

(5)-1 Transmission method

- Prepare all the items and set the personal computer.
- Place a sample tube filled with a sample in the sampling chamber, then Press the START key.
- Immediately after the measurement is finished, the following is displayed on the screen of the computer.

〈Example〉

NO.0013, 080118, 1922, NOTHING-01, ROTATION=+34.11, ISS=+98.51, ISS(TC)=+98.88,
S.R.=+65.59, CONC=+25.63, PURITY=98.89, POL=+23.43, TEMP=27.9, L=200, WAVELENGTH=589,
ATAGO AP-300, S/N=AAKBA, USER ID=KOJPZ, USER NAME=MICHEL ,

- When zero setting is completed, the following is displayed on the screen of the computer.

〈Example (When zero setting is completed normally)〉

NO.0002, 080118, 1542, ZERO, -0.01° , -> 0.00° , TEMP=27.0°C, ATAGO AP-300, S/N=AAKBA,
USER ID=KOJPZ, USER NAME=MICHEL ,

(5)-2 Format of transmitted data

The format of the data transmitted from the AP-300 to the personal computer or laptop as follows.

〈When measurement is finished〉

NO.****, YYMMDD, HHMM, AAAAAAAAAA, ROTATION=+**.***, ISS=+**.***, ISS(TC)=+**.***,
S.R.=+**.***, CONC=+**.***, PURITY=**.***, POL=+**.***, TEMP=**.*, L=***, WAVELENGTH=***,
ATAGO AP-300, S/N=******, USER ID=******, USER NAME=******, C/RL/F

Output above data each time after end of measurement.

NO.**** : Sample No.
YYMMDD : Year / Month / Day
HHMM : Time / Minutes
AAAAAAAAAA : Sample Name

18. RS-232C Communication

(6) Transmission from the personal computer to the AP-300 (reception by the AP-300)

- a) Complete all preparations and set the personal computer.
- b) Then type *ZERO (Case Sensitive) from the personal computer under this condition and press enter key. The AP-300 starts to zero set. Make sure that the sampling chamber is completely empty in advance.
- c) Similarly, when you type * START from the personal computer and press enter key, the AP-300 starts to measure a sample. Place a observation tube filled with a sample in the sampling chamber in advance.

(7) How to end communication

Follow the instructions on saving files in Windows® to save data.
Close Tera Term to end the communication.

19. Setting the Manual Calibration

When calibrating by a quartz control plate, set the length and accurate of the selected observation tube to the same length (For instance, 200 [200.00] mm. Refer to P.29).

In addition to the zero setting function, the measurement value indications of the AP-300 can also be adjusted manually. Follow the steps below to adjust the AP-300 if it provides measurement value that differ from those acquired with other polarimeters or those of a quartz control plate or standard substance:

- Press the MENU key twice when a measurement value screen or the ZERO SET END screen is on the display panel. The screen shown in Fig.20-1 will be displayed on the display panel.
- Using ↓ or ↑, move the arrow (→) on the screen so that it points to "4 MANUAL CALIBRATION," and then press the ← key. The screen shown in Fig.20-2 will appear on the display panel.
- Place a quartz control plate in the sampling chamber, and then press the ← key. The AP-300 begins the process and the screen shown in Fig.20-3 will appear on the display panel.
- Adjust the numerical value in SETTING [] by pressing the ← or → key so that the displayed measured value of optical rotation matches the true value..
- Press the ← key again. The display panel returns to the SET UP MENU after a beep, indicating that the setting has been completed successfully.
- Press the QUIT key to return to the measurement value screen.

* When the manual calibration process has been completed, measure the angle of rotation once again using a quartz control plate or standard substance for confirmation.

* The measured value is adjusted with the coefficient entered and then displayed.

Example: Coefficient = 1.0006

Measured value	Displayed value
8.88	$8.88 \times 1.0006 = 8.89$
34.10	$34.10 \times 1.0006 = 34.12$

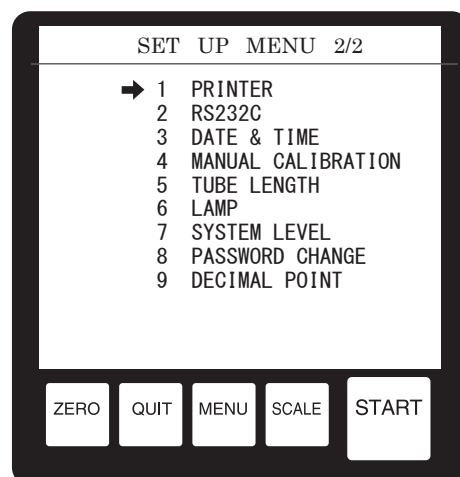


Fig.19-1

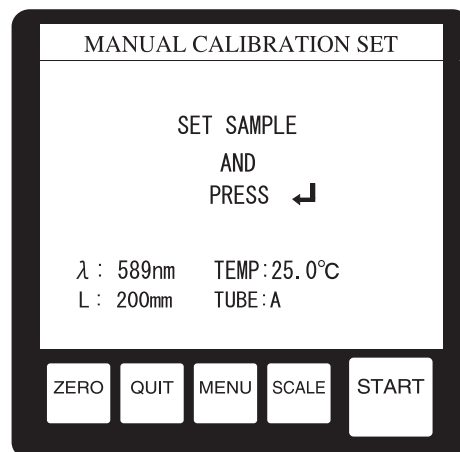


Fig.19-2

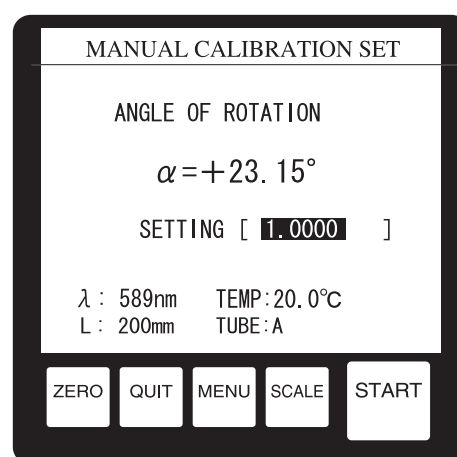


Fig.19-3

20. Adjusting the brightness of the screen

If the display panel of the AP-300 is not easy to read because of the ambient lighting, adjust its brightness according to the following procedure.

- a) Press the MENU key when a measurement value screen or the ZERO SET END screen is on the display panel. The screen shown in Fig.21-1 will be displayed on the display panel.
- b) Use the ↓ or ↑ key to adjust the arrow(→) to "6 CONTRAST", then press the ← key.
- c) The brightness becomes highest at the right end (HIGH) of the brightness scale and becomes lowest at the left end (LOW). Adjust it properly with the ↓ or ↑ key (Fig.21-2).
- d) Press the ← key. The unit makes a "beep" and switches back to the screen as shown in SET UP MENU screen. Here, press the QUIT key to return to the screen as shown in the measurement display panel.

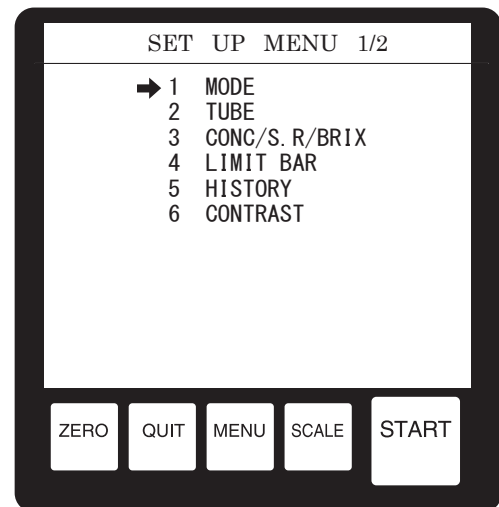


Fig.20-1

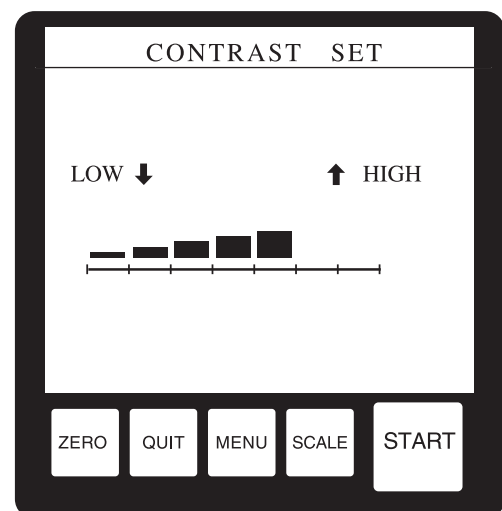


Fig.20-2

21. Calling the past measurements

- Press the MENU key when a measurement value screen or the ZERO SET END screen is on the display panel. The screen shown in Fig.22-1 will be displayed on the display panel.
 - Using the $\downarrow$ or $\uparrow$, move the arrow($\rightarrow$) on the screen so that it points to "5 HISTORY", and then press $\leftarrow$ key (The same can be done by pressing the "5 MNO" key, and then the " $\leftarrow$ " key on the numeric keypad ("5" + " $\leftarrow$ "), without using $\downarrow$ or $\uparrow$).
The screen shown in Fig. 22-2 will appear on the display panel.
 - Using $\downarrow$ or $\uparrow$, highlighted "1 READINGS" to display the history of stored measurement values, or select "2 CALIBRATIONS" to display the zero setting screen or the manual calibration screen and press the $\leftarrow$ key .
 - The screen shown in Fig.22-3 or 22-4 will appear on the display panel respectively.
 - Press the START(PRINT) key to print out data if the printer is connected.
 - Press the QUIT key to return to the measurement value screen.
- * Press the ZERO (CLEAR) key and hold for two seconds or longer to delete all the previously stored data.



Fig.21-1

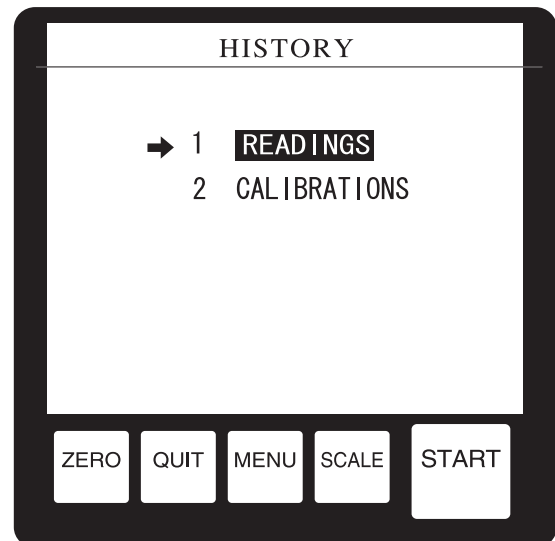


Fig.21-2

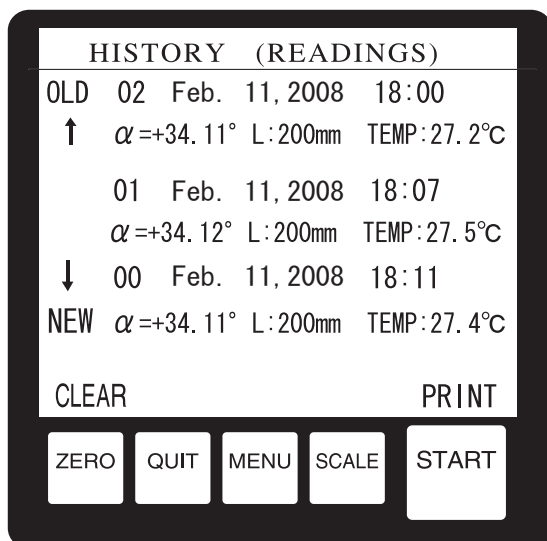


Fig.21-3

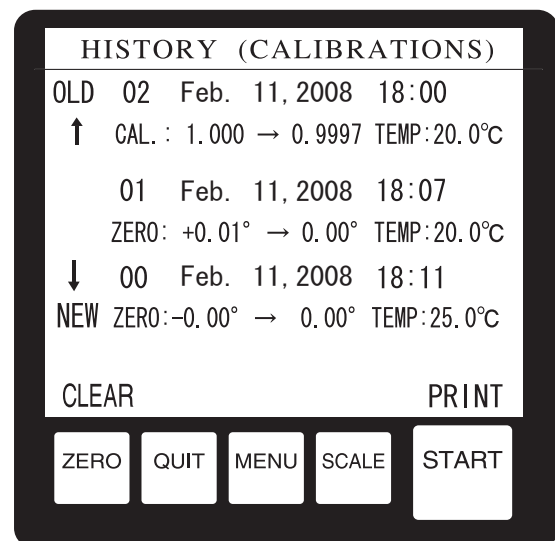


Fig.21-4

22. Error Messages

If the operator of AP-300 makes any mistake in operation or inputting work, AP-300 displays the corresponding error message. In this case, operate correctly according to the given remedy and action to take.

Error message	Cause
OUT OF RANGE	When sample whose measurement value is out of range is measured with International Sugar Scale (without TC) or
	The sample being measured is either insufficient or exceeds the assigned limits.
	When the amount of light going through the observation tube is not enough because of measuring colored / turbid sample.
	When the light going through the observation tube is scattered because of the sample containing bubbles.
	When the lamp is dying because of its life span.
ZERO SET ERROR	Zero set was performed with a sample out of the range from -5 to +5° .
TEMP.ERROR	The measurement is being performed out of the temperature compensation range (between 18 and 30 °C or 66.4 and 86° F) on the INTERNATIONAL SUGAR SCALE screen (with the automatic temperature compensation function).
LAMP BURNED OUT	The light source has been burned out. Please contact ATAGO.

23. Running a Diagnostic Check on the AP-300

Check on the AP-300 to confirm that the unit functions properly and that measurement value are displayed correctly. Regular checkup - monthly, for instance - is recommended. Be sure to carry out a checkup when the AP-300 is subjected to an excessive mechanical shock or vibration, or when the display panel indicates irregular measurement values.

Be sure to use a quartz plate or standard substance, of which the angle of rotation has been predefined, for a checkup.

(1) Diagnostic Check, Using the Standard Quartz Plate

a) Following the instructions specified in this manual, follow all necessary measures to prepare the AP-300 for a diagnostic check.

* Do not change the environmental temperature of the instrument.

b) Empty the sampling chamber and conduct zero setting properly.

c) Measure the angle of rotation of the standard quartz plate. (Take the measurement repeatedly, for about 5 times.)

d) If the difference between the measurement value acquired and that of the standard quartz plate is within $\pm 0.01^\circ$, the AP-300 is functioning properly. If the difference is over $\pm 0.02^\circ$, check all the procedures to make sure the checkup measurement has been carried out properly.

e) If the difference between the measurement values exceeds $\pm 0.02^\circ$ on the second attempt, consult the representative at the place of purchase, our distributors, or ATAGO directly.

* If the difference between the measurement values exceeds $\pm 0.04^\circ$ or differences reoccur immediately after the manual calibration process has been taken, consult the representative at the place of purchase, our dealers, or ATAGO directly.

* In the case of measuring while syringing solution into the observation tube, be careful of unstable measurement values by air bubble, etc.

(2) Confirmation of LAMP TIME

You can confirm LAMP consumption.

a) Press MENU key twice on the Measurement display screen, The screen shown Fig. 24-1 will be displayed.

b) Select 「6 LAMP」, and press $\leftarrow$ key.

c) The Screen shown Fig. 24-2 will be displayed, check 「LAMP ON TIME」.

d) Press QUIT key twice to return to Measurement display screen.

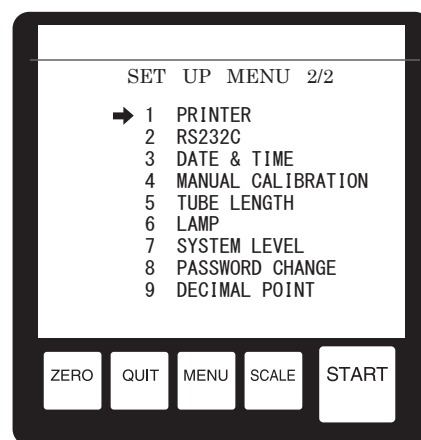


Fig.23-1

(3) How to reset LAMP TIME

a) On the screen shown Fig. 24-2, Press $\leftarrow$ key twice to select RESET LAMP TIME [NO].

b) Press $\leftarrow$ key to select [YES] and press $\leftarrow$ key again to return to SET UP MENU.

c) Press QUIT key to return to Measurement Display screen.

d) To reconfirm the LAMP TIME, please follow the instruction above under (2) Confirmation of LAMP TIME.

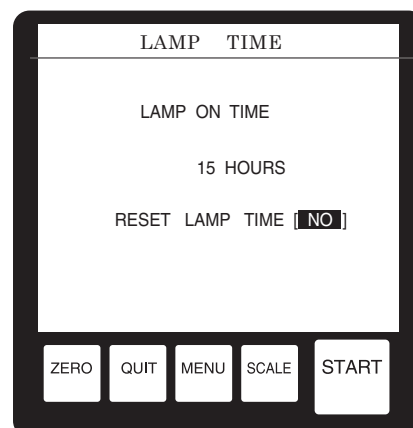


Fig.23-2

24. Cleaning Fan and Replacing Dust Filter

Dusty cooling fans, the intake fan on the side, may cause malfunction of the instrument. Clean the fans regularly and replace the filter as necessary.

Intake cooling fan is located on the side of the instrument.
Remove the cover with a [type of driver need to be identified] screw driver.
Clean the filter under warm soapy water or replace with a new filter.
Place the cover back on and secure.

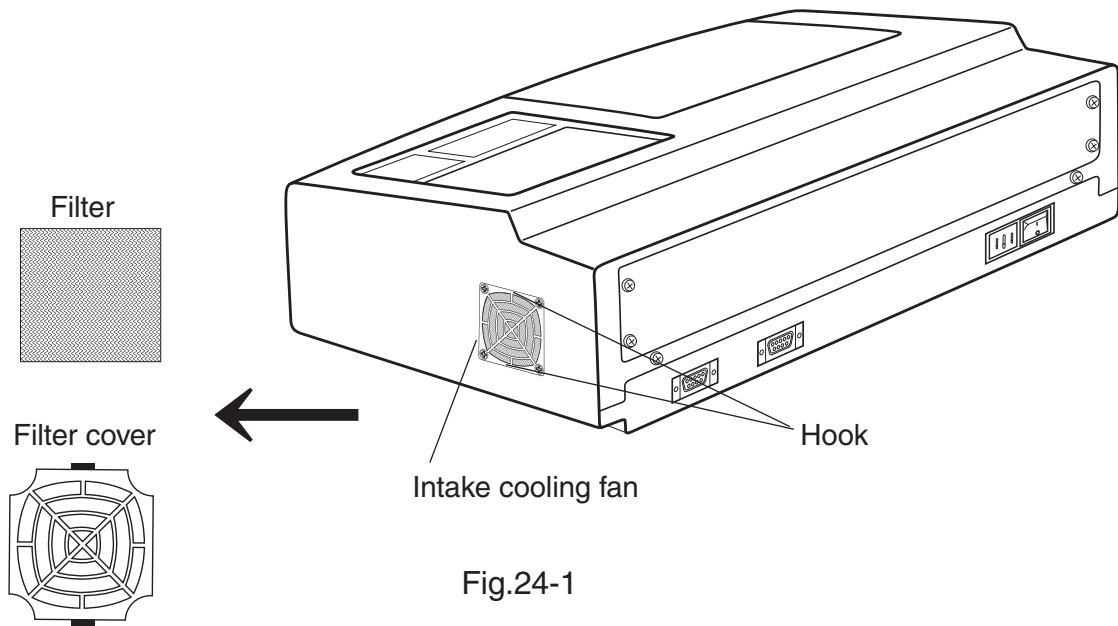


Fig.24-1

25. Replacing Component Parts and Other Items

Ordering Replacement Items

Product codes and other information on the user-friendly replacement items for the AP-300 are as shown in the list below. Consult the representative at the place of purchase, our dealers, or ATAGO directly.

Parts name	Parts No.	Remarks
Observation tube 100mm long (OT-100(A)(SUS))	RE-72054	Capacity: 5ml
Observation tube 200mm long (OT-200(A)(SUS))	RE-72055	Capacity: 10ml
Observation tube 50mm long (OT-50(A)(SUS))	RE-72056	Capacity: 2.5ml
Unjacketed small volume observation tube 10mm long	RE-72081	Capacity: 1ml
Deck glass for observation tube	RE-6712	For OT-50(A) (SUS), OT-100(A) (SUS), OT-200(A) (SUS)
Rubber packing for observation tube (PTFE)	RE-78020	For OT-50(A) (SUS), OT-100(A) (SUS), OT-200(A) (SUS)
Ring nut for observation tube (SUS)	RE-72057	For OT-50(A) (SUS), OT-100(A) (SUS), OT-200(A) (SUS)
Jacketed flow tube 50mm	RE-72115	
Jacketed flow tube 100mm	RE-72116	
Jacketed flow tube 200mm	RE-72117	
Jacketed flow tube with funnel 100mm	RE-72118	
Jacketed flow tube with funnel 200mm	RE-72119	
Unjacketed flow tube with funnel 100mm	RE-72120	
Unjacketed flow tube with funnel 200mm	RE-72121	
Sample chamber cover for flow tube	RE-76015	
Inner lid for 50mm tube	RE-76026	
Inner lid for 100mm tube	RE-76027	
Inner lid for 200mm tube	RE-76028	
Quartz control plate 34 °	RE-72045	Angle of Rotation : 34° International Sugar Scale : 100° Z
Quartz control plate 17°	RE-72044	Angle of Rotation : 17° International Sugar Scale : 50° Z
Quartz control plate 8 °	RE-72043	Angle of Rotation : 8° International Sugar Scale : 25° Z
Quartz control plate -34 °	RE-72050	Angle of Rotation : -34° International Sugar Scale : -100° Z
Quartz control plate -17 °	RE-72049	Angle of Rotation : -17° International Sugar Scale : -50° Z
Quartz control plate -8 °	RE-72048	Angle of Rotation : -8° International Sugar Scale : -25° Z
Replacement fan filter	RE-58001	A set of 12 pcs
Printer paper for DP-AD	RE-89403	A set of 4 rolls (Plain paper)
Ribbon cassette for DP-AD	RE-89402	

26. Angle of Rotation, International Sugar Scale, Specific Rotation, Concentration, and Purity

● Angle of Rotation

The rotation of polarized light is a phenomenon, which occurs when the direction of polarized light, that is oscillating unidirectionally, rotates when passing through a sample solution. The measurement of this angle of this rotation is called the "Angle of Rotation."

The angle of rotation is the basic numeric value measured by polarimeters, and changes depending on the concentration of the solution, the length of the observation tube, temperature, and/or the measurement wavelength. It is symbolized by " α " and indicated in "°".

● International Sugar Scale

The International Sugar Scale is a scale converted using the angle of rotation, and is determined by the following formula:

$$\text{International Sugar Scale} = \text{Angle of Rotation} \times 2.888$$

The International Sugar Scale is indicated in "°Z."

The measurement value of 26.000g/100ml of sucrose solution in a 200mm observation tube is 100 °Z. This measurement value is commonly used in the sugar manufacturing industry, and is usually temperature-compensated to the reference temperature of 20 °C or 68 °F.

The AP-300 can display the measurement value with or without temperature compensation (Automatic temperature compensation, "TC").

● Specific Rotation

The Specific Rotation is a numeric value unique to each substance. By definition, the specific rotation value is equivalent to the angle of rotation obtained by a measurement using a solution of 100% concentration in a 100mm observation tube (although such a measurement is actually not practicable).

The specific rotation is determined by the following formula:

$$\text{Specific Rotation} = (10,000 \times \text{Angle of Rotation}) / (\text{length of observation tube [mm]} \times \text{Concentration [g/100ml]})$$

Specific rotation is symbolized by " $[\alpha]$ " and indicated in "°".

To display the specific rotation measurement value, input the concentration value of the sample to be measured into the AP-300 before taking a measurement.

● Concentration

The Concentration is the density of a liquid solution made by dissolving an optically active substance in water or alcohol.

The concentration is determined by the following formula:

$$\text{Concentration} = (10,000 \times \text{Angle of Rotation}) / (\text{length of observation tube [mm]} \times \text{Specific Rotation})$$

It is indicated in "g/100ml."

To display the concentration measurement value, input the specific rotation value of the sample to be measured into the AP-300 before taking a measurement.

● Purity

The Purity is the proportion of sucrose comprised in a soluble solid content (a sample). It is indicated in "%." To measure the purity, input the Brix value of the sample to be measured, which can be evaluated by using a refractometer, into the AP-300 before taking a measurement. Sucrose content is symbolized by "POL," and is determined by the following formula:

$$\text{POL} = (26.016 / \text{Mass (density) of 100ml}) \times \text{International Sugar Scale}$$

The mass (density) of 100ml is determined by the Brix value that has been input into the AP-300 beforehand.

The purity is determined by the sucrose content and the Brix value, using the following formula:

$$\text{Purity} = (\text{POL} / \text{Brix}) \times 100$$

The AP-300 displays the sucrose content (POL), along with the purity.

27. Specifications of AP-300

Product name	Automatic Polarimeter AP-300 (Cat.No. 5291)
Measurement scales	Angle of Rotation, International Sugar Scale (without TC), International Sugar Scale (with automatic TC)
Measurement readings	Angle of Rotation, International Sugar Scale (without TC), International Sugar Scale (with automatic TC), Specific Rotation, Concentration, and Purity
Measurement range	Angle of Rotation: -89.999 to +89.999 ° International Sugar Scale: -130.000 to +130.000 °Z
Resolution	Angle of Rotation: 0.001 ° / 0.01 ° / 0.1 ° by selection International Sugar Scale: 0.001 °Z / 0.01 °Z / 0.1 °Z by selection
Measurement accuracy	Angle of Rotation: Displayed value $\pm 0.01^\circ$ (-35.00° to +35.00°) Relative precision $\pm 0.2\%$ (-35.01° to -89.99° and +35.01° to +89.99°) International Sugar Scale: Displayed value $\pm 0.03^\circ\text{Z}$ (-101.00°Z to +101.00°Z) Relative precision $\pm 0.2\%$ (-130.00°Z to -101.01°Z and +101.01°Z to +130.00°Z) (Checked by reading a standard Quartz Plate at 10.0 to 30.0°C)
Temperature correction range for International Sugar Scale	18.0 to 30.0°C
Temperature indication	Resolution : 0.1°C, Accuracy : $\pm 0.5^\circ\text{C}$
Display panel	LCD (320 × 240 dpi) with illuminating back light
Graphic display	Graphic display indicating the conformity of measurement values for measurements with limit settings.
History Function	Flash memory stores the 30 most recent measurement readings for printing and reference.
Manual calibration	Enables manual calibration by measuring a standard quartz plate or standard substance.
Measurement wavelength	589nm (equivalent to the sodium-D line spectrum)
Outputs	1) Digital printer DP-AD (optional) 2) RS-232C input/output ports for connecting to a computer system BAUDRATE : 9600bps DATA LENGTH : 8bit PARITY : None STOP BIT : 1bit Character Code : ASCII Code
Power supply	AC100V to 240V 50/60Hz
Power consumption	65VA
Light source	LED : 589nm interference filter
Attachments	100mm observation tube × 1, 200mm observation tube × 1
Dimensions and weight	48.5 × 28.5 × 17.5cm , 14.5kg (Main Unit only)

28. Repair and warranty

The Automatic Polarimeter AP-300 is a complicated precision electronic unit consisting of optical parts and electronic parts. Since light and electricity are combined in the operation of this instrument, their mutual actions may make it difficult to isolate operational problems. For this reason, repair and adjustment can be complicated and each serviceman is required to have special knowledge of optics and electrical engineering.

Do not disassemble or perform any repair on the unit other than the basic inspection and replacement of parts described in this operation manual (unless you have taken the maintenance technology course in our company and has been certified).

The warranty of this unit is one year after the date of purchase. Any trouble detected during the warranty period will be performed without charge. After the warranty has expired, the cost of repairs will be subject to evaluation. Ask your ATAGO distributor concerning this matter.

During the warranty period, if a person who has not taken the maintenance technology course at our company and has opened and tampered with the components within the casing, the warranty will be invalidated and a charge for repair will be assessed.

All instruments received for repair are subject to a possible inspection fee. ATAGO does not warrant the problems which are caused by user's fault even though the unit is under warranty.

● Performance parts for repair

ATAGO will endeavor to secure the performance parts for repair up to seven years after manufacturing of this instrument is discontinued. Performance parts are those which are necessary to maintain the operation of this instrument. However, ATAGO may not be able to supply all parts due to discontinuation or modifications by our parts manufacturers. Please understand this matter. Performance parts are available through your ATAGO distributor.

● Recommendation of periodic inspection and maintenance(Charged)

We recommend to have your AP-300 inspected periodically (once in two years, or so) to ensure years of dependable and accurate use.

Ask your ATAGO distributor for the periodic inspection (charged).

Periodic inspection includes:

- Inspection, confirmation, and replacement of performance parts
- Inspection and adjustment of span

ATAGO CO., LTD.

When asking about repair or other matters, be sure to notify us of the serial No. of your AP-300.

29. ATAGO CO.,LTD. Service Center

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

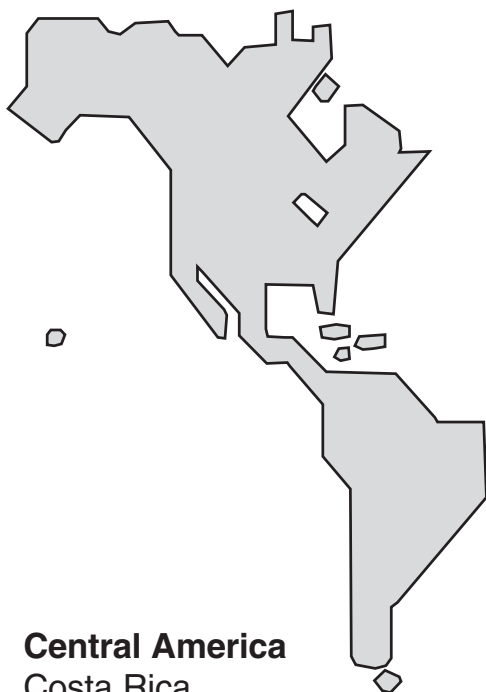
Please provide your company name, address and telephone number so that we can direct your inquiry to the Authorized Service Center nearest you. The Authorized Service Center in your area will contact you within 1 to 2 business days.

North America

Canada
U.S.A.
Mexico

Europe

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

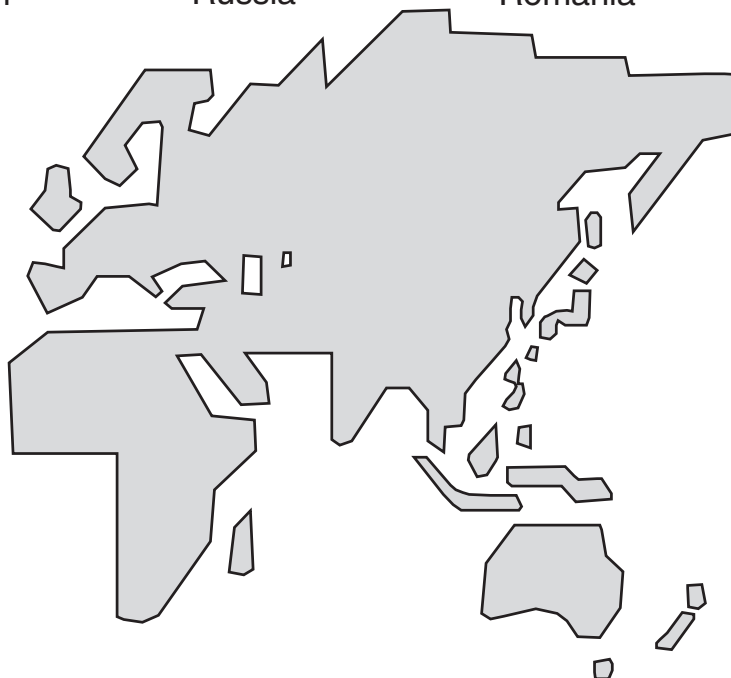


Central America

Costa Rica
El Salvador
Guatemala

South America

Argentina
Bolivia
Brazil
Colombia
Chile
Ecuador
Paraguay
Peru



Middle East / Africa

Iran
Turkey
U.A.E.
Saudi Arabia
Israel
Lebanon
South Africa

Asia / Oceania

Australia
China
India
Thailand
Korea
Taiwan
Hong Kong
Indonesia
Malaysia
Singapore
Philippines
Bangladesh
Pakistan

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 ATAGO CHINA Guangzhou Co., Ltd.

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 ATAGO RUSSIA Ltd.

TEL: 7-812-777-96-96 info@atago-russia.com

 ATAGO KAZAKHSTAN Ltd

TEL: 7-727-257-08-95 info@atago-kazakhstan.com